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LES CAUSES STRUCTURELLES DES CONFLITS INTERNES DANS LES PAYS À REVENUS FAIBLES À INTERMÉDIAIRES

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RÉSUMÉ

Les causes structurelles des conflits internes correspondent à leurs facteurs profonds car intégrés au système économique, politique et social d'une région, d'un pays ou d'une société. Ce travail de thèse est constitué des trois études portant sur l'identification de ces mécanismes et de leurs effets (souvent hétérogènes) sur des formes spécifiques de conflits touchant de manière récurrente les pays à faibles revenus et à revenus intermédiaires.

Le chapitre 2 est une revue de la littérature empirique sur les causes profondes des conflits civils. L'apport principal de ce travail est de fournir une analyse détaillée des avancées théoriques et méthodologiques permises par l'usage de données désagrégées pour la compréhension des causes des conflits civils. Ce chapitre montre que l'évolution des outils statistiques a permis de mieux comprendre le rôle local de facteurs tels que la pauvreté et les ressources naturelles, tout en dessinant des perspectives de recherche prometteuses pour des enjeux contemporains et controversés tels que le changement climatique. Néanmoins, le gain en précision qu'offre l'usage de données désagrégées ne doit pas se faire au détriment d'une meilleure compréhension des facteurs régionaux et mondiaux de conflits civils. Ainsi, les questions de commerce et de cohésion sociale nécessitent encore d'être approfondies car elles s'expliquent à l'échelle de groupes dont la dimension est mal connue.

Le chapitre 3 analyse comment les chocs de politisation des identités religieuses influencent le risque de conflit politique dans le temps. Les chocs politico-religieux étudiés dans ce chapitre sont les emblématiques voyages internationaux du Pape Jean Paul II (entre 1979 et 2003). Comment les voyages du Pape agissent sur le risque de conflit politique en fonction de la diversité religieuse des pays visités ? Les résultats obtenus suggèrent que les voyages du Pape Jean Paul II réduisent le risque de conflit politique d'environ 9 à 20% dans les pays d'accueil sur un horizon de 4 ans. Néanmoins, cet effet est hétérogène en fonction de la structure religieuse des pays visités. La baisse du risque concerne principalement les

pays où les Catholiques représentent une part infime de la population. Lorsque le niveau de polarisation religieuse et la proportion de catholiques sont élevés, les visites papales augmentent le risque de conflit politique jusqu'à 19,5% après deux ans. Ces résultats montrent que la polarisation religieuse rend les pays structurellement plus fragiles à des épisodes brefs de tension politique suite à des évènements politico-religieux.

Le chapitre 4 porte sur les causes économiques et géographiques contemporaines des conflits entre éleveurs transhumants et les agriculteurs sédentaires au Nigéria. La concurrence pour les derniers pâturages nigérians est-elle un facteur de violence entre les éleveurs nomades venus du Niger et les agriculteurs nigérians ? Cet article analyse les implications sécuritaires de la transhumance transfrontalière entre le Niger et le Nigéria à l'échelle de cellules de 0,5x0,5 degrés entre 2006 et 2016. En utilisant des techniques de panel spatial et des données satellitaires sur la couverture terrestre, il questionne l'importance des stratégies d'accaparement des prairies comme une cause des récents conflits éleveurs-agriculteurs au Nigéria. Les résultats obtenus coïncident peu avec l'idée que l'accaparement des dernières ressources en pâturage est le principal motif de ces conflits. De plus, nous trouvons un effet de débordement géographique négatif et significatif des pâturages sur le risque de conflit éleveurs-agriculteurs dans les cellules voisines. Ainsi, il apparaît que c'est davantage l'absence de pâturages aux alentours que leur présence sur place qui affecte le coût d'opportunité des éleveurs à entrer en conflit.

ABSTRACT

The structural causes of conflict are their root causes embedded in the economic, political and social system of a region, country or society. This PhD work consists of three studies on the identification of these mechanisms and their (often heterogeneous) effects on specific forms of recurrent conflict affecting low- and middle-income countries.

Chapter 2 is a review of the empirical literature on the root causes of civil conflict. The main contribution of this work is to provide a detailed analysis of the theoretical and methodological advances made possible by the use of disaggregated data for understanding the causes of civil conflicts. This chapter shows that evolution of statistical tools has led to a better understanding of the local role of factors such as poverty and natural resources, while at the same time providing promising research perspectives on contemporary and controversial issues such as climate change. However, accuracy gains from disaggregated data should not blind us to regional and global drivers of civil conflict. For example, issues of trade and social cohesion still need to be explored in greater depth because they are explained at the level of groups whose size is poorly understood.

Chapter 3 examines how shocks to the politicization of religious identities influence the risk of political conflict over time. The politico-religious shocks studied in this chapter are the emblematic international trips of Pope John Paul II (between 1979 and 2003). How do the Pope's travels affect the risk of political conflict according to the religious diversity of the countries visited? The results suggest that Pope John Paul II's travels reduce the risk of political conflict by about 9-20% in the host countries over a 4-year horizon. Nevertheless, this effect is heterogeneous depending on the religious structure of the countries visited. The decrease in risk occurs mainly in countries where Catholics represent a very small share of the population. When the level of religious polarization and the proportion of Catholics are high, papal visits increase the risk of political conflict by up to 19.5% after two years. These results show that religious

polarization structurally exposes countries to brief episodes of political tension following political and religious events.

Chapter 4 focuses on the contemporary economic and geographic causes of conflicts between transhumant herders and sedentary farmers in Nigeria. Is competition for the scarce Nigerian grassland a factor of violence between nomadic herders from Niger and Nigerian farmers? This article analyses the security implications of cross-border transhumance between Niger and Nigeria at the scale of 0.5x0.5 degree cells between 2006 and 2016. Using spatial panel techniques and satellite data on land cover, it questions the importance of grassland grabbing strategies as a cause of the recent herder-farmer conflicts in Nigeria. The obtained results are not very consistent with the idea that the monopolization of the last grazing resources is the main reason for these conflicts. We also find a significant negative geographical spillover effect of pasture on the risk of herder-farmer conflict in neighboring cells. Thus, it appears that it is more the absence of pasture in the surrounding area than its presence where the herder is that affects the opportunity cost of herders to enter into conflict.

Table des Matières

[2]Ce chapitre à donné lieu à deux publications. La première, correspondant à la version complète de ce chapitre, a été publiée dans la *Revue française d'économie*: Laville, Camille. "Les causes des conflits civils : avancées récentes à l'aide de données désagrégées", *Revue française d'économie*, vol. xxxiv, no. 3, 2019, pp. 123-165. La deuxième est une version courte et simplifiée focalisée sur les enjeux de pauvreté dans les pays d'Afrique de l'Ouest. Elle a été publiée dans la *Revue Défense Nationale*: Laville, Camille. "Vulnérabilité des ménages ruraux et insécurité en Afrique de l'Ouest." *Revue Défense Nationale* 7 (2020): 136-140.

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Chapitre 1

INTRODUCTION GÉNÉRALE

1.1 De l'intérêt d'étudier les conflits

Le conflit est le résultat d'un désaccord entre acteurs sur la base d'objectifs perçus comme incompatibles (Consortium, 2012). Initier une étude de sciences humaines et sociales sur les conflits amène rapidement à constater que ces évènements sont le sujet d'une immense littérature. Les conflits prennent des formes variées suivant la nature de l'espace dans lequel ils apparaissent (conflit en entreprise, conflit international, conflit interne, etc.), la nature des acteurs impliqués (conflit civil, conflit au sein du ménage, conflit inter-communautaires, etc.), la nature de leurs apparentes motivations (conflit politique, conflit d'intérêts, conflit irrégulier, etc.), ou encore la nature des moyens et stratégies mises en œuvre (conflit armé, conflit nucléaire, guerre d'usure, etc.).

L'une des raisons expliquant l'intérêt suscité par l'étude des conflits est qu'ils sont coûteux ne serait-ce qu'en temps et, dans leur forme la plus grave, en vies humaines. Lorsque ces antagonismes apparaissent à l'échelle de pays (i.e., conflits inter ou intra-étatiques), ils ont des coûts économiques graves à long terme. Ainsi, Paul Collier et al. (2003) parle "d'années de développement à l'envers" lorsqu'il présente le potentiel destructeur des conflits non seulement par l'anéantissement de vies humaines et de capitaux, mais également par la capacité qu'ont ces évènements à déconstruire les institutions. Les conflits internes (i.e., l'ensemble des conflits apparaissant à l'intérieur des frontières nationales) sont donc une menace particulièrement importante pour les pays en développement, comme l'indique l'ajout des enjeux de paix, justice et institutions efficaces dans les 17 objectifs de développement durable de l'agenda

2030[1]. Mais malgré l'évidente nécessité de mettre un terme aux désastres causés par les conflits, est-il possible de les éviter ? Cette question a été traitée par des philosophes tels que Rousseau et Kant au XVI-IIeme siècle. Pour ces derniers, le conflit est indissociable de la vie en société. Dans la deuxième partie du *Discours sur l'origine et les fondements de l'inégalité parmi les hommes*, Rousseau présente le conflit comme la manifestation supérieure de l'égoïsme des Hommes vivant en société. A l'état de nature, les conflits n'existent pratiquement pas; ils sont vraiment apparus au moment où l'Homme a commencé à cultiver la terre et à partager cette dernière. Dans *Idée d'une histoire universelle d'un point de vue cosmopolitique*, Kant estime que la nature humaine recèle des conflits. Les Hommes recherchent la vie en société mais veulent tout régler selon leur volonté individualiste et égoïste, ce qui menace en permanence l'ordre social établi[2]. Parce que l'Homme rationnel réalise qu'il ne peut se soustraire à la vie en société, cette "insociable sociabilité" l'amène à se surpasser (i.e., sortir de l'inactivité et de la paresse) dans l'ambition de posséder et dominer pour se tailler sa place parmi les autres[3]. C'est ainsi que va le progrès.

Le Contrat social (i.e., la conception contractuelle de l'Etat) est la principale solution proposée aux conflits entre les Hommes. Si Rousseau et Kant ne s'accordent ni sur la nature profondément conflictuelle des Hommes, ni sur les bienfaits du conflit comme moteur de la réalisation de l'Homme, ils partagent l'idée que la violence est le fruit de la vie en société. Ils insistent tous les deux sur la nécessité d'une constitution civile (i.e. d'un Etat) pour garantir la liberté de chacun afin que la force de la justice l'emporte sur les forces particulières. La volonté d'échapper à la souffrance que les Hommes s'infligent les uns aux autres en liberté sauvage pousserait les Hommes vers la création d'un Etat coercitif.[4] C'est seulement au sein d'un ordre social établi que les penchants de l'Homme pour la domination et la possession leur permettraient de se réaliser sans se détruire[5]. Néanmoins, parce que ce Contrat social est géré par des Hommes, il reste imparfait. Le conflit interne à l'Etat est un outil puissant car il est capable de contribuer à la régulation sociale; en manifestant une recherche d'équilibre et de justice, il réinvente les normes et règles communes aux acteurs qu'il oppose (Simmel, 1995). Le conflit interne ne peut donc être considéré

[1] Objectif 16: "Promouvoir l'avènement de sociétés pacifiques et inclusives aux fins du développement durable, assurer l'accès de tous à la justice et mettre en place, à tous les niveaux, des institutions efficaces, responsables et ouvertes à tous"

[2] Dans *Idée d'une histoire universelle d'un point de vue cosmopolitique*, Kant développe l'hypothèse que l'Homme ne dispose pas de véritable libre arbitre mais suit un projet établit par la Nature (qui lui est supérieur).

[3] "L'homme veut la concorde, mais la nature sait mieux ce qui est bon pour son espèce : elle veut la discorde", Kant (2011, quatrième proposition).

[4] Idée déjà présente chez Hobbes.

[5] "*C'est seulement dans un enclos tel que celui de la société civile que les mêmes penchants produisent par la suite le meilleur effet*" Kant (2011, cinquième proposition)

comme le seul fait d'Hommes transgressant la force légitime de l'Etat, il est aussi un moteur de progrès d'autant que les institutions peuvent elles-mêmes abuser de la violence.

Le présent travail de thèse porte sur divers aspects que peuvent prendre les conflits internes aux Etats. Le chapitre 2 examine le cas des conflits civils, c'est à dire tout conflit interne impliquant la participation active du gouvernement national et la résistance efficace des deux parties (Small and Singer, 1982). Il s'agit, en d'autres termes, de conflits pour le monopole de la violence physique. Le chapitre 3 examine le cas des conflits politiques, c'est à dire des conflits internes concernant spécifiquement une incompatibilité avec le gouvernement. Le chapitre 4 analyse un cas de conflits inter-communautaires, c'est à dire de conflits internes concernant les relations entre plusieurs communautés.

1.2 Les causes structurelles des conflits internes

Sous toutes ses formes, le conflit interne peut être à la fois la conséquence et la cause de déséquilibres économiques, politiques et sociétaux. Les pays ayant connu des épisodes de conflits civils ont ainsi plus de chance de connaitre des conflits civils dans le futur (Collier et al., 2003). Cette situation qualifiée de "piège à conflictualité" apparait encore plus rapidement dans les zones déjà fragilisées par le phénomène de « piège de pauvreté » combinant faiblesse du capital humain (indicateurs d'éducation et de santé alarmants), pressions démographiques et écologiques et extrême faiblesse des institutions publiques (Guillaumont et al., 2016). Dans ces zones où l'État peine à exercer son autorité, la pauvreté et l'insécurité s'entretiennent. Cette situation favorise l'apparition de nouveaux acteurs de la violence sous la forme de leaders et d'organisations ayant investi dans des compétences et équipements qui ne sont utiles que pour la violence (Collier et al., 2003).

Les causes profondes menant à l'apparition récurrente (voir cyclique) de conflits internes sont qualifiées de causes structurelles. Leur dangereuse particularité est qu'elles sont intégrées aux normes, structures et politiques des sociétés, contrairement aux causes immédiates des conflits (ou évènements déclencheurs) qui sont plus récentes et ne s'inscrivent pas dans la durée (Herbert, 2017). Cette intégration se fait souvent de manière progressive et leur capacité conflictuelle peut rester latente, étant parfois alimentée par des chocs externes (causes immédiates). En d'autres termes, un facteur ne sera pas considéré comme une cause structurelle du conflit parce qu'il est ancien mais parce qu'il est ancré dans un système économique, politique ou social établi.

Ce travail de thèse puise ses sources dans divers travaux de sciences sociales pour approcher les causes structurelles de différentes formes de conflits internes. Ces formes de conflits déstabilisent de manière récurrente les pays à faibles revenus et à revenus intermédiaires dans lesquels ils apparaissent. Le chapitre 2 examine le rôle de la pauvreté, des ressources naturelles et de la cohésion sociale en tant que causes structurelles des conflits civils à l'échelle des individus, des régions et des Etats. Le chapitre 3 porte sur le lien entre le risque de conflit politique et le supposé transfert systématique des divisions sociales à la sphère politique (Schmidt, 2000). Il interroge en particulier l'effet ambivalent de la diversité religieuse sur le risque de conflit politique lorsque cette diversité est politisée. Pour cela, les visites internationales du Pape Jean Paul II (118 voyages dans 102 pays en développement et en transition) sont envisagées comme des chocs politico-religieux sur la saillance de l'identité catholique dans le contexte politique des pays visités. Ainsi, la visite du Pape n'est pas analysée en tant que cause structurelle du conflit politique, mais en tant que cause immédiate ou élément catalyseur agissant sur des tensions préexistantes. Dans le chapitre 4, l'attention est portée sur le cas des conflits entre éleveurs nomades et agriculteurs, soit l'un des conflits inter-communautaires parmi les plus anciens d'Afrique de l'Ouest. Dans ce chapitre, nous analysons comment la raréfaction des ressources en pâturages agit comme une cause structurelle du conflit et se trouve affectée par les chocs climatiques (causes immédiates).

1.3 Le rôle particulier de l'économiste des conflits

Puisque les conflits ont de multiples origines, l'apport de l'économie dans leur analyse doit être conçu comme une contribution à un corpus pluridisciplinaire, sans supposer une quelconque hiérarchie dans la nature des mécanismes en jeu. L'économie des conflits est un champ d'étude défini par deux caractéristiques (Anderton and Carter, 2009). D'une part, elle soutient que les méthodes, principes et concepts économiques peuvent s'appliquer dans l'étude des comportements conflictuels. Le conflit est alors envisagé comme la conséquence de choix délibérés répondant à une modification des incitations. D'autre part, au delà de la seule application de l'économie dans l'étude des conflits, ce champ s'attèle à reconstruire le noyau de la théorie économique en ajoutant les comportements d'appropriation aux moyens économiques conventionnels d'acquisition de la richesse (i.e., la production et les échanges).

Les premières avancées dans la compréhension économique des conflits ont été faites sur la base de modèles théoriques établissant le cadre général du choix rationnel de l'appropriation. L'individu a le

choix entre rester un producteur ou devenir un prédateur. Les trois principaux facteurs influençant cette décision sont assez simples à comprendre et s'adaptent à la plupart des formes de conflits. Quelle est la force (relative) de mon opposant ? Quelle est la valeur du gain espéré ? Qu'est ce que je perds (par rapport au gain) à consacrer mon temps au combat[6] ? Parce que l'effort conflictuel d'un groupe armé organisé est coûteux (temps, munitions, mobilisation de combattants, etc.), la prise de décision de leurs leaders est influencée par ces enjeux. Il est important de noter que le gain du conflit n'a pas obligatoirement une définition pécuniaire, il peut être politique (e.g., luttes révolutionnaires) ou social (e.g., manifestations ou grèves pour l'équilibre et la justice). Au sein de la littérature économique sur les causes des conflits, les analyses empiriques sont relativement récentes. Les premiers travaux ont été réalisés dans les années 60, mais ce domaine d'étude se développe principalement à partir des années 90, au moment où de nombreux conflits armés apparaissent en Afrique et que des bases de données répertoriant ces évènements se développent. La littérature s'est réellement structurée à partir de cette période puisque la création de bases de données sur les conflits a soulevé un nombre important de questions méthodologiques liées à la définition empirique (i.e., codage) et à l'utilisation de ces mesures.

Depuis le début des années 2000, cette littérature est à nouveau transformée dans ses méthodes. Les études empiriques peuvent dorénavant se faire à une échelle désagrégée puisque, d'une part, de plus en plus de bases de données permettent de géolocaliser les conflits et que, d'autre part, l'accès et l'usage de données satellites se simplifie. L'une des difficultés à laquelle l'économiste des conflits est confronté est l'accès à des données sur des zones dans lesquelles l'insécurité empêche tout déplacement. Les données désagrégées permettent de répondre à ce manque (Blattman and Miguel, 2010; Collier and Hoeffler, 2007; Dixon, 2009; Couttenier and Soubeyran, 2015). Néanmoins, dans quelle mesure l'analyse "à la loupe" des conflits internes nous permet-elle de mieux comprendre leurs causes structurelles? Quelle est la part de responsabilité des individus par rapport à celle des régions et des Etats dans l'apparition des conflits internes?

Ce travail de thèse s'inscrit dans le champ de l'économie des conflits. Le chapitre 2 explore ces nouveaux enjeux à la fois théoriques et méthodologiques au regard des apports de la littérature empirique récente sur les causes des conflits. Les enjeux méthodologiques soulevés dans ce chapitre se retrouvent également dans les chapitres suivants. Ces derniers constituent des études de cas apportant des éléments

[6]Par ailleurs, ces modèles peuvent et ont été raffinés de multiples manières, par exemple en intégrant des comportements stratégiques ou des asymétries d'information.

de réponse aux questions d'échelle temporelle et spatiale dans l'analyse des conflits. Le chapitre 3 montre que des avancées récentes dans l'étude des phénomènes macroéconomiques permettent, une fois appliquées au cas des conflits politiques, de mettre en lumière certaines causes nationales de violence. En effet, les enjeux temporels des conflits (i.e., la propagation dans le temps des conflits) soulèvent des questions essentielles pour l'étude empirique des conflits. Néanmoins, la plupart des méthodes actuellement utilisées pour prendre en compte ces enjeux sont limitées par la nécessité d'établir, préalablement à leur utilisation, des hypothèses restrictives sur la structure de corrélation temporelle des conflits (Beck et al., 1998; Reed and Webb, 2010). Le chapitre 4 porte sur les enjeux géographiques des conflits entre éleveurs transhumants en provenance du Niger et agriculteurs nigérians. Ce conflit ancien a été le sujet d'une vaste littérature mais les travaux empiriques ont été plus rares (Eberle et al., 2020; McGuirk and Nunn, 2020). En appliquant les méthodes économétriques de panel spatial sur des données satellite et des données géolocalisées de conflit pour les terres, ce travail apporte un éclairage sur les enjeux spatiaux d'accès aux pâturages dans un contexte de rareté.

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Chapitre 2

LES CAUSES DES CONFLITS CIVILS : AVANCÉES RÉCENTES À L'AIDE DE DONNÉES DÉSAGRÉGÉES[1]

2.1 Introduction

Les causes des conflits sont multiples, interdépendantes et liées à des dynamiques qui s'organisent à différentes échelles. Leurs causes locales concernent les relations que les individus entretiennent avec leur contexte politico−géographique immédiat, tel que les enjeux de financement et de création des groupes armés. Leurs causes nationales se retrouvent dans les questions relatives au pouvoir de l'État et de ses institutions ; leur contrôle du territoire, leur souveraineté judiciaire et leur capacité financière sont des facteurs essentiels à la compréhension des conflits. De la même manière que leurs conséquences se propagent dans le temps et l'espace, les causes des conflits ne se limitent pas aux frontières nationales d'un pays. Ces dernières années, ils sont devenus plus longs et plus complexes car ils impliquent de plus en plus d'acteurs et de dynamiques régionales et internationales. Le changement climatique, les catastrophes naturelles et la criminalité internationale organisée constituent de nouveaux défis pour la stabilité mondiale. Intégrer l'ensemble de ces dimensions au sein d'une analyse des causes des conflits

[1] Ce chapitre à donné lieu à deux publications. La première, correspondant à la version complète de ce chapitre, a été publiée dans la *Revue française d'économie*: Laville, Camille. "Les causes des conflits civils : avancées récentes à l'aide de données désagrégées", *Revue française d'économie*, vol. xxxiv, no. 3, 2019, pp. 123-165. La deuxième est une version courte et simplifiée focalisée sur les enjeux de pauvreté dans les pays d'Afrique de l'Ouest. Elle a été publiée dans la *Revue Défense Nationale*: Laville, Camille. "Vulnérabilité des ménages ruraux et insécurité en Afrique de l'Ouest." *Revue Défense Nationale* 7 (2020): 136-140.

est une tâche essentielle mais complexe.

La recherche empirique (économétrique) sur les causes des conflits a longtemps été dominée par un large nombre de travaux en coupe transversale à l'échelle de plusieurs pays. En effet, les bases de données sur les conflits ont été initialement construites à une échelle pays/années qui se prête difficilement à des analyses locales des causes des conflits. En permettant d'approcher ces causes à une échelle plus fine, les récentes avancées en matière de collecte automatisée des données et de géo−référencement des événements violents ont engendré un développement rapide et important du nombre de travaux empiriques sur les causes des conflits. L'usage de données désagrégées a−t−il permis une meilleure compréhension des causes des conflits dans le monde ?

La question de l'échelle d'analyse est centrale et régulièrement abordée dans les travaux empiriques sur les causes des conflits. Cette revue de la littérature est pourtant, à notre connaissance, la première à proposer une analyse des avancées techniques et conceptuelles permises par une approche locale des conflits. En établissant le périmètre d'analyse actuel ainsi que les innovations récentes dans l'explication des causes des conflits civils par la littérature économétrique, elle s'intègre aux quelques revues de la littérature existantes (Blattman et Miguel, 2010 ; Collier et Hoeffler, 2007 ; Dixon, 2009 ; Couttenier et Soubeyran, 2015). Plus précisément, en insistant sur les avancées statistiques permises par l'usage de données désagrégées, ce travail complète les travaux de Blattman et Miguel (2010) et de Couttenier et Soubeyran (2015) qui défendent l'usage de méthodes *quasi* expérimentales et d'unités spatiales de plus en plus petites. Ce travail complète également le travail de Collier et Hoeffler (2007) en questionnant ouvertement leur conclusion sur le fait que les prochaines avancées empiriques viendraient d'une désagrégation de la dimension spatiale des conflits. Enfin, il complète le travail de Dixon (2009)en rappelant que les évolutions techniques de cette littérature proviennent à la fois de l'accès à des données plus précises, mais également (et surtout) d'une meilleure théorisation des mécanismes à l'origine des comportements prédateurs.

Cette revue de la littérature est organisée de la manière suivante. Tout d'abord, elle présente en quoi l'accès à des données désagrégées est essentiel pour assurer une meilleure validité interne et externe des travaux empiriques (première section). Elle aborde ensuite les avancées techniques et conceptuelles que ces données ont permises à ce jour dans la réponse à trois questions centrales de la littérature sur les conflits : les enjeux liés aux ressources naturelles (deuxième section), ceux liés à la richesse et à la pauvreté des hommes et des nations (troisième section) et ceux liés au concept de cohésion sociale (quatrième

section).

2.2 Les défis empiriques liés à une approche pays/années

2.2.1 Données agrégées et défis pour la validité interne

Les premiers travaux empiriques sur les causes des conflits sont réalisés entre les années 1960 et les années 1970. À cette époque, les bases de données sur les conflits en sont à leurs prémices et la grande majorité des conflits civils ont lieu dans des pays *post*−coloniaux. Une approche empirique alors populaire consiste à rechercher les causes suffisantes et binaires de leur apparition. En effet, les conflits civils sont compris comme des phénomènes touchant les États uniformément du fait de l'absence de démocratie, de luttes ethniques ou d'un faible niveau de développement. Ces travaux ont mis en évidence des liens de corrélation entre la présence de conflits dans un pays et ses diverses caractéristiques telles qu'un faible taux de croissance, un faible niveau de revenu par tête, une forte population, une instabilité politique récente, un faible nombre de militaires ou la présence de terrains accidentés et/ou difficiles d'accès. Ces corrélations sont insuffisantes pour établir de quelconques liens de cause à effet mais ils suggèrent que les racines des conflits ne se trouvent pas seulement à l'échelle nationale mais également locale (par exemple dans des zones difficiles d'accès, pauvres et fortement peuplées), c'est−à−dire au sein de la relation que les individus entretiennent avec leur contexte politico−géographique immédiat.

À partir des années 1990, alors que le nombre de conflits armés diminue dans la plupart des pays en développement, ces derniers augmentent dans les pays africains. Le conflit civil n'est alors plus compris comme un phénomène simple lié à la construction économique et politique des États mais comme un phénomène humain complexe. Le nombre de travaux publiés connaît un grand essor avec le développement de théories économiques des conflits basées sur les notions d'individualisme méthodologique et de choix rationnels. Ces travaux partent de l'hypothèse que les agents évoluent dans un environnement de prédation où leurs interactions sont marquées par l'impossibilité d'établir des contrats optimaux au sens de Pareto (*i.e.* les droits de propriété ne sont pas assurés par une autorité supérieure)[4]. Le conflit y est modélisé comme une compétition pour l'accaparement d'une partie (ou de la totalité) d'une récompense. La probabilité relative de succès de chaque joueur dépend alors des ressources qu'il en-

[4]Le conflit est une solution Pareto−inefficiente à un désaccord entre deux parties car son issue est incertaine et il implique d'importants coûts humains et financiers (Hirshleifer, 1995). Idéalement, les individus préfèreront négocier entre eux de manière pacifique afin d'obtenir une solution mutuellement avantageuse.

gage dans le conflit par rapport à celles engagées par son opposant[5](Garfinkel, 1990 ; Grossman, 1991 ; Skaperdas, 1992 ; Hirshleifer, 1995). Les conflits civils apparaissent lorsque les négociations échouent ou qu'un groupe rebelle peut obtenir des gains supérieurs en choisissant une stratégie violente[6]. Trois mécanismes sont au cœur de cette prise de décision. Les deux premiers, le « coût d'opportunité » et la « récompense issue de la capture de l'État » (plus connu en anglais sous le nom de « State as a prize »), expliquent comment des civils peuvent être incités à se rebeller contre l'État. Le coût d'opportunité d'une rébellion correspond à l'arbitrage que les agents réalisent entre leur activité de production et le fait de rejoindre un groupe armé. La récompense issue de la capture de l'État correspond aux recettes obtenues par le combat lorsque l'accaparement du pouvoir étatique est au cœur de la dispute. Plus un État est riche, plus le gain est important. Le troisième mécanisme est la « capacité de l'État », c'est−à−dire la capacité d'un État à se défendre contre de potentiels opposants. Plus un État est riche, plus il a les capacités de surveiller, dissuader et acheter l'opposition. La conception économique du conflit civil repose donc sur l'idée que les agents sont opportunistes et que leur niveau de revenu, l'importance du gain issu d'un potentiel conflit et la force de l'État peuvent fournir des conditions inhabituelles favorables à la construction de groupes rebelles et au combat.

L'intégration de ces mécanismes au sein d'analyses empiriques est complexe. Il se pose tout d'abord un problème de données manquantes qui concerne particulièrement les deux mécanismes liés aux incitations individuelles des agents : le coût d'opportunité et le gain issu de la capture de l'État sont deux concepts difficilement quantifiables et donc approchables par des données. Ensuite, puisque ces trois mécanismes agissent en interaction les uns avec les autres, l'échelle d'analyse spatiale doit pouvoir permettre d'étudier à la fois les causes locales (plus proches des incitations des agents) et nationales. En effet, bien que la frontière entre ces deux dimensions soit poreuse, une analyse focalisée uniquement sur les dynamiques locales (micro) ou nationales (macro) omettra une partie du problème.

En observant les travaux empiriques réalisés à une échelle pays/années, on constate qu'une grande partie d'entre eux n'ont approché que de manière approximative les mécanismes à l'origine des conflits en utilisant des proxys inadaptés car trop agrégés (Blattman et Miguel, 2010). Par exemple, Fearon et

[5]Dans les modèles de conflits, la relation entre les efforts conflictuels et la récompense obtenue est appelée la « technologie du conflit », elle est modélisée par une fonction mathématique appelée la « contest success function ».

[6]Cette note étant focalisée sur les modèles économétriques, la typologie des modèles théoriques existants ne sera pas abordée en détail. Des développements récents ont insisté sur le rôle d'acteurs extérieurs, des coalitions, d'une approche dynamique ou du commerce international. Les fondements axiomatiques, stochastiques et opérationnels de ces modèles mériteraient également de plus amples explications.

Laitin (2003) et Collier et Hoeffler (2004) ont cherché à quantifier le pouvoir explicatif des revendications (*i.e.* ressentiments atypiques sévères au sein de la population) par rapport à celui des trois mécanismes théoriques précédemment cités. Parce que les revendications sont universellement présentes, Collier et Hoeffler défendent l'idée que les incitations économiques ont un rôle décisif dans l'apparition des conflits. L'approche de Fearon et Laitin suppose également que les revendications ne sont pas une explication suffisante mais ils estiment que ce sont les capacités des États qui ont un rôle décisif[7]. Pour pallier le problème de données manquantes, les quatre auteurs utilisent la même mesure du revenu national par tête comme proxy de ces deux mécanismes pourtant différents. Fearon et Laitin interprètent le lien négatif entre la richesse de l'État et le risque de conflit par le mécanisme des capacités de l'État, tandis que Collier et Hoeffler l'interprètent comme l'arbitrage que les agents font entre leurs revenus actuels et leurs gains espérés en rejoignant un groupe armé. Sur la base de modèles statistiques très similaires[8], les résultats et les recommandations politiques de ces deux articles divergent donc grandement (voir annexe 1). Le problème lié à l'usage de proxys trop agrégés est qu'ils ne permettent pas de distinguer les effets des mécanismes compétiteurs ; cela complique le travail d'inférence causale lorsque leurs effets n'ont pas le même signe (voir la troisième section). Par exemple, l'amélioration des revenus de l'État permet au gouvernement de dépenser davantage dans ses outils sécuritaires, engendrant une baisse du nombre de conflits ; mais un État plus riche est également plus intéressant à capturer, ce qui suppose que davantage de groupes armés se créeront dans l'objectif de capter le pouvoir. La validité interne des travaux empiriques sur les causes des conflits est donc limitée par le manque de données désagrégées.

2.2.2 Données agrégées et défis pour la validité externe

La plupart des bases de données macro ont été construites à partir de la définition du conflit civil de Small et Singer (1982), soit « tout conflit qui implique l'action militaire interne à la métropole, la participation active du gouvernement national et la résistance efficace des deux parties ». Cette définition est très restrictive car elle insiste sur la dimension nationale du conflit civil au détriment de ses enjeux locaux.

[7] Ils montrent que les conflits internes qui sont apparus dans les années 1990 ne sont pas « nouveaux » mais proviennent d'une accumulation de conflits non résolus depuis les années 1950 et ayant abouti à la construction d'États financièrement, bureaucratiquement et militairement fragiles.

[8] Les deux études utilisent des données de panel pour 161 pays sur une échelle de temps relativement similaire (i.e. période 1960−1999 pour Collier et Hoeffler et 1945−1999 pour Fearon et Laitin). Leurs modèles statistiques reposent sur la technique du Logit avec des variables explicatives semblables et une variable d'intérêt binaire construite selon la même définition du conflit, soit un conflit interne ayant causé au minimum 1 000 morts. Néanmoins, ce seuil est annuel pour Collier et Hoeffler (ils observent la présence ou l'absence de « conflit » chaque année) tandis que Fearon et Laitin tiennent compte de la durée du conflit et proposent un seuil annuel de 100 décès.

Elle s'adapte mal à des contextes où les capacités des États sont faibles ou le gouvernement inexistant, comme ce fut le cas en Somalie après 1991. En outre, un gouvernement peut mener une guerre par le biais de milices comme dans la vallée kenyane du Rift entre 1991 et 1993. Enfin, en insistant sur le caractère soutenu et réciproque des violences, cette définition requiert l'utilisation d'un « seuil » de décès pour être empiriquement opérationnelle. La valeur et le mode de calcul de ce seuil sont largement débattus au sein de la littérature (voir **Tableau 2.1**). En effet, un conflit sera forcément plus ou moins meurtrier en fonction des caractéristiques de l'environnement dans lequel il apparaît (population, capacité de réaction du gouvernement, etc.). Au final, les bases de données construites à une échelle pays/années ne permettent d'étudier que certaines formes de conflits civils, ce qui limite grandement la validité externe des résultats des travaux empiriques qui les utilisent.

Depuis quelques années, la littérature sur les causes des conflits se tourne davantage vers des bases de données proposant une typologie indépendante du nombre de décès comptabilisés. Les avancées techniques en matière de collecte de données automatisée ont permis aux chercheurs de redéfinir leur objet d'étude en s'éloignant d'une définition contraignante des conflits civils au profit d'une approche plus souple centrée autour des événements qui les composent (batailles, émeutes, violences, etc.) (voir **Tableau 2.2**). Par exemple, la base de données Acled rapporte des informations sur la localisation exacte, la date et diverses caractéristiques d'événements politiques violents en Afrique, au Moyen−Orient et en Asie du Sud et du Sud−Est (Acled, 2017). Depuis sa publication en 2010, la base est quotidiennement mise à jour à partir de rapports d'ONG et de ressources médiatiques.

Le géoréférencement des conflits a été une étape importante dans l'évolution des travaux empiriques sur leurs causes. Cela a permis de modéliser des dynamiques présentes à l'échelle de sous−régions et donc beaucoup plus proches d'une conception du conflit basée sur des choix individuels et des dynamiques spatiales (notamment les effets frontières). Cette évolution a également été permise par une plus grande disponibilité des données géolocalisées et d'imageries par satellite. Ces dernières permettent d'étudier des contextes pour lesquels peu de données sont généralement disponibles, comme les pays en crise et les États défaillants. À ce jour, il s'agit principalement de données sur les conditions agricoles, la luminosité, les gisements de ressources naturelles ou les systèmes routiers.

Tableau 2.1: Comparaison des principaux seuils de décès permettant de définir les guerres civiles

	Critère(s)	Avantage(s)	Inconvénient(s)
Seuil du nombre de décès cumulés	Small et Singer [1982] « Guerre civile » : > 1 000 décès cumulés sur la durée totale du conflit[6]	Facilité d'utilisation	Risque d'identifier plusieurs conflits mineurs et s'étendant dans le temps comme un seul et même conflit
	Fearon et Laitin [2003] « Guerre civile » : > 1 000 décès cumulés sur la durée totale du conflit « Guerre » : > 100 décès/an en moyenne	Résout la critique du seuil unique proposé par Small et Singer [1982]	Un conflit faisant 900 morts sur 9 ans ne sera pas considéré comme une guerre continue tandis qu'un conflit faisant 1 000 morts sur 10 ans le sera
Seuil annuel de décès	Gleditsch, Wallensteen, Eriksson, Sollenberg et Strand [2002] « Guerre » : présence d'une année où le nombre de décès est supérieur à 1 000	Corrige certaines limites liées au critère de nombre de décès cumulés en considérant qu'un conflit se termine l'année où le nombre de décès passe en dessous de 1 000	Problème des conflits dits intermédiaires (*i.e.* entre 100 et 1 000 morts en une année) : risque de prendre en compte le même conflit comme s'il s'agissait de plusieurs. Exemple : année 1 : 600 décès ; année 2-4 : 0 décès ; année 5 : 600 décès. Ce n'est pas une guerre pour Gleditch *et al.* [2002] ; c'est une guerre civile pour Small et Singer [1982]
Un intervalle de décès plutôt qu'un seuil	Sambanis [2004] « Début du conflit » : année marquée par un nombre de décès compris entre 100 et 300 « Guerre civile » : > 1 000 décès durant trois ans Il conseille de tenir compte du nombre de décès par tête	Corrige les biais induits par le concept de « seuil de décès », notamment pour les pays faiblement peuplés. Permet de définir une date de début du conflit	Complexité d'utilisation

Source : Sambanis (2004).

Tableau 2.2: Typologie des événements répertoriés dans la base de données Acled

Classification	Terminologie Acled	Signification
Actions violentes	Battle - No change of territory	Bataille entre deux groupes armés violents où le contrôle de la zone contestée ne change pas.
	Battle - Non-state actor overtake territory	Bataille entre deux groupes armés violents où le contrôle de la zone contestée est obtenu par un (nouveau) groupe non étatique.
	Battle - Government regains territory	Bataille entre deux groupes armés violents où le contrôle de la zone contestée est obtenu par l'État. Contient des événements où des milices agissant au nom de l'État reprennent le contrôle.
	Violence against civilians	Acte de violence contre des civils dans un groupe armé et organisé (rebelles, gouvernement, milices, forces étrangères, manifestants). Ex. : fusillades, torture, mutilation, viols, kidnapping, disparitions.
	Remote violence	Événement où l'engagement dans le conflit ne nécessite pas la présence physique du belligérant. Ex. : bombardement, mines, etc.
Manifestations	Protests and riots	« Protest » : manifestation publique non violente. « Rioting » : manifestation publique violente (ex. : casses).
Actions non violentes	Non-violent transfer of territory	Acquisition d'un territoire sans violence.
	Headquarters or base established	Un groupe violent établit une base ou un siège permanent ou semi-permanent sans violence.
	Strategic development	Informations contextuelles importantes. Ex. : recrutement, pillages, incursions, négociations de paix, arrestations, destructions de bâtiments, déplacement forcé

Source : Acled (2017).

2.3 Les rôles des ressources naturelles

2.3.1 Variables omises et hétérogénéité inobservée

L'idée que les ressources naturelles sont fortement impliquées dans la faisabilité financière des conflits civils a servi de base à la théorie de la cupidité développée par Collier et Hoeffler (2004). Elle soutient que les groupes rebelles sont principalement motivés par la perspective de pillages et non par la volonté de rectifier une quelconque injustice[13]. Mais les ressources naturelles ne constituent pas seulement

[13]Par exemple, beaucoup des combattants du Revolutionary United Front (RUF) en Sierra Leone ou des « janjawiid » du Darfour étaient de jeunes hommes issus du milieu de la petite criminalité et travaillant pour le plus offrant.

un générateur de financement pour les groupes armés mais également pour l'État. Comme le souligne Fearon (2005), le lien positif entre les exportations de matières premières et le risque de conflit qui sert de base à la théorie de Collier et Hoeffler pourrait être fortement biaisé par le cas des pays exportateurs de pétrole qui cumulent des institutions (*i.e.* capacités) faibles et de grandes sources de revenus nationaux qui peuvent attiser la convoitise de groupes rebelles (voir **Annexe A1**).

Lorsqu'il s'agit de comprendre le rôle joué par les ressources naturelles, la question de l'échelle d'analyse est primordiale car ces ressources peuvent être impliquées à la fois dans l'augmentation et dans la diminution du risque d'émergence de conflits civils suivant le mécanisme considéré. Lorsqu'elles améliorent les revenus locaux, ces ressources augmentent le coût d'opportunité des agents à rejoindre un groupe armé et diminuent donc le risque de conflit. Lorsqu'elles améliorent les revenus de l'État, leur effet est double. D'une part, elles peuvent lui permettre d'améliorer ses capacités et donc de diminuer le risque de conflit ; d'autre part, les richesses qu'elles génèrent rendent sa capture plus attractive aux yeux des groupes armés rebelles. Les ressources naturelles n'ont donc potentiellement pas toutes le même impact sur le risque de conflit et la seule prise en compte de variables agrégées telles que la valeur totale des exportations ne permet pas un tel degré de précision. La littérature a mis en avant plusieurs critères permettant une classification désagrégée des ressources en fonction de l'acteur dont elles augmentent la richesse (voir **Annexe A2**).

L'idée que les ressources naturelles sont au centre de la stratégie de financement des groupes rebelles contient une importante part de vérité mais peut aussi être une approche trompeuse. En effet, cette conception a parfois abouti à une caricature de leur rôle qui suggère que leur seule présence suffit à générer des conflits. Par exemple, les diamants sont souvent considérés comme des facteurs importants dans l'apparition de conflits civils car ils ont eu un rôle décisif dans le financement des groupes rebelles au cours des guerres en Sierra Leone, en Angola ou en République démocratique du Congo. Pourtant, ce n'est pas la présence de gisements de diamants mais leur exploitation qui influence le risque d'apparition de conflits civils (Lujala, Gleditsch et Gilmore, 2005). En effet, les ressources naturelles ne sont pas indépendantes des sociétés avec lesquelles elles partagent l'espace. Comprendre leur rôle dans l'apparition des conflits nécessite tout d'abord de savoir quel est leur rôle pour ces sociétés. Ainsi, sous l'hypothèse qu'il n'y aurait pas d'exploitation illégale, la présence de gisements augmente uniquement les perspectives de revenus de l'État. À l'inverse, leur exploitation enrichit l'État et/ou les civils en fonction de l'intensité en facteur capital ou travail que cette activité requiert. Les productions intensives en

capital, comme le pétrole, sont supposées enrichir l'État tandis que les ressources dont la production est intensive en travail, comme les produits agricoles, sont supposées enrichir les individus (Bazzi et Blattman, 2014).

Pour comprendre le lien entre ressources naturelles et conflits civils, il faut pouvoir distinguer la dépendance de l'abondance en ressources naturelles (De Soysa, 2002). Cela est particulièrement important pour les pays pauvres où ces concepts se confondent et pour les pays connaissant des tensions persistantes qui empêchent le développement d'un secteur manufacturier. L'abondance ou la dépendance des pays aux ressources naturelles ne fait pas appel aux mêmes mécanismes. L'abondance est liée au montant absolu de rente disponible par habitant. Théoriquement, plus les ressources naturelles sont abondantes, plus les groupes armés disposent de motivations financières à entrer en conflit : le coût d'opportunité à rejoindre un groupe armé diminue. L'abondance en ressources naturelles indique également que l'État dispose de revenus supérieurs et qu'il peut être plus intéressant de le capturer. La dépendance correspond à l'idée que la rente issue des ressources naturelles est la plus importante source de revenus de l'État. Les pays dépendants de leurs ressources naturelles sont moins incités à créer des institutions compétentes et à développer leurs capacités sur le territoire. Ils sont particulièrement concernés par les mécanismes liant l'émergence de conflits aux faibles capacités de l'État.

Les groupes armés n'ont pas les capacités techniques d'exploiter n'importe quel type de ressource. Certaines sont faciles à piller car elles peuvent être récoltées avec des méthodes simples par des individus ou des petits groupes ; d'autres nécessitent de larges investissements ou ne peuvent pas être vendues facilement comme biens de contrebande (Lujala, Gleditsch et Gilmore, 2005). Les diamants primaires et les gisements pétroliers « offshores » attireront moins les groupes armés que leurs versions respectives secondaires (Lujala, Gleditsch et Gilmore, 2005)[16] et « onshores » (Nordvik, 2018) car elles sont beaucoup plus difficilement exploitables. La facilité d'extraction des ressources dépend également de leur facilité d'accès, de transport (avec des critères de taille et de poids), de repérage et de vente. Pour autant, le prix de revente élevé de certaines ressources peut inciter les groupes armés à faire abstraction de quelques−uns de ces critères. Sanchez de la Sierra (2020) montre par exemple que la difficulté de transport et d'extraction de certaines ressources « volumineuses » mais de grande valeur peut pousser

[16] Ils montrent que la production de diamants secondaires augmente le risque de conflit ethnique tandis que la production de diamants primaires le diminue. Ces résultats sous−entendent que les diamants primaires augmentent les capacités de répression de l'État et que les diamants secondaires peuvent représenter des opportunités de financements dans le cadre de conflits initiés pour d'autres raisons.

des groupes armés à s'installer dans des villages situés à proximité des gisements afin d'en taxer la population.

Ces points ont d'importantes implications théoriques sur le lien entre ressources naturelles et conflits civils mais ils ne sont pas faciles à intégrer au sein d'analyses empiriques. En effet, les pays riches ou pauvres en ressources naturelles sont également différents en de nombreux points (politiquement, géographiquement, économiquement, etc.) : il y a donc un risque de biais issus de variables omises et d'hétérogénéités inobservées. Des travaux réalisés à l'échelle pays/années ont essayé de tenir compte de ces limites en intégrant des effets fixes à leurs analyses mais ils trouvent des résultats contradictoires. Alors que Lei et Michaels (2014) trouvent un effet positif de l'abondance en pétrole (*i.e.* la découverte de gisements) sur le risque de conflit, Cotet et Tsui (2013) ne trouvent plus d'effet significatif une fois qu'ils contrôlent pour les effets fixes. Le problème est que ces travaux utilisent des données agrégées qui ne permettent pas de tenir compte de l'hétérogénéité interne des pays, qu'il s'agisse de leurs ressources ou des conflits civils qu'ils ont connus. Elles donnent donc lieu à des estimations imprécises. Les innovations récentes en matière de collecte et de géolocalisation des données sur les conflits permettent des études à l'échelle de « grid cells », c'est−à−dire de cellules d'une superficie souvent comprise entre 50 et 100 km². Ce quadrillage est particulièrement utile pour analyser, selon différentes échelles, le rôle des ressources dans l'apparition de conflits. Il permet de réduire le poids des caractéristiques étatiques et de comparer les cellules entre elles puisqu'elles ne diffèrent plus que par leurs dotations en ressources naturelles. Berman, Couttenier, Rohner et Thoenig (2017) ont ainsi étudié l'impact de différents types d'activités minières sur le risque de conflits en Afrique à l'échelle de cellules de 55 km². Ils montrent que la forte hausse des prix des minéraux au cours des années 2000 (aussi appelée le « commodities super cycle ») explique entre 15 et 25 % de la violence moyenne observée dans les pays africains entre 1997 et 2010. L'usage de données aussi désagrégées a également permis aux auteurs de montrer que le contrôle d'une zone minière permet aux groupes rebelles de financer non seulement leurs « activités locales », mais également de diffuser à long terme la violence vers d'autres territoires.

2.3.2 Quel est le rôle du changement climatique ?

Le changement climatique et la croissance démographique sont de plus en plus considérés comme des facteurs de risque pour la stabilité des pays en développement. Des travaux inspirés par ceux de Malthus (1798) supposent qu'il existe un lien entre la rareté des ressources, la croissance de la population et le

risque de conflit (Homer−Dixon, 2010). Leurs résultats ont néanmoins été vivement critiqués pour leur manque de preuves empiriques et parce qu'ils négligent la capacité d'adaptation et les comportements stratégiques des individus. À une échelle pays/années, De Soysa (2002) ne trouve, par exemple, aucun effet significatif des ressources renouvelables[19] impliquées dans le phénomène de pression malthusienne. Mais l'échelle d'analyse pays/années qu'il utilise ne permet pas de tenir compte des différences climatiques au sein d'un même territoire. Travailler à une échelle plus fine est d'autant plus justifié lorsqu'il s'agit de comprendre l'impact de ressources dont le caractère renouvelable ne dépend pas uniquement du changement climatique mais également de l'action locale des hommes.

La géolocalisation des données sur les conflits a été accompagnée d'un développement et d'un plus grand accès aux Systèmes d'informations géographiques (SIG) et aux données climatiques. Cela a récemment permis un développement rapide du nombre de travaux empiriques sur le lien entre le changement climatique et le risque de conflit interne. Hsiang, Burke et Miguel (2013) ont réalisé une méta−analyse de soixante travaux basés sur des méthodes expérimentales ou des expériences naturelles à ce sujet. Parmi eux, vingt−six ont analysé l'effet du changement climatique sur les conflits civils, les conflits communautaires ou les rébellions populaires[20]. Ils concluent qu'il existe un lien positif, significatif et robuste entre les variations climatiques et le risque de divers types de conflits. Plus précisément, des températures plus chaudes, des précipitations plus faibles ou extrêmes, ou une plus grande vigueur du phénomène tropical El Niño−Oscillation australe (ENOA) augmentent de 2 à 40 % le risque conflit pour une variation d'un écart−type de la variable climatique ; par exemple, un changement d'un écart−type de la température d'un lieu est associé à une augmentation de 13,2 % du taux de conflit entre groupes vivants dans cette zone.

Même si un grand nombre de travaux indique un effet positif, significatif et robuste du changement climatique sur le risque de conflit, il reste difficile de décrire statistiquement les mécanismes profonds à l'origine de cette relation. En effet, le changement climatique affecte toutes les variables théoriquement à l'origine des conflits internes à travers son impact sur l'activité économique, les caractéristiques institutionnelles du pays ou encore la cohésion sociale et la diversité ethnique (du fait des migrations qu'il

[19] Ces ressources renouvelables comprennent les terres cultivées, les ressources en bois, les forêts, les pâturages et les zones protégées.

[20] Le changement climatique y est approché à travers diverses variables telles que les changements dans le niveau moyen de pluviométrie et de température ou l'intensité et quelquefois la fréquence des sécheresses, inondations et orages. Il aurait un impact sur divers types de conflits, suivant leur taille et leur niveau d'organisation. En dehors des résultats présentés ici, les auteurs analysent aussi la littérature traitant du lien entre le changement climatique et les violences interpersonnelles telles que les crimes, la violence domestique ou les meurtres.

implique). Malgré cela, la littérature a généralement tendance à réduire les causes du nexus « changement climatique/conflits » aux seules théories néomalthusiennes de violence induite par la rareté des ressources (Buhaug, 2015). L'évolution constante des méthodes de mesure du changement climatique (*i.e.* amélioration des méthodes de télédétection, données satellites mensuelles et journalières, etc.) continue d'ouvrir de nouvelles perspectives dans l'analyse du lien entre les variations climatiques et les caractéristiques économiques, sociales et institutionnelles des agents impliqués dans l'émergence de conflits.

2.4 Les rôles de la pauvreté

2.4.1 L'endogénéité de la relation entre pauvreté et conflits

L'un des résultats empiriques parmi les plus robustes de la littérature est la corrélation entre de bas niveaux de revenus nationaux et un risque supérieur de conflit. Cette relation est souvent utilisée pour justifier l'idée que la pauvreté est à la base des comportements violents. En effet, une baisse des revenus nationaux peut potentiellement augmenter le risque de conflit si elle affecte le coût d'opportunité des agents et/ou les capacités de l'État. Mais il y a deux limites à ce raisonnement. Tout d'abord, le mécanisme du « gain issu de la capture de l'État » suppose qu'une baisse des revenus nationaux diminue le risque de conflits car la valeur du gain est inférieure. Ensuite, la relation entre la pauvreté et les conflits est endogène car ces événements ont des répercussions économiques et sociales importantes à long terme : en moyenne un conflit civil coûte trente années de croissance du PIB aux pays concernés (Banque mondiale, 2011). Comprendre le lien entre la pauvreté et le risque de conflit est pourtant essentiel pour pouvoir proposer des recommandations politiques adaptées puisque principalement destinées à des pays en développement. Cela nécessite de corriger l'endogénéité et de pouvoir distinguer comment la richesse ou la pauvreté des individus (échelle locale) et des États (échelle nationale) affectent le risque de conflit.

Plusieurs articles ont essayé de corriger le problème d'endogénéité en conservant une échelle d'analyse pays/années. Ils ont par exemple proposé d'utiliser une variable de revenu national retardée mais cette solution reste inefficace. En effet, l'anticipation de l'instabilité politique et des conflits futurs affecte les comportements d'investissement présents et donc les niveaux de vie (Chassang et Padro−i−Miquel, 2008, 2010). Une autre solution statistique répandue est le recours à l'instrumentation. Miguel, Shanker Satyanath et Sergenti (2004) ont, par exemple, utilisé la croissance annuelle de la plu-

viométrie comme instrument de la croissance annuelle du revenu par tête en Afrique sub−saharienne. Ils montrent que la population rurale de pays touchés par des chocs négatifs produira moins et considèrera davantage l'opportunité de rejoindre un groupe armé : une baisse de 5 % de la croissance des revenus peut augmenter le risque de conflit l'année suivante de plus de 10 %. Néanmoins, l'instrumentation par la pluviométrie ne permet pas de distinguer l'effet des mécanismes compétiteurs à l'origine des conflits car elle influence à la fois les revenus des agents et ceux de l'État. Il s'agit d'une grave limite à la robustesse de leurs résultats car le signe de l'effet de la richesse des États sur le risque de conflit reste inconnu. Brückner et Ciccone (2010) utilisent plutôt le taux de croissance de l'indice global du prix des principales exportations comme instrument du taux de croissance du PIB ; ils concluent qu'une baisse de la valeur de cet indice est associée à l'apparition de davantage de conflits dans les pays d'Afrique sub−saharienne. L'instrumentation par les évolutions du prix des exportations est une alternative intéressante mais tout aussi limitée. Tout d'abord, cette méthode suppose que les chocs de prix affectent uniquement les revenus des agents, ce qui exclut le moindre effet passant par d'autres canaux tels que la migration ou les inégalités. Ensuite, elle ne répond pas au précédent problème d'agrégation trop large de l'effet des ressources sur le risque de conflit. En effet, certains chocs affectent particulièrement les revenus des agents (principalement les biens dont la production est intensive en travail comme les biens agricoles) ou le budget de l'État (principalement les biens dont la production est intensive en capital comme le pétrole). Étudier les chocs internationaux sur le prix de chaque type de commodité permet de travailler à une échelle plus désagrégée, c'est−à−dire à l'échelle de productions locales. Cette méthode a deux avantages par rapport à l'instrumentation par les chocs sur le prix des exportations totales d'un pays. Tout d'abord, cela permet de distinguer le rôle des différents mécanismes théoriques en fonction des produits concernés (à l'échelle des individus et de l'État séparément). Ensuite, l'exogénéité de ces chocs est facilement justifiable car les pays enclins à connaître des conflits n'exportent qu'un faible nombre de produits. En fonction de l'échelle spatiale d'analyse qu'elles utilisent, les études réalisées en suivant cette méthode ne tombent pas sur les mêmes résultats. En effet, les conséquences des chocs de prix n'influencent pas les territoires de manière uniforme. À une échelle pays/années, Bazzi et Blattman (2014) montrent que ni la hausse (mécanisme de la capacité de l'État[23]), ni la baisse (mécanisme du gain issu de la capture de l'État) des revenus de l'État ne sont liés à un plus grand risque de conflits, y compris

[23] Mais il joue un rôle important dans l'augmentation de l'intensité et de la durée des conflits déjà en cours.

pour les pays fragiles ou dépendants de leurs ressources extractives[24]. Ils montrent aussi que les chocs sur le prix des commodités influençant les revenus des agents n'ont pas d'effet sur le risque d'émergence de conflit, ce qui contredit le mécanisme du coût d'opportunité. À une échelle municipalités/années, Dube et Vargas (2013) montrent qu'une chute du prix d'un bien intensif en travail n'affecte pas un territoire de manière uniforme. Ce sont les municipalités productrices qui sont affectées puisque cette chute de prix y réduit les salaires et y augmente le risque de conflit à travers le mécanisme du coût d'opportunité. Ces régions seraient également déstabilisées par une hausse du prix des biens intensifs en capital à travers le mécanisme du « gain issu de la capture de l'État ». En effet, ces hausses permettent au gouvernement de s'enrichir par les taxes sur les ressources naturelles, ce qui incite les groupes armés à attaquer les régions productrices pour capter ces rentes. Ces effets géographiquement hétérogènes peuvent également contredire les mécanismes théoriques en fonction de la ressource considérée (voir **Annexe A3**). Ainsi, Angrist et Kugler (2008) montrent qu'en Colombie la hausse du prix mondial de la cocaïne dans les années 1990 en a augmenté la production mais n'a eu qu'un impact économique modeste sur le niveau de vie des individus impliqués dans le processus productif. En outre, le nombre de conflits civils a significativement augmenté dans les régions productrices par rapport aux zones urbaines. Leurs résultats rejettent donc la théorie du coût d'opportunité pour deux raisons : *i)* la culture de la coca est un secteur fermé qui génère peu de spillovers sur la qualité de vie dans les régions productrices et, *ii)* étant donné que les capacités de l'État colombien sont faibles, la moindre hausse des revenus de la population est automatiquement captée par des groupes paramilitaires et des guérillas qui détruisent ensuite les activités économiques dans les autres secteurs.

Plus les travaux sont réalisés à une échelle fine, plus il est possible de distinguer les mécanismes compétiteurs et de s'approcher de la réalité locale. L'usage de données désagrégées a donc permis de réaliser des avancées majeures dans la compréhension du lien entre la richesse des agents et de l'État et le risque de conflits. Berman et Couttenier (2015) ont réalisé une étude à l'échelle de cellules de 50 km² afin de prendre en compte de manière précise la diversité des productions agricoles dans les pays d'Afrique sub−saharienne. Ils montrent que les variations temporaires de la demande mondiale pour ces biens produits localement augmentent le risque d'apparition de conflits ainsi que leur incidence et leur intensité. En étudiant les mêmes chocs à une échelle nationale beaucoup plus large, ces effets ne

[24] L'analyse des chocs temporaires est peut−être moins adaptée à l'étude du mécanisme d'incitation à capturer l'État que l'étude des stocks de ressources. Néanmoins, Cotet et Tsui (2013) ont montré des résultats similaires en analysant l'effet d'une hausse soudaine du nombre de réserves de pétrole.

sont plus visibles[27] du fait d'une trop grande agrégation. Ces études désagrégées permettent également de mettre en avant des effets différenciés en fonction du statut de consommateur ou de producteur des unités considérées. McGuirk et Burke (2020) ont étudié l'impact des chocs exogènes du prix des biens alimentaires sur la violence locale en Afrique. Leur modèle se base sur des données géocodées permettant de diviser le continent africain en cellules de 55 km². Ils trouvent que dans les zones de production vivrière, une hausse du prix des biens alimentaires diminue le nombre de conflits pour le contrôle de territoires mais augmente le nombre de conflits pour l'appropriation de surplus. Dans les autres régions, une hausse des prix induit une hausse des deux types de conflits.

2.4.2 Quel est le rôle du commerce ?

Les échanges commerciaux sont peu abordés dans les travaux sur les conflits. Pourtant, la richesse d'une nation est difficilement concevable sans tenir compte de sa place au sein du commerce international et de la mondialisation. L'idée que les flux commerciaux réduisent la probabilité de guerre entre les pays remonte au moins aux travaux de Montesquieu et de Kant au XVIII^{ème} siècle. Dans De l'esprit des lois, 1758, Montesquieu présente le commerce comme un vecteur de paix entre les nations puisque les individus qui commercent mettent fin à des comportements violents par intérêt. Dans le Projet de paix perpétuelle, 1795, Kant indique que le commerce est incompatible avec la guerre et qu'il est un facteur de rapprochement des peuples. Pour Montesquieu et Kant, le commerce créerait des relations d'interdépendance économique entre les nations ce qui encouragerait le compromis plutôt que le conflit[28].

Le commerce est lié à l'environnement économique, politique et social dans lequel une société évolue et choisit entre des activités de prédation ou de production. Il améliorerait les capacités des gouvernements (*i.e.* présence de plus d'institutions afin de diminuer les risques associés au fait d'appartenir au système commercial international), réduirait le coût d'opportunité d'entrer dans un groupe armé (car il existe alors des alternatives économiques au combat) et augmenterait globalement le capital social des individus concernés. Il est donc pertinent d'en analyser les effets, non seulement à une échelle locale,

[27] Hormis dans les régions les plus ouvertes sur le commerce international.

[28] Selon le concept de « paix libérale », l'augmentation des flux commerciaux ainsi que la propagation de la démocratie et des marchés libres diminuent les incitations à utiliser la violence dans les relations interétatiques. Pour un État, la guerre et le commerce sont tous les deux des moyens d'obtenir les ressources nécessaires à la croissance économique et à la stabilité politique. En outre, le commerce favorise les contacts et les communications entres les acteurs privés et publics des différents pays concernés ce qui facilite la mise en place de relations politiques de coopération. Enfin, les gains à l'échange issus de l'ouverture commerciale rendraient les consommateurs et les opérateurs privés dépendants du marché mondial et défavorables à une interruption du commerce en réponse à des antagonismes politiques.

mais également nationale, régionale et mondiale.

Plusieurs travaux à l'échelle pays/années ont montré que l'ouverture commerciale d'un pays fournissait des indications sur la qualité de sa gouvernance et ils recommandent donc une plus grande libéralisation comme moyen de limiter le risque de conflit interne. Par exemple, De Soysa (2002) part de l'hypothèse que les pays fortement peuplés sont généralement moins ouverts au commerce et ont un gouvernement de plus petite taille (*i.e.* où les institutions sont faibles et implantées inégalement sur le territoire). Il montre que le ratio de commerce par rapport au PIB est relié de manière significative et négative au risque de conflit et de faillite des États (Gurr, Harff, Levy, Dabelko, Surko et Unger, 1999 ; De Soysa, 2002)[31]. Hegre, Gissinger et Gleditsch (2003) montrent également que l'ouverture économique est associée à une plus grande stabilité des systèmes politiques ainsi qu'à des revenus par tête plus élevés, eux−mêmes associés à des risques relativement inférieurs de conflits. Ils suggèrent que les effets bénéfiques du commerce et des investissements étrangers surpassent les effets potentiellement néfastes des inégalités sur les conflits (*i.e.* augmentation de la violence).

À l'échelle locale et à l'échelle régionale, le commerce pourrait réduire le risque de conflit grâce aux liens de confiance mutuelle qu'il instaure entre les communautés qui échangent. En effet, la plupart des relations commerciales intercommunautaires nécessitent des investissements spécifiques en capital humain, par exemple dans l'apprentissage de la langue ou des coutumes de l'autre. Néanmoins, le manque de données à une échelle désagrégée réduit pour l'instant la compréhension locale du rôle du commerce aux résultats issus de plusieurs études de cas sur les incitations à la paix entre ethnies. Pour Horowitz (2000), les minorités intermédiaires de plusieurs pays asiatiques tels que l'Indonésie, la Malaisie ou l'Inde ont souvent été protégées des violences politiques parce qu'elles fournissaient à l'ethnie locale majoritaire divers services précieux. C'est une conclusion que l'on retrouve dans les travaux de Jha, 2013 sur les interactions entre hindous et musulmans à l'échelle des villes indiennes. Il montre que, durant la période médiévale, les ports commerciaux indiens permettaient aux deux communautés d'échanger des services complémentaires. Cela a engendré une tolérance religieuse et un niveau plus faible de violences politiques dans les villes portuaires que dans les autres villes indiennes. C'est l'affaiblissement du commerce entre les hindous et musulmans indiens (résultant de divers facteurs exogènes) qui, en réduisant le coût d'opportunité du conflit, aurait conduit aux émeutes de Moradabad en 1980. Olsson (2016) montre que

[31] « Les pays d'Afrique subsaharienne dont le niveau d'ouverture commerciale est supérieur à la médiane ont moitié moins de chance de faillir par rapport aux pays situés sous la médiane » (Gurr, Harff, Levy, Dabelko, Surko et Unger, 1999), traduit par l'auteur.

des changements exogènes sur les conditions climatiques au Darfour (comme l'apparition d'une grave sécheresse) ont mené à un effondrement des liens commerciaux puis à l'apparition de conflits violents entre fermiers et éleveurs.

2.5 Les rôles de la cohésion sociale

2.5.1 Les indices de polarisation et de fractionnalisation

La question de l'échelle d'analyse est au cœur des travaux sur le lien entre la cohésion sociale (*i.e.* le vivre ensemble harmonieux) et le risque de conflit. Les données agrégées à l'échelle nationale ne permettent de comprendre qu'une petite partie de cette relation tandis qu'une approche à une échelle plus locale nécessite une division de la société en sous−groupes pertinents mais difficiles à déterminer.

Les travaux empiriques approchent souvent la notion de cohésion sociale par l'ethnicité des agents. En effet la science politique et la sociologie considèrent que les différences ethniques créent des lignes de division naturelles entre les individus. Ces dernières seraient une source « naturelle » de tensions (théories primordialistes) ou seraient sées par des leaders communautaires qui cherchent à acquérir un accès à des ressources politiques ou économiques (théories instrumentalistes). Les individus qui ont les mêmes caractéristiques partagent aussi les mêmes préférences ; ils ont donc tendance à rester entre eux car ces liens profonds facilitent la coordination de groupe.

Les travaux empiriques considèrent principalement deux types de mesures de la diversité ethnique : la polarisation et la fractionnalisation ethnique, religieuse et/ou linguistique (Esteban et Ray, 1994; Montalvo et Reynal−Querol, 2005). Le niveau de fractionnalisation est une mesure de la probabilité que deux individus sélectionnés aléatoirement dans une société appartiennent à deux groupes sociaux différents ; plus le nombre de groupes (ethniques, religieux ou linguistiques) dans une société est grand, plus il augmente. Une forte fractionnalisation a deux effets supposés sur le risque de conflits : d'un côté, elle augmente les tensions basées sur la religion, l'ethnie ou la langue entre groupes d'individus proches géographiquement ; de l'autre, elle réduit la taille moyenne des groupes et complique donc l'organisation de ces derniers en groupes rebelles. Comme le soulignent Montalvo et Reynal−Querol (2005), de nombreux travaux empiriques ne trouvent pas de relation entre le niveau de fractionnalisation et le risque de conflit civil (Fearon et Laitin, 2003 ; Collier et Hoeffler, 2004 ; Montalvo et Reynal−Querol, 2005 ; Hegre et Sambanis, 2006). En effet, la relation entre la diversité ethnique et le risque de conflit n'est pas monotone.

D'un côté, la diversité ethnique augmente la cohésion sociale et diminue le risque de conflit (*i.e.* effet intragroupes) ; de l'autre, elle augmente les tensions entre groupes aux caractéristiques différentes (*i.e.* effet intergroupes). Il y a moins de violence dans les sociétés fortement hétérogènes et fortement homogènes et davantage de violence dans les sociétés où une seule minorité ethnique fait face à un groupe ethnique majoritaire (Montalvo et Reynal−Querol, 2005). Les indices de polarisation permettent de tenir compte de cela (Esteban et Ray, 1994 ; Montalvo et Reynal−Querol, 2005). En effet, la polarisation augmente lorsqu'il y a peu de larges groupes sociaux de même dimension[32]. Elle est maximale lorsqu'il y a uniquement deux groupes d'individus de même taille. Dans ce cas, elle suppose que les deux groupes sont suffisamment différents pour que des tensions apparaissent et suffisamment grands pour entrer en conflit. Malgré tout, les concepts de fractionnalisation et de polarisation ne doivent pas être conçus comme opposés mais plutôt comme complémentaires. Comme le montrent Esteban, Mayoral et Ray (2012), la polarisation expliquerait mieux les conflits dont les gains sont de nature publique (par exemple, la suprématie idéologique ou religieuse, ou le pouvoir politique) et la fractionnalisation expliquerait mieux les conflits pour des gains privés (comme la capture de ressources pétrolières ou minières).

Bien que ces deux concepts soient importants pour comprendre comment la cohésion sociale influence le risque d'apparition de conflits, ils restent complexes à intégrer au sein d'analyses empiriques désagrégées. En effet, en dehors des questions ethnologiques relatives aux méthodes de classification des groupes ethniques (par exemple en termes de proximité linguistique), ces indices sont surtout limités par le fait qu'ils sont agrégés à l'échelle nationale avec très peu de variabilité dans le temps. Tels qu'ils sont utilisés aujourd'hui, ils ne permettent donc pas une analyse locale des interactions entre les groupes ethniques d'un même pays (voir **Annexe A4**).

Comprendre les enjeux locaux de la cohésion sociale demande de définir quels sont les groupes les plus adaptés pour mettre en avant les clivages culturels, c'est−à−dire les différences en matière de valeurs, normes et attitudes (Desmet, Ortuño−Ortín et Wacziarg, 2012). Pour cela, il est important de comprendre l'origine de ces antagonismes parfois très anciens. À partir de données d'enquêtes, (Desmet, Ortuño−Ortín et Wacziarg, 2012) trouvent que des clivages linguistiques datant de plusieurs milliers d'années ont encore aujourd'hui un impact significatif sur le risque de conflit. Arbatli, Ashraf et Galor (2020) ajoutent que l'émergence, la prévalence, la récurrence et la sévérité des conflits intra−étatiques

[32] Par rapport à la seule dominance ethnique, la polarisation ethnique ajoute l'idée que le groupe minoritaire est large et non divisé.

modernes s'expliquent par la diversité génétique déterminée durant l'exode des hommes d'Afrique il y a des dizaines de milliers d'années. Ils montrent que cette diversité génétique contribue à la fragmentation ethnolinguistique et à l'hétérogénéité des préférences pour les biens publics. Selon eux, la polarisation ethnolinguistique et la diversité génétique auraient des effets complémentaires sur l'incidence des conflits.

Parce que les clivages culturels précédent généralement la création des États, il leur arrive de dépasser le tracé des frontières nationales et d'être davantage « visibles » à une échelle régionale. Ainsi, la partition d'ethnies africaines autour de frontières tracées arbitrairement au moment de la colonisation influence encore aujourd'hui le risque de conflit sur ce continent (Michalopoulos et Papaioannou, 2016). Les foyers ethniques qui ont été partitionnés ont plus de chance de connaître des interventions militaires de pays adjacents, des conflits opposant des groupes rebelles au gouvernement ainsi que des violences contre les civils. Cette partition affecte aussi négativement leurs patrimoines, leurs accès aux services et leurs résultats scolaires. Comme l'indiquent de nombreux historiens africains, les groupes divisés sont davantage discriminés par les gouvernements et auront donc plus tendance à s'engager dans des rébellions.

2.5.2 Les inégalités horizontales

L'idée que les inégalités influencent le risque de conflit a été largement développée par les sciences politiques, particulièrement par Ted Gurr (1970) à travers le concept de « frustration relative » (plus connu en anglais sous le nom de « relative deprivation »)[35]. Il définit la frustration relative comme la perception par les acteurs d'écarts entre leurs attentes (*i.e.* les biens et les conditions de vie qu'ils estiment mériter) et leurs capacités (*i.e.* les montants de ces biens et des conditions de vie qu'ils pensent être capables d'obtenir et de garder) ; plus la frustration relative d'une population est importante, plus la magnitude du conflit est grande. Dans les années 1970, l'idée que les conflits sont liés aux inégalités perçues et au sentiment d'injustice a fait émerger un grand nombre de travaux économétriques aux conclusions diverses et contradictoires. Au−delà des limites propres aux données et méthodes statistiques de l'époque, ces travaux sont surtout critiqués aujourd'hui pour n'avoir envisagé que la dimension individuelle (dite aussi verticale) des inégalités. Le risque d'apparition de conflits n'est pas lié aux inégalités

[35]Outre la frustration relative, deux autres éléments sont nécessaires à analyser, selon Gurr, pour comprendre l'origine des mouvements de protestation et de rébellion : les arguments ou les croyances des individus sur le caractère justifié et utile de l'action politique et l'organisation des individus par rapport à la capacité du gouvernement à les réprimer. Elle montre que la polarisation sociale et les inégalités sociales horizontales sont positivement liées à la survenue de conflits. Les variables de pure polarisation ethnique, d'inégalités interindividuelles et de polarisation ethnico−socio−économique ne sont pas significatives.

entre individus mais à celles qui se développent entre groupes (appelées aussi inégalités horizontales). En effet, lorsque les ressources et le pouvoir sont inégalement distribués entre des groupes sociaux (qui se différencient déjà par d'autres critères tels que la religion, l'ethnie ou le langage), des conflits peuvent survenir puisqu'un groupe se sent discriminé et/ou un autre craint de perdre ses privilèges. Lorsque des inégalités socio−économiques systématiques coïncident avec des clivages ethniques, religieux ou linguistiques, cela renforce la cohésion entre les individus relativement désavantagés. Ils peuvent donc surmonter les problèmes d'action collective qui les empêchaient initialement de coopérer du fait de suspicions mutuelles. C'est parce que cette identité partagée est associée à des motifs de mécontentement (*i.e.* les inégalités) que les individus sont incités à rejoindre des groupes armés.

Intégrer le concept d'inégalités horizontales au sein de travaux empiriques est une tâche aujourd'hui encore complexe. Tout d'abord, elle est gravement limitée par le manque de données, même si une approche intéressante consiste à agréger des données disponibles à une échelle inférieure (lorsqu'elles sont elles−mêmes disponibles). À partir de micro−données du Demographic and Health Surveys (DHS), Ostby, 2008 construit, par exemple, des macro−indicateurs agrégés de polarisation et d'inégalités horizontales (*i.e.* inégalités entre les deux groupes ethniques les plus importants) par rapport à des dimensions économiques et sociales[18]. De même, Mitra et Ray, 2014 utilisent des données d'enquête ménage pour composer des mesures de la richesse de deux groupes ethniques (les hindous et les musulmans) à l'échelle de régions indiennes. Cette technique leur permet d'étudier l'effet de différences de revenus au niveau de ces deux groupes sur les conflits qui les ont opposés. Intégrer le concept d'inégalités horizontales est aussi complexe car, comme pour toute mesure de cohésion sociale, il est difficile de déterminer à l'échelle de quels groupes l'analyse est la plus pertinente. Alors que les inégalités horizontales sont par définition multidimensionnelles, les enjeux de pouvoir entre groupes (la polarisation) ne sont souvent mesurés que selon une unique dimension telle que l'ethnicité (Montalvo et Reynal−Querol, 2005) ou le bien−être économique (Esteban et Ray, 1994). Elles ne sont donc pas capables de prendre en compte d'autres clivages importants comme ceux entre groupes urbains et ruraux, ou définis à une échelle supranationale comme ceux entre groupes régionaux (Fedorov, 2002).

2.6 Conclusion

Les conflits civils sont des événements destructeurs et complexes car ils trouvent leurs racines auprès d'acteurs, de structures et de processus présents à différents niveaux. Leurs causes locales considèrent les relations que les individus entretiennent avec leur contexte politico−géographique immédiat ; elles concernent par exemple les enjeux de financement et de création des groupes armés. Leurs causes nationales se retrouvent dans les questions relatives au pouvoir de l'État et de ses institutions ; leur contrôle du territoire, leur souveraineté judiciaire et leur capacité financière sont des facteurs essentiels à la compréhension des conflits. De la même manière que leurs conséquences se propagent dans le temps et l'espace, les causes des conflits ne se limitent pas aux frontières nationales d'un pays et proviennent parfois de dynamiques et d'acteurs présents à l'échelle régionale ou mondiale. Comprendre les causes des conflits dans leur globalité est donc une tâche particulièrement difficile, d'autant plus que les frontières entre toutes ces dimensions sont poreuses.

La conception économique du conflit civil repose sur les concepts d'individualisme méthodologique et de choix rationnels. Elle considère que les agents sont opportunistes et que leur niveau de revenu (mécanisme du coût d'opportunité), l'importance du gain issu d'un potentiel conflit (mécanisme du gain issu de la capture de l'État) et les capacités de l'État à se défendre et à contrôler l'opposition (mécanisme des capacités de l'État) sont à l'origine des comportements de prédation. Ces trois mécanismes fournissent des conditions favorables à la construction de groupes rebelles et au combat et sont essentiels à la démarche d'inférence causale. Parce qu'ils agissent en interaction les uns avec les autres à l'échelle locale et nationale, ils sont difficilement approchables par des analyses à l'échelle pays/années. Les avancées en matière de collecte de données automatisée, de Systèmes d'informations géographiques (SIG) et de géolocalisation des conflits permettent d'adopter des approches capables de mettre en avant les micro−fondations des conflits modernes. Ce passage à une échelle plus fine permet également de redéfinir l'objet d'étude en le recentrant autour d'événements indépendants d'une définition complexe et débattue du conflit civil.

L'usage de données désagrégées a permis de répondre à plusieurs limites statistiques auxquelles les travaux à une échelle pays/années ont longtemps été confrontés sans pouvoir apporter de réponse convaincante. En permettant de comparer un grand nombre de microcellules d'une cinquantaine de kilomètres carrés, elle a permis de limiter le problème de variables omises et d'hétérogénéité inobservée

qui compliquait la compréhension du rôle des ressources naturelles dans l'émergence des conflits. Elle a également permis de revoir le lien entre la pauvreté et le risque de conflit en limitant le problème d'endogénéité qui lui est associé. Le passage à une analyse locale des conflits, associée à une plus grande disponibilité des données climatiques, ouvre également des pistes très prometteuses pour la compréhension du rôle du changement climatique dans l'apparition de conflits civils.

Néanmoins, d'autres dimensions des conflits nécessitent encore d'être éclaircies. En effet, ces derniers n'apparaissent pas de manière indépendante au phénomène de globalisation et ils sont profondément liés à la manière dont les groupes sociaux se forment et restent cohérents. Ces enjeux vont au−delà des dimensions locales et nationales et la compréhension des causes des conflits ne peut s'envisager sans leur prise en compte. Malgré tout, il est important de rappeler la jeunesse de cette littérature. En effet, les apports de l'économétrie dans l'explication des causes des conflits sont largement dépendants des évolutions dans les méthodes de collecte de données. Les bases de données sur les conflits n'ont émergé que récemment et l'importance du nombre de travaux sur ce sujet indique, avant tout, un intérêt important des chercheurs pour cette question. Aujourd'hui, l'usage du Big Data et de méthodes innovantes de télédétection commencent à peine à affiner les conclusions de ces travaux en passant d'échelles pays/années à des analyses de régions ou de cellules par mois ou même par jour. De même, les chercheurs commencent tout juste à considérer les conflits actuels comme la conséquence de clivages profonds et anciens ayant affecté à long terme l'organisation des sociétés.

2.7 Annexes du Chapitre 2

Tableau A1: Typologie des événements répertoriés dans la base de données Acled

Références et modèles	Hypothèses	Résultats	Variable dépendante
Fearon et Laitin [2003] Panel Logit 1945-1999 161 pays (avec une population > 500 000 personnes en 1990)	**H1 : Motivation = conditions inhabituelles fournissant l'opportunité de construire une organisation rebelle (avidité).** H1a hausse des financements : baisse du coût d'opportunité de rejoindre un groupe armé et donc plus grand nombre de combattants. H1b avantage technologique : meilleure connaissance des populations/terrains difficiles, donc faible risque de dénonciation et capacités de l'État relativement inférieures. H1c fragilité de l'État : baisse des capacités militaires étatiques (proxy de la force de l'État = revenus par tête), donc meilleure force de combat relative des insurgés. **H2 : motivation = ressentiments (diversité ethnique/absence de démocratie et de libertés civiles)**. La diversité ethnique/religieuse (*i.e.* fractionnalisation ethnique/ religieuse, domination ethnique, diversité linguistique) implique davantage de discrimination étatique ou sociétale basée sur la culture.	**Les individus sont « avides » et l'État est fragile.** H1 > H2 H1c > H1a et H1b H1c (+ population forte + instabilité politique) > H2	**Déclenchement de nouvelles guerres civiles/ an** État/rebelles But = pouvoir ou terres Min. 1 000 morts/conflit avec min de 100 morts/an Min. 100 morts de chaque côté Source : auteurs.

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Fearon [2005] 1960-1999 Panel Logit 161 pays	**Comment les exportations de matières premières impactent-elles le risque de conflit ?** H1 mécanisme de Collier et Hoeffler [2004] : « meilleurs opportunités de financements pour les rebelles » Limites selon Fearon [2005] : • données qui ne contiennent pas les pierres précieuses/ production de drogue. • elles contiennent les cultures commerciales/ production de pétrole dont l'appropriation nécessiterait le contrôle du système national de production et de distribution. • ces exportations impactent également les revenus de l'État (d'autres mécanismes sont en jeu). H2 mécanisme de Fearon et Laitin [2003] : « gains issus de la capture de l'État supérieurs ». Les pays exportateurs de pétrole ont des institutions particulièrement fragiles.	**Mécanisme de Fearon et Laitin [2003] plus robuste que celui de Collier et Hoeffler [2004]**	**Déclenchement de nouvelles guerres civiles/5 ans** État/rebelles But = pouvoir ou terres Min. 1 000 morts/conflit Min. 1 000 morts/an Min. 5 % morts de chaque côté Sources : Collier et Hoeffler [2004] et COW

Source : auteure.

Tableau A2: Ressources naturelles et conflits

Références et modèles	Hypothèses	Principaux résultats	Variable dépendante
Lujala, Gleditsch et Gilmore [2005] 1945-1999 Panel Logit 161 pays	**Facilité d'extraction des ressources naturelles** D1 : diamants primaires (difficiles à extraire). Hausse du gain issu de la capture de l'État et potentiel pouvoir répressif supérieur. D2 : diamants secondaires (faciles à extraire). Financent les groupes armés et diminuent le coût d'opportunité de rejoindre la rébellion. Fractionnalisation : améliore la cohésion sociale et répond au problème d'action collective.	**Découverte de gisements :** absence d'effet. **Production et conflits civils** Déclenchement : absence d'effet. Durée : D1 : absence d'effet ; D2 : effet positif dans les pays ethniquement hétérogènes. **...conflits ethniques** Déclenchement : D1 : effet négatif ; D2 : effets positif dans les pays ethniquement hétérogènes. Durée : D1 : effet négatif ; D2: effet positif (surtout dans les pays pauvres).	**Déclenchement de nouveaux conflits/an** Binaire État/rebelles But = pouvoir ou terres Min. 1 000 morts/conflit avec min. de 100 morts/an Min. 100 morts de chaque côté Source : Fearon et Laitin [2003].
De Soysa [2002] 1989-1999 Panel Probit 138 pays	**Abondance et pénurie de ressources naturelles** H1a abondance : les ressources naturelles fournissent des opportunités de financement aux groupes armés. H1b pénurie : pression malthusienne (rôle de la taille/densité de la population). H2 identité commune : les différences ethniques et religieuses augmentent les tensions (primordialisme ou instrumentalisme). Bonne gouvernance : réduit le risque de conflit (proxy : commerce total/ PIB).	H1a valide uniquement pour les ressources minérales. H1b : peu de preuves. H2 valide en cas d'homogénéité religieuse. Une forte population et une faible ouverture commerciale augmentent le risque de conflits, peu importe l'abondance en ressources.	**Déclenchement de nouvelles guerres civiles/ an** État/rebelles But = pouvoir ou terres Min. 1 000 morts/conflit Min. 25 morts/an Min. 5 % morts de chaque côté Sources : Collier et Hoeffler (2004), COW.

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	Ouverture commerciale : réduit le risque de conflit (meilleures capacités des gouvernements, réduction du coût d'opportunité d'entrer dans un groupe armé, bon indicateur du degré de spécialisation économique requérant un haut niveau de contrats entre l'État et la population). Forte population : augmente le risque de conflit (réduit la taille du gouvernement et l'ouverture commerciale). Homogénéité religieuse : augmente le risque de conflit (diminue la séparation entre l'État et l'Eglise et réduit les capacités de l'État).		

Source : auteure.

Tableau A3: Chocs exogènes et conflits

Références et modèles	Hypothèses	Résultats	Variable dépendante
Angrist et Kugler [2008] 1992 – 2000 Panel, doubles différences Logit 12 régions productrices de Colombie	**Effets de la hausse des prix de la coca sur la violence en Colombie** H1 coût d'opportunité : de meilleurs revenus diminuent la pauvreté et augmentent le coût d'opportunité d'entrer dans un groupe armé. H2 gains supérieurs issus d'un conflit d'accaparement : de meilleurs revenus ruraux représentent une nouvelle source de revenus pour l'État (taxation). Mais, parce que l'État colombien est « faible », cette manne est captée par les groupes paramilitaires et les guérillas.	H2 > H1 **La hausse des revenus n'a pas réduit les conflits civils mais les a augmentés.** Pas d'amélioration générale du niveau de vie dans les zones productrices (pas d'effets de spillover).	**Taux de décès violents** (homicides, suicides, autres) par tranche d'âge, département et année. Sources : Colombian national statistical agency, DANE.
Bazzi et Blattman [2014] Logit (simple et effets fixes) Modèle de probabilité linéaire EF (maximum de vraisemblance) 1957-2007 65 commodités légales Pays : issus d'Afrique, Moyen- Orient, Amérique du Sud, Asie (moins pays dont la population < 1 million de personnes)	**Effets d'une chute du prix des exportations** H1 revenus des ménages : effet direct des biens intensifs en travail (agriculture) ; effet indirect inférieur des biens intensifs en capital (produits miniers et pétrole). H2 revenus de l'État : hausse du gain issu de la capture de l'État ; hausse de la force de l'Etat dans la lutte contre l'insurrection. *Nb. : variable de choc des prix annuel sur les exportations = différence annuelle pour chaque pays du Logarithme (index prix exportations = moyenne géométrique du prix de toutes les commodités à l'exportation pondérée par la part des exportations décalées).*	**Déclenchement** : absence d'effet. **Durée/intensité** : une hausse du prix de toutes les classes de commodités (même prix pétroles/ressources minière) diminue la durée et l'intensité des conflits. **Mécanisme « gains issus de la capture de l'État » : peu probable** **Mécanisme « capacité de l'État » : probable.** **Mécanisme « coût d'opportunité » : possible, mais relation moins importante qu'avec la capacité de l'État.**	**Déclenchement** Indicateur égal à 1 l'année où un nouveau conflit apparait ; les années suivantes sont codées 0 ou supprimées. **Durée** Indicateur égal à 1 les années où un nouveau conflit apparait ainsi que les années où un conflit est en cours. **Intensité du conflit** Nombre de décès Sources : UCDP/Prio ; COW

Source : auteure.

Tableau A4: Diversité ethnique et conflits

Références et modèles	Hypothèses	Résultats	Variable dépendante
Montalvo et Reynal-Querol [2005] 1960-1999 (périodes de 5 ans) Panel Logit 138 pays	**Faut-il mieux mesurer la diversité par un indice de fractionnalisation ou de polarisation ?** Impact de la diversité sur risque de conflits non linéaire : relation en « U » inversé. La dominance ethnique augmente le risque de conflits.	**L'indice de polarisation est plus adapté car il inclut le concept de dominance ethnique.**	**Nombre de conflits d'intensité intermédiaire à forte /** 5 ans (min. 25 morts / an ; min. 1 000 morts au cours du conflit). Sources : PRIO, PRIOCW et PRIO1000
Østby [2008] 1986-2004 Panel Logit 36 pays	**Quel est l'impact des inégalités horizontales ?** H1 revendications : des gains futurs supérieurs en biens publics (*i.e.* meilleure répartition des richesses) augmentent la probabilité de conflit. Des inégalités économiques et sociales horizontales (*i.e.* de groupe) augmentent le risque de conflit civil. H2 Identité commune : la polarisation ethnique, économique et sociale augmente le risque de conflit civil.	**Les inégalités sociales** **...verticales :** absence d'effet. **...horizontales et/ ou la polarisation sociale :** augmentent la cohésion de groupe et les ressentiments parmi les plus défavorisés. Cela facilite la mobilisation et augmente le risque de conflit.	**Nombre de nouveaux conflits civils chaque année** (min 25 morts/ an ; 2 ans entre conflits récurrents ; années consécutives de conflit non codées). Source : PRIO

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Esteban, Mayoral et Ray [2012] 1960-2008 (par périodes de 5 ans) Panel Logit 138 pays	**Faut-il mieux mesurer la diversité par un indice de fractionnalisation, de polarisation ou de différences entre groupes ?** H1 : l'impact de la diversité sur l'intensité des conflits est une combinaison linéaire des 3 indices. H2 : l'importance de chaque indice dépend du niveau de cohésion entre les groupes impliqués dans le conflit et de l'importance relative des biens publics et privés dans les gains issus du conflit (proxy des préférences des individus pour les biens publics ou privés = distance linguistique entre deux groupes). H2a polarisation : influence l'intensité de conflits pour les biens publics lorsque la cohésion est forte. H2b fractionnalisation : influence l'intensité de conflits pour les biens privés lorsque la cohésion est forte. H2c différences entre groupes : influence l'intensité des conflits lorsque la cohésion est basse.	**Forte polarisation et faible différences entre groupes :** hausse de l'intensité des conflits (rôle important de la cohésion de groupes). **Fortes polarisation et fractionnalisation:** les conflits pour les biens publics et pour les biens privés sont importants. **Forte polarisation :** les conflits pour les biens publics sont les principaux composants des tensions sociales.	**Intensité des conflits :** variable binaire PRIO25. Source : PRIO.

Source : auteure.

2.8 Références du Chapitre 2

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Chapitre 3

POLITICIZATION OF RELIGION AND TIMING OF POLITICAL CONFLICTS. EMPIRICAL EVIDENCES FROM JOHN PAUL II'S INTERNATIONAL TRAVELS

3.1 Introduction

There is an ongoing debate among conflict scholars on the link between internal conflicts and the diversity of religious groups within the population. Several publications suggest that some religious structures can inevitably maintain violent political competition taking the form of revolutions, revolts and social unrest in general (Esteban and Ray, 1994; Collier and Hoeffler, 2000; Fearon and Laitin, 2003). Empirical evidence that religious heterogeneity at the state level influences the risk of conflict is, at best, mixed (Montalvo and Reynal-Querol, 2005; Cederman and al., 2010) and recent work suggest that the religious identity only increases the risk of conflict when it is politicized (Basedau and al., 2011; Isaacs, 2016). The religious diversity variables used in the literature, such as polarization[1] and fractionalization[2] indices, generally show little variation over time. As a result, they coarsely account for defined periods when religious identities are politicized. One solution is to find an event that constitutes an external shock on the

[1] i.e. the presence of a large minority group and a large majority one.
[2] i.e. the number of competing groups.

political salience of religious issues. Papal travels are brief international visits of the supreme authority of the Catholic Church. They are an important tool for Vatican peace diplomacy because they help to maintain relations with the Catholics, religious leaders and policy makers all around the world (Huntington, 1993). Between 1978 and 2005, Pope John Paul II was involved in a record number of 118 international voyages in an heterogeneous set of developing and transitioning countries (Barbato, 2013). In this article, we approach Pope John Paul II's papal visits as politico-religious shocks on the political salience of the Catholic identity. We then explore their impacts on the risk of political conflict in host countries depending on their religious structure. The empirical methodology uses information on the timing of each Papal travels to estimate impulse response functions of the effect of the visits on the risk of political conflict in subsequent years. It accounts for time-varying country characteristics through control variables, and correct for the potential endogeneity of the timing of Papal visits through inverse probability weighting.

By examining papal travels, this article also explores the efficiency of one of the many ways in which external religious leaders are still involved in world peace. Indeed, over the past twenty years, the international community has increasingly recognized and called on the capacity of faith actors to resolve and prevent conflicts with a religious dimension though education of the parties, trauma healing, ideas dissemination, and interfaith dialogue (Karam, 2016; Totta and Wilkinson, 2019). The idea that religious leaders can prevent or even stop violence involves strong claims on the significance of their influence, their lack of hidden political agenda, or on the trust and credibility they enjoy in their communities (Bercovitch and Kadayifci-Orellana, 2009). Because many of these assumptions are linked to the transcendent and hardly measurable dimension of religiosity, faith leaders' peacebuilding activities don't receive a lot of attention in quantitative works of conflict economics. Furthermore, actions like multi-faith dialogue are not considered a priority because no empirical evidence show that conflicts involving parties from different religious groups are harder to settle (Svensson, 2007). While this article does not attempt to address the effect of papal visits on interfaith tensions in general, it does provide information concerning the political form such conflicts can take when they involve the state power.

Our results indicate that the 118 foreign travels of Pope John Paul II in developing countries have on average a significant negative effect on the risk of conflict which persists over a four-year horizon. However, they also generate a temporary increase in the risk of conflict during the two years following a visit for countries combining a high level of religious polarization and a large proportion of Catholics in their population. These results are robust to a variety of modifications to our data and empirical specification.

They suggest that an external religious leader can influence the risk of political conflict and provide clarity as to where and when religious polarization can lead to violent episodes of political destabilization. Consistent with recent literature, we find that religious polarization only increases the risk of political conflict during times when identities are politicized. We add that this effect can take the form of a brief adverse shock over the next two years.

This study contributes in several ways to the literature on the religion/conflict nexus. First, this case study provides a detailed analysis of the effect over time of politico-religious shocks on the risk of political conflict, therefore contributing to the debate on the role of religion as a structural causes of political conflicts. Second, this study brings some clarifications on the impact of religious leaders in the area of peacebuilding by focusing on one of the most prominent peace mediators of the 20th century. For its purpose, we have developed a new database on the duration and destination of papal journeys, as well as on the nationality, age and date of appointment of the members of the College of Cardinals. It is, to our knowledge, the first empirical analysis of the effects on conflicts of the international travels of Pope John Paul II. Finally, several political science studies focus on the motivations and consequences of visits by foreign heads of state (Malis and Smith, 2020), but little attention has been paid to the case of "theocratic" visits where the guest is both a head of state and a religious leader (Goldstein, 2008). By analyzing the effects of theocratic visits on political contestation, this article is also linked to political science works on the consequences of diplomatic visits.

The remainder of the paper is structured as follows. Section 2 presents the theoretical motivations and contextual elements behind this study. Section 3 describes the main data and provides descriptive statistics on papal travels. Section 4 presents a baseline analysis of the correlations between papal travels and political conflicts, highlighting the main empirical challenges and the estimation strategy we use to address them. Section 5 presents the main findings. In Section 6 we propose some robustness checks and we conclude in Section 7.

3.2 Theoretical Motivations and Contextual Elements

3.2.1 Background information on papal travels

The Holy See is the name given to the government of the Catholic Church, which is ruled by the Bishop of Rome (i.e., the Pope). After the Lateran Treaty of 1929, the Holy See ceased to have military interests

in the protection of its territory (i.e. the Vatican)[3]. Its foreign policy is oriented toward the establishment and preservation of international peace as a common good of humanity[4] and rejects the concept of "just war" (Appleby, 2000a; Matlary, 2001)[5]. On October 1965, Pope Paul VI promulgated Nostra Aetate, the Declaration on the Relation of the Church with Non-Christian Religions of the Second Vatican Council. This declaration contradicts the previous Catholic doctrine toward non-Christian religions. It insists on the importance of religious freedom and on the universal brotherhood stemming from common spiritual values between religions. Since 1964, the Holy See is a permanent observer to various international peacekeeping organizations (including the General Assembly of the United Nations and the Council of Europe) and frequently asked to mediate and facilitate peace negotiations (Appleby, 2000a; Matlary, 2001; Troy, 2018). According to the Pastoral Constitution of 1965, the Holy See's foreign actions are independent of special interests and political alliances.[6]

In the world's geopolitical arena, the Catholic Church is a non-state actor and papal travels are a way for the head of the Church to engage with a global audience and maintain a credible position on international issues of interest or concern for the Church (Lynch, 2019). During John Paul II's papacy, papal travels became the main diplomatic instrument for the Holy See to promote peace and generate a dialogue between the Church and other religions.[7] This papacy was long (22 years) and marked by many travels in numerous countries (118 travels in 102 countries). At the end of his papacy, John Paul II had visited more countries than all his predecessors combined. Maybe because most of the countries and regions he visited were hosting a Pope for the first time, these events gathered a wide audience and lots of media coverage. The speeches, masses and public appearances of Pope John Paul II regularly attracted

[3]The Holy See has not engaged in any war since 1929. Also, acts of repentance for its past involvement in religious and political wars have been carried by Pope John Paul II. Indeed, the Vatican is involved in wars for the control of the Holy Land between 1096 and 1291.

[4]The Holy-See's foreign policy aims at protecting Christians and promotion of justice, peace and civil liberties independently of religious affiliations (Appleby, 2000a).

[5]In the encyclical Fratelli Tutti, Pope Francis writes "We can no longer think of war as a solution, because its risks will probably always be greater than its supposed benefits. In view of this, it is very difficult nowadays to invoke the rational criteria elaborated in earlier centuries to speak of the possibility of a 'just war.' Never again war!"

[6]As stated in the Pastoral Constitution on the Church in the Modern World (Gaudium and Spes) promulgated by Paul VI on December 7, 1965: "*It is very important, especially where a pluralistic society prevails, that there be a correct notion of the relationship between the political community and the Church, and a clear distinction between the tasks which Christians undertake, individually or as a group, on their own responsibility as citizens guided by the dictates of a Christian conscience, and the activities which, in union with their pastors, they carry out in the name of the Church. The Church, by reason of her role and competence, is not identified in any way with the political community nor bound to any political system.*"

[7]During the close of the Great Jubilee of the Year 2000, John Paul II wrote in the apostolic letter Novo Millennio Ineute: "*In the climate of increased cultural and religious pluralism which is expected to mark the society of the new millennium, it is obvious that [interreligious] dialogue will be especially important in establishing a sure basis for peace and warding off the dread spectre of those wars of religion which have so often bloodied human history.*"

gigantic crowds that sometimes exceeded one million attendees.[8]

Pope John Paul II visits to Poland illustrate the soft power the Church holds in world affairs. Indeed his critiques of communism during visits to his native country are considered by many authors as a crucial element in the downfall of the Soviet Union (Huntington, 1993; Appleby, 2000a). Pope John Paul II's travels take place at a key time for the link between religion and politics. After World War II and independence, most developing countries adopted a political framework based on the concept of nationalism and either liberal, communist, fascist or socialist political regimes (Fox, 2004). During the 1980s, many regimes were affected by a crisis of legitimacy in the face of gaps perceived by the populations between reality and the promises kept in terms of social justice and economic development (Appleby, 2000b; Fox, 2004). This crisis generated a return to religion as the (already known and acceptable) basis of the political model (Fox, 2004). Huntington (1993) suggests that Pope John Paul II's travels are key elements in the democratization process of host countries because they coincide with or precede the political involvement of local churches in revolts against authoritarian regimes in Poland (June 1979, June 1983, and June 1987), Brazil (June-July 1980), the Philippines (February 1981), Argentina (June 1982), Guatemala, Nicaragua, El Salvador and Haiti (March 1983), Korea (May 1984), Chile, (April 1987), and Paraguay (May 1988). Nevertheless, the cases studied mainly concern countries where the population is predominantly Catholic, although more than half of his travels were made in countries where Catholics constitute less than 27% of the population.

3.2.2 Religious diversity: a factor of peace, conflict or both?

Adam Smith is among the leading contributors to the theory of religious markets. The starting point of this theory is that the funding of local religious leaders depends on voluntary contributions from their devotees and/or the allocation of funds according to the law of the country in which they are established. In *The Wealth of Nations* (1791), he defends the idea that the clergy's actions are motivated by personal interests (like secular producers) and constrained by market forces (like secular businesses).[9] Through

[8] His final mass during his travel to Manila in 1995 gathered more than 5 million people.

[9] "*The teachers of [religion] may either depend altogether for their subsistence upon the voluntary contributions of their hearers, or they may derive it from some other fund to which the law of their country may entitle them [...]. In this respect the teachers of new religions have always had a considerable advantage in attacking those ancient and established systems of which the clergy, reposing themselves upon their benefices, had neglected to keep up the fervour of faith and devotion in the great body of the people, and having given themselves up to indolence, were become altogether incapable of making any vigorous exertion in defence even of their own establishment. Such a clergy, when attacked by a set of popular and bold [...] feel themselves as perfectly defenceless [...] [and] have commonly no other resource than to call upon the civil magistrate to persecute, destroy or drive out their adversaries, as disturbers of the public peace.*", Smith (1791), 1049-50.

religious diversity, competition between religion teachers is expected to increase the level of religious tolerance and the "quality" of the religion product with regards to the preferences of the population, contributing positively to the economy as a whole. McCleary and Barro (2006) find empirical evidences that this competition has economic benefits. They find that an unusual productivity[10] of the religion sector is associated with higher economic growth.

The literature on conflict economics suspects religious diversity to increase the likelihood of government being challenged by groups with opposing political interests. Two interdependent theoretical channels are generally cited. Firstly, diversity is believed to be associated with frequent grievances against the state (Gurr and Harff, 1994) since social groups are more likely to perceive inequalities in treatment when public choices "deviate more from the preferences of the average individual as heterogeneity increases" (Collier and Hoeffler, 2004, p.572). Conflict in diverse society may arise because of the difficulty to reconcile the different demands of social groups for public good provision under scarcity.[11] Secondly, a mobilization channel linked to instrumentalist theories states that recruiting fighters from the same cultural group reduces the costs of rebellion because it is easier to create and maintain a rebel group's cohesion when its members share similar values, languages and faith (Olson, 1971; Tilly, 1978). If the mobilization costs are low, religious beliefs and practices can be exploited by opportunistic actors to motivate individuals to join a rebellion even in the absence of religious motives (Gurr and Harff, 1994; Huntington, 1996).[12] Yet, empirical evidence supporting both these theoretical relationships is mixed. Academics usually assume that cultural polarization (i.e. the presence of a large minority group and a large majority one) is the structure that intensifies the most hostilities because coordination costs are at their lowest (Horowitz, 1985; Esteban and Ray, 1994; Reynal-Querol, 2002, Montalvo and Reynal-Querol,2005). However, the literature usually finds that religious polarization is, at best, not a strong determinant of conflicts (Fearon and Laitin, 2003; Collier and Hoeffler, 2004; Montalvo and Reynal-Querol, 2005). Alesina and al. (2003) find that religious diversity, in the form of religious fractionalization and polarization, is actually associated with a better quality of governance (in terms of indicators such as the quality of public goods, corruption, regulations, or the level of education). They suggest that a high level of religious diversity can already be an indicator of a more tolerant and democratic form of government. Besides, where appropri-

[10] The religion sector's productivity is established by comparing the quantity of output (belief related to an afterlife) and the one of input (attendance).

[11] See Blattman and Miguel (2010) and Garfinkel and Skaperdas (2007) for a review.

[12] Historical example of political organizations strategically using religious rhetoric for mobilization can be find worldwide. For a review, see Isaacs (2016).

ate, other sources of social heterogeneity may be better suited to political competition because they are more divisive (Cederman and al., 2010; Basedau and al., 2011). Montalvo and Reynal-Querol (2005) find that religious diversity actually decreases the probability of a civil war conditional on a given degree of religious polarization. When indexes of ethnic polarization and religious polarization are added to their model, only the coefficient associated to the ethnic index is statistically significant. Also, Cederman and al. (2010) show that conflict with the government is more likely in societies where many representatives of an ethnic group are excluded from state power, especially if they experienced conflict in the past and have a high mobilizational capacity.

3.2.3 The politicization of religious identities and the timing of political conflicts

Recent work suggests that some forms of religious diversity like polarization only increases the risk of political conflict when religious identities are already politicized. This idea is linked to the mobilization mechanism presented above. Organizations' leaders can choose between different types of cultural or social identities to mobilize followers. In order to be part of the conflict, religion must be socially relevant (Basedau and al., 2011). Basedau and al. (2011) use indicators of discrimination and inter-religious tensions to assess the level of religious politicization in African countries. When religion is highly politicized, they find that religious polarization significantly increases the risk of religious conflict onset, while religious dominance[13] increases the risk of armed conflict onset. They consider that religion is more often politicized in countries where one religious group is dominant because it encourages coalitions between discriminated groups, providing them the possibility to credibly threaten the balance of power (while other religious structures would more easily either reach an agreement or silence the isolated and small minority groups) (Basedau and al., 2011, Basedau and al. 2016). For Isaacs (2016), previous empirical works on the effect of religion on violence have underestimated issues of measurement validity and endogeneity. He finds that the use of religious rhetoric by political organizations does not increase their likelihood of participating to violence. On the contrary, it is the past participation to violence by political organizations that increases the probability that they strategically adopt religious rhetoric. In other words, some organizations already involved in a violent political competition may instrument religious issues to serve their strategic needs (i.e., access to material resources and recruitment). The author there-

[13] A religious group is considered dominant when it represents more than 60% of the population; see Basedau and al. (2016) for a detailed discussion on this topic.

fore insists on the importance of using "*a temporally sensitive measure of religious mobilization capable of distinguishing between a sequence in which prior religious mobilization contributes to subsequent violence and one in which prior violence introduces strategic incentives for religious mobilization*" (Isaacs, 2016, pp. 214). Data on religious structures generally show little or no variation over time. They are therefore limited when it comes to analyzing changes in the politicization of religion according to the period considered. Indeed, some periods could be more conducive to religious politicization than others. For example, Iyer and Shrivastava (2018) show that religious riots in India benefit political parties, which may prompt them to provoke religious tensions during electoral periods. Freedman (2019) shows that Israeli rabbinical rhetoric influences local political behavior and responds to levels of violence in the Israeli-Palestinian conflict.

In host countries, papal visits can become part of local political debates since they involve official meetings of a Catholic authority with the religious and political leaders of a nation. If religious identities are politicized (i.e., the basis of pre-existing religious grievances against the government and, thus, political competition), political conflicts could ensue. Considering the global rise of religious nationalism during John Paul II's papacy (Fox, 2004) and reported cases of violent actions carried out by fundamentalist groups during his visits (for example during his travels in India in 1999, and in Greece in 2001), two types of political debates are possible. First, violent (organized) groups might fight the government over the place of Catholicism in society if it is this particular identity that is politicized. Papal visits can be seen as a government gesture to the local Catholic community. As such, this event can be seen as a source of "relative deprivation" (Gurr and Harff, 1994) against a government whose decisions benefit one group more than others (Collier and Hoeffler, 2004). Second, violent (organized) groups could fight the government about the place of religion in society. Indeed, since the Second Vatican Council, Papal visits can be associated with a struggle for democratic rights (including religious freedom) supported by the Church and local religious leaders (Appleby, 2000a). In both cases (i.e. whether Catholic identity is politicized alone or not), identified violent groups with political ambitions may use the papal visit to stir up rebellion, mobilize fighters and gain popular support on politico-religious issues.

However, if the Catholic identity is not politicized, papal travels could reduce or leave the risk of political conflict unchanged. Recent empirical work from Bassi and Rasul (2017) presents evidence that John Paul II's speeches significantly affect some religious beliefs (i.e. what people believe) and practices (i.e. the consequence of religious beliefs on people's actions) in their communities. They show that the

speeches he gave in Brazil in 1991 significantly influenced local fertility rate and fertility-related beliefs of Brazilian Catholics after his visit. Through their (potential) effects on religious freedom and tolerance, the inter-religious dimension of papal speeches or the local actions of religious leaders following papal travels could reduce the risk of conflict. However, these channels are only coarsely explored in this study as they would be in line our assumptions (see hypothesis 1 below) and would require detailed textual analysis of the papal discourses. In this article, the following hypotheses are tested:

Hypothesis 1: If the politicization of the Catholic identity is a source of political conflict, then the risk of conflict between the government and organized violent groups should be higher following a papal visit.

Hypothesis 2: If religious identities are more politicized in religiously polarized countries, then H1 should be stronger in societies that are polarized between the Catholics and another religious group.

Hypothesis 3: If religious identities are more politicized in countries where there is a dominant religious group, then H1 should be stronger in societies where Catholicism is the dominant religious identity.

Hypothesis 4: If political conflicts arise from a structural competition between religious groups for political power, then H1 should evolve regardless of previous changes in the political system.

3.3 Data

Our sample contains 128 developing and transitioning countries (as listed by the OECD before the end of the Cold War) over the period 1971-2005.[14] We analyze the case of 118 foreign visits that John Paul II undertook in 86 countries of our sample. In this section, we present our main variables (information on the control variables is presented in the empirical methodology section).

3.3.1 Political Conflicts

Our main political conflict variable is the incidence of formally organized internal armed conflict according to the UCDP-PRIO Armed Conflict dataset. It compiles information on violent events resulting from an incompatibility concerning the government (i.e. the type of political system, the replacement of the central government, or the change of its composition) or territory (i.e. secession or autonomy). It is a

[14] We extend our temporal coverage beyond the pontificate of John Paul II (October 16, 1978 -April 2, 2005) to take into account the history of conflict (Pope Paul VI did not travel between 1971 and 1978).

dummy variable taking the value 1 (0 otherwise) if at least one episode of internal conflict is reported in the country for a given year.

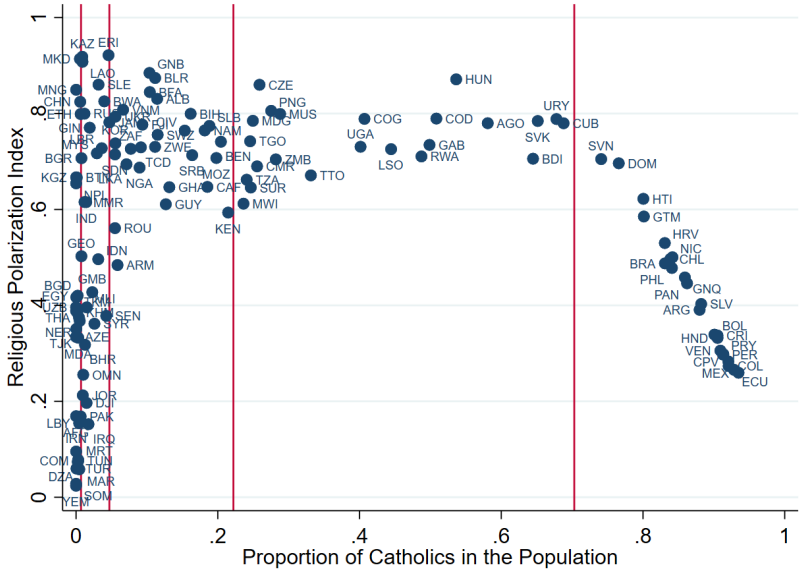
In its definition of an armed conflict, the UCDP-PRIO dataset use a 25 battle-related deaths a year threshold. Also, the UCDP-PRIO Armed Conflict dataset only deals with formally organized opposition. Smaller-scale political conflicts are therefore not taken into account. Social unrest episodes are a good proxy of civil discontent expressed in small acts of violence that challenge the state's monopoly on violence. As a second source of information on political conflicts, we use a variable indicating the total number of riots, assassinations, strikes and demonstrations in a country for a given year according to the Cross-National Time-Series Data Archive (Banks and Wilson, 2020).

3.3.2 Religious Structure

Empirical works generally use the polarization index of Reynal-Querol (2002) to analyze how the religious structures affect the risk of conflict. It defines, on a scale from 0 to 1, how close the religious structure is to a situation where 50% of the population belongs to one religious group and 50% to another. This index is relevant for models that make no assumptions about a particular religious group, but it may be misleading with respect to our research question which focuses on the case of Catholic communities. **Figure 1** presents a scatter-plot of the average level of religious polarization[15] compared to the average proportion of Catholics in the population for each country. It shows that both low and high levels of religious polarization can be observed in countries with a high or a low proportion of Catholics. For example, Mongolia ("MNG") presents a high level of religious polarization between the Buddhists and the animists (i.e. 0.85) while the Catholics represent less than 0.2% of the population. To take into account the religious structure, we use a categorical measure of the proportion of Catholics in the population using the World Religion Project Dataset (Maoz and Henderson, 2013). Each category is an interval created by the division of our sample according to four quantiles (i.e. 20% , 40% , 60% , and 80%). We present their characteristics in **Figure 3.1** and **Table 3.1**. Category zero (0) corresponds to contexts where there are few or no Catholics in the population. In this interval, the level of religious polarization is highly heterogeneous since there are countries that are highly polarized between other religious groups than the

[15]Index computed using the World Religion Project dataset and Reynal-Querol's polarization's formula: $P = 1 - \sum_{i=1}^{N} \left(\frac{\frac{1}{2} - \pi_i}{\frac{1}{2}} \right)^2 \pi_i$,where is the proportion of the population belonging to one of a N following religious groups: Catholics, Protestants, Anglicans, Orthodox, other Christians, Judaism, Islam, Buddhism, Zoroastrian, Hindu, Sikh, Shinto, Baha'i, Taoism, Confucianism, Jain, Syncretic and other religions.

Catholics. Category one (1) presents contexts where the Catholics are a small minority group (in absolute terms) with low influence on the level of religious polarization in the country. For categories two (2), three (3), and four (4), the proportion of Catholics is sufficiently large to influence the level of religious polarization. In category 2, Catholics are still a minority while in category 3 they become a majority group. Finally, category 4 describes countries where the Catholic community represents such a large part of the population that the literature describes them as "dominated" by the Catholics (i.e. other religious groups are rare).



Note: Red lines represent the four quantiles (i.e. 20%, 40%, 60%, and 80%); labels are ISO-3 country codes. *Source: Author's compilation using the World Religion Project Dataset.*

Figure 3.1: Average religious polarization and proportion of Catholics in the population (1971-2005)

Table 3.1: Description of the categories

Category	Proportion of Catholics		Religious Polarization		Conflicts	Observations
	Min	Max	Mean	Std. Dev.	Mean*	
0	0%	0.70%	0.321	0.273	0.253	759
1	0.70%	4.70%	0.555	0.255	0.239	759
2	4.70%	22.20%	0.722	0.095	0.161	759
3	22.20%	70.30%	0.748	0.073	0.157	760
4	70.30%	97.10%	0.42	0.175	0.206	760

*: from the political conflict risk index.
Source: Author's compilation using the World Religion Project Dataset.

3.3.3 Papal Visits

The variable of interest is a dummy variable indicating the year and destination of John Paul II's international travels. This variable is created using official information provided by the Holy See[16]. **Figure 3.2** compares the geographic destination and number of papal travels organized each year under the papacy of John Paul II (1978-2005) and his predecessor Pope Paul VI (1963-1978). It shows the high number of visits made during the papacy of Pope John Paul II compared to the one of his predecessor and the greater diversity of their destinations. Pope John Paul II regularly traveled to Africa and South America; travels to developing and transitioning European countries are also frequent after the end of the Cold War.[17]

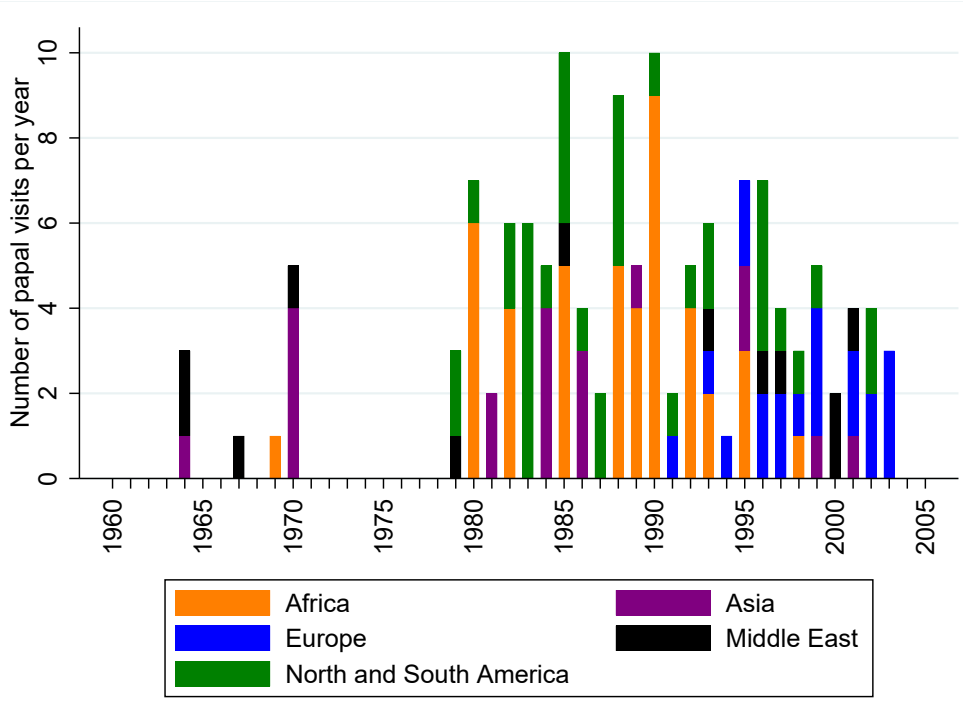
Table 3.2 presents additional information on visited and not-visited countries under the papacy of John Paul II. Although they experience, on average, a similar number of conflicts, visited countries experience more episodes of social unrest. Their political scores are also different and suggest that John Paul II tended to avoid autocracies although he visited some undemocratic regimes. Visited countries have diverse religious profiles but generally present a higher proportion of Catholics in their population. Finally, the GDP growth and GDP per capita measures are similar for both groups on average, suggesting that the Holy See did not select the visited countries based on their economic performances.

Table 3.2: Balance and characteristics of visited and not visited countries

	Visited (N=90)			Not Visited (N=38)			Balance	
	Mean	Variance	Skewness	Mean	Variance	Skewness	Std-diff	Var-ratio
Conflict Incidence	0.20	0.16	1.50	0.20	0.16	1.47	-0.01	0.99
Social Unrest	1.58	15.04	5.00	0.85	6.57	6.19	0.22	**2.29**
Polity2 Index	-0.06	48.18	0.11	-3.61	30.95	0.84	**0.56**	1.56
GDP Growth	3.43	107.01	2.09	3.42	160.94	1.30	0.00	0.66
GDP p.c. (log)	7.85	0.89	-0.04	7.77	0.91	0.39	0.09	0.97
Catholics (%pop)	0.36	0.12	0.57	0.06	0.03	4.32	**1.10**	**4.04**

Notes: "Visited" ("Not Visited") group contains N countries who have (not) hosted John Paul II. Imbalance (i.e. significant difference between groups) is characterized by a standard difference value greater than 0.25, and/or a ratio of the variances of the treated group and of the control group greater than 2 or inferior to 0.5; equilibrium is defined by a ratio close to 1 (Rubin, 2001).
Sources: Author's compilation using UCDP-PRIO, Banks and Wilson (2020), Polity IV, Gleditsch (2002), and World Religion Project data. Data on papal visits comes from the Holy See's official website.

[16] `http://www.vatican.va/content/vatican/en.html`
[17] Poland and high-income European countries are excluded from our sample of countries.



Notes: Travels that took place before 1971 were made by Pope Paul VI. *Sources: Author's compilation using information provided by the Holy See.*

Figure 3.2: Number of papal travels per year and geographic region

3.4 Empirical Challenges and Methodology

3.4.1 Correlation analysis and empirical challenges

In this section, we analyze the correlation between political conflicts and the timing of Pope John Paul II's visits using simple linear regressions with country fixed effects.[18] The timing of papal travels is defined by a nine-year period: four years before the visit (T-4 to T-1), the year of the visit (T), and four years following the visit (T+1 to T+4). The set of control variables is composed of a dummy indicating the Cold War period and usual predictors of conflict at the state level (see section 3.4.2 for more information on the selection of conflict predictors). Actions of local Catholic leaders before, during and after papal visits may influence the effect of papal travels on the risk of political conflict. We control for the presence of an embassy of the Holy See in the country (Moyer and al., 2016) and create a dummy variable taking the

[18]Logistic and linear regression are commonly used in the literature when the dependent variable is a binary indicator of conflict. The choice between the two specifications depends on the expected theoretical implications of the model. Here, we use linear regression because a logistic specification with country fixed effects would restrict the observations to conflict-affected countries (i.e., countries experiencing at least one conflict episode during the sample's period).

value "1" if at least one local religious leader was part of the College of Cardinals elected by John Paul during the previous year.

Results are presented in column (1) of **Table 3.3**. It shows a negative but insignificant association between the risk of political conflict and papal travels in T-1, T, T+2, T+3 and T+4. In T+1, visited countries present on average a significantly ($p<0.05$) higher risk of political conflict: being visited by the pope is associated with a 6.2 percentage point increase in the following year's risk of political conflict. For 20% of observations, at least one election is held in the year of a papal visit. The greater risk of political conflict observed in T + 1 could be linked to post-election violence (Cederman and al., 2013). However, these tensions are not necessarily linked to a politicization of religion (sore-loser mechanism). In column (2), dummy variables indicating the presence of elections during the year of a visit and one year before are added to the model.[19] Their effects are not statistically significant and their inclusion hardly modifies the previous results. The effect observed in T + 1 might also stem from a past strategic choice of the government to provoke a visit from the Pope. Governments may artificially increase religious freedom to pass themselves off as good candidates for a papal visit. In column (3) indicators of the level of religious freedom before and during the visit are added to the model.[20] Both variables are significantly ($p<0.05$) associated with a smaller risk of political conflict. The inclusion of these indicators increases the significance level and magnitude of the coefficient associated to the year following papal visit: papal travels are significantly ($p<0.001$) associated with a 7.9 percentage point increase in the risk of political conflict during the following year. The coefficients associated with other timings of papal travels stay insignificant but their sign is now generally positive (except in T-3). In column (4), we continue to explore the correlation between papal travels and religious freedom. This time, the level of religious freedom is regressed against the timing of papal travels using an ordered logit specification. The level of religious freedom is significantly higher one year after the papal visit: for countries who have been visited by the Pope last year, the odds of having a moderate or high versus low level of religious freedom is 0.44 times that of countries that have not been visited by the Pope. A positive and significant ($p<0.001$) coefficient is also observed in T+4 : for countries who have been visited by the Pope four years ago, the odds of having a moderate or high versus low level of religious freedom is 0.68 times that of countries that have not been

[19] Data on election years are obtained from the NELDA database.

[20] The level of religious freedom is obtained from Cingranelli-Richards (CIRI) Human Rights Database. It is a categorical variable indicating the extent to which the freedom of citizens to exercise and practice their religious beliefs is subject to actual government restrictions. A score of 0 (1) indicates that are severe and widespread (moderate) restrictions on religious practices. A score of 2 indicates that such practices are practically absent.

visited by the Pope.

These first results show a positive correlation between John Paul II's travels and political conflicts one year after the visit. They suggest that papal travel is associated with a higher level of religious freedom, but this effect does not lead the positive association between papal travel and political conflicts in T + 1. However, these results are not sufficient to identify causal effects. The main identification concern is that the timing of Papal visits might depend on the risk of political conflict (i.e., the timing of the visits might be endogenous). For example, the Pope might be less likely to travel to areas that are currently experiencing conflicts, as those areas are less safe. If the Pope systematically travels to areas where conflict is declining, this could confound the true treatment effect. This endogeneity concern remains however unlikely if we look at the data: the ratio of visited countries in conflict compared to the ones in peace varies little (between 20 and 28%) between T-4 and T. Still, we explore the extent of this concern in **Table 3.4** . Columns (1) to (4) present the results of a rare events logistic regression of the probability of papal travels on past episodes of political conflicts (T-1 to T-4). As expected, the coefficients are negative (except a in T-3) but not significant. Even considering from these results that past episodes of political conflict do not influence the probability of papal travel, one cannot totally rule out the possibility of an endogeneity bias. Indeed, some pre-visit characteristics like the strong repressive capacity of authoritarian regimes can influence both the risk of conflict and the probability of a papal visit. Therefore, these models lack an adjustment for the level (between country changes of pre-visit characteristics) and the temporal variations of these variables (within country changes of pre-visit characteristics). Furthermore, the proposed specifications only coarsely control for the time dependence of conflict. Indeed, integrating an arbitrarily defined number of lags makes important and questionable assumptions on how many lags are useful for understanding conflicts (Beck et al., 1998; Reed and Webb, 2010), especially since tensions inside a country sometimes rise through social unrest like protests and riots before the state decides to use its "legitimate monopoly on violence" and engages in the conflict. Indeed, it is uncommon for periods of total peace to be immediately followed by a conflict.[21]

Our analysis therefore rests on a two-step approach. First, we construct a synthetic conflict indicator

[21] **Table A2** presents the unconditional transition probabilities between four different states observed in the sample: Peace (i.e. no conflict and no social unrest), social unrest but no conflicts, conflict and social unrest, and "pure conflict" (i.e. conflicts but no social unrest,). It suggests that conflicts are cyclical. Each state is more likely to be followed by the same state: peace by peace, conflict by conflict, etc. Also, periods of social unrest appear to be a relevant state of transition between peace and conflict. In comparison, years of peace are less likely to be followed by conflict (2.7% of cases) than years of social unrest (16.4%). The years of both social unrest and conflict are followed in 26.7% of cases by years of pure conflict. Finally, a conflict will lead more often to a period with social unrest (28.5%) than to peace (15.4%).

that describes the probability of a conflict occurring the following year. It is a continuous measurement of the risk of political conflict which can be compared within and between countries. The risk of conflict in year T is predicted from information in year T-1 on recently experienced tensions and on the political and economic structure of the country. We thus obtain an indicator able to accurately predict 93% of the observations. Next, we use a semi-parametric methodology that estimates impulse response functions controlling for past variations in the risk of conflict and in several economic and political variables linked to conflicts. We control for the endogeneity of papal visits and for differences between visited and non-visited countries using a doubly robust inverse propensity weighted estimator. Hence, we analyze how economically and politically similar countries react to a visit depending on their religious structure (i.e. the proportion of Catholics and the level of religious polarization).

Table 3.3: Timing of Pope John Paul II's visit, risk of political conflict and religious freedom.

	(1) Conflict UCDP-PRIO Linear regression	(2) Conflict UCDP-PRIO Linear regression	(3) Conflict UCDP-PRIO Linear regression	(4) Freedom of Religion Ordered logit
Papal visit - Year T-4	0.011	0.012	-0.001	0.140
	(0.030)	(0.030)	(0.033)	(0.198)
Papal visit - Year T-3	0.037	0.035	0.037	0.094
	(0.029)	(0.029)	(0.031)	(0.196)
Papal visit - Year T-2	0.002	0.002	-0.003	-0.270
	(0.029)	(0.029)	(0.030)	(0.226)
Papal visit - Year T-1	-0.005	-0.004	0.003	0.122
	(0.030)	(0.030)	(0.030)	(0.227)
Papal visit - Year T	-0.002	-0.002	0.012	0.148
	(0.030)	(0.030)	(0.029)	(0.214)
Papal visit - Year T+1	0.062**	0.061**	0.079***	0.438**
	(0.030)	(0.030)	(0.029)	(0.212)
Papal visit - Year T+2	-0.015	-0.014	0.020	0.108
	(0.029)	(0.029)	(0.028)	(0.202)
Papal visit - Year T+3	-0.014	-0.015	0.021	0.349
	(0.030)	(0.030)	(0.029)	(0.219)
Papal visit - Year T+4	-0.025	-0.023	0.002	0.681***
	(0.030)	(0.030)	(0.029)	(0.247)
L.Freedom of Religion			-0.025**	
			(0.011)	
Freedom of Religion			-0.024**	
			(0.011)	
L.Election		-0.014		
		(0.013)		
Election		0.007		
		(0.013)		
cut1				-2.841***
				(0.137)
cut2				-1.254***
				(0.122)
Observations	3246	3246	2157	2267
Controls	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	No
Regional Dummies	No	No	No	Yes
Cold War Indicator	Yes	Yes	Yes	Yes

Notes: ***/**/*: P< 0.01/0.05/0.10. Standard errors are in parentheses. T corresponds to the year of a visit (T+1 is one year after a visit and T-1 is one year before a visit). Controls include one-year lagged indicators of: neighboring minor conflicts, neighboring major conflicts, social unrest, level of development, oil/gas exports, factional democracy, autocracy, college of cardinals, and embassies of the Holy See. The inclusion of dummies indicating the timing of papal travels are responsible for the loss of observations between Table 3.3 and Table 3.4. *Sources: Author's compilation.*

Table 3.4: Probability of papal travels - Rare events logistic regression

	(1) Papal visit - Year T	(2) Papal visit - Year T	(3) Papal visit - Year T	(4) Papal visit - Year T
L.Conflict UCDP-PRIO	-0.102 (0.238)			
L2.Conflict UCDP-PRIO		-0.042 (0.234)		
L3.Conflict UCDP-PRIO			0.137 (0.225)	
L4.Conflict UCDP-PRIO				-0.013 (0.235)
Observations	3808	3797	3770	3740

Notes: ***/**/*: P< 0.01/0.05/0.10. Standard errors are in parentheses. Results were obtained using rare events logistic regressions (*firthlogit* command on Stata). T corresponds to the year of a visit. *Sources: Author's compilation using data from the Holy See's official website and UCDP-PRIO.*

3.4.2 Creation of a Political Conflict Risk Index

In this section, we develop a continuous index of political conflict risk through logistic regression. Our dependent variable is the UCDP-PRIO incidence of internal armed conflict. The accuracy and reliability of conflict predictions are often questioned, especially when they result from cross country modeling. These models generally lack predictive power because they exhibit over-fitting and over-determination biases. For example, Ward and al. (2010) show that the models of Fearon and Laitin (2003), and Collier and Hoeffler (2004) have a low predictive power despite the robustness and the significance of their coefficients. To avoid these limits, we select our controls based on the conflict theory, recent advances in the conflict prediction field, the minimization of the Akaike Information Criterion (AIC), and goodness of fit tests (Ward and al., 2010; Aas Rustad and al., 2011; Hegre and al., 2013).

Structural Conflict Predictors - Theoretical models of conflict consider that three mechanisms explain why it may be rational to choose violence and appropriation: the value of the state as a prize, the opportunity cost faced by the population and the state capacity. The first two explain why the population may be interested to rebel against the state based on the value of the prize they seek and on the trade-off they face between productive activity and rebellion. We measure the opportunity cost with a set of variables associated to the level of development (Hegre and al., 2013): the infant mortality rate, youth bulges, and the level of education.[22] The infant mortality rate is considered a good proxy of the

[22]Because these three variables are highly correlated with each other, we do a principal component analysis and extract one principal factor explaining more than eighty percent of the variance. Results are available upon request.

level of economic development.[23] Large youth cohorts represent an abundant supply of rebel labor with low opportunity cost. By reducing recruitment costs, they increase the risk of armed conflict (Fearon and Laitin, 2003; Collier and Hoeffler, 2004). Finally, education increases the opportunity cost of rebel labor because people expect greater income-earning opportunities (Collier and Hoeffler, 2004). To assess the value of the state as a prize, we use the total value of oil and gas exports from Ross and Mahdavi (2015). Oil and gas rents are attractive for rebel groups, but their appropriation requires capturing the state since they are difficult to loot without the technical means available to the state. Besides, oil producers have weaker state apparatuses and less incentive to strengthen them. They are therefore less effective in preventing conflicts (Fearon and Laitin, 2003). The state's capacity is its ability to monitor, deter, and/or buy the opposition off. We measure the state capacity through institutional coherence and quality of the political regime. Following Goldstone and al. (2010), we use two dummy variables indicating factionalist partial democracies and full autocracies. Autocracies are defined as systems that combine an absence of effective contestation for a chief executive with repressed or suppressed political participation. The literature agrees that they experience fewer conflicts because they strongly repress rebellions. Factionalism is defined as a pattern of sharply polarized and uncompromising competition between blocs pursuing clientelistic interests at the national level. Goldstone and al. (2010) showed that factional regimes are associated with a high relative risk of instability onset compared to any other type of partially democratic system.

Conflict History and Conflict Timing - Hegre and al. (2013) suggest that associating development indicators with data from the neighboring countries and conflict history can produce highly accurate predictions because violence spreads over time and beyond national borders. We use a categorical variable indicating if any neighboring country has experienced low intensity violence or civil war in the previous year. We also add a categorical variable indicating if the country experienced an episode of low intensity violence (between 25 and 1000 fatalities) or a civil war (more than 1000 fatalities) in the previous year. Conflict-related events like social unrest give information on latent-conflicts which are valuable for short term predictions (Aas Rustad and al., 2011; Hegre and al., 2013); a variable indicating the number of riots, assassinations, strikes and demonstrations according to the Cross-National Time-Series Data Archive (Banks and Wilson, 2020) was added.

[23] Conflict models generally use measures of economic growth and incomes, but these variables are not statistically significant in our model and capture a narrower conception of economic and social opportunities than the level of development.

Table 3.5: Statistics and classification power of the political conflict risk index

	Classification Power*				
	Sensitivity	Specificity	False Positive Rate	False Negative Rate	Correctly Classified
	82.46%	95.01%	4.99%	17.54%	92.44%
	(1)	(2)	(3)	(4)	(5)
	Mean	Std.Dev.	Obs	Min	Max
Political Conflict ("True")	0.205	0.404	3808	0	1
Political Conflict Risk Index	0.205	0.323	3808	0.002	0.998

*: calculated for a threshold that equals the index's mean.
Source: Author's compilation using UCDP-PRIO data for the "true" political conflict variable, and using logistic regression to predict the risk index.

The risk of conflict is predicted using a logistic regression with year fixed effects, regional dummies, and country clustered standard errors. All the control variables are lagged by one year and the results are reported in the first column (1) of **Table A3**. All the predictors affect significantly the risk of conflict and present the expected signs. We control for the goodness of fit of our model with Pearson Chi-square and Hosmer-Lemeshow tests and obtain appropriate results according to the literature. The statistics associated with the conflict prediction model are presented in **Table 3.5**. Our model has an area under the receiver operating characteristics (AUC) of 0.93 and correctly classifies 92.44 percent of the observations (see **Figure A1**). In columns (1) and (2), we observe that the predicted and observed conflicts' measures have the same means but different standard deviations. Indeed, an advantage of the predicted variable is that it considers that there are no years of total peace (0 in UCDP-PRIO) or total war (1 in UCDP-PRIO), as presented in columns (4) and (5) by differences in the minimum and maximum values reached by both measures.

3.4.3 Jordà's Local Projection Model

In order to estimate the dynamic impact of Papal visits on the risk of conflict, we use the method proposed by Jordà (2005) that consists in estimating impulse response functions (IRF) from local projections. One advantage of this semi-parametric method is that local projections are robust to misspecifications of the data generation process (DGP). It represents an interesting alternative to vector autoregressive models (VAR) which can misspecify the DGP.

In this paper, the IRFs describe the evolution of the risk of conflict along a time horizon of four years

(k = 0, ..., 4) after a Papal visit.[24] They are obtained by plotting the estimated coefficients $\beta_{\,k}$ for k = 0,...,4. Country fixed effects are included and the standard errors are clustered at the country level. For each k, the following equation is estimated using Least-Squares Dummy Variables (LSDV) :

$$\Delta y_{i,t+k} = \alpha_i^k + \beta_i^k D_{i,\,t} + \sum_{j=1}^{l} \gamma_j^k \Delta y_{i,t-j} + \sum_{j=1}^{l} \vartheta_j^k \Delta W_{i,t-j} + \delta_i^k \overline{X_{i,\,t}} + \varepsilon_{i,t+k} \qquad (1)$$

Where the dependent variable is $\Delta y_{i,t+k} = y_{i,t+k} - y_{i,t-1}$, namely the change in the risk level of political conflict (y) between $t-1$ and $t+k$. $\Delta y_{i,t-j}$ controls for past yearly variations in the risk of conflict up to the l^{th} year preceding a papal visit. We chose 4 lags (l=4), which is the number of lags that minimizes the AIC and BIC information criteria. D is a dummy variable taking the value 1 for the year of a Papal visit and 0 otherwise. α_i^k represents country fixed effects and $\varepsilon_{i,t+k}$ is the error term. $\Delta W_{i,t-j}$ and $\overline{X}_{i,\,t} = \frac{1}{l}\sum_{j=1}^{l} x_{i,t-j}$ corresponds to past yearly variations and arithmetic means (between $t-1$ and $t-4$) of controls already present in the baseline predictive model. This way, we examine the effect of a papal visit in year t on variations between $t-1$ and $t+(1,...,4)$ of the risk of conflict, leaving aside past variations (i.e. from $t-1$ to $t-4$) of the risk of conflict and political and economic predictors of conflict (i.e. level of autocracy and factional democracy, value of oil/gas exports, level of development, and conflicts in the neighboring countries). We also add an exogenous control which corresponds to past and contemporaneous yearly variations (from $t-4$ to t) in the Standardized Precipitation-Evapotranspiration Index (SPEI) to account for climatic shocks (Harari and La Ferrara, 2018).

Ultimately, we consider the impact of papal visits (i.e. treatment) on the risk of conflict at each horizon h . We use two treatment measures: the average treatment effect (ATE) and the Conditional Average Treatment Effect (CATE) to account for heterogeneity (Furceri and Zdzienicka, 2012). The CATE is obtained by interacting the treatment with a categorical variable $V_{i,\,t}$ that divides our sample in five groups according to their religious structure (hereafter, we will only present the CATE case since the ATE can be easily obtained by removing $V_{i,\,t}$):

$$\Delta y_{i,t+k} = \alpha_i^k + \beta_{1i}^k D_{i,\,t} + \beta_{2i}^k V_{i,\,t} + \beta_{3i}^k V_{i,\,t} D_{i,\,t} + \sum_{j=1}^{l} \gamma_j^k \Delta y_{i,t-j} + \sum_{j=1}^{l} \vartheta_j^k \Delta W_{i,t-j} + \delta_i^k \overline{X_{i,\,t}} + \varepsilon_{i,t+k} \qquad (2)$$

3.4.4 Augmented Inverse Propensity Weighted Estimator

The Pope's visits are organized following a rigorous process. Political and religious authorities must send an official invitation to the Holy See, whom may or may not accept it. The destinations are chosen ac-

[24] Four years is the longest period for which papal travels present a significant effect on the risk of conflict. Since this effect is not significant for larger horizons, a four years horizon is selected (Jordà , 2005).

cording to undisclosed criteria that may be linked to the anticipated evolution of the risk of conflict and therefore create an endogeneity bias. For example, political leaders might invite the Pope to boost their popularity in the context of increased internal tensions. In the presence of endogeneity and missing variables, Jordà and Taylor (2016) recommend the augmented inverse propensity weighted (AIPW) estimator, which combines the inverse probability weighted (IPW) and the inverse-probability-weighted regression adjustment (IPWRA) estimators.

STEP I - We estimate the probability of Papal visit with a Poisson pseudo maximum likelihood model using a set of variables $Z_{i,t}$ that influence the probability of a Papal visit and/or are correlated to the risk of political conflict. The idea is to obtain weights that give every observation the same probability of being visited by the Pope. The methodology relies on the "selection on observables" , which requires that our control set reflects information on which the Pope bases his choice of visiting or not a country (Troy, 2018). We use the following control variables.

To account for diplomatic relations with the Vatican, we use a variable indicating the presence and geographic influence (on a scale from 0 to 1) of an embassy of the Holy See (or Nuncio) according to the Diplometrics dataset (Moyer and al., 2016). We also create a dummy variable taking the value "1" if at least one local religious leader was part of the College of Cardinals elected by John Paul during the previous year.[25] Since visited countries are less likely to receive the Pope again in coming years, a variable indicating the total number of visited countries during the previous year and its squared term are added. Two election dummies are added: one indicating an election during the previous year and one indicating the mean number of unfair elections during the four previous years according to the Nelda dataset (Hyde and Marinov, 2012).[26] We then add characteristics that are generally considered to be linked to the risk of conflict: a dummy indicating the presence of lootable diamonds in the country, an indicator of the terrain ruggedness, the lagged size of the population (in logarithm), the mean SPEI index during the four previous years, the lagged total magnitude of interstate conflicts in the region according to the MEPV dataset (Marshall, 2019), and regional dummies. Finally, we add the mean over the four previous years of control variables present in our risk index model: the level of development, factional democracies, autocracies, and the value of oil and gas exports. We obtain an AUC of 0.70 and use the results (which

[25] Source: author's compilation from GCatholic website. By including the presence of local Catholic religious leaders in the weight, this characteristic is considered to be similar in all observations.

[26] The variable is coded "1" if NELDA answers "yes" for each of the following questions: "Was the opposition authorized?", "Was more than one party legal?", "Were there a choice of candidates on the ballot? "; otherwise, it is coded "0".

are presented in the **Table A4**) to construct the propensity score for a country i at time t to be treated (i.e. visited), $\hat{\rho}_{\mathrm{i,\,t}}$, or to be part of the control group (i.e. not visited or not treated), $1-\hat{\rho}_{\mathrm{i,\,t}}$ (the balance and overlap checks are reported in the **Figure A2 and Table A5**).

STEP II - The outcome model is estimated separately for the treatment and the control groups and we predict for the whole sample the potential outcome $\widehat{E}\left[\left(y_{i,t+k}-y_{i,t-1}|D_{\mathrm{i,\,t}}=d\right)\right]$. It defines the risk of political conflict in the treated group if they didn't receive a papal visit ($d=0$), and in the control group if they did receive a Papal visit ($d=1$). For each $k=0,...,5$ and for each category of $V_{\mathrm{i,\,t}}$, the CATE is defined as:

$$CATE=\Lambda_k=E\left[y_{i,t+k}(1)-y_{i,t-1}|D=1;V_{\mathrm{i,\,t}}\right]-E\left[y_{i,t+k}(1)-y_{i,t-1}|D=0;V_{\mathrm{i,\,t}}\right] \qquad (3)$$

Because the second term of the Equation (3) is not observable, we use a counterfactual. Under the independence assumption $y_{i,t+k}(D)-y_{i,t-1}\perp D_{i,t}|Z_{\mathrm{i,\,t}}$, (where $Z_{\mathrm{i,\,t}}$ is the set of covariates explaining the probability of papal visits; see Step 1), we estimate the CATE by comparing countries with and without papal visits conditional on $Z_{\mathrm{i,\,t}}$ and $V_{\mathrm{i,\,t}}$:

$$CATE=\Lambda_k=E\left[y_{i,t+k}(1)-y_{i,t-1}|D=1;V_{\mathrm{i,\,t}};\ Z_{\mathrm{i,\,t}}\right]-E\left[y_{i,t+k}(0)-y_{i,t-1}|D=0;V_{\mathrm{i,\,t}};\ Z_{\mathrm{i,\,t}}\right] \qquad (4)$$

STEP III - We use the general AIPW's expression provided by Lunceford and Davidian (2004) to estimate the CATE of Papal visits on the risk of political conflict for the k following years:

$$\hat{\Lambda}^{k}_{AIPW}=\frac{1}{n}\sum_i\sum_t\left[\left(\frac{D_{\mathrm{i,\,t}}(y_{i,t-1})}{\hat{p}_{\mathrm{i,\,t}}}-\frac{(1-D_{\mathrm{i,\,t}})(y_{i,t-1})}{1-\hat{p}_{\mathrm{i,\,t}}}\right)-\frac{D_{\mathrm{i,\,t}}-\hat{p}_{\mathrm{i,\,t}}}{\hat{p}_{\mathrm{i,\,t}}(1-\hat{p}_{\mathrm{i,\,t}})}\times\left[\begin{array}{c}(1-\hat{p}_{\mathrm{i,\,t}})\hat{E}\left(y_{i,t+k}-y_{i,t-1}|D_{\mathrm{i,\,t}}=1;X_{\mathrm{i,\,t}};\ V_{\mathrm{i,\,t}}\right)\\ +\hat{p}_{\mathrm{i,\,t}}\hat{E}\left(y_{i,t+k}-y_{i,t-1}|D_{\mathrm{i,\,t}}=0;X_{\mathrm{i,\,t}};\ V_{\mathrm{i,\,t}}\right)\end{array}\right]\right] \qquad (5)$$

This semi-parametric estimator is doubly robust, which means that it is highly robust to misspecification of the treatment and outcome equations.[27] It allows for selection errors in both equations and permits to obtain the semi-parametric efficiency bound under standard additional conditions, even in the presence of heteroskedasticity (Lunceford and Davidian, 2004; Farrell, 2015). The use of propensity score weighting with stabilized weights[28] is also recommended for treatments that are rare events (Hajage and al., 2016; Pontines, 2018).

[27] The "doubly robust" property means that consistency of the estimated ATE can be proved when either the propensity score model or the conditional mean is correctly specified.

[28] Stabilized weights are constructed by using the observed proportion of treated (for the treatment observations) and controls (for the control observations) in the sample as a numerator instead of 1. They are used to produce estimates with a smaller variance when the dependent variable is rare.

3.5 Results

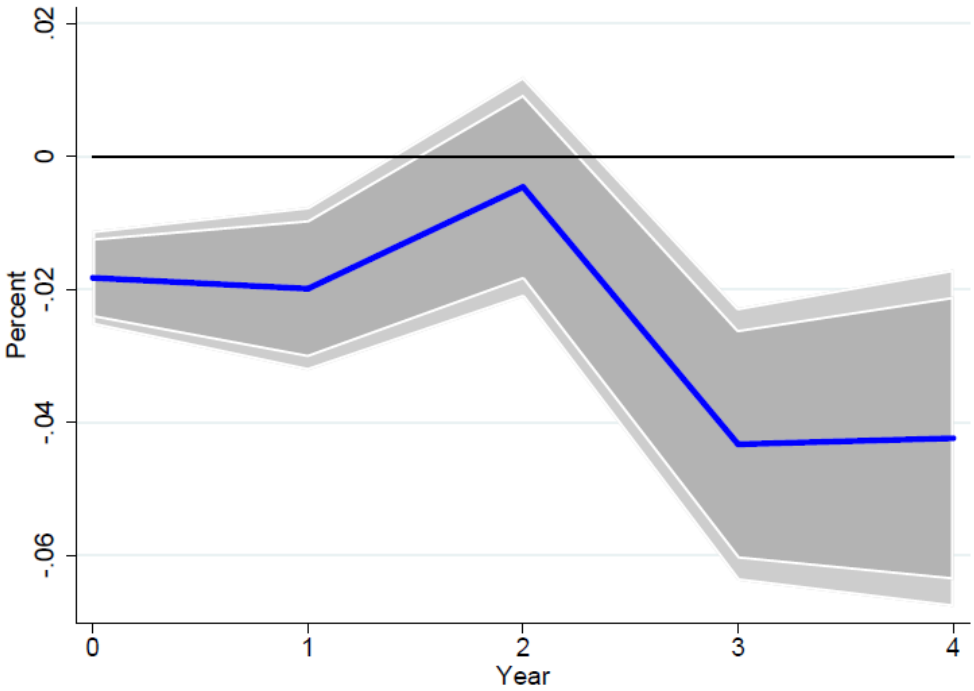
3.5.1 Average Treatment Effect

We start with our simplest setting and estimate the average treatment effect (ATE) of a visit of John Paul II on changes in the risk of the political conflict. We present the results in **Table 3.6** and **Figure 5**. On average, the travels of John Paul II have a negative effect on the risk of political conflict. During the year of the visit, the risk of conflict drops significantly by 1.8 percentage points (i.e. pp.). During a papal visit, visited countries observe on average an 8.78% decrease in the risk of conflict. This effect persists one year after a visit, with 9.76% less chances to experience conflicts than if they had not been visited. In **Figure 3.3**, we observe a non-linearity around the second year following a papal visit while **Table 5** shows a small and not significant ATE coefficient. After three and four years, the risk of conflict decreases significantly by 4.3 and 4.2 pp. respectively. This means that four years after receiving the Pope, the risk of conflict in the host countries decreases on average by 20.5% . The results of our baseline model suggest that John Paul II visits generally reduce the risk of conflict up to four years after their occurrence.

Table 3.6: ATE of papal visits

	(1)	(2)	(3)	(4)	(5)
	Year t	Year t+1	Year t+2	Year t+3	Year t+4
ATE	-0.018***	-0.020***	-0.005	-0.043***	-0.042***
	(0.004)	(0.006)	(0.008)	(0.010)	(0.013)
Observations	3042	2914	2793	2671	2549
Country F.E.	x	x	x	x	x

Notes: ***/**/*: p< 0.01/0.05/0.10. Standard errors (clustered at the country level) in parentheses. Controls: yearly changes from t-1 to t-4 in y, autocracy level, factional democracy level, value of oil and gas exports, development indicator and conflicts in the neighboring countries ; mean value during the four previous years of oil and gas exports, development, factional democracy and autocracy; yearly changes from t to t-4 in SPEI index; religious structure; country fixed effects (F.E.). *Source: Author's compilation.*



Notes: Local projection (blue line), 95% and 90% confidence intervals (soft and dark gray band) were obtained based on results presented in Table 4; the ATE is negative (positive) and significant when the local projection and the confidence intervals are all below (above) zero. *Sources: Author's compilation.*

Figure 3.3: Local projection for the baseline model

3.5.2 Average Treatment Effect Conditional on the Religious Structure

The section explores the heterogeneity in the effects of John Paul II's visits depending on the religious structure of the host countries. We estimate the CATE by interacting the treatment variable with the proportion of Catholics. We obtain the effect of papal visits on the risk of conflict over five years (i.e. from T to T+4 after a visit) depending on the religious structure of the countries. The results are reported in **Table 3.7** and **Figure 3.4**. In **Figure 3.4**, we can see that there is a sudden rise in the risk of conflict two years after a visit to category 2, 3 and 4 countries (i.e. where Catholics represent more than 4.7% of the population). In column (3) of **Table 3.7**, we see that this increase is only significant for category 3 countries. It corresponds to an increase of approximately 19% in the risk of conflict compared to a situation where they would not have been visited. In Category 4 countries, fourth (4) row of **Table 3.7** indicates that papal visits significantly reduce the risk of conflict by 3.3 pp. in T+1, 2 pp. in T+3 and 3.2 pp. in T+4.

The highest levels of religious polarization are observed in category 2 and 3 countries (see **Table 3.1**).

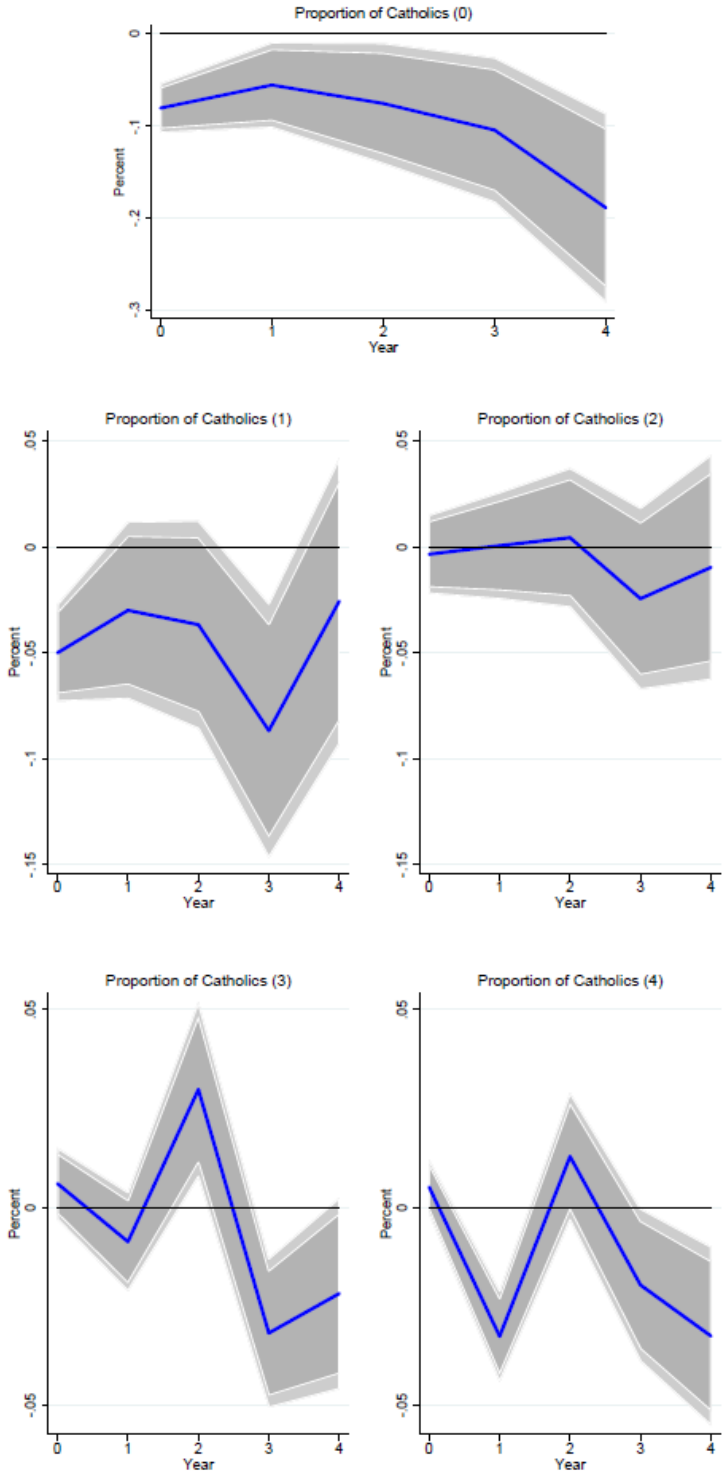
In category 2 countries, Catholics are a minority group, while there form a majority group in category 3 countries. Papal travels have no significant effect on the risk of conflict in category 2 countries. Conversely, category 3 countries experience significant variations in the risk of conflict between 2 and 4 years after a visit (see columns 3 to 5 of **Table 3.7**). The momentary increase of 3 pp. in the risk two years after a visit (T+2) is followed by a two consecutive decreases of 3.2 pp. in T+3 and 2.2pp. in T+4.

In category 0 and 1 countries, Catholics are a small minority group (1), or almost absent from the population (0). **Figure 3.4** shows that the local projections of the results for categories 0 and 1 have a relatively similar curvilinear shape up to three years after a papal visit. Column (1) of **Table 3.7** indicates that these countries experience a direct and significant reduction in the risk of conflict during the year of a papal visit (the risk of conflict falls respectively by 8 pp. and 5 pp.). A second significant pacification effect is observed three years after a visit; column (4) shows an average decrease of 10.4 pp. for category 0 countries 22 and 8.7 pp. for category 1 countries. This corresponds respectively to a reduction of 41.1% and 36.4% of the risk of conflict compared to a situation where they would not have host the Pope.

Table 3.7: CATE of papal visits

	(1) Year t	(2) Year t+1	(3) Year t+2	(4) Year t+3	(5) Year t+4
CATE 0 (Catholics<0.7%)	-0.080***	-0.055*	-0.075*	-0.104*	-0.189**
	(0.014)	(0.024)	(0.033)	(0.040)	(0.052)
Observations	567	537	510	481	454
Country F.E.	x	x	x	x	x
CATE 1 (0.7% ≤ Catholics<4.7%)	-0.050***	-0.030	-0.037	-0.087***	-0.026
	(0.012)	(0.021)	(0.025)	(0.031)	(0.034)
Observations	614	590	568	549	528
Country F.E.	x	x	x	x	x
CATE 2 (4.7% ≤ Catholics<22.2%)	-0.003	0.001	0.004	-0.024	-0.010
	(0.009)	(0.013)	(0.017)	(0.022)	(0.027)
Observations	620	597	574	549	522
Country F.E.	x	x	x	x	x
CATE 3 (22.2% ≤ Catholics<70.3%)	0.006	-0.009	0.030**	-0.032***	-0.022*
	(0.005)	(0.006)	(0.011)	(0.010)	(0.012)
Observations	621	589	560	531	504
Country F.E.	x	x	x	x	x
CATE 4 (70.3% ≤ Catholics<97.1%)	0.005	-0.033***	0.013	-0.020*	-0.032***
	(0.003)	(0.006)	(0.008)	(0.010)	(0.012)
Observations	610	591	571	551	531
Country F.E.	x	x	x	x	x

Notes: ***/**/*: p< 0.01/0.05/0.10. Standard errors (clustered at the country level) in parentheses. Controls: yearly changes from t-1 to t-4 in y, autocracy level, factional democracy level, value of oil and gas exports, development indicator and conflicts in the neighboring countries; mean value during the four previous years of oil and gas exports, development, factional democracy and autocracy; yearly changes from t to t-4 in SPEI index; religious structure; country fixed effects (F.E.).
Source: Author's compilation.



Notes: Local projections (blue lines), 95% and 90% confidence intervals (soft and dark gray band) are based on the results presented in Table 6; the ATE is negative (positive) and significant when the local projection and the confidence intervals are all below (above) zero. *Sources: Author's compilation.*

Figure 3.4: Local projections for each category of religious structure

3.6 Robustness Checks

3.6.1 Omitted Variables

Papal travels only explain variations in the risk of conflict if they are correlated with variations of independent variables present in our forecasting model (i.e. the model from which we get our political conflict risk index) and not controlled for in our local projection model. This means that omitting a variable correlated to papal visits and conflicts in our forecasting model could bias our results. Although we get good prediction and classification statistics according to the literature, we may have overlooked some of the channels through which religion is associated with conflict, like a particular institutional system (De Soysa, 2002) or natural battle lines between religious communities (Huntington, 1996). In the columns (2) to (5) of the **Table A3**, we present the results of our forecasting model when we add several commonly used religious controls. We add the proportion of Catholics in the population in column (2), an interaction between the proportion of Christians and the proportion of Muslims in column (3), and the level of religious polarization and fractionalization of Alesina and al. (2003) in column (4) and (5). We also examine the correlation of Papal visits and religious variables with the Pearson residuals of our forecasting model. The results are presented in **Table 3.8**. The additional religious variables have no significant effect on the risk of UCDP-PRIO conflict and are not correlated with the residuals of our forecasting model. The dummy variable indicating the years of John Paul II's travels is also not correlated with the residuals. These results therefore greatly reduce concerns about potential omitted variables, particularly those related to the religious context.

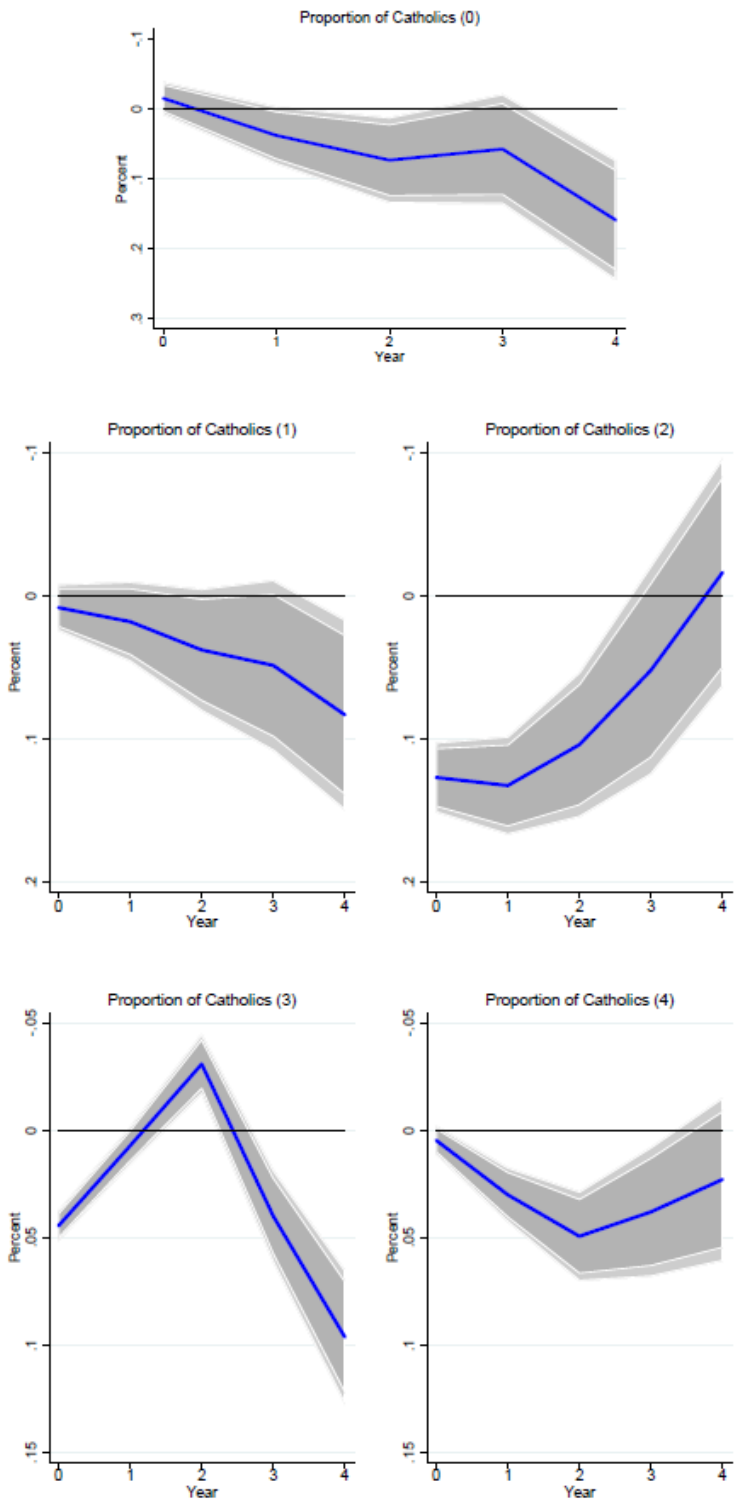
Table 3.8: Correlation with standardized Pearson residuals

	Coefficient	P-values	Observations
Papal Visits	-0.020	0.225	3808
Proportion of Catholics	0.004	0.809	3798
Proportion of Muslims	0.013	0.436	3798
Proportion of Christians	-0.001	0.871	3798
Religious Polarization	0.001	0.935	3798
Religious Fractionalization	-0.016	0.329	3808

Notes: Pearson standardized residuals (i.e. the standardized difference between the observed frequency and the predicted frequency) of the model used to estimate the political conflict risk index. A significant correlation indicates misspecifications.
Source: Author's compilation using the World Religion Project Dataset for religious groups' size and religious polarization variables, and the religious fractionalization variable of Alesina and al. (2003).

3.6.2 Alternative Dependent Variable

We reproduce our CATE model using an external source to measure the risk of political conflict. We use the index of internal conflict risk developed by the PRS group as a component of the International Country Risk Guide (ICRG) rating. This index is defined on a scale from 0 to 12 (then rescaled to vary in the range [0, 1]), where highest ratings correspond to countries experiencing no armed or civil opposition to the government and where governments are not actors of arbitrary violence against the population. Lowest ratings correspond to countries involved in an on-going civil war. Although this index is not available for years prior to 1984, the results reported in **Figure 3.5** are generally consistent with those of our model. They also point to a statistically significant increase in the risk in T+2 for polarized countries (with a similar magnitude of 3.1 pp.) and for a diminution in the risk in the other cases (again, particularly affecting category 0 countries). We note, however, two differences. First, while our model find weak evidence of a momentary increase in the risk of conflict for countries with a large majority of Catholics (4th category), the results rather suggest that these countries will face a lower risk. Secondly, we find a statistically significant general reduction of the risk for category 2 countries while our model was rather pointing towards non-significant effects. These differences have no impact on our conclusions and rather confirm that measures of religious minority and majority that are too broad and might miss the indirect effect of religious demography on the risk of political conflict.



Notes: Local projections (blue lines), 95% and 90% confidence intervals (soft and dark gray band) are based on the results presented in **Table A7**; the ATE is negative (positive) and significant when the local projection and the confidence intervals are all below (above) zero; a larger index indicates more stability; ordinate axis' order is inverted to simplify comparisons with other figures. *Sources: Author's compilation.*

Figure 3.5: Local projections for each category of religious structure (ICRG data)

3.6.3 Other Robustness Checks

Changes in the Number of Lags

We test the sensitivity of the baseline results to the inclusion of different lags of the risk of political conflict and controls. The results, presented in **Table A8**, show that the point estimates are stable for lags superior to 3 but are statistically different from each other when we compare estimations with one or two lags and estimations with a higher number of lags. This difference slightly affects the significance level and the magnitude of the coefficients but leaves unchanged our main conclusions on the sign of papal travels' effects. Indeed, the observed differences may come from inaccuracies inherent to the use of a smaller number of lags. The fact that the coefficients are similar for a number of lags equal or superior to the one used in our preferred model (i.e. 4 lags) indicates that adding more information on past variations in the risk of conflict doesn't influence our results.

Papal Visits and Subsequent Changes in the Catholic Demography

Papal visits may affect the national religious structure through its influence on birth rate, Catholic conversions, or people declaring themselves Catholics (Bassi and Rasul, 2017). In our empirical strategy, we interact papal visits with a broad categorical indicator of the proportion of Catholics and, therefore, already control for changes in the risk of conflict associated with large demographic variations. Smaller changes, however, may have been ignored. We test this possibility by controlling for past and contemporaneous variations (from t-4 to t) in the total number of Catholics in the population (in logarithm) in our model estimating the CATEs. We present the result in **Table A9**. This modification hardly changes our results[29] and has no effect on the magnitude and significance of the peak observed in T+2 for category 3 countries.

Regional Effects

Some regions of our sample as well as the very special period that we are studying could influence our results. For example, they might be driven by African countries since they are overrepresented in categories 2 (57.44%) and 3 (69.47%). We reproduce our model adding regional indicators for Sub-Saharan Africa, Middle East, Latin America, Europe and Asia. Our results remain unchanged and are available on request. John Paul II was also involved in the fall of the Soviet Union (Troy, 2018). The effects that we observe could be driven by this influence specific to communist countries (although we control a cer-

[29] We also note that removing fixed effects does not change our coefficients. These results are available on request.

tain number of political characteristics and withdraw Poland of our sample).[30] We reproduce our model adding separately a dummy variable indicating Eastern Bloc countries (before 1991), and a dummy variable for the Cold War period. Again, our coefficients remain unchanged and the results are available on request.

3.7 Discussion and Concluding Remarks

The results of this study show that Pope John Paul II's travels reduce on average the risk of political conflict during the year of his displacement and in the medium term. This decline reaches approximately 9% during the year of the visit and the next one. It reaches 20% after three to four years. This suggests that religious leaders involved in peacebuilding activities can have an impact on the risk of political violence. We stay cautious on a systematic explanation of this causal effect, which appears to be heterogeneous depending on the religious demography of the host country (i.e. the proportion of Catholics in the population). Indeed, the effect's magnitude and sign appear to be linked to the level of religious polarization between the main recipients of the visit (i.e. the Catholics) and the rest of the population. When the level of religious polarization is high, papal visits increase the risk of political conflict by up to 19.5% after two years. When this level is low, the risk is demeaned by up to 36.4% in countries where Catholics are a religious minority, and 16% when Catholics are a very large majority. Finally, when there are almost no Catholics in the population, a large and continuous reduction of the risk is observed over time and reaches 75% four years after a visit.

The results presented here shed light on one of the ways religious polarization indirectly influences the risk of conflict. Compared to other religious structures, the risk of political conflict in polarized countries is more likely to be positively affected by shocks highlighting the religion of one of the two majority groups. In these countries we find little evidence of a continuous increase in grievances against the government. Since the response to the shock is brief and independent from the direct effect of the religious demographic structure on the risk of conflict, it would rather suggest a reuse of religious issues at a time deemed opportune. For example, there is sometimes a surge in religious issues during electoral periods in polarized countries. This increase leads to violent events which are not always caused by an increase in pre-existing tensions between religious groups but by the current political stake (Platteau, 2011; Iyer

[30] Alongside the Church, John Paul II supported the resistance of the population to the communist regime of Wojciech Jaruzelski in Poland.

and Shrivastava, 2018).

Our results also suggest that the usual categorization of religious groups as either "minorities" and “majorities" might be too broad to fully assess the link between political conflict and religion. More specifically, we do not find a linear association between the size of the Catholic community and the risk of political conflict. In countries with a large majority of Catholics (category 4), the effect of papal travels on the risk of political conflict is positive but not significant two years after a visit. A possible explanation is provided by Fox (2003), who finds that local religious institutions tend to facilitate social unrest if grievances have a religious importance, and inhibit them in the opposite case. In highly Catholic countries, local religious institutions may have the sufficient legitimacy and leverage to deter political conflicts (Bercovitch and Kadayifci-Orellana, 2009). Demonstrations or conflicts following papal visits could depend on the involvement of local Catholic institutions. For example, five years after his 1981 travel to Philippines, the Cardinal Jaime Sin organized a campaign of pacific revolt that led to the resignation of the dictator Ferdinand Marcos. In Haiti, the Christian radio station “Radio Soleil" became popular by diffusing the messages of John Paul II during his visit in 1983. The station quickly became a symbol of a Haitian spirituality that was endangered by the dictatorship of the Duvalier dynasty. After its censorship by the government, it fueled a series of social unrest that led to the collapse of the authoritarian regime in 1986.

By showing that the travels of John Paul II reduce on average the risk of political conflict, this article suggests that religious leaders' peacebuilding efforts can have an effect. Indeed, John Paul II worked for interfaith dialogue during numerous travels to non-Catholic countries. During his stays, he delivered peace messages based on inter-religious tolerance, celebrated ecumenical masses and had meetings with political leaders and representatives of various religious communities. He often advocated for a greater openness of the Church to other religions, in particular Islam.[31] The effects on the risk of political conflict of Pope John Paul II's inter-religious discourses and discussions with head of states are beyond the scope of this article, but they constitute an interesting area for future research.

[31] During his visit to Morocco (1985), he organized a meeting with 80,000 young Muslims where he highlighted different religious values and beliefs bringing the two communities together. During his visit in Beirut (1997), he publicly presented and signed the apostolic exhortation for national unity in Lebanon. This text was the fruit of a work initiated in 1993 during the Special Assembly of the Synod in which the representatives of all Lebanese faiths participated, notably (and for the first time in the history of Synods) of Islam.

3.8 Appendices of Chapter 3

Table A1: Country List

Afghanistan		Czech Republic	**	Laos		Rwanda	*
Albania	*	Democratic Republic of the Congo	**	Lebanon		Senegal	*
Algeria		Djibouti		Lesotho	*	Sierra Leone	
Angola	*	Dominican Republic	***	Liberia		Slovakia	**
Argentina	*	Ecuador	*	Libya		Slovenia	**
Armenia	*	Egypt	*	Macedonia		Solomon Islands	*
Azerbaijan	*	El Salvador	**	Madagascar	*	Somalia	
Bahrain		Equatorial Guinea		Malawi	*	South Africa	*
Bangladesh	*	Eritrea		Malaysia		South Korea	*
Belarus		Ethiopia		Mali	*	Sri Lanka	*
Benin	**	Fiji	*	Mauritania		Sudan	*
Bhutan		Gabon	*	Mauritius	*	Suriname	
Bolivia	*	Gambia	*	Mexico	*****	Swaziland	*
Bosnia and Herzegovina	***	Georgia	*	Moldova		Syria	*
Botswana	*	Ghana	*	Mongolia		Tajikistan	
Brazil	****	Guatemala	***	Morocco	*	Tanzania	*
Bulgaria	*	Guinea	*	Mozambique	*	Thailand	*
Burkina Faso	**	Guinea-Bissau	*	Myanmar		Togo	*
Burundi	*	Guyana		Namibia		Trinidad and Tobago	*
Cambodia		Haiti	*	Nepal		Tunisia	*
Cameroon	**	Honduras		Nicaragua	**	Turkey	*
Cape Verde	*	Hungary	**	Niger		Turkmenistan	
Central African Republic	*	India	**	Nigeria	**	Uganda	*
Chad	*	Indonesia	*	Oman		Ukraine	*
Chile	*	Iran		Pakistan	*	Uruguay	**
China		Iraq		Panama	*	Uzbekistan	
Colombia	*	Ivory Coast	***	Papua New Guinea	**	Venezuela	**
Comoros		Jamaica	*	Paraguay	*	Vietnam	
Congo	*	Jordan	*	Peru	**	Yemen	
Costa Rica	*	Kazakhstan	*	Philippines	*	Yugoslavia/Serbia	
Croatia	***	Kenya	**	Romania	*	Zambia	*
Cuba	*	Kyrgyzstan		Russia		Zimbabwe	*

Note: Each * represents a visit of Pope John Paul II.
Source: Author's compilation using information from the Holy See's official website.

Table A2: Unconditional Markov transition matrix

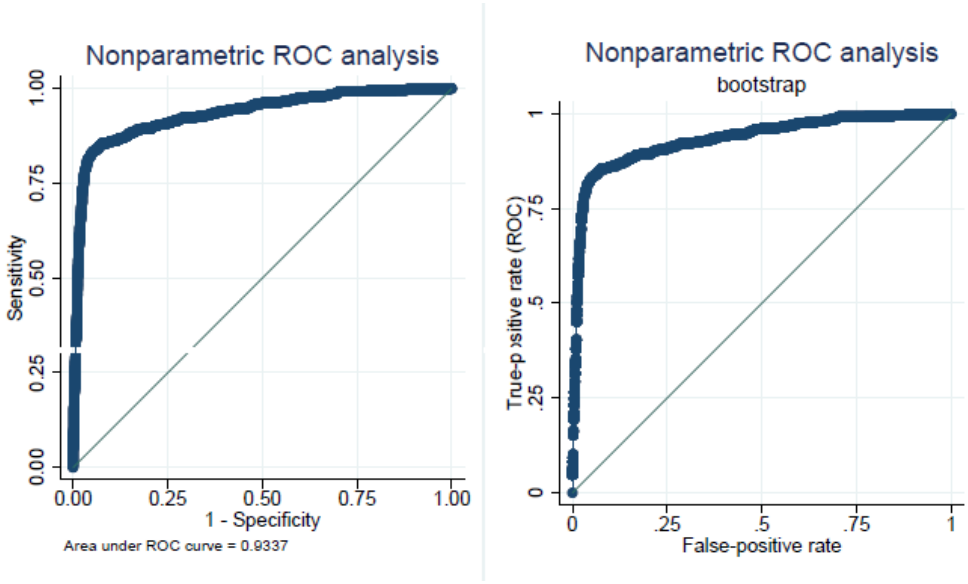
	Peace	Social Unrest (No Conflict)	Conflict and Social Unrest	Conflict (No Social Unrest)
Peace	79.8	16.4	0.1	2.7
Social Unrest (No Conflict)	38.7	54.8	4.1	2.4
Conflict and Social Unrest	5.6	9.3	58.4	26.7
Conflict (No Social Unrest)	15.4	5.3	23.2	56.2

Notes: Raw transition matrix for the whole sample. Coefficients are expressed in percentages. Rows sum to 100%.
Source: Author's compilation using UCDP-PRIO, and Banks and Wilson (2020) data.

Table A3: Political risk index - Table of results

	Conflict Incidence (UCDP-PRIO)				
	(1)	(2)	(3)	(4)	(5)
Minor Conflict	3.376***	3.382***	3.372***	3.379***	3.353***
	(0.269)	(0.272)	(0.272)	(0.267)	(0.266)
Major Conflict	4.853***	4.831***	4.838***	4.842***	4.859***
	(0.239)	(0.236)	(0.240)	(0.242)	(0.238)
Neighboring Minor Conflict	0.579***	0.581***	0.559***	0.578***	0.562***
	(0.204)	(0.203)	(0.205)	(0.208)	(0.208)
Neighboring Major Conflict	0.651***	0.665***	0.628***	0.650***	0.662***
	(0.197)	(0.193)	(0.195)	(0.198)	(0.196)
Social Unrest	0.084***	0.084***	0.086***	0.084***	0.083***
	(0.024)	(0.024)	(0.024)	(0.023)	(0.024)
Level of Development	-0.349***	-0.349***	-0.341***	-0.348***	-0.340***
	(0.081)	(0.084)	(0.084)	(0.080)	(0.082)
Oil/Gas Exports	0.026*	0.024*	0.025*	0.026*	0.024*
	(0.014)	(0.014)	(0.015)	(0.013)	(0.013)
Factional Democracy	0.385*	0.389*	0.407*	0.394*	0.389*
	(0.229)	(0.229)	(0.229)	(0.231)	(0.233)
Autocracy	-0.380**	-0.355**	-0.364**	-0.372**	-0.349**
	(0.185)	(0.180)	(0.182)	(0.178)	(0.177)
Catholics (%pop)		0.129			
		(0.346)			
Christians (%pop)			0.130		
			(0.428)		
Muslims (%pop)			0.158		
			(0.391)		
Christians x Muslims			2.258		
			(1.689)		
Religious Polarization				0.041	
				(0.359)	
Religious Fractionalization					-0.460
					(0.324)
Constant	-4.029***	-4.058***	-4.261***	-4.048***	-3.794***
	(0.458)	(0.480)	(0.549)	(0.524)	(0.460)
Pseudo R^2	0.57	0.56	0.57	0.56	0.57
Regional Dummies	x	x	x	x	x
Year FE	x	x	x	x	x
Hosmer Lemeshow p.val	0.89	0.82	0.45	0.89	0.55
Pearson Chi-Square p.val	0.49	0.47	0.64	0.52	0.48
Observations	3808	3798	3798	3798	3808

Notes: ***/**/*: p< 0.01/0.05/0.10. Results were estimated using logistic regression where all control variables present a one year lag. Robust standard errors (in parentheses) are clustered at the country-level and coefficients are in log-odds units. The model was selected according to the Akaike information criterion and the shrinkage statistics (Bilger and Manning, 2015).
Source: Author's compilation.



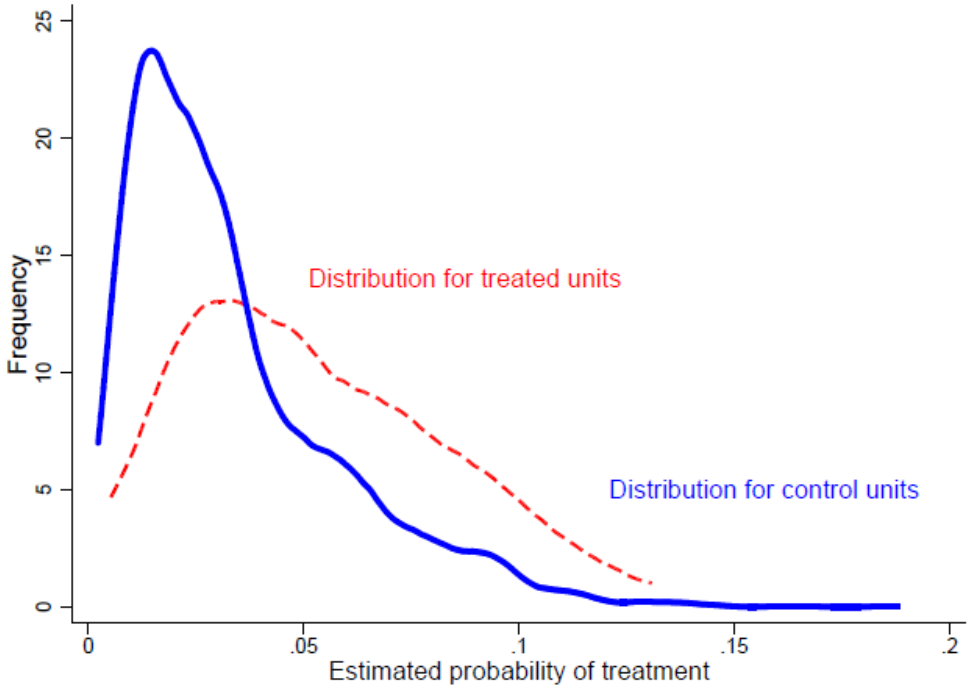
Sources: Author's compilation.

Figure A1: Predictive power of the model based on the Receiver Operating Characteristics (ROC)

Table A4: Treatment model - table of results

	(1) Treatment (t)
College of Cardinals (Lagged)	0.411*
	(0.217)
Embassies	0.648**
	(0.272)
Total Papal Visit	0.456***
	(0.108)
Total Papal Visit sq.	-0.040***
	(0.012)
Not Fair Election (4 prev. years mean)	-0.795
	(0.586)
Election (lagged)	-0.022
	(0.234)
Interstate Conflicts Magnitude for all Regional States (Lagged)	-0.010
	(0.028)
Ruggedness (Terrain Ruggedness Index, 100 m.)	-0.103
	(0.117)
Logarithm of the Population Size (Lagged)	-0.013
	(0.101)
Presence of Lootable Diamonds	-0.262
	(0.235)
SPEI (4 prev. years mean)	-0.013
	(0.225)
Political conflict risk index controls:	
Development (4 prev. years mean)	-0.161
	(0.101)
Factional Democracy (4 prev. years mean)	-0.385
	(0.329)
Value of the Oil/Gas Exports (4 prev. years mean)	0.010
	(0.018)
Autocracy (4 prev. years mean)	0.042
	(0.275)
Africa	-0.505
	(0.308)
Asia	-0.569
	(0.400)
Europe	0.614
	(0.388)
Middle East	-1.199**
	(0.493)
Constant	-4.029***
	(1.484)
Observations	3332
Model AUC	0.703

Notes: *p<0.1, **p<0.05 and ***p<0.01. Results were estimated using Poisson regression by pseudo maximum likelihood. Treatment (t) is a dummy variable indicating a visit of John Paul II. *Source: Author's compilation.*



Notes: The probability of treatment is low because Papal visits are rare events. As suggested by the literature on P-score weighting in the presence of such variables, we use stabilized weights to take into account the real proportion of Papal visits in our sample. *Sources: Author's compilation.*

Figure A2: Overlap check

Table A5: Balance check

	Treated Variance	Control Variance	Standardized Diff.	Variance Ratio
		Non-Weighted		
Cardinals	0.252	0.221	0.367	1.139
Embassies	0.185	0.241	0.394	0.766
Total Papal Visit sq.	670.54	737.942	0.11	0.909
Total Papal Visit	6.004	8.401	0.239	0.715
Not Fair Election (4 prev. years mean)	0.027	0.036	0.037	0.745
Election	0.182	0.182	0.007	1
Magnitude of Regional Conflicts	9.878	17.986	0.154	0.549
Rough Terrain	0.883	1.481	0.139	0.596
Population	2.175	2.415	0.137	0.901
Lootable Diamond	0.218	0.215	0.005	1.012
Development (4 prev. years mean)	2.66	2.175	0.11	1.223
SPEI (4 prev. years mean)	0.263	0.204	0.025	1.288
Factional Democracy (4 prev. years mean)	0.091	0.101	0.049	0.898
Oil/Gas Exports (4 prev. years mean)	50.097	53.701	0.131	0.933
Autocracy (4 prev. years mean)	0.187	0.203	0.094	0.92
Region=Africa	0.232	0.232	0.013	1.001
Region=Asia	0.109	0.157	0.2	0.69
Region=Europe	0.115	0.076	0.158	1.52
Region=Middle East	0.058	0.119	0.258	0.488
		Weighted		
Cardinals	0.226	0.223	0.008	1.014
Embassies	0.236	0.24	0.075	0.983
Total Papal Visit sq.	903.458	732.389	0.036	1.234
Total Papal Visit	8.443	8.331	0.043	1.013
Not Fair Election (4 prev. years mean)	0.029	0.036	0.118	0.818
Election	0.182	0.182	0.006	1.001
Magnitude of Regional Conflicts	9.78	17.765	0.154	0.55
Rough Terrain	1.541	1.462	0.034	1.054
Population	2.641	2.399	0.04	1.101
Lootable Diamond	0.22	0.215	0.017	1.022
Development (4 prev. years mean)	2.068	2.193	0.015	0.943
SPEI (4 prev. years mean)	0.236	0.204	0.201	1.158
Factional Democracy (4 prev. years mean)	0.094	0.101	0.059	0.927
Oil/Gas Exports (4 prev. years mean)	50.489	53.688	0.003	0.94
Autocracy (4 prev. years mean)	0.179	0.203	0.123	0.884
Region=Africa	0.24	0.232	0.049	1.034
Region=Asia	0.149	0.156	0.033	0.956
Region=Europe	0.08	0.077	0.011	1.041
Region=Middle East	0.131	0.117	0.051	1.119

Notes: Variance of the treated and the control groups, standardized mean differences and variance ratio of the two groups with and without AIPW weights. Imbalance is characterized by a standard difference value greater than 0.25, and/or a ratio of the variances of the treated group and of the control group greater than 2 or less than 0.5; equilibrium is defined by a ratio close to 1 (Rubin, 2001). *Source: Author's compilation.*

Table A6: Summary statistics and unit root tests

Variable	Mean	Std. Dev.	Obs	Min	Max	Statistic	P-value
Forecasting Model							
Conflict UCDP-PRIO	0.205	0.404	3808	0.000	1.000	-	-
Minor conflict	0.049	0.216	3808	0.000	1.000	-	-
Major conflict	0.155	0.362	3808	0.000	1.000	-	-
Neighboring conflict	1.104	0.820	3808	0.000	2.000	-	-
Social Unrest	1.400	3.602	3808	0.000	49.000	-	-
Development	-0.031	1.500	3808	-2.439	4.974	-	-
Oil/gas exports	7.078	7.334	3808	0.000	20.228	-	-
Factional Democracy	0.141	0.348	3808	0.000	1.000	-	-
Autocracy	0.336	0.472	3808	0.000	1.000	-	-
Predicted political conflicts	0.205	0.323	3808	0.002	0.998	-	-
Baseline model							
Conflict risk (t)	-0.000	0.182	3670	-0.873	0.907	147.422	0.000
Conflict risk (t+1)	0.001	0.216	3533	-0.903	0.950	135.415	0.000
Conflict risk (t+2)	0.004	0.235	3404	-0.910	0.958	46.975	0.000
Conflict risk (t+3)	0.005	0.258	3276	-0.924	0.939	29.994	0.000
Conflict risk (t+4)	0.007	0.269	3149	-0.932	0.907	40.075	0.000
Change in Conflict Risk	-0.000	0.182	3670	-0.873	0.907	147.422	0.000
Change in Autocracy	-0.011	0.185	3800	-1.000	1.000	40.144	0.000
SPEI	-0.092	0.785	3743	-3.979	3.567	60.747	0.000
Change in Oil/Gas Exports	0.098	0.897	3807	-9.030	13.627	28.995	0.000
Change in Factional Democracy	-0.000	0.187	3800	-1.000	1.000	30.985	0.000
Change in Development	0.044	0.048	3807	-0.164	0.280	6.344	0.000
Change in Neighbors Conflicts	-0.014	0.515	3807	-2.000	2.000	111.986	0.000
Oil/Gas Exports (4 prev. years mean)	6.952	7.270	3734	0.000	20.165	10.189	0.000
Development (4 prev. years mean)	-0.052	1.471	3448	-2.422	4.845	36.347	0.000
Factional Democracy (4 prev. years mean)	0.138	0.314	3726	0.000	1.000	17.351	0.000
Autocracy (4 prev. years mean)	0.355	0.455	3726	0.000	1.000	7.764	0.000
Treatment model							
Cardinals	0.323	0.468	3808	0.000	1.000	-	-
Vatican Embassies	0.538	0.492	3808	0.000	1.000	-	-
Total Papal Visit sq.	23.984	28.995	3808	0.000	121.000	-	-
Total Papal Visit	3.858	3.017	3808	0.000	11.000	-	-
Not Fair Election (4 prev. years mean)	0.171	0.187	3716	0.000	0.750	-	-
Election	0.235	0.424	3808	0.000	1.000	-	-
Magnitude of Regional Conflicts	1.868	4.121	3755	0.000	24.000	-	-
Rough Terrain	1.304	1.206	3808	0.115	6.740	-	-
Population	15.897	1.594	3808	12.269	20.968	-	-
Lootable Diamonds	0.308	0.462	3808	0.000	1.000	-	-
SPEI (4 prev. years mean)	-0.092	0.450	3677	-1.862	1.681	-	-
Africa	0.373	0.484	3808	0.000	1.000	-	-
Asia	0.192	0.394	3808	0.000	1.000	-	-
Europe	0.087	0.281	3808	0.000	1.000	-	-
Middle East	0.131	0.338	3808	0.000	1.000	-	-

Note: Unit root results are obtained using Fisher-type tests with Augmented Dicker-Fuller and Choi's modified version of the inverse chi-squared transformation. *Source: Author's compilation.*

Table A7: Average treatment effect of papal visits using ICRG data

	(1) Year t	(2) Year t+1	(3) Year t+2	(4) Year t+3	(5) Year t+4
CATE 0	-0.015	-0.038*	-0.074**	-0.058	-0.159***
	(0.012)	(0.021)	(0.031)	(0.040)	(0.044)
Observations	230	212	194	178	164
Country F.E.	x	x	x	x	x
CATE 1	0.008	0.018	0.038*	0.049	0.083**
	(0.008)	(0.014)	(0.022)	(0.030)	(0.034)
Observations	331	313	295	278	259
Country F.E.	x	x	x	x	x
CATE 2	0.127***	0.132***	0.104***	0.052	-0.016
	(0.012)	(0.017)	(0.026)	(0.037)	(0.040)
Observations	293	275	255	235	216
Country F.E.	x	x	x	x	x
CATE 3	0.044***	0.007	-0.031***	0.040***	0.096***
	(0.004)	(0.004)	(0.007)	(0.011)	(0.016)
Observations	301	278	257	236	216
Country F.E.	x	x	x	x	x
CATE 4	0.005	0.030***	0.049***	0.038**	0.023
	(0.003)	(0.006)	(0.011)	(0.015)	(0.019)
Observations	321	303	284	267	250
Country F.E.	x	x	x	x	x

Notes: Each CATE's number corresponds to a category of religious structure. Standard errors (clustered at the country level) are in parentheses. ***/**/* Indicate p < 0.01/0.05/0.10. Controls: changes from t-1 to t-4 in y, autocracy level, factional democracy level, value of oil and gas exports, development indicator, conflicts in the neighboring countries, and number of Catholics; mean value during the four previous years of oil and gas exports, development, factional democracy and autocracy; changes from t to t-4 in SPEI index; religious structure; country fixed effects (Country F.E.). *Source: Author's compilation.*

Table A8: Average treatment effect of papal visits for different specifications of the lags

	(1) 1 lag	(2) 2 lags	(3) 3 lags	(4) 4 lags	(5) 5 lags	(6) 6 lags
ATE (T)	-0.013***	-0.010***	-0.017***	-0.018***	-0.019***	-0.020***
	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)
Observations	3320	3298	3170	3042	2914	2786
Country F.E.	x	x	x	x	x	x
ATE (T+1)	-0.007	-0.004	-0.016***	-0.020***	-0.021***	-0.019***
	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)	(0.005)
Observations	3190	3168	3041	2914	2787	2659
Country F.E.	x	x	x	x	x	x
ATE (T+2)	0.012	0.013*	0.000	-0.005	-0.006	-0.008
	(0.007)	(0.007)	(0.008)	(0.008)	(0.008)	(0.008)
Observations	3067	3045	2919	2793	2665	2537
Country F.E.	x	x	x	x	x	x
ATE (T+3)	-0.026***	-0.023**	-0.039***	-0.043***	-0.047***	-0.043***
	(0.009)	(0.009)	(0.010)	(0.010)	(0.010)	(0.010)
Observations	2944	2923	2798	2671	2543	2417
Country F.E.	x	x	x	x	x	x
ATE (T+4)	-0.024**	-0.021*	-0.037***	-0.042***	-0.045***	-0.040***
	(0.012)	(0.012)	(0.012)	(0.013)	(0.013)	(0.012)
Observations	2824	2803	2677	2549	2423	2296
Country F.E.	x	x	x	x	x	x

Notes: Standard errors (clustered at the country level) in parentheses. ***/**/* Indicate p < 0.01/0.05/0.10. Controls: changes from t-1 to t-4 in y, autocracy level, factional democracy level, value of oil and gas exports, development indicator and conflicts in the neighboring countries; mean value during the four previous years of oil and gas exports, development, factional democracy and autocracy; changes from t to t-4 in SPEI index; country fixed effects (Country F.E.). *Source: Author's compilation.*

Table A9: Conditional average treatment effects of papal visits controlling for variations in the number of Catholics

	(1) Year t	(2) Year t+1	(3) Year t+2	(4) Year t+3	(5) Year t+4
CATE 0	-0.073***	-0.050*	-0.073*	-0.092*	-0.192***
	(0.013)	(0.024)	(0.034)	(0.040)	(0.053)
Observations	567	537	510	481	454
Country F.E.	x	x	x	x	x
CATE 1	-0.058***	0.015	-0.032	-0.082**	-0.027
	(0.012)	(0.022)	(0.026)	(0.032)	(0.035)
Observations	610	586	564	545	524
Country F.E.	x	x	x	x	x
CATE 2	-0.004	0.000	0.003	-0.025	-0.010
	(0.009)	(0.013)	(0.017)	(0.022)	(0.027)
Observations	620	597	574	549	522
Country F.E.	x	x	x	x	x
CATE 3	0.006	-0.009	0.030**	-0.031***	-0.022*
	(0.005)	(0.006)	(0.011)	(0.010)	(0.012)
Observations	621	589	560	531	504
Country F.E.	x	x	x	x	x
CATE 4	0.006	-0.032***	0.013	-0.019*	-0.032***
	(0.003)	(0.006)	(0.008)	(0.010)	(0.012)
Observations	610	591	571	551	531
Country F.E.	x	x	x	x	x

Notes: Each CATE's number corresponds to a category of religious structure. Standard errors (clustered at the country level) are in parentheses. ***/**/* Indicate p < 0.01/0.05/0.10. Controls: changes from t-1 to t-4 in y, autocracy level, factional democracy level, value of oil and gas exports, development indicator, conflicts in the neighboring countries, and number of Catholics; mean value during the four previous years of oil and gas exports, development, factional democracy and autocracy; changes from t to t-4 in SPEI index; religious structure; country fixed effects (Country F.E.). *Source: Author's compilation.*

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Chapitre 4

KEEP OFF THE GRASS: GRASSLAND SCARCITY AND THE SECURITY IMPLICATIONS OF CROSS-BORDER TRANSHUMANCE BETWEEN NIGER AND NIGERIA

4.1 Introduction

Conflicts between nomadic pastoralists and sedentary farmers are not new phenomena in Africa. However, their frequency and intensity are seemingly increasing in several West African countries (Higazi and Abubakar Ali, 2018). Herder-farmer conflicts mostly appear in coastal States following the partial or total destruction of agricultural land on the passage of herds in transhumance. Over the last years, this violence has taken more lives in Nigeria than in all ECOWAS countries combined (Higazi and Abubakar Ali, 2018). In 2018, more than 1,300 people were killed and 300,000 displaced in Nigeria because of herder-farmer violence (ICG, 2018). On December 3, 2019, the Economic and Social Council and the United Nations Peacebuilding Commission met to discuss cross-border transhumance's economic and security impact in West Africa. This traditional activity, which is linked to the climatic constraints in the Sahel, divides West African countries around the economic benefits of regional integration and the security risk associated with the movement of people and their goods across borders.

The Economic Community of West African States (ECOWAS) recognizes transhumance as an economically and socially important adaptation strategy to climate change. For several Sahelian countries, pastoralism is the only possible activity in the vast arid spaces near the Sahel. This environment-induced specialization gives them a comparative advantage in supplying livestock and livestock-related products to coastal countries.[1] However, the amount of Sahelian pastures fluctuates with climatic conditions, making seasonal migration to the Coastal States the primary adaptation mechanism of Sahelian pastoralists to the depletion of pastures during the dry season. Cross-border transhumance involves seasonal and cyclical migration of herders and their cattle in complementary ecological areas beyond national borders. This practice supplies 65% of cattle meat in Western Africa (Kamuanga et al., 2008) and has proven to be highly resilient to the economic and ecological challenges of the region (Ducrotoy et al., 2016; Leonhardt, 2019). Nigeria imports a large proportion of its meat from neighboring countries[2], particularly Niger through transhumance. During the rainy season (between June and September), both Nigerien and Nigerian nomadic herders take advantage of Nigerien grasslands. During the dry season (between October and May), the herders and their cattle travel several hundred kilometers[3] to the South (in Nigeria), searching for water and pasture.

During transhumance, the herder seeks to maximize the health and size of his herd by reaching successively pastoral resources, knowing that movement has a cost and his information on the localization of grassland over the Nigerian territory is imperfect. Recent empirical work analyzes how climate-motivated migration of herders affects the risk of herder-farmer conflict in Africa (Eberle et al., 2020; McGuirk and Nunn, 2020). Sudden climatic shocks affecting the depletion of grazing resources in pastoral areas can increase the number of herders resorting to transhumance. These movements are associated with a higher risk of herder-farmer conflict in nearby transition areas (i.e., areas suited for agricultural and pastoral activities) as they disrupt traditional informal arrangements between herders and farmers on land use. The authors are interested in migration between a cell (of approximately $55x55$ kilometers at the equator) and its direct neighboring cells (i.e., "short" migration). Empirically, the herder's itinerary for these short migrations is defined by one area of origin (a pastoral zone) and one destination (a neighboring transi-

[1] See, for example, https://www.worldbank.org/en/news/press-release/2021/03/30/world-bank-provides-375-million-to-boost-efforts-towards-realizing-the-full-potential-of-pastoralism-in-the-sahel, accessed April 2021.

[2] In Nigeria, the livestock sector's contribution to the GDP is around 1.7% (FAO, 2019).

[3] Some breeders practice "great nomadism" and cover more than 1000 km (Dia and Duponnois, 2013; Thébaud et al., 2018; Apolloni et al., 2019). Also, transhumance to the southern parts of Nigeria is more frequent since the decline in trypanosomiasis prevalence.

tion area). In the case of cross-border transhumance between Niger and Nigeria, the itinerary involves one departure area (a pastoral zone in Niger), several destination zones (pastures in Nigeria), and several "transit areas" between them. Conflicts appearing at the destination (where the resource is) may be linked to a competition for the resource in a context of destabilized traditional arrangements. Nonetheless, conflict can appear during transit if the departure and destination are far away. Indeed, the absence of continuous access to pastoral resources can force herders to practice crop encroachment or buy crop residues[4] to avoid costly animal diseases or deaths during a long transit. The induced proximity of pastoralists to agricultural areas could increase the risk of herder-farmer conflict.

Are herder-farmer conflicts caused by competition for the remaining grasslands or by reducing the opportunity cost of violent appropriation of nearby lower quality grazing resources? This article analyzes the economic mechanisms linking climate-related seasonal migration of nigerien and nigerian herders from Niger to conflict with Nigerian farmers. Our empirical strategy relies on highly disaggregated information (at the scale of 0.5x0.5 degree latitude and longitude) on land covers, climatic conditions, and cattle grazing clashes in Nigeria. It includes a rich set of fixed effects to rule out competing political, ethnic, and religious mechanisms.[5]

The obtained results indicate that an unclear effect of climate-induced migratory flows of pastoralists coming from Niger on the average risk of herder-farmer conflict in Nigeria. Some evidences are found of a positive effect of extreme climatic events (floods and droughts) on this risk, but we also find that dryer climatic conditions significantly decrease the probability of conflict. We also find that predatory behavior for the grabbing of the last Nigerian pastures does not constitute a major cause of conflicts between transhumant herders (from Niger) and Nigerian farmers. Furthermore, proximity to alternative grasslands significantly reduces the risk of herder-farmer conflicts in cells, regardless of their pasture cover. Replacing these results in the politico-legal context of transhumance in Niger and Nigeria, it appears that the scarcity of Nigerian pastures (observed during our entire temporal sample) puts Nigeria in a risky, yet politically-motivated, trajectory. Spotty pasture covers increase the cost of transhumance, which increases the risk of conflict following climatic hardships in Niger.

[4] In Western Africa, crop residues and wild grasses are increasingly commercialized as pastoral resources by residents. This practice tends to increase the number of herder-farmer clashes (Leonhardt, 2019)."*Under this pressure, conflicts over the modalities of access to pastoral resources are rife. This often shows in conflicts over the determination of the date, by which harvested fields are opened to pastoralists.*", Leonhardt (2019).

[5] It should be noted that this analysis excludes but makes no judgment on the relative importance of these factors as causes of herder-farmer conflicts.

The first contribution of this work to the recent literature on the onset of herder-farmer conflict is to specifically question the effect of the location of pastures using new satellite imagery provided by the European Space Agency and spatial panel econometrics techniques. Indeed, the study of spatial spillovers rising from the localization of the remaining pastures in Nigeria contributes to the recent literature on herder-farmer conflict by exploring the motivations of involved actors. The second original contribution of this article is to study the costs and benefits of seasonal migration on a regional and local scale in times of scarcity. It provides a detailed analysis of the heterogeneous effect of climatic conditions in Niger's grasslands during the rainy season on the risk of herder-farmer conflict in Nigeria during the following dry season. It also analyzes the legal and political framework surrounding nomadic pastoralism at the national (i.e., in Niger and Nigeria) and regional scale (i.e., in the ECOWAS region), highlighting diverging views and ambitions for this practice. Finally, this article contributes to the disaggregated literature on the effect of resource scarcity on the risk of conflict (De Soysa, 2002; Magnus Theisen, 2008; Urdal, 2005; Almer et al., 2017; Vesco et al., 2020) and the literature on the effect of climate on conflict (Benjaminsen et al., 2012; Fjelde and von Uexkull, 2012; Hendrix and Salehyan, 2012; Harari and Ferrara, 2018).

The remainder of this paper is organized as follows. Section 2 presents the legal framework surrounding cross-border transhumance between Niger and Nigeria. In Section 3, we present the literature and theoretical motivations of this analysis. Section 4 describes the main data. Section 5 presents the empirical challenges and the empirical strategy associated with this study. Section 6 presents our main results. Some robustness checks are presented in Section 7, and we conclude in Section 8.

4.2 Background and Legal Context

4.2.1 The 1979 ECOWAS Protocol on Free Movement of People and Goods

Niger and Nigeria are members of the Economic Community of West African States (ECOWAS) since 1975. One of the main objectives of ECOWAS is to accelerate regional development by removing obstacles and barriers to the commercial movement of citizens across the artificial borders created by the colonial powers. It has been the only regional organization in Africa that has recognized the economic value of transhumance and passed legislation ensuring regional livestock mobility.

The 1979 ECOWAS Protocol on Free Movement of People and Goods[6] gives ECOWAS citizens the right to enter and reside in the territory of any member state as long as they possess valid travel documents and international health certificates. It also provides member states the right to refuse admission to citizens deemed inadmissible under their national law. Although all ECOWAS countries signed the protocol in 1978, some coastal countries, including Nigeria, have rapidly expressed concern about its implication for national security. The free movement of people and goods across borders could ease criminal activities such as money laundering and traffics (Aduloju and Opanike, 2015). Nonetheless, member states adopt the protocol in 1979 with a three-phase implementation plan: (1) the right of entry and the abolition of visas for stays of less than 90 days; (2) the right of residence after 90 days to seek and exercise income-earning employment; and (3) the right of establishment for companies. Only the first phase was implemented. The application of phases (2) and (3) encountered many obstacles, particularly the two oil shocks' consequences on the Nigerian economy. Since the 1980s, Nigeria has regularly resorted to anti-regionalist policies justified by the desire to protect its economy during downturns. These decisions contravene the ECOWAS initiative. In response to the Nigerian economic crisis of 1983, President Shehu's civil administration expelled one million foreign workers, mostly from neighboring countries (Brown, 1989). After the military coup of Major General Muhammadu Buhari, Nigeria launched a "war against indiscipline"[7] which led it to close and secure its borders from April 1984 till March 1986. Again, in May 1985, over a million foreign workers were expelled from Nigeria.

Additional protocols were adopted between 1985 and 1990[8] to commit the Member States, among other things, not to carry out mass expulsions and limit the ground for individual expulsion to reasons of national security, public order, morality, public health, or non-compliance with an essential condition of residence.[9]

The full implementation of the protocol and free movement of people (with their goods and services) has so far never been fully achieved. Economic and security issues both at the national and regional scale are still a source of divergence between Nigeria and ECOWAS regarding the movements of transhumant

[6] 1979 Protocol A/P.1/5/79 relating to Free Movement of Persons, Residence and Establishment.

[7] Indiscipline refers to illegal activities such as smuggling or currency trafficking.

[8] 1985 Supplementary Protocol A/SP.1/7/85 on the Code of Conduct for the implementation of the Protocol on Free Movement of Persons, the Right of Residence and Establishment; 1986 Supplementary Protocol A/SP.1/7/86 on the Second Phase (Right of Residence); 1989 Supplementary Protocol A/SP.1/6/89 amending and complementing the provisions of Article 7 of the Protocol on Free Movement, Right of Residence and Establishment; and 1990 Supplementary Protocol A/SP.2/5/90 on the Implementation of the Third Phase (Right to Establishment).

[9] Initially, these additions intend to protect the rights of refugees following the civil wars in Liberia, Sierra Leone, and Côte d'Ivoire.

herders between Niger and Nigeria. For example, Nigeria again decided to close its border with Niger and Benin in August 2019 to develop a strategy to stem the fraudulent export of agricultural products across the Nigerian border.

4.2.2 Recent Policies on Transhumance

ECOWAS

The 1998 ECOWAS Transhumance Protocol[10] recognizes the economic value of transhumance and authorizes it under certain conditions. The right of free passage of animals requires presenting an ECOWAS International Transhumance Certificate for the herd.[11] Member States of the ECOWAS establish predefined routes while the host countries fix the period during which transhumant animals can enter and leave their territory. Since the ECOWAS Transhumance Protocol, Sahelian States like Niger have implemented new legislation on pastoralism and transhumance. The legislation of Nigeria and other coastal States permits cross-border transhumance as defined by the ECOWAS Protocol, but they also seek to restrict and control it by imposing severe conditions on these flows of foreign breeders.

The regulation related to the ECOWAS Protocol's implementation[12] was promulgated in 2003, five years after the protocol was signed. It stresses that pastoral transhumance contributes to socio-economic development and livestock production's growth, but recommends its gradual replacement by intensive animal husbandry methods (without specifying if this involves the sedentarization of nomadic herders). It formalizes the role of member States in dissemination the content of the Transhumance protocol and establishing/strengthening pastoralist organizations, national committees, and networks able to manage and monitor transhumance. Both State members and the ECOWAS were asked to collaborate to improve knowledge, technical and financial support to pastoralism.

In 2005, the ECOWAS elaborated its first Agricultural Policy (ECOWAP). As part of its implementation and following the 2008 food crisis, the Ministers of Livestock, Trade, and Security of the ECOWAS Member States adopted in 2009 the Guiding Principles for the Development of the Livestock Industry within ECOWAS. They recognize the contribution of the livestock sector to food security and economic development in West Africa. Among the guiding principles, the ministers propose to protect pastoral

[10] Decision A/DEC.5/10/98 Relating to the regulations on Transhumance Between the ECOWAS Member States.

[11] This document specifies the composition, the vaccination history and the itinerary of the cattle in the host country.

[12] Regulation C/REG.3/01/03 Relating to the implementation of the regulations on transhumance between the ECOWAS Member States

areas and transhumance corridors through the harmonization of pastoral codes and agro-sylvo-pastoral laws implemented. Furthermore, they recommend the strict implementation of the regulation on the free movement of persons, goods, capital, and services (including the right of entry, residence and establishment). The guiding principles were then used by the ECOWAS Commission to prepare a "Strategic Action Plan for the Development and Transformation of the Livestock Sector in the ECOWAS Region (2011–2020)". In contrast to the 1998 Protocol on transhumance, it recognizes transhumance as a way for herders to cope with climate change. They consider that clashes between nomad herders and farmers are due to grazing deficits, ignorance or difficulty in applying the 1998 Protocol on Transhumance, irrational management of pastoral grazing resources, weak institutional framework, and coordination failures between member states. The ECOWAS envisages a budget of 52 million dollars to secure and simplify the transnational mobility of pastoralists. It plans to coordinate the mapping of pastures and facilitate the use of corridors (40 million), adapt the legislation on transnational transhumance (7 million), and put in place a regional conflict prevention framework (5 million).[13]

Niger

Niger is the largest West African country with a land area of 1,270,000 square kilometers. It is an arid country where only 1% of the territory receives the regular and sufficient rainfall necessary for agricultural production. Because of this climate, Niger has a long tradition of livestock production. 87% of its active population still practice animal husbandry as a primary or secondary source of income, and this sector accounts for 13% of Niger's Gross Domestic Product (GDP) and 40% of its agricultural GDP (Rhissa, 2010). In Niger, mobility is a necessity for all agro-pastoral production systems, given the environmental conditions. It is also an expression of cultural identity and reinforcing social ties between pastoralists and farmers (Leonhardt, 2019).[14]

Among ECOWAS members, Niger's legislation on pastoralism is one of the most advanced (Leonhardt, 2019). Niger's GDP depends on the livestock sector at 8.5% (according to 2018 estimations of Niger's national statistics institute). Since 1993, Niger is developing its Rural Code which guides natural resources'

[13]The ECOWAS budget also includes developing a sub-regional transhumance charter and establishing a transhumance observatory.

[14]In recent decades, most pastoralists and farmers have diversified their production systems by combining agriculture and animal husbandry. For the Fulani people (approximately 7% of the Nigerien population), breeding is part of their identity and constitutes cultural heritage. Although they now also combine cattle breeding with a certain degree of agriculture and have mostly settled down, they continue to practice transhumance, which involves moving the herds to the South during the dry season to access water points and pastures.

use in rural areas. A multi-tiered institutional structure rules the management of natural resources and the registration of land certificates.[15] The Nigerien Rural code (1993) defines the use rights for pastoralists according to a division of the territory between land affected to agricultural (in the Southern regions with isohyets superior to 300-400 mm) or pastoral activities (public lands in the North). In the official pastoral areas, herders enjoy collective use rights, and large-scale agricultural activity is prohibited (farmers cannot expect compensation for damage on unauthorized fields). To facilitate the cohabitation of farmers and herders in the South, the Rural Code introduces private land ownership for farmers and defines pastoral enclaves (transhumance corridors and grazing areas) for exclusive pastoral use.

The 2010 Ordinance on pastoralism reaffirms several prerogatives of the 1993 Rural Code. It guarantees and recognizes nomadic pastoralism as a fundamental right and prohibits the granting of land concessions in pastoral areas if they obstruct pastoralists' movement. Transhumance is recognized as a sustainable and efficient way of using pastoral resources. Also, all pastoral lands are classified as public domain and protected from agriculture occupation. The ordinance gives herders the right to graze their herds in agricultural zones after harvesting of rain-fed produce. In the case of crisis, including drought-related pasture scarcity, pastoralists are authorized to use public ranches and protected forests as an emergency refuge for their cattle. In case of damage on agricultural lands, the Land Commission determines compensation for the farmer that cannot exceed the value of the loss. In case of animal abuse, herders are also eligible for financial compensation according to the animal's value on the livestock market. The 1993 Rural code and the 2010 Ordinance on pastoralism provide a legal framework intending to reduce competition over land between herders and farmers. It indicates a political will to recognize and protect pastoral activities, including transhumance. However, the operationalization of the 2010 ordinance is still in progress. In 2017, only a few decrees were adopted out of the 14 necessary ones.

Nigeria

The Nigerian economy is dependent on the oil sector (Ross, 2003).[16] This dependency can be detrimental to its economic development because oil abundance can be associated with a natural resource curse

[15] There is the National Committee of the Rural Code at the ministerial level, the permanent secretary of the Rural Code at the national and regional level, and land commission at community and departmental levels.

[16] Between 1970 and 1999, the Nigerian petroleum industry generated about 231 billion dollars in rents, while average income per capita fell from 264 to 250 dollars a year (Ross, 2003).

(Sala-i Martin and Subramanian, 2013). Oil rents can affect the political and administrative environment and hamper long-term growth by inducing rent-seeking and corruption. It also expose the country to commodity price volatility and Dutch Disease (i.e., appreciation of the real exchange rate in case of positive shocks). The 1972 Nigerian Enterprises Promotion Decree (also referred as the Indigenization Decree) is generally presented as the first step of Nigerian government into the import substitution industrialization (ISI) strategy (Ezeji and Okonkwo, 2014). This type of policy aims at reducing a country's dependency on foreign imports by improving domestic production. The Decree had mixed results, especially for the agricultural sector. Before the mid 1970s, the agricultural sector contributed to over 60% of the GDP and 95% of the Nigerian food needs (Osuntokun et al., 1997). In the 80's, Nigeria turned from a net exporter of agricultural products to a net importer of food items (Akanle et al., 2013). Successive governments implemented various strategies to improve the balance of trade, but Nigeria is still a heavy importer of food item, including meat[17].

Nigerian legislation has tried for many years to sedentarize transhumant pastoralists to develop intensive livestock ranches, reduce meat imports, and stop conflicts between herders and farmers over grazing lands. In 1942, the "Fulani Settlement Scheme" is the first attempt of Nigeria to sedentarize transhumant pastoralists. Pastoralist households were allocated plots in Plateau State while being encouraged to practice mixed farming.[18] Through the Grazing Reserve Act of 1965, Nigeria tried simultaneously to sedentarize pastoralists (particularly the Fulani) and improve their access to grazing lands and essential equipment. It empowered the Ministry of Animal and Forestry Resources to acquire, preserve, control, and manage grazing resources. It also paved the way for the creation of transhumance routes linking the reserves together. The National Agricultural Policy of 1988 was a second step in this direction. It stipulates that at least 10% of the Nigerian territory (9.8 million acres) would be allocated to grazing reserves. Between 1970 and 1980, nearly 50 million USD were invested by federal and state governments to establish grazing reserves, while the World Bank and USAID provided financial support to the equipment and operationalization of the selected reserves. By 1980, less than 1 million acres were established as pasture reserves (10% of the planned size). Today, there are 415 grazing reserves in Nigeria, but only a third are used (Leonhardt, 2019).

Buhari made agricultural development an argument for his 2015 and 2019 election campaigns. How-

[17] See, for example, https://www.bbc.com/news/world-africa-49367968, accessed April 2021.

[18] The Scheme was finally considered too expensive, and the plots have quickly been replaced by tin mines (Leonhardt, 2019).

ever, several challenges remain to achieve independence on meat imports, including population growth, international oil price volatility, and security issues (causing population displacement, isolation from local markets, and human and capital losses). In 2015, a “Special Committee on Strategic Action Plan for the Development of Grazing Reserves and Stock Routes Nationwide” was set up by the recently elected president Buhari to propose solutions to the increasing number of clashes between herders and farmers. In 2016, the committee presented a National Grazing Reserve (Establishment) Bill to the parliament. They proposed establishing a National Grazing Reserve Commission responsible for the identification and acquisition of lands to establish grazing reserves. The Senate rejected the bill since grazing reserves establishment relates to zoning and planning laws that are primarily state and local issues. Indeed, the land tenure system and property rights in Nigeria are defined by the 1999 Constitution and the Land Use Act (LUA) of 1978, which handed over the management of land to state governors (Ele, 2020). In response to the government’s proposal to establish grazing reserves in all states, some of them introduced particularly hostile laws against the establishment of pasture reserves and transhumant herding. For example, Benue and Taraba states introduced legislation in 2017 banning open grazing in their territories to stop herders/farmers conflicts. Either in the current "Agricultural Promotion Policy" (2016-2020) or the "National Ranching Development Plan" of 2017, pastoral transhumance is seen as a threat to national security while intensive ranching is presented as the only future for livestock production in Nigeria.

4.3 Theoretical Motivations

Conflicts between herders and farmers are probably one of the oldest forms of conflict in Western Africa. The sources of disagreement between both actors are relatively straightforward. On the one hand, there is the objective damage to the fields caused by the passage of animals. On the other hand, the very principle of transhumance is sometimes perceived by farmers as an opportunistic strategy of herders to take advantage of other people’s land. However, the root causes behind the use of violence are more complex to establish since they refer to economic, political and social issues specific to the countries considered. There is a large multidisciplinary literature on the causes of the failure of local institutions in the management of these conflicts. The colonial era is generally presented as a highly destabilizing period for customary or informal land tenure and resource use systems in Western Africa (Wade, 1974; Davidheiser and Luna, 2008). In the pre-colonial era, pastoralists and small-surplus farmers have often been comple-

mentary economic actors by trading sector-specific goods and services (for example, pastoralists helping to fertilize agricultural land and farmers providing pastoralists with agricultural surplus) (Lovejoy and Baier, 1975; Bassett, 1988). Social structures were in charge of preserving this symbiosis. In Niger and Nigeria, Rugas were elected officials responsible for the settlement of land-related disputes and the regulation of grazing use (Davidheiser and Luna, 2008). Colonial authorities changed the sociopolitical landscape by implementing new land tenure laws (Jacobson, 1988) and increasing agricultural production (including the production of commodities through irrigation), resulting in an unintended compatibility-loss between both groups (Sinclair and Fryxell, 1985; Brink et al., 1995; van den Brink et al., 1995).

Since the independence, there is an ongoing process of politicization of herder-farmer conflicts in Western Africa that involves political marginalization of pastoral communities, underestimation of pastoralists' contribution to the national economy, and overestimation of the negative ecological impacts of grazing (for a review of the political origins of herder-farmer conflicts, see Benjaminsen et al., 2012). This politicization is also linked to the flagrant identity dimension of herder-farmer conflicts in Nigeria. Herders and farmers seldom share a common ethnic and religious identity. Also, the Fulani ethnic group is the most represented among Sahelian nomadic pastoralists. In Nigeria, these issues often tend to turn herder-farmer conflicts into hard to settle inter-community clashes maintained by a systemic stigmatization of nomadic pastoralists through stereotypes (Eke, 2020). This stigmatization takes the form of identity-based national policy narratives, including the fulanisation and islamization of the Christian South (Chukwuma, 2020; Chiluwa and Chiluwa, 2020).[19] Another common rhetoric used to present these conflicts is to place the responsibility on the very principle of transhumance. In the early 60's, following their independence, many new African governments encouraged pastoralists' settlement to avoid out of control cross-border movements (Wade, 1974). It quickly destabilized the balance between herders, their herds and the environment by reducing the access to alternative northern grasslands and putting grasslands of the Southern Sahel into a year-round pressure leading to their destruction (Barnes, 1972; Kelly and Walker, 1976; Walker et al., 1981).[20] To this day and despite historical precedents of failed sedentarization, transhumance is still perceived in countries like Nigeria as an outdated predatory practice. It would be associated, in times of scarcity, with the invasion of land and the use of violence by pastoralists

[19] "The issue of the herdsmen and Boko Haram is no longer an issue of a lack of education and employment for our youths in Nigeria which it began as, it is now West African Fulanisation, African Islamisation and global organized crimes", former Nigerian President Olusegun Obasanjo, "Boko Haram, herdsmen fighting to islamise Nigeria" quoted in `https://punchng.com/bharam-herdsmen-fighting-to-islamise-nigeria-africa-obasanjo/` (accessed June 2021).

[20] For a discussion on the effect of sedentarization, mobility on pastures' desertification, see Weber and Horst (2011).

whose goal is to appropriate the last pastoral resources. In this article, we specifically explore this economic and environmental dimension of the politicization of pastoralist-farmer violence in Nigeria. This "invader-farmer" rhetoric represents a serious threat for security in Western Africa because it has the potential to disrupt the international cattle trade between Sahelian and Coastal States. Indeed, this narrative presents the sedentarization of pastoralists as a solution to herder-farmer conflicts, as illustrated by the recent Rural Grazing Area (RUGA) policy (currently suspended) proposed by the Buhari Muhammad Presidency whose objective is to sedentarize herders in ranches. On paper, RUGA's policy portends positive productivity results for the national pastoral sector. However, the project underestimates the economic importance of cross-border movements, especially in the face of climatic shocks (O'Gefu and Gilles, 1990). Is scarcity driving the use of violence by nomadic herders in Nigeria?

Academics often present disputes involving nomad pastoralists and sedentary farmers as illustrations of "resource scarcity conflicts" associated with the diminishing number of grasslands (for a review, see Hussein et al., 1999; Turner, 2004). Homer-Dixon (1999) theorizes resource scarcity conflict as violence caused by the scarcity of natural resources and population growth degrading the environment and intensifying the competition for remaining resources. However, empirical proofs of the scarcity-conflict theory are lacking.[21] The scarcity-conflict theory has been criticized for lacking precision on the underlying causal mechanisms associating the increasing scarcity of a resource to predatory behaviors. As a result, scarcity conflicts are presented as almost instinctual responses to scarcity (Turner, 2004). In this section, we present several mechanisms linking the scarcity of pasture to the risk of herder-farmer conflict.

One of the leading critic made to the scarcity-conflict theory is that it neglects the adaptation capacity of individuals confronted with the scarcity of a vital resource (De Soysa, 2002; Turner et al., 2011). For individuals who can adapt, scarcity is a relative rather than an absolute issue. Relative scarcity supposes that the resource is present in some quantities, but its access carries an opportunity cost. For a typical herder, the pasture of one zone is substitutable for the ones of other zones, provided he can support the cost of moving his herd. Pasture scarcity is therefore defined in relative terms because it is associated with access to alternative grasslands. In Niger, at the end of the rainy season, pastures are scarcer, and their access

[21] On a study of all sovereign States for the period 1950–2000, Urdal (2005) finds that pressure on agricultural land is not significantly associated with the risk of civil conflict. He also finds that population growth and population density do not affect the risk of civil conflict, except during the 1970s. On a study of 139 countries over the post-Cold War period, De Soysa (2002) finds that the quantity of natural resources available in a country does not have a statistically significant impact on conflict onset (unlike the availability of mineral wealth). Concerning the link between population size and conflict, his results contradict the hypothesis of a linear relationship developed in the scarcity-conflict theory. They suggest that densely populated rural societies with access to a greater wealth of renewable resources per capita tend to experience more civil conflict.

becomes difficult for herders. Therefore, the opportunity cost of transhumance (i.e., the cost of reaching alternative grasslands as an adaptation strategy) diminishes: a herder will prefer a risky migration rather than an assured loss of future income (McGuirk and Nunn, 2020). Unpredictable climatic shocks such as droughts can sharply reduce the length of the rainy season and accelerate the natural depletion of pastures. They are associated with a sudden increase in the number of herders involved in transhumance, including cross-border movements (Thébaud et al., 2018; Apolloni et al., 2019). Recent empirical analyses of herder-farmer conflicts in Africa conclude that drought-induced migration of herders is associated with a higher risk of conflict (Eberle et al., 2020; McGuirk and Nunn, 2020). They suggest that competition for the remaining resources plays a significant role in the onset of herder-farmer conflicts. McGuirk and Nunn (2020) use a desegregated framework (i.e., at the level of $55x55$ kilometers grid cells at the equator) to analyze how the expansion of arid regions (proxied by precipitation measures) affects the risk of herder-farmer conflict in Africa. They show that conflicts are more likely in areas suited for both nomadic pastoralism and agriculture. They also show that drought in areas suited for nomadic pastoralism increases the risk of conflict in neighboring agricultural regions. Eberle et al. (2020) investigate the impact of climate change (proxied by temperature measures) on the risk of herder-farmer conflict in Africa. Their results also suggest that herder-farmer conflicts are more likely in cells with mixed settlements at the fringe between rangeland and farmland, especially when sudden migratory shifts destabilize traditional and mutually beneficial agreements established over the years between herders and farmers. This recent literature studies short-distance transhumance (i.e., at the scale of a cell and its direct neighbors). However, the supported mechanisms may also apply to long cross-border transhumance. By ignoring such spatial dependencies, we may underestimate the effect of climate on conflict (Maystadt and Ecker, 2014).

H1: If herder-farmer conflicts are caused by a sudden influx of nomadic herders practicing cross-border transhumance, then pasture scarcity in Niger will increase the risk of herder-farmer conflict in Nigeria.

The distance between the resources and the conflict has theoretical implications (Lujala, 2010). In Africa, institutional and academic sources report a higher risk of herder-farmer conflicts in transition zones between pasture and cropland (Olaniyan and Okeke-Uzodike, 2015; ICG, 2017). Eberle et al. (2020) and McGuirk and Nunn (2020) suggest that conflicts in transition areas are caused by competition for the remaining fertile land. However, they do not test for grassland in the cell where the conflict appears.

Conflicts in zones with pastures suggest that resource-grabbing strategies may explain herder-farmer conflicts following drought in Niger. Informal arrangements regulate the management of common resources and settle disputes over property rights (Eberle et al., 2020). Following an early depletion of pastures in Niger, the sudden increase in the flow of pastoralists moving to Nigeria may disrupt these fragile arrangements. In the absence of an institutional framework limiting issues of distribution and access to resources, the risk of violent competition for the remaining grasslands could increase (Coase, 1960; Sekeris, 2010). This channel would be magnified by grassland scarcity in Nigeria since the number of pastoralists per pasture would be higher.

H1a "Competition for the remaining resource" : If grassland scarcity causes herder-farmer conflicts through the competition channel, then conflict will be more likely in cells with pastures.

The resource-grabbing channel does not explain conflicts in pasture-less areas. **Figure 4.1** presents a map of the distribution of herder-farmer conflict occurrences and grasslands across the Nigerian territory between 2006 and 2016. While most conflicts appear in cells with pastures (68% of the occurrences), a large share of them appear in pasture-less cells (32%). Also, conflicts are mainly located in the middle and southern part of Nigeria, although the Northern region presents the most significant amount of pasture. The characteristics of a cell directly enter the herder's income maximization strategy, but the characteristics of neighboring cells might also influence his behavior. The value of neighboring prizes (i.e., grasslands) and the opportunity cost associated with their capture (i.e., the cost of migration) may indirectly affect the herder's decision to use violence in the cell where he is located. The expectation of high future income can act as an incentive to grab a scarce resource, but the cost of accessing the resource constrains this mechanism. Caselli et al. (2015) show that oil deposits located close to a border are more likely to be challenged by interstate conflicts because their access is less costly for both countries. Lujala (2010) shows that proximity to lootable and highly valuable resources like oil increase conflict duration independently of the quantity of resource produced. Indeed, rebel groups will finance conflict by selling in advance use rights to the oil deposits (i.e., booty futures) that they seek to grab. Depending on their spatial dispersion, accessing the remaining grasslands can be costly for herders. Since moving is expensive[22], the opportunity cost of crop encroachment (i.e., predatory behavior) decreases with the

[22] Crossing long distances is costly for herders because it is associated with a higher risk of animal disease and death.

distance to the next pasture[23]. The risk of crop encroachment is higher when herders move between pastures located far from each other. Therefore, proximity to pasture may decrease the risk of conflict in a cell. The importance of continuous access to pasture and water during long herders' movements is well known and constitute one of the primary motivation behind the implementation of transhumance corridors (Moutari and Giraut, 2013).[24] Herders and farmers generally recognize them as a factor of peace because they ensure continued access to resources and avoid the passage of animals too close to agricultural areas (Alidou, 2016). In summary, the scarcity of pastures can not only cause pastoralist-farmer conflicts due to predatory behavior, but also because their access cost is higher.

H1b "Accessing the remaining resource": If grassland scarcity increases the risk of herder-farmer conflicts by increasing the cost of accessing grazing areas in Nigeria, then conflicts will be less likely in cells close to pastures.

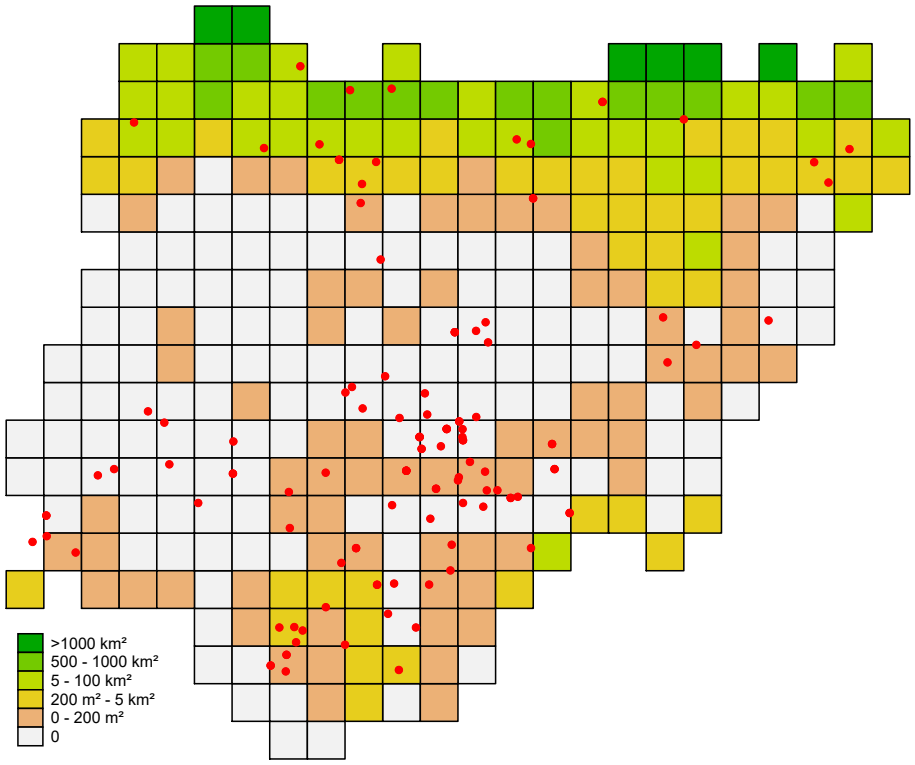
The farmers' decisions may also explain herder-farmer conflicts. In Nigeria, grassland scarcity is part of the broader issue of land scarcity associated with population growth and croplands' expansion (Arowolo and Deng, 2018). Grasslands represent large areas of unexploited (low quality) arable lands. Given the relative scarcity of land, farmers may consider exploiting portions of grasslands, even if this increases the probability of encountering pastoralists (Leonhardt, 2019). Nigerian farmers make a trade-off between allocating their resources to production or appropriation (i.e., grabbing the product of others or defending their production). Devoting resources to conflict is costly because it represents time and investments that they are not allocating to their agricultural production. Several studies have shown that shocks affecting agricultural incomes increase the risk of conflict by reducing the opportunity cost of conflict (see, for example Miguel et al., 2004; Hendrix and Salehyan, 2012). When farmers face droughts during the growing season of their fields, they may be more likely to engage in conflict because the return from productive activity is lower.

H2: If the farmers' opportunity cost channel causes conflicts, then adverse climatic shocks during the growing season of their cropland will increase the risk of conflict.

[23] See, for example, this quote from Wade (1974, pp. 235) explaining the ecological rationality of pastoral movements during the pre-colonial period "*The traditional migration routes followed by the herds, and the amount of time a herd of given size might spend at a particular well, were governed by rules worked out by tribal chiefs. In this way overpasturage was avoided. The timing of the movement of animals was carefully calculated so as to provide feed and water with the least danger from disease and conflict with other tribal groups*".

[24] Transhumance corridors are passage areas reserved for transhumant herds in transit between water resources, pastures, and other pastoral infrastructures like livestock markets, resting area, or vaccination zones).

Finally, a possible answer to scarcity is to limit one's dependence on the diminishing supply source. In the Sahelian region, transhumance involves 70 to 90% of cattle (Kamuanga et al., 2008), and it is a fundamental aspect of the identity and climate resilience of Sahelian herders. Therefore, it is unlikely that pasture scarcity induces a drastic reduction in these activities. However, one may argue that nomadic herders can change their transhumance patterns by migrating to other Coastal countries like Ghana or Benin. This scenario is likely for Sahelian countries sharing a border with several coastal countries (Mali and Burkina Faso, for example). In the case of Niger, the majority of nomadic pastoralists are unlikely to travel to countries other than Nigeria. Indeed, Niger shares a border of 1,497 km with Nigeria and only 266 km with Benin. Also, areas dedicated to pastoralism and agro-pastoralism are primarily located near the Nigerian border, opposite to Benin.



Notes: The size of each cell is approximately 55 × 55 kilometers at the equator. Each red dot represents a dry season conflict for cattle-grazing (2006-2016). *Sources: Author's computations from Nigeria Watch database and Climate Change Initiative land cover maps.*

Figure 4.1: Average grassland cover and localization of conflicts between herders and farmers in Nigeria (2006-2016)

4.4 Data

4.4.1 Data Description

Herder-farmer conflict are small-scale conflicts. They involve a relatively small number of individuals and result in a relatively low number of deaths.[25] A highly-desegregated design is more appropriate for the analysis of small-scale conflicts. This analysis is based on sub-national observation units in the form of cells of 0.5 degree latitude x 0.5 degrees longitude (approximately 55 × 55 kilometers at the equator). Compared to administrative boundaries, grid-cells are exogenous to political decisions and power distribution (Michalopoulos and Papaioannou, 2013; Berman et al., 2017). Our sample contains N=305 Nigerian cells for the period 2006-2016 (T= 11 years).

The movement of transhumant pastoralists is cyclical. During the rainy season, herders from Niger and Nigeria take advantage of the rich Nigerien meadows. They gradually descend to the South at the start of the dry season and cross back the Niger-Nigeria border. **Figure 4.2** presents the timeline of conflicts and seasons analyzed in this article. Because we are interested in conflicts happening during the transhumance, our temporal unit of analysis is the period outside the rainy season (Herder-farmer conflicts ($year\,t$)). Climatic controls are measured separately for the rainy and the dry seasons.

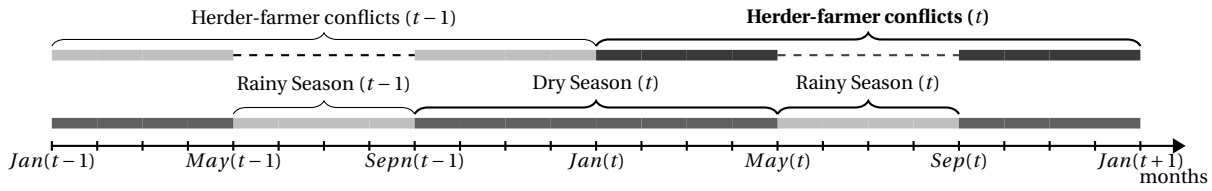


Figure 4.2: Timeline associated with the empirical strategy

Conflict Data - Our dependent variable comes from the Nigeria Watch database. It is the incidence of violent clashes caused by cattle grazing in Nigeria during the dry season. It is a binary indicator for whether a cell experiences at least one conflict episode in a given year's dry season. The Nigeria Watch database compiles information on homicides and violent deaths in Nigeria, including each event's date and geographic coordinates. Its sources are the Nigerian press and human right organizations reports. Because this database includes information on the cause of violent events (including cattle grazing), a

[25] The maximum number of casualties is 82 for our sample, with an average of 9 deaths per conflict.

precise selection of herder-farmer conflicts is possible (contrary to other violent event databases like Acled of UDCP-Prio). The Nigeria Watch database compiles information from local press and human rights organizations. One limit of this database is that it could overestimate the number of events in the regions where herder-farmer conflicts are recurrent or politicized, leading to selection bias. However, the inclusion of a rich set of fixed effects eliminates most forms of unobserved heterogeneity.

Land Cover Data - The percentage of each cell's area covered by grassland and agricultural land is compiled using remotely sensed satellite imagery of land covers from the European Space Agency (ESA) Climate Change Initiative (CCI) (ESA, 2017). These maps describe the yearly land cover at a resolution of 300 meters according to 22 classes defined by the United Nations Food and Agriculture Organization's (UN FAO) Land Cover Classification System (LCCS) (ESA). Climate Change Initiative land cover (CCI-LC) maps provide high definition information on land covers consistent over time and regions. The categories refer to different (bio)physical covers (vegetation and man-made features) and not land uses. Therefore, several types of land covers may be used for agricultural production or cattle grazing. To assess the proportion of land used as agricultural lands or grazing areas, we use the Intergovernmental Panel on Climate Change (IPCC) land classification developed by Université Catholique de Louvain (ESA). It defines six categories based on the legend used in CCI-LC maps: cropland, forest, grassland, wetland, settlement, and other lands (details on this classification are presented in **Annex A1**). The CCI-2015's overall accuracy is 71% (ESA, 2017). A high level of accuracy is reported for agriculture-related land classes (>80%), but the ones associated with grasslands present lower levels of accuracy (between 34 and 42.5%). However, we use CCI-LC maps at a larger scale than the one used to assess the product's accuracy (55km instead of 300m resolution) and rely on a discrete indicator of grassland. Therefore, the accuracy of the variable indicating the presence of grassland is expected to be higher (Tsendbazar et al., 2018). Past herder-farmer conflicts could influence the size of the cell's area covered by pasture. Cases have been reported of farmers facing recurring clashes with herders that deliberately destroy or cultivate part of the nearby pastures to hinder the future passage of herds or claim high financial compensations (Dimelu et al., 2016; Leonhardt, 2019). Correlation between grassland cover and previous herder-farmer conflicts could induce an endogeneity bias. To avoid this, we use a measure of the presence of grassland (instead of the percentage of the cell covered by grassland) during the previous year. It is a dummy variable indicating if at least one pixel (300x300m) of pasture is observed in the cell during the previous

year.

Climatic Data - To capture weather shocks, we use the Standardized Precipitation-Evapotranspiration Index (SPEI) developed by Vicente-Serrano et al. (2010). It is a multi-scalar drought index based on information on precipitations and the ability of the soil to retain water (which depends on latitude, sunshine exposure, temperature, and wind speed). SPEI has a mean of zero and is expressed in units of standard deviation from the cell's historical average. The conflict literature has mainly used precipitation indices to capture weather shocks affecting farmers' incomes (Miguel et al., 2004; Hendrix and Salehyan, 2012). However, the growth cycle of plants also depends on the capacity of the soil to retain water. The SPEI thus outperforms rainfall indices in predicting land yields (Vicente-Serrano et al., 2012; Harari and Ferrara, 2018). Several empirical works use shocks on the international prices of agricultural goods (Brückner and Ciccone, 2010; Dube and Vargas, 2013). This solution is not an option in our case because the pastures do not directly produce internationally valued yields, and cattle price often differs between adjacent areas since livestock markets are poorly integrated (Fafchamps and Gavian, 1997). By using the SPEI, we follow recent contributions in the conflict literature (Couttenier and Soubeyran, 2014; Harari and Ferrara, 2018).[26] The cost of transhumance depends on the distance traveled by herders. Therefore, regions located far from the Niger-Nigeria border are expected to host fewer breeders from Niger. To control for this, we also calculate for each year the average level of drought in Niger's grassland (during the rainy season) divided by the cell's distance to the Niger-Nigeria border:

$$RS-Drought\ Niger's\ grasslands\ (dist)_{k,t} = \frac{RS-Drought\ Niger's\ grasslands_t}{Distance_k}$$

Where $RS-Drought\ Niger's\ grasslands_t$ is the average drought level in Nigerien cells with pasture during the year t rainy season, and $Distance_k$ is the logarithm of the distance between the Nigerian cell k and the Niger-Nigeria border.

Other Controls - The itinerary of transhumant breeders is fluctuating and does not necessarily follow old transhumance corridors. Insecurity is one of the main reasons why pastoralists deviate from their usual itinerary (Leonhardt, 2019). Since 2009, Boko Haram has been involved in cattle rustlings, bombings, assassinations, kidnappings, and lootings in northeastern Nigeria. Using ACLED data, we

[26] An alternative to SPEI is the Palmer Drought Severity Index (PDSI) used by Couttenier and Soubeyran (2014), but the SPEI has a higher spatial resolution (i.e., 0.5 x 0.5 degrees) which is more suitable for our empirical strategy.

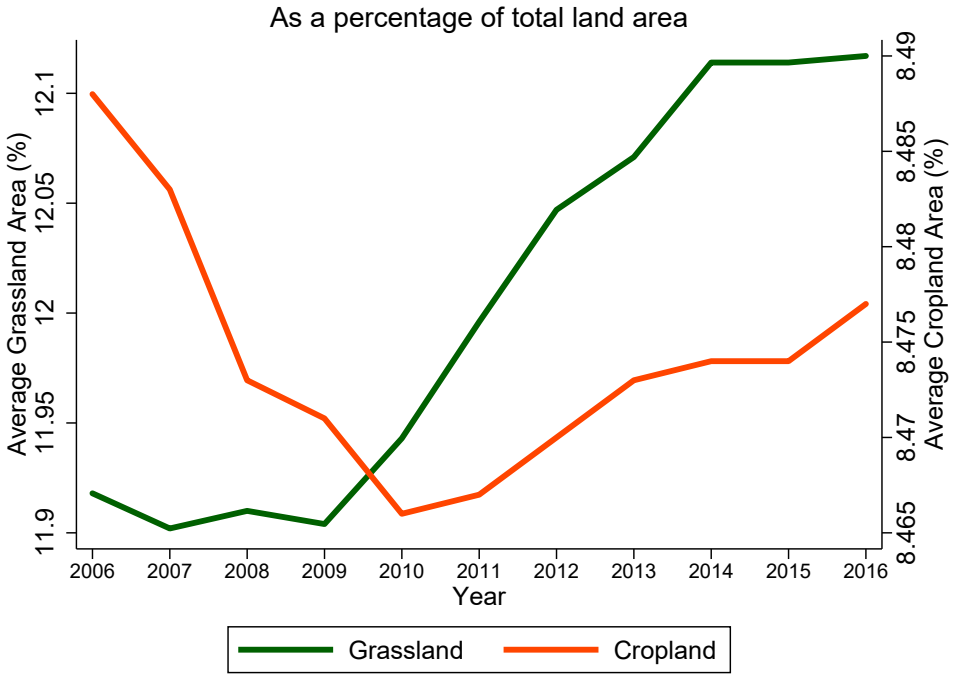
control for their presence using a dummy variable indicating if the cell experienced a conflict involving the group during the previous year. Overexploitation of pastures is more likely in heavily populated areas because the resource is shared among a larger number of pastoralists (Homer-Dixon, 1999). Data on population size (in logarithm) are retrieved from the Gridded Population of the World collection (CIESIN et al., 2020). The database provides cell-level information on the size of the population in 2005, 2010, 2015 and 2020 from population censuses.[27] When possible, a set of time-invariant cell-level controls is included. The transhumance paths are often close to the main roads. For each cell, we calculate the total length of roads (in kilometers) using the latest Open Street Map (OSM) data on motorways, primary, secondary, tertiary, and trunk denominations (OpenStreetMap contributors, 2017). Although the road density is usually larger in cities, herders seldom cross urban areas. We therefore exclude urban areas using GRID3 data on settlement extents (CIESIN et al., 2020)[28] Herders' movement depends on the presence of grasslands and water. We control for water resources with an indicator of the total river length per cell constructed from OSM data (OpenStreetMap contributors, 2017).

4.4.2 Descriptive Statistics

Annex A2 displays the descriptive statistics of the main variables used for the analyses. The unconditional probability of observing at least one conflict between herders and farmers in a cell is 4.3%. This level is more than twice as high during the dry season (3.1%) compared to the rainy season (1.5%). **Figure 4.3** presents the annual evolution of grassland and cultivated land in Niger between 2006 and 2016 (expressed as a percentage of the total area). **Figure 4.4** presents the annual evolution of grassland and cultivated land in Nigeria between 2006 and 2016 (expressed as a percentage of the total area). In Nigeria, the grassland cover is declining over the entire period. Grassland covers 3.48% of the territory in 2006 and 3.28% of the territory in 2016. The cropland cover increases until 2014 (from 61.21% in 2006 to 62.49% in 2014) then slightly decreases between 2015 and 2016 (from 62.47% in 2015, to 62.34% in 2016). In Niger, the grassland cover is decreasing between 2006 and 2009 but increasing between 2009 and 2014. Similarly, the cropland cover decreases until 2010 and is slightly increasing between 2010 and 2016. Between 2006 and 2016, Niger lost approximately $139 km^2$ of cultivated land and gained approximately $2,523 km^2$ of pasture. During the same period, about $10,383 km^2$ of newly cultivated land appeared in Nigeria and

[27] Yearly data are calculated by linear interpolation.

[28] Using Qgis, we remove footprints of settlement areas and obtain a vector layer of Nigerian roads with "holes" where there is an urban center.

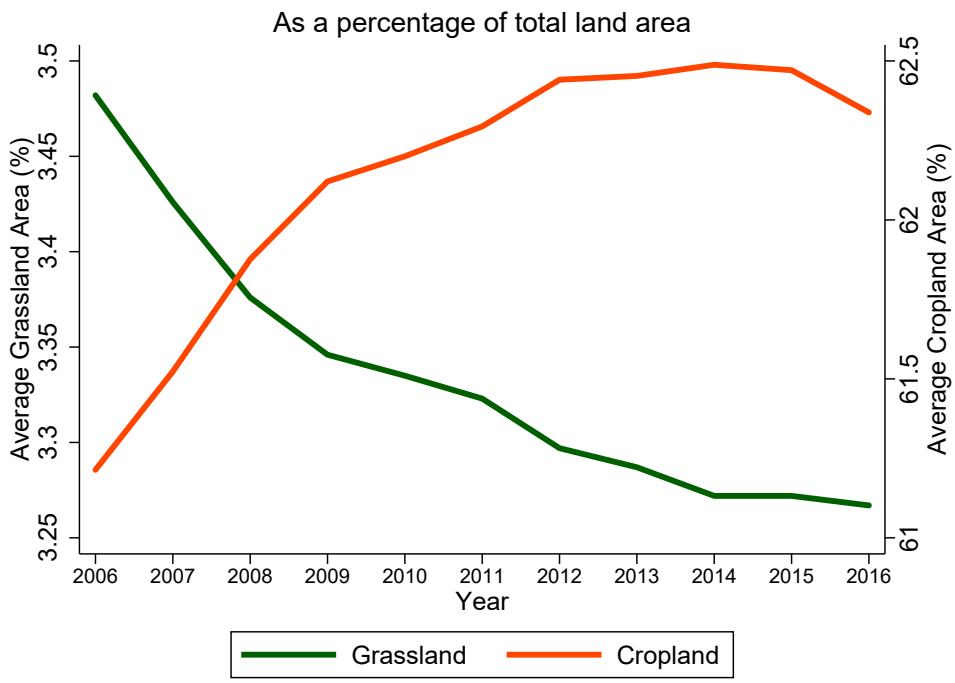


Notes: Values are presented as a percentage of the total land area. The left axis corresponds to grasslands, and the right axis corresponds to cultivated lands. *Source: Author's compilation.*

Figure 4.3: Annual Changes in Land Cover in Niger

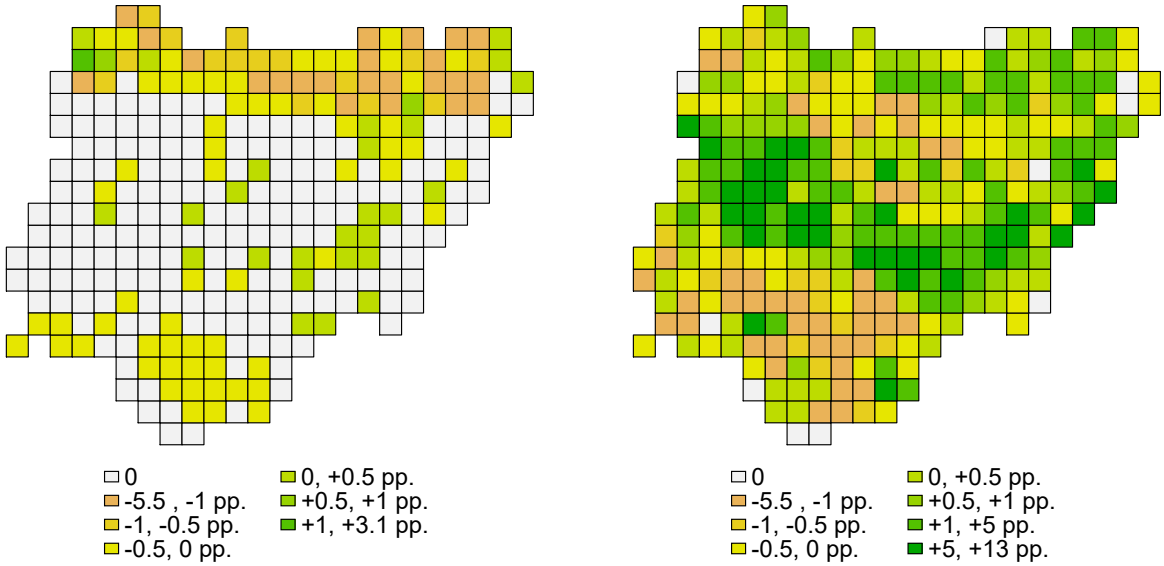
$1,986 km^2$ of pasture disappeared. The rise of international food prices in 2008 and the introduction of the 2010 ordinance that recognizes and protects pastoral lands may explain the sudden shift experienced by Niger between 2009 and 2010. The values observed for Nigeria are consistent with the agricultural policies and pastoralism laws that the country has implemented since its independence.

Figure 4.5 shows that Northern Nigeria is particularly affected by the decline in the pasture area. In the middle belt, the amount of pasture is low and stable, but there has been an expansion of the cultivated areas. These changes complicate the transhumance of livestock. The decline in pastures in the North could increase the interest in moving to the South during the dry season. However, the growth in the expansion of cultivated areas and the small amount of pasture in central Nigeria makes this itinerary riskier.



Notes: Values are presented as a percentage of total land area. The left axis corresponds to grasslands and the right axis corresponds to cultivated lands. *Source: Author's compilation.*

Figure 4.4: Annual Changes in Land Cover in Nigeria

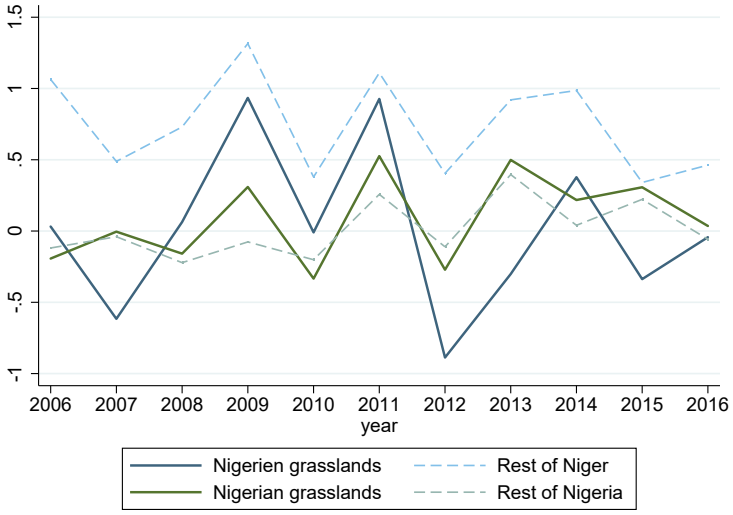


(a) Grassland Cover (b) Cropland Cover

Note: Differences between the land covers in 2016 compared to 2006 in percentage points (pp.). *Source: Author's compilation using CCI-LC maps.*

Figure 4.5: Changes in Grassland and Cropland Covers in Nigeria

A strong correlation between the climatic conditions in the grasslands of Niger and Nigeria could complicate our analysis by making it impossible to separate both effects. **Figure 4.6** presents the average value of the rainy season's SPEI in Niger and Nigeria between 2006 and 2016. It suggests that Nigerien grasslands are not always confronted with stronger droughts than Nigerian grasslands. There are as many years when drought is greater in Niger as there are years when Niger's drought is lower than in Nigeria. For each country, a distinction is made between the grassland areas (solid lines) and the rest of the territory (dotted lines). In Nigeria, grazing areas are generally exposed to drier climatic conditions than the rest of the country (except in 2006, 2010, and 2012). In Niger, grasslands are generally less dry than the rest of the territory (except in 2009 and 2011).[29]



Notes: Average value of the SPEI index between June and September (rainy season). The values of the SPEI index are inverted (positive values indicate drought). Grasslands correspond to cells with a pasture cover of at least $93.3m^2$. The classification of drought categories is extreme drought (SPEI>2), severe drought (1.5<SPEI<1.99), moderate drought (1<SPEI<1.49), mild drought (0.5<SPEI<0.99), near normal (-0.49<SPEI<0.49), mild wet (-0.99<SPEI<0), moderate wet (-1.49<SPEI<-1), severe wet (-1.99<SPEI<-1.5), extreme wet (SPEI<-2). *Source: Author's compilation.*

Figure 4.6: Average Value of the Rainy Season's SPEI Index (2006-2016)

[29] A large portion of the Nigerien territory is covered by arid deserts.

4.5 Empirical Strategy and Methodological Challenges

4.5.1 Logistic Models

First, we test if the average cell-level probability of herder-farmer conflict in Nigeria is affected by sudden increases in the flow of nomadic herders following pasture scarcity in Niger (H1). If H1 holds, then an increase in the average level of pasture scarcity in Niger should be associated with a higher likelihood of herder-farmer conflict in Nigerian cells. We use logistic regression with robust standard errors. Different measures of pasture scarcity in Niger are proposed. In equation (1), the effect of pasture scarcity in Niger is measured with a variable indicating the average level of drought (SPEI index) during the previous rainy season in the Nigerien cells where there is pasture. [30] The effect of pasture scarcity in Niger is then compared with the effect of drought in the rest of the Nigerien territory (i.e., the average level of drought in the whole Nigerien territory except cells where there is grassland).

$$Y_{i,k,t} = \quad \beta_1 D_{j,t-1} + \beta_2 X_{i,k,t} + \epsilon_{i,k,t} \quad (1)$$

Where i refers to Nigeria, and j refers to Niger. The parameters k and t denote respectively cell and year. $Y_{i,k,t}$ is a dummy variable indicating the incidence of herder-farmer conflict in the cell at a given year. $D_{j,t-1}$ is the level of drought in Niger's grasslands during the previous year's rainy season. $X_{i,k,t}$ is a vector of cell-level controls. $\epsilon_{i,k,t}$ is the error term.

In equation (2), the effect of pasture scarcity in Niger is measured with extreme values of the SPEI index (floods and droughts). A quadratic term is therefore added to equation (1).

$$Y_{i,k,t} = \quad \beta_1 D_{j,t-1} + \beta_2 D^2_{j,t-1} + \beta_3 X_{i,k,t} + \epsilon_{i,k,t} \quad (2)$$

In equation (3), the effect of pasture scarcity is tested on different types of cells depending on their suitability for herders. Indeed, suppose pasture scarcity in Niger affects the risk of herder-farmer conflict by increasing the flow of nomad pastoralists. In that case, those effects should be observed in areas where herders are expected to be found. Three different measures are used: a dummy variable indicating grassland in the cell, an indicators of the cell's suitability for animal husbandry, and an indicators of the cell's suitability for mobile pastoralism (Beck and Sieber, 2010; McGuirk and Nunn, 2020).

[30] For purposes of clarity, the SPEI values are inverted: an increase in the index refers to an increase in drought.

$$Y_{i,k,t} = \beta_1 D_{j,t-1} + \beta_2 G_{i,k,t-1} + \beta_3 D_{j,t-1} \times S_{i,k,t-1} + \beta_4 X_{i,k,t} + \epsilon_{i,k,t} \quad (3)$$

Where i refers to Nigeria, and j refers to Niger. The parameters k and t denote respectively cell and year. $Y_{i,k,t}$ is a dummy variable indicating the incidence of herder-farmer conflict in the cell at a given year. $D_{j,t-1}$ is the level of drought in Niger's grasslands during the previous year's rainy season. $S_{i,k,t-1}$ is a variable indicating the cell's suitability for herders. $X_{i,k,t}$ is a vector of cell-level controls. $\epsilon_{i,k,t}$ is the error term.

4.5.2 Spatial Model

The second part of our empirical strategy integrates the spatial spillovers associated with the proximity to grasslands on the risk of herder-farmer conflict (hypotheses H1a and H1b). The introduction of control variables considering the characteristics of neighboring cells can only partially resolve spatial autocorrelation issues. Indeed, such models would neglect the effect of conflicts in a neighboring cell j on the risk of conflict in cell i. Herder-farmer conflicts might be spatially autocorrelated. For discrete variables, the recommended local indicator of spatial association is the join count statistic (Cliff and Ord, 1973). In this case, spatial correlation manifests in the form of a pattern in which neighboring cells are more likely to display the same value "1" (or opposite value "0") than would be expected in the absence of spatial autocorrelation. The join count test consists in classifying the joins between contiguous cells as either "1:1", "0:0", or "1:0". The frequencies of the joins are then compared to the expected frequencies under the null hypothesis of spatial randomness (Cliff and Ord, 1981).

Table 4.1 reports the results of the join count analysis when neighbors are defined according to a first-order row-standardized Queen contiguity spatial weight matrix. They show that herder-farmer conflicts exhibit spatial dependence in three out of eleven years examined. In 2011, 2013 and 2016, contiguous cells exhibit positive spatial dependence in conflicts ((1 : 1) joins in the table). For each of these years the observed (1 : 1) join counts were at least twice as large as what we would expect to observe under the null hypothesis of spatial randomness (which is rejected at the 99% level). A positive spatial dependence in conflicts is also supported by the (1:0) joins, which reflect instances in which a cell not experiencing a herder-farmer conflict is contiguous to a cell in conflict. In 2013 and 2016, the (1:0) joins are less common than what would be expected under spatial randomness. It suggests that peaceful cells close to cells in conflict are less common than we would expect if spatial location were irrelevant for herder-farmer

conflict. In 2013 and 2016, a cell without herder-farmer conflicts is likely surrounded by a cell without conflict. For these years, the observed join counts are slightly but significantly larger than what we would expect to observe under the null hypothesis of spatial randomness at least at the 90% level. In short, in 2013 and 2016, cells experiencing conflict are likely surrounded by cells in conflict, and cells in peace by cells in peace. It suggests that herder-farmer conflicts may be distributed in a non-uniform way in Nigeria.

Table 4.1: Join Count Results for Herder-Farmer Conflicts in Nigeria (2006-2016)

Year	Number of Conflicts	Join Type	Count	Permutation Mean	Variance	Z-Stat
2006	0		Not Applicable			
2007	6	0:0	146.52	146.55	0.04	-0.147
		1:1	0.00	0.05	0.01	-0.598
		1:0	5.98	5.90	0.06	0.322
2008	7	0:0	145.21	145.57	0.05	-1.609
		1:1	0.00	0.07	0.01	-0.710
		1:0	7.29	6.86	0.08	1.545
2009	6	0:0	146.65	146.55	0.04	0.488
		1:1	0.00	0.05	0.01	-0.598
		1:0	5.85	5.90	0.06	-0.202
2010	5	0:0	147.47	147.53	0.03	-0.343
		1:1	0.00	0.03	0.00	-0.487
		1:0	5.03	4.93	0.05	0.444
2011	3	0:0	149.62	149.51	0.02	0.835
		1:1	0.13***	0.01	0.00	3.092
		1:0	2.75	2.98	0.02	-1.521
2012	10	0:0	142.57	142.65	0.07	-0.283
		1:1	0.38	0.15	0.02	1.610
		1:0	9.55	9.70	0.13	-0.414
2013	23	0:0	131.78***	130.33	0.21	3.143
		1:1	1.75***	0.83	0.10	2.866
		1:0	18.97***	21.34	0.50	-3.340
2014	13	0:0	140.14	139.76	0.10	1.202
		1:1	0.38	0.26	0.03	0.644
		1:0	11.98	12.49	0.20	-1.131
2015	10	0:0	142.25	142.65	0.07	-1.440
		1:1	0.13	0.15	0.02	-0.163
		1:0	10.12	9.70	0.13	1.151
2016	21	0:0	132.96*	132.19	0.19	1.784
		1:1	1.64***	0.69	0.09	3.241
		1:0	17.89***	19.62	0.43	-2.627

Notes: * p<0.1, ** p<0.05, *** p<0.001. The spatial weight matrix in a first-order row-standardized Queen contiguity matrix. Results were obtained using the *joincount.multi* command on R. Column "Number of Conflicts" presents the number of cells experiencing at least one herder-farmer conflict during the considered year. *Source: Author's compilation.*

Join count statistics must be interpreted with caution in case of rare event and large data set (Anselin and Li, 2019). As Anselin and Li (2019) note, "*any occurrence of a rare event surrounded by another event is likely to be so exceptional that it automatically becomes significant.*" Between 2007 and 2011, not many conflicts are reported and (1 : 1) joins are never observed (i.e., $Count = 0$ in the table). In 2011, the number of conflict event is low (i.e., each cell has 0.98% chance to experience conflict) but the join count test supports the presence of positive spatial autocorrelation at the 99% level. These observations suggest that 1:1 joins are very rare in our sample before 2011 and probably because not many events are reported. In view of the results and the limitations of the join count tests, the presence of positive spatial autocorrelation is likely enough (at least, for certain years) that this issue cannot be overlooked.

To complete this exploratory analysis, we look at the spatial pattern of the average incidence of herder-farmer conflict per cell for the whole period (2006-2016). This variable is continuous with values in the range from 0 to 1. Higher values indicate a higher average risk of conflict in the cell during the period. The Moran's I statistic is the most common indicator of global spatial correlation for continuous variables (Le Gallo, 2002). **Annex A3** presents the Moran's I statistic and scatter plot associated with the cells' average incidence of herder-farmer conflict between 2006 and 2016, using a first-order row-standardized Queen contiguity weight matrix.[31] The Moran's I statistic is positive with a value of 0.257 and significant at the 0.001 level.[32] This result confirms that the average incidence of conflict between herders and farmers is spatially autocorrelated. **Annex A4** presents the cluster map associated with the Moran's I statistic. It shows the type of spatial association for cells with a significant (p<0.05) local Moran's I statistic. This map indicates that the global spatial auto-correlation is primarily influenced by the Middle Belt states (particularly Benue, and Nasarawa) and in southeastern Nigeria (particularly in Enugu and Anambra States). In these regions, cells with an average conflict incidence higher than the sample's mean are surrounded by similar cells.

The selection of the most suitable spatial model follows the specific-to-general procedure (Elhorst, 2010). It consists in starting from an spatial Durbin model (SDM) and test the validity of alternative specifications. Using matrix notation, the SDM model takes the form:

$$Y = \quad \rho WY + \beta X + \theta WX + \epsilon \quad (4)$$

[31] Row-standardization takes the binary zero-one weights and divides them by the row sum.

[32] The significance of the Morans'I index is estimated by assuming normality (*moran.test* command on R) and through a Monte Carlo procedure using 999 permutations (*moran.mc* command on R). The similarity of the results ensures the robustness of our conclusions regarding the spatial autocorrelation (Ardilly et al., 2018).

In equation (4), if $\theta = 0$ and $\rho \neq 0$, then the most appropriate model is a spatial autoregressive model (SAR). If $\theta = -\beta\rho$ in equation (4), then the most appropriate model is a spatial error model (SEM). Following Belotti et al. (2017), we test these linear and non-linear hypotheses. The tests successively reject the null hypotheses (i) $H0 : \theta = 0$, and (ii) $H0 : \theta = -\beta\rho$ with a risk of error of the first kind of 0.03%. Then, we test if the spatial autocorrelation model (SAC) is more appropriate than the SDM. Because the SAC and the SDM are nonnested, we compare the Akaike information criterion (AIC) associated with both models. With an AIC of −2910.116 for the SDM model and an AIC of −2883.416 for the SAC model, the SDM model is preferred. We estimate the following spatial Durbin model on a balanced panel through quasi-maximum likelihood:[33]

$$\begin{aligned} Y_{i,k,t} = \quad & \alpha_{ikt} + \rho W Y_{i,k,t} + \beta_2 G_{i,k,t-1} + \beta_3 D_{j,t-1} + \beta_4 (G_{i,k,t-1} \times D_{j,t-1}) + \beta_5 W G_{i,k,t-1} + \beta_6 W D_{j,t-1} + \\ & \beta_7 W (G_{i,k,t-1} \times D_{j,t-1}) + \beta_8 X_{i,k,t} + \beta_9 W X_{i,k,t} + FE_{i,k} + FE_{i,t} + \epsilon_{i,k,t} \end{aligned} \tag{5}$$

Where i refers to Nigeria, j refers to Niger. The parameters k and t denote respectively cell and year. $Y_{i,k,t}$ is a dummy variable indicating the incidence of herder-farmer conflict in the cell at a given year. W is a row-standardized Queen contiguity matrix. $D_{j,t-1}$ is the level of drought in Niger's grasslands during the previous year's rainy season. $G_{i,k,t-1}$ is a dummy variable indicating grassland in the cell last year.$X_{i,k,t}$ is a vector of controls. $FE_{i,t}$ are time fixed effects, $FE_{i,k}$ are cell fixed effects, α_{ikt} is the constant, and $\epsilon_{i,k,t}$ is the error term.

One classical question in spatial panel data empirical analyses is the choice between spatial random effects and spatial fixed effects. This issue is addressed by using the robust Hausman test (Belotti et al., 2017). The results (reported at the bottom of **Table 4.5**) indicate that the spatial random effects estimator is outperformed by the spatial fixed effects estimator (the null hypothesis is rejected with a χ^2 test statistic of 44.86 and a p-value inferior to 1%). Year and cell fixed effects are introduced to the model to control for a large number of omitted variables. Year fixed effects remove cyclical variations that concern each cell equally, such as international price variations, changes in total area of pasture in Niger and Nigeria, or regime changes. Cell fixed effects control for any characteristic that differs between cells while being constant over time. Such confounders include the geographical distribution of religious or ethnic groups

[33] We use the Stata command *xsmle* developed by Belotti et al. (2017). Several articles where the dependent variable is a binary measure of the incidence of conflict use this quasi-maximum likelihood technique (See, for example, Ralston, 2013; Harari and Ferrara, 2018).

within Nigeria, geographic characteristics (for example, rivers, mines, or urban centers), and systematic coverage bias of the dependent variable.

The spatial Durbin model reduces the endogeneity bias from omitted variables that are spatially correlated (Fingleton and Le Gallo, 2010). For example, we might suspect the dummy variable indicating pasture to only partially remove the reverse causality issue between pasture and conflict. Some regions are more hostile than others to open-grazing and transhumance. In these areas, farmers may fully destroy remaining pastures (i.e., variation from 1 to 0 of the dummy variable).[34] This hostility is complex to integrate in an empirical analysis. It is linked to the political, ethnic and religious issues of certain regions and is maintained in the speeches of federal governments and interest groups (Chukwuma, 2020). The omission of local hostility towards pastoralism could be a source of endogeneity. As this variable is linked to political, ethnic and religious issues, it is likely spatially correlated (i.e., hostile cells are most likely located near cells where pastoralism is linked to similar issues). When the omitted variable is spatially correlated, LeSage and Pace (2008) and Pace and LeSage (2008) show that its effect is eliminated by the SDM, which provides unbiased estimates of the coefficient associated to the endogenous variable.

In a second spatial model, we test the validity of Hypothesis 2 related to the farmers' strategy. We isolate the effects of their agricultural yields and opportunity costs by focusing on weather shocks during the growing season (Harari and Ferrara, 2018). We use data on the main crop's growing season start and end months developed by Portmann et al. (2010) and match these crop calendars with the relevant SPEI data for each cell.[35] Three variables are added to **Equation (5)**: the level of drought during the cell's main crop growing season, the proportion of the cell covered by crops, and an interaction term of both variables.[36]

4.6 Results

4.6.1 Average Effect of Grassland Scarcity in Niger on Herder-Farmer Conflicts in Nigeria

Table 4.2 presents the results of the logistic model. Contrary to our expectations, dryer rainy seasons in Niger are associated with a significantly lower risk of conflict in Nigeria. Column (1) shows that a one-

[34] Nevertheless, variations of the dummy variable are seldom observed in the sample.

[35] For example, we use the SPEI05 calculated in October for cells where the growing season starts in June and ends in October (i.e., the growing season lasts five months).

[36] The control variable indicating the level of drought during the dry season is removed because it is correlated with the variable indicating the level of drought during the growing season.

standard-deviation increase in the drought index of Niger's grasslands during the rainy season decreases by 0.6 percentage points the risk of herder-farmer conflict in Nigeria during the next dry season (holding all the control variables at their mean). Instead of analyzing drought, we now analyze the effect of extreme climatic events (floods and droughts) on the risk of herder-farmer conflict. In column (2), a quadratic measure of the variable of interest is added to the model. The sign of the coefficient associated with the log measure is unchanged and stays strongly significant (p<0.001). The coefficient associated with the quadratic measure is significant (p<0.01) and positive. It suggests a U-shaped link between the dryness in Niger's grasslands and the risk of herder-farmer conflict in Nigeria. **Annex A5** presents a plot of the average predicted probability of herder-farmer conflict depending on the level of drought in Niger's grasslands. The lowest probability of conflict is observed for an approximate 0.4 deviation relative to the average level of the drought, holding other controls at their mean. The risk of herder-farmer conflict increases with deviations superior to this level. The marginal effects associated with dryer climatic conditions in Niger's grasslands is small in magnitude: a change from a near normal climatic state to a mild level of drougt (i.e., a change from 0 to 0.5) only increases the risk of herder-farmer conflict by 0.27 percentage points. The marginal effects associated with wetter climatic conditions are larger: a change from a near normal climatic state to a mild humidity level (i.e., a change from 0 to -0.5) increases the risk of herder-farmer conflict by 1.53 percentage points. The confidence intervals associated with extreme drought index values (either very low or very high) are larger than those associated with near-normal climatic conditions, suggesting uncertainty and potentially heterogeneous effects across Nigeria.

Columns (3) and (4) show that there is a significant linear link (p<0.001) between droughts in the rest of Niger's territory (i.e., excluding grasslands) and the risk of herder-farmer conflict in Nigeria, but no proof of a curvilinear relationship is found. Finally, column (5) presents the results when cell fixed effects are added to the model. The curvilinear effect of the rainy season's drought in Niger's grasslands stays significant with only marginal changes to the coefficients.

In all specifications, the climatic conditions in Nigeria are positively but not significantly associated with the risk of herder-farmer conflict. The coefficient associated with the SPEI of the dry season in the cell is never significant. The one associated with the SPEI of the previous rainy season is weakly significant ($p < 0.05$), but it becomes insignificant when cell fixed effects are added to the model. The distance to the border and the road's length significantly increase the risk of herder-farmer conflict. Holding all the control variables at their mean in our baseline specification (column 1), a one-standard-

deviation increase in distance to the border and the road's length are respectively associated with a 0.8% and a 1.2% increase in the likelihood that a pastoralist-farmer conflict arises in Nigeria during the next dry season (holding all the control variables at their mean). The amount of freshwater is negatively associated with the risk of herder-farmer conflict. A one-standard-deviation increase in the river's length decreases the risk of conflict by 1.2% (holding all the control variables at their mean). A larger population size significantly (p<0.001) increases the risk of herder-farmer conflict, even when the model includes cell-fixed effects. Holding all the control variables at their mean in our baseline specification (column 1), a one-standard-deviation increase in population size is associated with a 0.6% increase in the likelihood of herder-farmer conflict (holding all the control variables at their mean). Finally, we find no evidence that Boko Haram activity significantly influences the risk of herder-farmer conflict in the cells.

Table 4.2: Table of Results - Logistic Model (Drought in Niger)

	(1)	(2)	(3)	(4)	(5)
L.RS-Drought Niger (grassland)	-0.650**	-0.678***			-0.608**
	(0.236)	(0.183)			(0.187)
L.RS-Drought Niger (grassland) sq		0.835**			0.874**
		(0.292)			(0.317)
L.RS-Drought Niger (no grassland)			-1.232***	-1.163***	
			(0.338)	(0.353)	
L.RS-Drought Niger (no grassland) sq				0.686	
				(1.412)	
Border Distance	0.523***	0.522***	0.512***	0.510**	
	(0.154)	(0.155)	(0.155)	(0.155)	
L.RS-Drought	0.317*	0.333*	0.388*	0.385*	0.134
	(0.146)	(0.140)	(0.153)	(0.153)	(0.171)
DS-Drought	0.111	0.124	0.156	0.161	0.082
	(0.126)	(0.134)	(0.111)	(0.110)	(0.146)
Population	0.408***	0.406***	0.401**	0.400**	6.632***
	(0.121)	(0.123)	(0.122)	(0.123)	(1.417)
Roads Length	0.647***	0.652***	0.661***	0.663***	
	(0.154)	(0.156)	(0.158)	(0.158)	
River Length	-3.527***	-3.556***	-3.578***	-3.575***	
	(0.815)	(0.819)	(0.826)	(0.825)	
L.Boko Haram Activity	0.046	0.041	0.048	0.048	-0.017
	(0.030)	(0.029)	(0.029)	(0.029)	(0.031)
Log-lik	-412.37	-408.48	-410.41	-410.30	-186.56
Obs	3355	3355	3355	3355	726
Cell F.E.	No	No	No	No	Yes

Notes: * p<0.05, ** p<0.01, *** p<0.001. Results were estimated using logistic regressions. The coefficients are log odds-ratios. Robust standard errors are in parentheses. The outcome variable is a dummy variable indicating the incidence of conflict between herders and farmers during the dry season, according to the Nigeria watch database. It takes the value "1" if there is at least one conflict episode in the cell during the year considered. *Source: Author's compilation.*

The hypothesis that climate-induced flows of nomadic herders increase the risk of herder-farmer

conflict suggests that the likelihood of conflict is higher in places where they move. We now test if the effect of drought in Niger's pasture depends on the cell's suitability for herders. **Table 4.3** presents the results of the logistic regression that includes an interaction between the level of drought in Niger's grassland and different measures of the cell's suitability for nomadic pastoral activity. Each variable is presented in its standard and mean-centered version. "L.RS-Drought Niger (g)" indicates the effect of an increase of the drought measure in Niger's grasslands when the suitability measure is maintained at zero or its mean value (for mean-centered variables). The coefficient associated with the suitability measure indicates the effect of their increase under normal climatic conditions. The interaction term indicates if the marginal effect of drought in Niger's grassland is a linear function of the suitability measure. The results indicate that the effect of Niger's grasslands drought is not higher in areas where herders should be found. On the contrary, the significant and negative coefficients associated with "L.RS-Drought Niger (g)" suggest that Niger's drought predominantly reduce the likelihood of conflict in less attractive areas for herders: areas with no pasture, low or average suitability for mobile pastoralism and animal husbandry, or average river length. An increase in the suitability of an area for herders is positively but not significantly associated with the risk of herder-farmer conflict. In **Annex A8**, we add a third term to the interaction (i.e., a quadratic form) to test if the effect of Niger's drought is non-linear. No proof of a quadratic relation is found and the results remain unchanged.

Table 4.3: Table of Results - Logistic Model (Nomadic Pastoralism suitability)

	(1)	(2)	(3)	(4)	(5)
L.RS-Drought Niger (g)	-1.278*	-1.230*	-0.678**	-0.734*	-0.626**
	(0.498)	(0.517)	(0.237)	(0.295)	(0.243)
L.Grassland	0.505				
	(0.275)				
L.Grassland × L.RS-Drought Niger (g)	0.859				
	(0.567)				
Mobile Pastoralism Suit.		1.356			
		(0.728)			
L.RS-Drought Niger (g) × Mobile Pastoralism Suit.		2.028			
		(1.612)			
Mobile Pastoralism Suit. (c)			1.356		
			(0.728)		
L.RS-Drought Niger (g) × Mobile Pastoralism Suit. (c)			2.028		
			(1.612)		
Animal Husbandry Suit.				-0.898	
				(2.370)	
L.RS-Drought Niger (g) × Animal Husbandry Suit.				2.154	
				(4.856)	
Animal Husbandry Suit. (c)					-0.898
					(2.370)
L.RS-Drought Niger (g) × Animal Husbandry Suit. (c)					2.154
					(4.856)
Log-lik	-409.51	-409.79	-409.79	-412.09	-412.09
Obs	3355	3355	3355	3355	3355
Controls	Yes	Yes	Yes	Yes	Yes

Notes: * p<0.05, ** p<0.01, *** p<0.001. Results were estimated using logistic regression. The coefficients are log odds-ratios. Robust standard errors are in parentheses. The outcome variable is a dummy variable indicating the incidence of conflict between herders and farmers during the dry season, according to the Nigeria watch database. It takes the value "1" if there is at least one conflict episode in the cell during the year considered. "L.RS-Drought Niger (g)" is the level of drought in Niger's grassland during the previous rainy season (Vicente-Serrano et al., 2010). (c) indicates a mean-centered variable. Indicators of the cell's suitability (Suit.) for animal husbandry and mobile pastoralism come from Beck and Sieber (2010). Controls include the level of drought during the previous rainy season and during the dry season, Boko Haram activity during the previous year (dummy variable), population size, road length, river's length, and distance to the Niger-Nigeria border. *Source: Author's compilation.*

According to these preliminary results, drought episodes specifically affecting the pastures of Niger do not show the expected effect. Dryer conditions in Niger's pasture generally reduce the risk of herder-farmer conflict in Nigeria. We find evidence that extreme climatic events in Niger's grassland (droughts and floods) can increase the risk of conflict, but their effect appears relatively small and heterogeneous. Also, the climatic conditions in Niger's grasslands affect areas where there are seldom nomadic herders. This finding is hardly compatible with the hypothesis that sudden shifts in migratory flows of pastoralists from Niger increase the risk of herder-farmer conflict in Nigeria. We reject the hypothesis that stronger flows of pastoralists from Niger increase the average risk of herder-farmer conflict at the level of the whole Nigerian territory. However, this does not mean that climate-induced flows of pastoralist do not locally increase the risk of conflict.

4.6.2 Spatial Effects of Pasture Scarcity on the Risk of Herder-Farmer Conflict

This section explores the local effect of drought in Niger's grassland (i.e., pasture scarcity in Niger) on the risk of herder-farmer conflict, taking into account spatial spillovers. **Table 4.4** presents the results of the spatial Durbin models depending on the types of fixed effects included: cell fixed effects (column 1), time fixed effects (column 2), or both (column 3). The objective here is to test how the spatial distribution of grasslands affects the risk of conflict between nomadic herders from Niger and Nigerian farmers. The variables of interest are "L.Grass x L.RS-Drought Niger's grasslands (dist)" and spatially lagged counterpart "W x (L.Grass x L.RS-Drought Niger's grasslands (dist))." For all specifications, the characteristics of the studied cell have low predictive power. In pasture-less cells, the effect of drought in Niger's pastures has the expected negative sign but is not significant. Likewise, under normal climatic conditions in Niger's pastures, pasture in the cell has a positive but insignificant effect on the risk of herder-farmer conflict. In columns (1) and (2), the coefficient associated with the variable of interest is significant ($p<0.05$), positive, and presents a similar magnitude of 0.182 in both columns. However, when country and year fixed effects are added (column 3), this effect is no longer significant at the 5% level ($p = 0.051$).

Many direct and spatial effects are acting in opposite directions. The results presented in columns (1) to (3) suggest that the risk of herder-farmer conflict in a cell strongly depends on the characteristics of the cells surrounding it. The coefficient on the spatially lagged variable of interest is negative and significant ($p<0.05$ in columns (1) and (2), and $p<0.01$ in column (3)). In cells surrounded by no pasture, dryer conditions in Niger's pastures have a positive but not significant effect on the risk of herder-farmer conflict. Under normal climatic conditions in Niger's pastures, pasture in the neighborhood increases the risk of herder-farmer conflict. This coefficient is only significant ($p<0.01$) in models taking into account cell fixed effects. When the model only includes year fixed effects (column 2), the coefficient's magnitude approaches zero and is not significant anymore at the 5% level. It suggests that it is not the absence but disappearance (presence but apparition) of grasslands in the neighborhood that reduces (increases) the risk of herder-farmer conflict under normal climatic conditions in Niger.

Under normal climatic conditions in Niger's grasslands, the flow of herders from Niger is supposedly maintained at its average value. Therefore, this effect is not linked to a sudden increase in the flow of nomadic pastoralists. It could be associated with small-scale transhumance practiced by local Nigerian herders. We note that yearly changes in the dummy variables indicating the presence of grassland are

uncommon and concern 0.5% of the observations.

Table 4.4: Table of Results - Spatial Durbin Model

	(1)	(2)	(3)
L.Grass	0.022	0.006	0.024
	(0.027)	(0.010)	(0.026)
L.RS-Drought Niger's grasslands (dist)	-0.105	-0.255	-0.264
	(0.291)	(0.298)	(0.297)
L.Grass x L.RS-Drought Niger's grasslands (dist)	0.182*	0.182*	0.173
	(0.089)	(0.089)	(0.089)
L.RS-Drought	-0.059	-0.058	-0.068
	(0.035)	(0.039)	(0.037)
DS-Drought	0.082*	0.049	0.065*
	(0.032)	(0.031)	(0.033)
L.Boko Haram Activity	0.001	0.003**	0.001*
	(0.001)	(0.001)	(0.000)
Population	-0.196	0.012	-0.064
	(0.169)	(0.008)	(0.174)
L.Grass	0.267**	0.002	0.276**
	(0.085)	(0.013)	(0.085)
L.RS-Drought Niger's grasslands (dist)	0.040	0.647	0.697
	(0.289)	(0.449)	(0.449)
L.Grass x L.RS-Drought Niger's grasslands (dist)	-0.234*	-0.315*	-0.335**
	(0.110)	(0.124)	(0.125)
L.RS-Drought	0.065	0.064	0.078*
	(0.037)	(0.043)	(0.039)
DS-Drought	-0.084*	-0.036	-0.056
	(0.033)	(0.033)	(0.035)
L.Boko Haram Activity	-0.009**	-0.009***	-0.008**
	(0.003)	(0.002)	(0.003)
Population	0.341	0.004	-0.301
	(0.182)	(0.010)	(0.509)
ρ	0.106*	0.167***	0.081*
	(0.042)	(0.045)	(0.041)
Log-lik	1458.05	1201.13	1471.06
Obs	3355	3355	3355
Hausman χ^2	44.14	21.78	44.86
Hausman p-value	0.00	0.11	0.00
Cell fixed effects	Yes	No	Yes
Time fixed effects	No	Yes	Yes

Notes: * p<0.05, ** p<0.01, *** p<0.001. Results were estimated using a fixed-effects spatial Durbin model. Robust standard errors are in parentheses. The outcome variable is a dummy variable indicating the incidence of herder-farmer conflict during the dry season, according to the Nigeria Watch database. It takes the value "1" if there is at least one conflict episode in the cell during the year considered. *Source: Author's compilation.*

The coefficient ρ associated with the spatial autoregressive term $W \times Y$ indicates how conflicts in the neighborhood affect the risk of conflict in the cell. It is positive and significant regardless of the type of fixed-effect used. Column (3) reports that conflict in one of the neighboring cells induces an 8.1 percentage point increase in the probability of herder-farmer conflict in the cell. It suggests that conflicts in the neighborhood increase the risk of conflict in the cell for reasons other than pastures and climatic conditions (in Nigeria and Niger). When we do not consider cell fixed effects (column 2), the coefficient

rho's magnitude doubles and becomes significant at the 0.1% level, suggesting that time invariant cells' characteristics largely influence the spatial autocorrelation. In column (3), the low level of significance of ρ shows that spatial autocorelation is partially mitigated by the inclusion of cell fixed effects. Nonetheless the null hypothesis of absence of spatial autocorrelation can only be rejected completely with a spatial autoregressive term. This result is consistent with the observations of several reports and articles showing that there is a geographic clustering of herder-farmer conflicts in some regions of Nigeria (Leonhardt, 2019; Madu and Nwankwo, 2020).

It is impossible to directly interpret the coefficient presented in table 4.4 because they ignore the spatial autoregressive effects (Ardilly et al., 2018). Scalar summary measures are used to average these impacts. The average[37] direct effect indicates the impact on the risk of herder-farmer conflict in the cell i of the ith observation of the variable. It considers feedback effects that arise from the change in the variable on the risk of conflict in neighboring cells. The average indirect effect measures the average effect on the risk of herder-farmer conflict in a cell of a change in the variable in all neighboring cells. Finally, the average total effect is the combination of the average direct effect and the average indirect effect.

Table 4.5 presents the average total, direct and indirect effects of the interest variables. Column (1) presents the equilibrium effects associated with the baseline SDM specification. The magnitude and significance of the variables' direct and indirect effects are relatively similar to those of the coefficients presented in **Table 4.4**. The direct effect of the regressor of interest (the interaction term between grassland and the dryness of Niger's grasslands) is now significant at the 5% level. A one unit increase in the level of drought in Niger's grasslands increases on average by 17.8 percentage points the likelihood of herder-farmer conflict in cells with grassland. Under average climatic conditions in Niger's grasslands, grassland in the cell has no significant impact on the likelihood of herder-farmer conflict. Therefore, these results go in the direction of a reduction in the opportunity cost of conflict when pastoralists face pasture scarcity in Niger. Pastures in neighboring cells have a large and significant indirect effect on the risk of herder-farmer conflict. If all neighboring cells provide grassland under normal climatic conditions in Niger's grasslands, then the risk of herder-farmer conflict in the cell significantly ($p<0.001$) increases by 29.9 percentage points. However, if all neighboring cells provide grassland, a one unit increase in the level of drought in Niger's grasslands significantly ($p<0.01$) decreases the risk of herder-farmer conflict

[37] Averaged over all n cells.

by 35.6 percentage points. The direct and indirect effects of the interaction term cancel each other out, leaving a negative and not significant total effect. The total effect of the presence of grassland following normal climatic conditions in Niger's grasslands is positive and highly significant ($p<0.001$). If all cells provide grazing areas, the risk of herder-farmer clash increases by 32.7 percentage points in a typical cell. We note that the climatic conditions in Nigeria do not have a significant total effect on the risk of herder-farmer conflict. On the one hand, the level of drought during the dry season has a significant ($p<0.05$) and positive direct effect, but an insignificant total effect. On the other hand, the level of drought during the previous rainy season has a significant ($p<0.05$) and positive indirect effect but an insignificant total effect. Proximity to areas where Boko Haram is active significantly reduces the risk of herder-farmer conflict. A previous occurrence of conflict involving Boko Haram in each neighboring cell induces a 0.9 percentage point decrease in the probability of herder-farmer conflict in the cell. Column (2) presents the second spatial model specification (i.e., when the interests of Nigerian farmers are taken into account). We expect farmers who experienced drought during the growing season of their crop to face a lower opportunity cost of violence. The obtained results do not support this hypothesis. Although the coefficients associated with the interaction term are positive, they are never significant. Moreover, the size of the crop and the level of drought during the growing season have no significant direct, indirect, or total effects.

Several implications can be drawn from the results of the spatial models. First, we find evidence that proximity to grassland reduces the risk of conflict between nomadic herders from Niger and farmers from Nigeria.[38] Indeed, the negative and significant effect associated with the spatially lagged interaction term (between a previous drought in Niger's grasslands and Nigerian cells with pastures) shows that the dryer the conditions in Niger's pasture, the more proximity to grassland reduces the risk of herder-farmer conflict. This result suggests that pastures in Nigeria are important for herders using cross-border transhumance as a coping mechanism. However, we found that this effect is more linked to dryer climatic conditions in Niger's grasslands than actual grassland scarcity. Indeed, the interaction between the squared value of drought in Niger's grassland and the presence of grassland in the cell is not significant. Herders might undertake a cross-border transhumance before facing absolute grassland scarcity. Secondly, we find small and inconsistent evidence of scarcity-induced predatory behaviors of nomadic herders from Niger in Nigerian cells. It suggests that the appropriation of the remaining pastures is gener-

[38] It is important to note that "herders from Niger" refer to nomadic herders practicing seasonal migration from Niger to Nigeria during the dry season, not herders with the Nigerien nationality.

ally not the primary motivation behind herder-farmer conflicts. Thirdly, the opening of new grazing areas is associated with a higher risk of herder-farmer conflict in Nigeria under normal climatic conditions in Niger's grasslands. The implications of this result are beyond the scope of this article because they are likely influenced by local herders practicing short-distance transhumance. It indicates that herders are more likely to enter into conflict with farmers in areas close to pastures under normal climatic conditions in Niger. Finally, we find evidence that dryer climatic conditions during the dry season in the cell and previous droughts in neighboring cells increase the risk of herder-farmer conflict during the dry season. These results are in line with the ones of Eberle et al. (2020); McGuirk and Nunn (2020). Dryer rainy seasons push pastoralists to graze their herd in nearby areas, causing conflicts with local farmers.

Table 4.5: Total, Direct and Indirect Effects - Spatial Durbin Model

	(1)	(2)
DIRECT		
L.Grass	0.028	0.029
	(0.027)	(0.026)
L.RS-Drought Niger's grasslands (dist)	-0.267	-0.247
	(0.283)	(0.280)
L.Grass × L.RS-Drought Niger's grasslands (dist)	**0.178***	**0.175***
	(0.085)	(0.084)
L. Crop size		-0.491
		(0.346)
GS-Drought		0.025
		(0.020)
L.Crop size × GS-Drought		**0.012**
		(0.022)
L.RS-Drought	-0.068	-0.065
	(0.035)	(0.039)
DS-Drought	0.065*	
	(0.031)	
L.Boko Haram Activity	0.001	0.001
	(0.000)	(0.000)
Population	-0.068	0.032
	(0.178)	(0.177)
INDIRECT		
L.Grass	0.299***	0.275**
	(0.083)	(0.091)
L.RS-Drought Niger's grasslands (dist)	0.756	0.676
	(0.460)	(0.460)
L.Grass × L.RS-Drought Niger's grasslands (dist)	**-0.356****	**-0.335***
	(0.131)	(0.134)
L. Crop size		0.970
		(0.569)
GS-Drought		-0.043
		(0.025)
L.Crop size × GS-Drought		**0.009**
		(0.031)
L.RS-Drought	0.078*	0.074
	(0.038)	(0.042)
DS-Drought	-0.055	
	(0.034)	
L.Boko Haram Activity	-0.009**	-0.010**
	(0.003)	(0.003)
Population	-0.321	-0.615
	(0.559)	(0.543)
TOTAL		
L.Grass	0.327***	0.305**
	(0.086)	(0.093)
L.RS-Drought Niger's grasslands (dist)	0.489	0.429
	(0.320)	(0.317)
L.Grass × L.RS-Drought Niger's grasslands (dist)	**-0.177**	**-0.160**
	(0.123)	(0.126)
L. Crop size		0.479
		(0.469)
GS-Drought		-0.018
		(0.012)
L.Crop size × GS-Drought		**0.021**
		(0.015)
L.RS-Drought	0.010	0.008
	(0.007)	(0.008)
DS-Drought	0.010	
	(0.006)	
L.Boko Haram Activity	-0.008**	-0.009**
	(0.003)	(0.003)
Population	-0.389	-0.583
	(0.433)	(0.430)
ρ	**0.081***	**0.090***
	(0.041)	(0.040)
Log-lik	1471.06	1469.98
Obs	3355	3355
Hausman χ^2	44.86	56.17
Hausman p-value	0.00	0.00
Cell fixed effects	Yes	Yes
Time fixed effects	Yes	Yes
BIC	-2698.57	-2631.46

Notes: * p<0.05, ** p<0.01, *** p<0.001. Total, direct and indirect effects were estimated using a spatial Durbin model with spatial and individual fixed effects. Robust standard errors (in parentheses) are clustered at the cell level. The outcome variable is a dummy variable indicating the incidence of conflict between herders and farmers during the dry season, according to the Nigeria watch database. It takes the value "1" if there is at least one conflict episode in the cell during the year considered. *Source: Author's compilation.*

4.7 Robustness Checks

4.7.1 Alternative Specifications of the Logistic Model

The logistic model results using alternative independent variables are presented in **Annex A6**. In column (1), the drought variable is divided by the log distance to the Niger-Nigeria border. This transformation reduces the weight of cells that have less chance to receive nomadic herders from Niger. The negative effect of Niger's droughts on the risk of conflict persists; a 0.1 unit increase in the distance-weighted drought measure reduces the risk of herder-farmer conflict by 0.63 percentage points. Due to the highly disaggregated nature of the data, herder-farmer conflicts happen to be rare events. In this setting, King and Zeng (2001) show that using a non-linear estimation strategy can lead to biased results. Yet, column (2) shows that the coefficients' sign and significance are not modified when a linear probability model[39] is used instead of the logistic regression[40]. In columns (3) and (4), alternative measures of drought are used. Column (3) shows that temperature rise negatively affects the risk of conflict which corresponds to our previous result. However the coefficient is not significant, probably because temperature is not the primary determinant of phytomass (McGuirk and Nunn, 2020). Column (4) shows a significant effect of increased precipitation on the risk of conflict, which is consistent with our previous results when using the SPEI measure.

Annex A7 presents the logistic model results using Acled as an alternative database to construct the dependent variable. In column (1), a herder-farmer conflict is defined as any Acled event whose description contains at least one word or combination of terms that are specific to this type of conflict.[41] The sign and significance of the coefficient associated with pasture scarcity in Niger are not modified. The coefficient's magnitude is slightly higher. Column (2) presents the results obtained while using Eberle et al. (2020) categorization of herder-farmer conflicts.[42] Again, our results stay unchanged with a slightly

[39] When using a LPM model, the estimates are not constrained to the unit interval. When the dependent variable is binary, it may lead to biased and inconsistent estimates. Horrace and Oaxaca (2006) show that the LPM is unbiased and consistent when no predicted probabilities lie outside the unit interval. According to the baseline specification estimates, this is the case in our model since the average probability of herder-farmer conflict in a cell lies within the $(-0.20, 0.45)$ interval.

[40] We note a larger marginal effect of changes in the distance-weighted measure of drought in Niger's grasslands. This difference does not affect our conclusions and is linked to the fact that the predicted probabilities of conflict can be defined outside [0; 1] in a linear probability model.

[41] "crop" and "cattle", "land" and "cattle", "crop" and "herd", "farmer" and "herd", "agri" and "pastor", "farmer" and "transhumance", "farm" and "nomad", "cattle" and "invade", "nomad" and "farm", "grazing".

[42] Eberle et al. (2020) define herder-farmer conflicts as events that include at least one of the following keywords: land dispute,

higher coefficient. A one standard-deviation increase in the drought index of Niger's grasslands during the rainy season decreases by 0.6 percentage points the risk of herder-farmer conflict in Nigeria in the next dry season (holding all the control variables at their mean). In columns (3) and (4), a quadratic term is added. In both specifications and similarly to the baseline logistic model, the squared term presents a positive and significant coefficient.

4.7.2 Alternative Specifications of the Spatial Model

Alternative specifications of the spatial model are presented in **Annex A9** for robustness checks. Column (1) presents the results when the presence of a curvilinear (U-shape) effect of the interest variable is tested. A quadratic term is included and interacted with the binary variable indicating the presence of grassland. The coefficients associated with the quadratic term are never significant, suggesting that the previously found U-shaped effect of the climatic conditions in Niger's grasslands disappears when the model controls for spatial spillovers.

Nigeria is a federal country and each of the thirty-six Nigerian states can implement its legislation on nomadic pastoralism. Omitted variables related to state-level differences could skew the standard errors. In column (2), standard errors are clustered at the level of Nigerian States. The coefficient associated with the interaction term of interest in the cell becomes significant at the 5% level, which suggests that heterogeneous State level characteristics matter for the opportunity cost channel. The sign, magnitude, and significance of the other results remain unchanged.

The distance to the border is included in the construction of the variable of interest to capture that nomadic herders from Niger seldom travel very far into the Southern part of Nigeria. To verify that the effect of the distance to the border on conflicts does not drive our results, the SDM model is reproduced using the drought index not divided by the distance to the border. The results are reported in columns (3) and (4). Their significance and sign align with the findings of our baseline specification, including the recurrent inconsistency of the opportunity cost channel.

We are interested in the flow of pastoralists from Niger following the rarefaction of Nigerien pastures. We verify that the results of the spatial model are linked to the drought affecting the pastures and not the rest of the Nigerien territory. Column (5) presents the results of the SDM model using the average level

dispute over land, control of land, over land, clash over land, land grab, farm land,land invaders, land invasion, land redistribution, land battle, over cattle and land, invade land, over disputed land, over a piece of land, herd, pastoral, livestock, cattle, grazing, pasture, cow, cattle, farm, crop, harvest.

of rainy season's drought in Nigerien areas where there is no grassland. The coefficients associated with the interaction terms are not significant, which confirms that climate shocks affecting Nigerien pastures drive our main results.

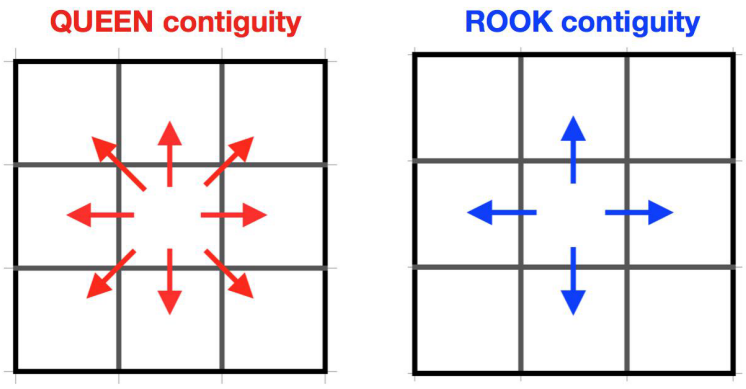
4.7.3 Alternative Weight Matrix

In this section, we modify the definition of what constitutes a neighbor and reproduce our main specification. The objectives are twofold: to provide methodological justifications to the choice of the weight matrix in our baseline model and to analyze how modifications of the spillovers' scale affect our results (LeSage and Pace, 2014a). The results of the spatial Durbin model using different row-standardized spatial weight matrices are reported in **Table 4.6**. Each column reports the direct, indirect, and total effects of the variables of interest using inverse distance weight matrices with different distance cutoffs. Since we use a gridded representation of Nigeria, column (1) is limited to first-order neighbors, column (2) to second-order neighbors, column (3) to third-order neighbors, and column (4) to fourth-order neighbors. Column (5) considers the whole Nigerian territory.

The estimates and inferences from spatial regression models are often considered sensitive to the spatial weighting matrix (LeSage and Pace, 2014b). The selection of a Queen contiguity spatial weight matrix is theoretically motivated, considering the hypothesis on the nature of spatial interactions. Indeed, we are interested in the choices that a breeder make during his transhumance between staying in a cell and moving to its neighbor according to the information at his disposal. Therefore, the nearest neighbor contiguity weight matrix appears to be the most appropriate measure to study these local spillover effects. Also, unlike Rook contiguity, Queen contiguity includes diagonal breeder moves (see **Figure 4.7**).

The coefficient ρ is not significant in columns (2), (4), and (5), suggesting that these SDM models can be further simplified to spatial lag of X models (SLX). Results of the SLX models are presented in **Table 4.7**. **Table 4.6** and **Table 4.7** report the Bayesian Information Criterion (BIC) associated with the most suited spatial model for the considered spatial weight matrix. Models having a smaller BIC indicate a better model fitting and model parsimony. The BIC reported for different cutoffs of inverse distance matrix are generally bigger than the one of our baseline model ($BIC = -2698.57$, see **Table 4.5**). One exception is the SDM model with a cutoff of the weighting matrix of 270km. However, this difference is marginal and theory should be the driving force behind the selection of the spatial weight (LeSage and Pace, 2014b).

Figure 4.7: Definition of Queen and Rook Contiguity



Source: Ardilly et al. (2018).

The results are generally in line with the ones of our baseline spatial model concerning local spillovers (i.e., immediate neighbors). The magnitude of the indirect effects increases with the size of the distance cutoff because they reflect an average of spatial spillovers cumulated over more neighbors. Concerning the direct effects, a significant ($p<0.05$) positive effect of the interaction term is observed when the neighborhood is limited to contiguous neighbors (column 1 of *Table 4.6*). Concerning the total effects, a significant ($p<0.05$) positive effect of the interaction term is observed for the inverse distance matrix with no cutoff (column 3 of *Table 4.7*). When a larger number of neighbors is considered, the analysis explores global spillovers(LeSage, 2014). Local spillovers' analysis is linked to short-term decision making, while the analysis of global spillovers takes into account a larger set of future prospects and past experiences of herders during transhumance. The direct effect of drier climatic conditions in Niger's grasslands for Nigerian cells with pasture is only significant at a very local scale (direct neighbors). It suggests that predatory behaviors for the remaining grasslands may span from local decision making. In column (3) of *Table 4.7*, the total effect of drier climatic conditions in Niger's grasslands for Nigerian cells with pasture is negative and significant at the 5% level. Also, drier climatic conditions in Niger's grasslands increase the risk of herder-farmer conflict close to pasture-less Nigerian cells. These results suggest that grasslands, and more precisely the presence of alternative grasslands, can reduce the risk of herder-farmer conflict by reducing the economic interest to resort to predatory behavior.

Table 4.6: Alternative Specifications of the Spatial Weights - SDM Models

	SDM Inv. Dist. d = 90 km	**SDM** Inv. Dist. d = 180 km	**SDM** Inv. Dist. d = 270 km	**SDM** Inv. Dist. d = 360 km	**SDM** Inv. Dist. Total
	(1)	(2)	(3)	(4)	(5)
Direct					
L.Grassland	0.031	0.030	0.028	0.030	0.032
	(0.027)	(0.028)	(0.027)	(0.028)	(0.027)
L.RS-Drought Niger's grasslands (dist)	-0.297	-0.328	-0.332	-0.364	-0.357
	(0.315)	(0.264)	(0.240)	(0.221)	(0.216)
L.Grassland × L.RS-Drought Niger's grasslands (dist)	0.182*	0.161*	0.156	0.153	0.157
	(0.087)	(0.080)	(0.081)	(0.082)	(0.082)
Indirect					
L.Grassland	0.284***	0.518***	0.591**	0.879**	2.038**
	(0.083)	(0.156)	(0.208)	(0.287)	(0.718)
L.RS-Drought Niger's grasslands (dist)	0.796	1.094*	1.270*	1.612*	4.106*
	(0.487)	(0.534)	(0.581)	(0.648)	(1.723)
L.Grassland × L.RS-Drought Niger's grasslands (dist)	-0.361**	-0.484**	-0.574*	-0.729*	-1.973**
	(0.130)	(0.181)	(0.228)	(0.296)	(0.754)
Total					
L.Grassland	0.315***	0.548***	0.619**	0.908**	2.069**
	(0.087)	(0.156)	(0.206)	(0.287)	(0.717)
L.RS-Drought Niger's grasslands (dist)	0.499	0.766	0.938	1.248*	3.749*
	(0.314)	(0.410)	(0.483)	(0.568)	(1.637)
L.Grassland × L.RS-Drought Niger's grasslands (dist)	-0.179	-0.323	-0.418	-0.576*	-1.816*
	(0.119)	(0.174)	(0.216)	(0.278)	(0.739)
ρ	0.085*	0.113	0.169*	0.174	0.123
	(0.041)	(0.110)	(0.041)	(0.087)	(0.467)
Log-lik	1471.06	1473.87	1471.41	1469.94	1471.03
Obs	3355	3355	3355	3355	3355
BIC	-2698.57		-2699.28		
Controls	Yes	Yes	Yes	Yes	Yes
Moran	0.264	0.167	0.133	0.097	0.046
Moran p.val	0.000	0.000	0.000	0.000	0.000

Notes: * p<0.05, ** p<0.01, *** p<0.001. Spatial Durbin models (SDM). Robust standard errors (in parentheses) are clustered at the cell level. Cell and year fixed effects are included. Standard and spatially lagged controls at the cell level include the level of drought during the previous rainy season, the level of drought during the dry season, the activity of Boko Haram during the previous year (dummy variable), and the size of the population. The Moran's I statistic is calculated from the average incidence of herder-farmer conflict per cell for the whole period (2006-2016). *Source: Author's compilation.*

Table 4.7: Alternative Specifications of the Spatial Weights - SLX Models

	SLX Inv. Dist. d = 180 km	**SLX** Inv. Dist. d = 360 km	**SLX** Inv. Dist. Total
	(1)	(2)	(3)
Direct			
L.Grassland	0.028	0.027	0.029
	(0.027)	(0.027)	(0.027)
L.RS-Drought Niger's grasslands (dist)	-0.394	-0.441	-0.450
	(0.352)	(0.312)	(0.291)
L.Grassland × L.RS-Drought Niger's grasslands (dist)	0.151	0.132	0.133
	(0.078)	(0.076)	(0.076)
Indirect			
L.Grassland	0.495***	0.760***	1.735***
	(0.112)	(0.190)	0.419)
L.RS-Drought Niger's grasslands (dist)	1.085*	1.448*	3.376**
	(0.528)	(0.584)	(1.280)
L.Grassland × L.RS-Drought Niger's grasslands (dist)	-0.406*	-0.491*	-1.148*
	(0.176)	(0.234)	(0.528)
Total			
L.Grassland	0.524***	0.787***	1.764***
	(0.113)	(0.190)	(0.418)
L.RS-Drought Niger's grasslands (dist)	0.692*	1.008*	2.926**
	(0.331)	(0.419)	(1.097)
L.Grassland × L.RS-Drought Niger's grasslands (dist)	-0.254	-0.359	-1.015*
	(0.154)	(0.212)	(0.499)
Log-lik	1188.93	1187.34	1189.72
Obs	3355	3355	3355
Controls	Yes	Yes	Yes
BIC	-2183.03	-2179.85	-2184.61

Notes: * p<0.05, ** p<0.01, *** p<0.001. Spatial lag of X (SLX) models with robust standard errors (in parentheses). Cell and year fixed effects are included. Standard and spatially lagged controls at the cell level include the level of drought during the previous rainy season, the level of drought during the dry season, the activity of Boko Haram during the previous year (dummy variable), and the size of the population. *Source: Author's compilation.*

4.8 Conclusion

This article studies how pasture scarcity in Nigeria affects the risk of conflict between pastoralists from Niger and local farmers. The recent empirical literature on herder-farmer conflicts in Africa shows that sudden flows of breeders in search of resources to feed their herd destabilize informal arrangements between herders and farmers, increasing the risk of violence for the remaining resources. Regarding the flow of herders leaving Niger during the dry season, this study finds little to no evidence that a greater climate-related flow of transhumant pastoralists leads to a higher risk of herder-farmer conflict in Nigeria. Dryer conditions in Niger's pastures are associated with a significantly smaller risk of herder-farmer conflict in Nigeria. This study finds evidence of a U-shaped relationship between climatic shocks (floods and droughts) and conflicts. however, these results hardly coincide with the mechanism of competition

for the remaining resources.

Using spatial econometric techniques, the second part of this article analyzes the spatial heterogeneity of the risk of conflict between herders and farmers depending on the proximity to pastures. Some evidence is found of conflict for the remaining resources following drought in Niger's grasslands. However, the magnitude of this effect is low and very local, suggesting that competition for the remaining grasslands is not the primary driver of conflict between nomadic pastoralists from Niger and farmers from Nigeria. Drier climatic conditions in Niger's grasslands are associated with a significantly lower risk of herder-farmer conflict in areas close to pastures. Proximity to alternative grasslands reduces transhumance's cost, making movement a more rational choice than violent appropriation. Therefore, pasture scarcity in Nigeria could increase the risk of herder-farmer conflict following massive climate-induced movements of pastoralists across the Niger-Nigeria border. Finally, climatic shocks affecting the farmers' incomes are positively by not significantly associated with the risk of herder-farmer conflict, suggesting that the economic constraint put on farmers does not influence the risk of herder-farmer conflict.

Comparing these results with the pastoral policies carried out in the region provides elements of reflection on the sustainability of Nigeria's position on cross-border transhumance. In many parts of Nigeria, cross-border transhumance is considered a threat to national security as local and foreign nomadic pastoralists are merged into the same invader-farmer rhetoric (Chiluwa and Chiluwa, 2020). Herders' movements to Nigeria, justified by climatic constraints in the departure area, are considered archaic and vectors of conflict with local farmers for the remaining grasslands. This article suggests that this rhetoric is not new and could be self-fulfilling. Since 2006, the amount of pasture in Nigeria is decreasing, justified by an ambition to sedentarize herders and develop the agricultural sector. However, the disappearance of open grazing areas makes seasonal and climate-induced transhumance riskier, increasing the herder's incentive to chose predatory behaviors and the likelihood of herder-farmer conflict.

Finding a solution to the herder-farmer crisis in Nigeria is important for the economy and the food security of the country and its neighbors. In the coming years, increasing pressure on land, higher temperatures, and depleted water resources are expected to move farms from high to low agro-ecological zones (Kurukulasuriya and Mendelsohn, 2008; Carrão et al., 2016). This change in the socio-ecological organization of spaces will likely increase encounters between breeders and farmers.

4.9 Appendices of Chapter 4

Table A1: Correspondence Between the IPCC Land Categories and CCI-LC Maps Legends

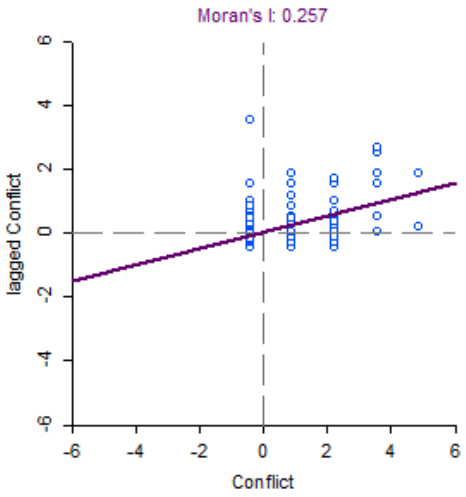
IPCC Classes	**LCCS Legends Used in the CCI-LC Maps**
1. Agriculture	Rainfed cropland
	Irrigated cropland
	Mosaic cropland (>50%) / natural vegetation (tree, shrub, herbaceous cover) (<50%)
	Mosaic natural vegetation (tree, shrub, herbaceous cover) (>50%) / cropland (<50%)
2. Forest	Tree cover, broadleaved, evergreen, closed to open (>15%)
	Tree cover, broadleaved, deciduous, closed to open (>15%)
	Tree cover, needleleaved, evergreen, closed to open (>15%)
	Tree cover, needleleaved, deciduous, closed to open (>15%)
	Tree cover, mixed leaf type (broadleaved and needleleaved)
	Mosaic tree and shrub (>50%) / herbaceous cover (<50%)
	Tree cover, flooded, fresh or brakish water
	Tree cover, flooded, saline water
3. Grassland	Mosaic herbaceous cover (>50%) / tree and shrub (<50%)
	Grassland
4. Wetland	Shrub or herbaceous cover, flooded, fresh-saline or brakish water
5. Settlement	Urban
6. Other	Shrubland
	Lichens and mosses
	Sparse vegetation (tree, shrub, herbaceous cover)
	Bare areas
	Water

Table A2: Descriptive Statistics Associated with the Main Variables

	(1) Mean	(2) Std.Dev.	(3) Obs	(4) Min	(5) Max
Herder-Farmer conflicts					
Total	0.043	0.203	3355	0.000	1.000
Dry season	0.031	0.173	3355	0.000	1.000
Rainy season	0.015	0.122	3355	0.000	1.000
Land cover					
Crops (proportion)	0.621	0.321	3355	0.000	0.999
Grasslands (proportion)	0.033	0.092	3355	0.000	0.705
Grassland (presence)	0.652	0.476	3355	0.000	1.000
Drought					
Nigeria - Rainy season $(t-1)$	0.118	0.778	3355	-1.963	2.314
Nigeria - Dry season (t)	0.535	0.905	3355	-3.089	2.995
Nigeria - Growing season (t)	0.138	0.870	3355	-2.507	2.606
Niger - Rainy season $(t-1)$	0.000	0.546	3355	-0.887	0.934
Niger - Rainy season $(t-1)$ (dist)	0.000	0.101	3355	-0.268	0.282
Other controls					
Boko Haram	0.248	2.122	3355	0.000	80
River lenght	0.181	0.197	3355	0.000	1.382
Roads length (log)	5.370	1.077	3355	0.000	6.857
Population size (log)	12.722	0.905	3355	10.150	15.255
Distance to the Niger-Nigeria border (log)	5.665	0.871	3355	3.314	6.825

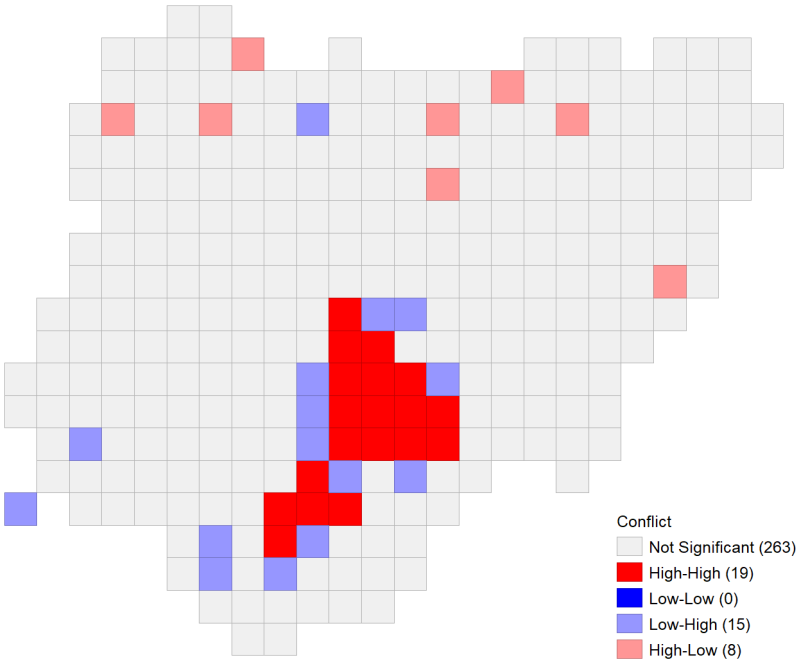
Notes: The unit of observation is the cell/year. The table presents some statistics of the main variables used in this study: mean (column 1), standard deviation (column 2), number of observations (column 3), minimum (column 4) and maximum (column 5) values. The dry season corresponds to the period October-May. The rainy corresponds to the period June-September. The growing season is defined by the main type of crop production of each cell. The drought measure corresponds to the inverted Standardized Precipitation Evapotranspiration Index (SPEI). *Source: Author's compilation.*

Table A3: Moran Scatter Plot for the Average Incidence of Conflict Between Herders and Farmers in Nigeria (2006-2016)



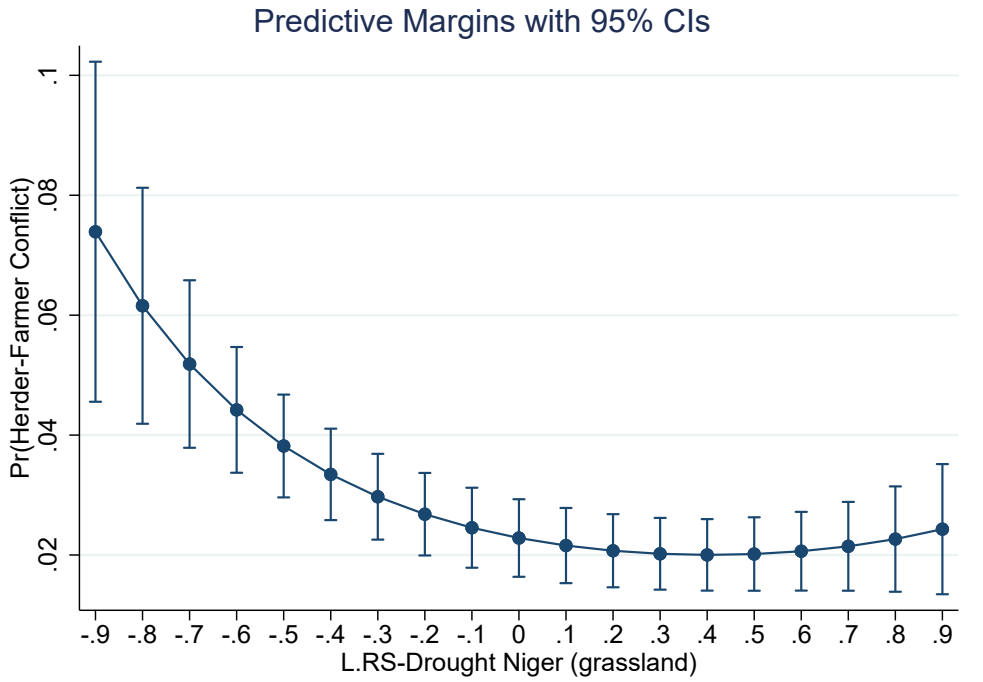
Notes: The variable tested is the cell's average incidence of conflict between herders and farmers between 2006 and 2016; the weight matrix is a first order queen contiguity matrix. The upper-right and the lower-left quadrants (lower-right and upper-left quadrants) correspond with positive (negative) spatial autocorrelation. *Source: Author's compilation.*

Table A4: Cluster Map for the Average Incidence of Conflict Between Herders and Farmers in Nigeria (2006-2016)



Notes: The variable tested is the cell's average incidence of conflict between herders and farmers between 2006 and 2016; the weight matrix is a first order queen contiguity matrix. Local Moran's I statistic significant at the 0.05 level using 999 permutations. *Source: Author's compilation.*

Table A5: Average Predicted Probabilities of Herder-Farmer Conflict Depending on the Level of Drought in Niger's Grasslands



Notes: Margins plot with capped spikes showing 95% confidence intervals. "Herder-Farmer Conflic" is a dummy variable indicating the incidence of conflict between herders and farmers during the dry season according to the Nigeria Watch database. It takes the value "1" if there is at least one conflict episode in the cell during the year considered. "L.RS-Drought Niger (grassland)" is the average level of drought in Niger's grasslands during the previous rainy season (centered at its mean); it corresponds to the inverted SPEI measure of (Vicente-Serrano et al., 2010).
Source: Author's compilation.

Table A6: Alternative Specifications of the Independent Variables - Logistic Model

	Logit (1)	*LPM* (2)	*Logit* (3)	*Logit* (4)
L.RS-Drought Niger's grasslands (dist)	-3.433**	-0.099**		
	(1.197)	(0.032)		
L.RS-Temp Niger's grasslands			-7.715	
			(9.776)	
L.RS-Prec Niger's grasslands				1.786*
				(0.838)
Border Distance			0.530***	0.523***
			(0.155)	(0.155)
Log-lik	-420.16	1156.96	-417.61	-415.46
Obs	3355	3355	3355	3355
Controls	Yes	Yes	Yes	Yes

Notes: * p<0.05, ** p<0.01, *** p<0.001. Results were estimated using logistic (columns 1-6) and linear (column 7) models. Robust standard errors are in parentheses. The outcome variable is a dummy variable indicating the incidence of conflict between herders and farmers during the dry season according to the Nigeria watch database. It takes the value "1" if there is at least one conflict episode in the cell during the year considered. Controls include the SPEI during the previous rainy season, the dry season's SPEI, the population size, the average roads' length, the average rivers' length, and an indicator of last year's activity of the group Boko Haram. *Source: Author's compilation.*

Table A7: Alternative Specifications of the Dependent Variables - Logistic Model

	Acled (1)	Eberle et al. (2020) (2)	Acled (3)	Eberle et al. (2020) (4)
L.RS-Drought Niger (grassland)	-0.705**	-0.726**	-0.696***	-0.741***
	(0.262)	(0.234)	(0.205)	(0.198)
L.RS-Drought Niger (grassland) sq.			0.763*	0.546[a]
			(0.314)	(0.308)
Log-lik	-362.92	-406.74	-360.31	-405.25
Obs	3355	3355	3355	3355
Controls	Yes	Yes	Yes	Yes

Notes: a p<0.1, * p<0.05, ** p<0.01, *** p<0.001. Results were estimated using logistic regression. Robust standard errors are in parentheses. The "Acled" dependent variable defines herder-farmer conflict as events defined by Acled with at least one of the following (association of) key words: *"crop" and "cattle", "land" and "cattle", "crop" and "herd", "farmer" and "herd", "agri" and "pastor", "farmer" and "transhumance", "farm" and "nomad", "cattle" and "invade", "nomad" and "farm", "grazing"*. The conflict variable proposed by Eberle et al. (2020) was constructed similarly but with a different list of key words that pertain to resources and competition: *"land dispute", "dispute over land", "control of land", "over land", "clash over land", "land grab", "farm land", "land invaders", "land invasion", "land redistribution", "land battle", "over cattle and land", "invade land", "over disputed land", "over a piece of land", "herd", "pastoral", "livestock", "cattle", "grazing", "pasture", "cow", "cattle", "farm", "crop", "harvest"*. Controls include: the level of drought during the previous rainy season and during the dry season, Boko Haram activity during the previous year (dummy variable), population size, road length, river length and distance to the Niger-Nigeria border.
Source: Author's compilation.

Table A8: Heterogeneous Effects of Climatic Events Affecting Niger's Grassland on the Risk of Herder-Farmer Conflict - Logistic Model

	(1)	(2)	(3)	(4)	(5)
L.RS-Drought Niger (g)	-1.115**	-1.110**	-0.705***	-0.732**	-0.665***
	(0.339)	(0.408)	(0.188)	(0.229)	(0.190)
L.RS-Drought Niger (g) sq.	1.048*	0.728	0.817**	0.738	0.849**
	(0.533)	(0.635)	(0.297)	(0.378)	(0.296)
L.Grassland	0.575				
	(0.338)				
L.Grassland × L.RS-Drought Niger (g)	0.628				
	(0.406)				
L.Grassland × L.RS-Drought Niger (g) sq.	-0.364				
	(0.641)				
Mobile Pastoralism Suit.		1.232			
		(0.919)			
L.RS-Drought Niger (g) × Mobile Pastoralism Suit.		1.486			
		(1.342)			
L.RS-Drought Niger (g) sq. × Mobile Pastoralism Suit.		0.328			
		(1.994)			
Mobile Pastoralism Suit. (c)			1.232		
			(0.919)		
L.RS-Drought Niger (g) × Mobile Pastoralism Suit. (c)			1.486		
			(1.342)		
L.RS-Drought Niger (g) sq. × Mobile Pastoralism Suit. (c)			0.328		
			(1.994)		
Animal Husbandry Suit.				-1.644	
				(3.374)	
L.RS-Drought Niger (g) × Animal Husbandry Suit.				1.340	
				(3.692)	
L.RS-Drought Niger (g) sq. × Animal Husbandry Suit.				2.216	
				(5.670)	
Animal Husbandry Suit. (c)					-1.644
					(3.374)
L.RS-Drought Niger (g) × Animal Husbandry Suit. (c)					1.340
					(3.692)
L.RS-Drought Niger (g) sq. × Animal Husbandry Suit. (c)					2.216
					(5.670)
Log-lik	-405.97	-406.13	-406.13	-408.22	-408.22
Obs	3355	3355	3355	3355	3355
Controls	Yes	Yes	Yes	Yes	Yes

Notes: * p<0.05, ** p<0.01, *** p<0.001. Results were estimated using logistic regression. Robust standard errors are in parentheses. The outcome variable is a dummy variable indicating the incidence of conflict between herders and farmers during the dry season according to the Nigeria watch database. It takes the value "1" if there is at least one conflict episode in the cell during the year considered. "L.RS-Drought Niger (g)" is the level of drought in Niger's grassland during the previous rainy season (Vicente-Serrano et al., 2010). (c) indicates mean-centered variable. Indicator of the cell's suitability (Suit.) for animal husbandry and mobile pastoralism was obtained from Beck and Sieber (2010). Controls include: the level of drought during the previous rainy season and during the dry season, Boko Haram activity during the previous year (dummy variable), population size, road length, river length and distance to the Niger-Nigeria border. *Source: Author's compilation.*

Table A9: Alternative Specifications - Spatial Model

	(1)	(2)	(3)	(4)	(5)
L.Grassland	0.027	0.024	0.024	0.024	0.008
	(0.053)	(0.027)	(0.026)	(0.029)	(0.034)
L.RS-Drought Niger's grasslands (dist)	-0.217	-0.264			
	(0.399)	(0.290)			
L.Grassland × L.RS-Drought Niger's grasslands (dist)	0.185	0.173*			
	(0.104)	(0.079)			
L.RS-Drought Niger's grasslands (dist) sq.	-0.192				
	(1.780)				
L.Grassland × L.RS-Drought Niger's grasslands (dist) sq.	-0.368				
	(1.026)				
L.Grassland × L.RS-Drought Niger's grasslands			0.030*	0.030*	
			(0.015)	(0.014)	
L.Grassland × L.RS-Drought Niger (no grasslands)					0.019
					(0.024)
WL.Grassland	0.278***	0.276**	0.271**	0.271**	0.308***
	(0.083)	(0.104)	(0.084)	(0.104)	(0.091)
WL.RS-Drought Niger's grasslands (dist)	0.611	0.697			
	(0.561)	(0.468)			
WL.Grassland × L.RS-Drought Niger's grasslands (dist)	-0.328*	-0.335**			
	(0.143)	(0.109)			
WL.RS-Drought Niger's grasslands (dist) sq.	0.966				
	(2.863)				
WL.Grassland × L.RS-Drought Niger's grasslands (dist) sq.	-0.195				
	(1.540)				
WL.Grassland × L.RS-Drought Niger's grasslands			-0.044*	-0.044**	
			(0.020)	(0.014)	
WL.Grassland × L.RS-Drought Niger (no grasslands)					-0.045
					(0.034)
ρ	0.081*	0.081*	0.082*	0.082*	0.081
	(0.041)	(0.039)	(0.041)	(0.040)	(0.042)
Log-lik	1471.43	1471.06	1470.00	1470.00	1467.66
Obs	3355	3355	3355	3355	3355
Hausman χ^2	47.71	44.86	42.80	42.80	43.67
Hausman p-value	0.00	0.00	0.00	0.00	0.00
Cell fixed effects	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
Cluster level	Cell	Admin	Cell	Admin	Cell

Notes: * p<0.05, ** p<0.01, *** p<0.001. Results were estimated using a fixed effects spatial Durbin model. Robust standard errors are in parentheses. The outcome variable is a dummy variable indicating the incidence of conflict between herders and farmers during the dry season according to the Nigeria watch database. It takes the value "1" if there is at least one conflict episode in the cell during the year considered. Controls (standard and spatially lagged) at the cell level include: the level of drought during the previous rainy season, the level of drought during the dry season, the activity of Boko Haram during the previous year (dummy variable), and the size of the population. *Source: Author's compilation.*

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RÉSUMÉ DÉTAILLÉ

Les conflits internes ont des conséquences économiques et sociétales graves à long terme. Dans les pays à faibles revenus et à revenus intermédiaires, les années de conflits sont des années de "développement à l'envers" contagieuses dans le temps et dans l'espace. Les causes structurelles des conflits correspondent à leurs facteurs profonds car intégrés au système économique, politique et social d'une région, d'un pays ou d'une société. S'intéresser aux mécanismes qui lient ces enjeux au choix rationnel de l'appropriation violente est important car ils constituent des sources de menace persistantes pour le développement et la sécurité des pays en développement. L'enjeu est également méthodologique puisque leur analyse permet d'éviter de tomber dans une simplification abusive de l'explication des causes des conflits internes, et donc de leurs solutions. Ce travail de thèse est constitué des trois études portant sur l'identification de ces mécanismes et de leurs effets (souvent hétérogènes) sur des formes spécifiques de conflits touchant de manière récurrente les pays à faibles revenus et à revenus intermédiaires.

Le chapitre 2 est une revue de la littérature portant sur les enjeux méthodologiques et théoriques de l'analyse empirique des causes profondes des conflits civils. L'absence de données désagrégées sur les conflits a longtemps limité les travaux empiriques à une échelle d'analyse pays/années. Depuis le début des années 2000, des avancées techniques en matière de géolocalisation des événements violents et d'analyse spatiale ont favorisé l'émergence d'un nombre important de travaux empiriques réalisés à l'échelle de régions, villes ou cellules géographiques. L'apport de ce travail de revue de la littérature est d'analyser spécifiquement les avancées théoriques et méthodologiques permises par l'usage de données désagrégées pour la compréhension des causes des conflits civils. Dans quelle mesure l'apparition de conflits civils s'explique-t-elle par des facteurs locaux, voir individuels ? Ce chapitre montre que cette évolution des outils statistiques a permis de mieux comprendre le rôle local de facteurs tels que la pauvreté et les ressources naturelles, tout en dessinant des perspectives de recherche prometteuses pour des

enjeux contemporains et controversés tels que le changement climatique. Par rapport à des mesures agrégées de richesse nationale telles que le produit intérieur brut, les indicateurs désagrégés permettent de capter avec plus de précision les contraintes économiques auxquelles les populations sont confrontées, indépendamment des capacités nationales en matière de sécurité. Ainsi, combinées avec des données géo-référencées de conflits civils, les chocs climatiques apportent des informations sur les enjeux économiques dans les zones rurales, particulièrement dans les pays d'Afrique où est majoritairement pratiquée l'agriculture pluviale. Malgré tout, le gain en précision qu'offre l'usage de données désagrégées ne doit pas se faire au détriment d'une meilleure compréhension des facteurs régionaux et mondiaux de conflits civils. Ainsi, les questions de commerce et de cohésion sociale nécessitent encore d'être approfondies car elles s'expliquent à l'échelle de groupes dont la dimension est mal connue.

Le chapitre 3 étudie l'une des manières dont la religion peut être un facteur structurel tantôt de conflit politique, tantôt de paix sociale. Les identités religieuses en tant de telles (c'est à dire la proportion représentée par chaque groupe religieux dans une société) ne sont pas automatiquement liées à un risque plus élevé de conflit dans une Nation. Adam Smith soutient que la diversité religieuse induit une forme de compétition entre groupe religieux favorable à la tolérance et à la "qualité" du contenu des doctrines. Néanmoins, les théories instrumentalistes soutiennent que les questions religieuses peuvent être instrumentalisées par des groupes afin de servir leurs ambitions politiques. L'ambivalence du rôle de la religion dans l'apparition de conflits politiques est analysée dans ce chapitre à travers son effet temporel. En effet, alors que les identités religieuses varient relativement peu dans le temps,[43] le recours à la politisation/instrumentalisation des questions religieuses est guidé par des considérations opportunistes précisément datées. De ce fait, si l'instrumentalisation politique des identités religieuses influence le risque de conflit politique, il est possible que cet effet varie dans le temps et réagisse à des évènements externes mettant ces enjeux sur le devant de la scène politique. Ce chapitre analyse comment les chocs de politisation des identités religieuses influencent le risque de conflit politique dans le temps. Les chocs politico-religieux étudiés dans ce chapitre sont les emblématiques voyages internationaux du Pape Jean Paul II (entre 1979 et 2003) et dont l'ambition était, entre autres, de promouvoir la paix inter-religieuse dans les pays visités. Comment les voyages du Pape agissent sur le risque de conflit politique en fonc-

[43] A l'exception des cas de déplacements massifs de population ou de génocides, le pourcentage de la population représenté par chaque groupe religieux évolue relativement peu d'une années sur l'autre. Cela ne signifie pas que la diversité religieuse est statique car des phénomènes communs tels que la migration agissent sur la part relative de chaque groupe. Il n'est donc pas rare d'observer à long terme une évolution lente et linéaire de la part d'un groupe religieux (menant parfois à une modification de l'identité du groupe religieux majoritaire comme au Burkina Faso dans les années 90).

tion de la diversité religieuse des pays visités ? Les résultats obtenus suggèrent que les voyages du Pape Jean Paul II réduisent le risque de conflit politique d'environ 9 à 20% dans les pays d'accueil sur un horizon de 4 ans. Néanmoins, cet effet est hétérogène en fonction de la structure religieuse des pays visités. Lorsque le niveau de polarisation religieuse et la proportion de catholiques sont élevés, les visites papales augmentent le risque de conflit politique jusqu'à 19,5% après deux ans.

Le chapitre 4 porte sur les causes économiques et géographiques contemporaines d'un conflit parmi les plus anciens d'Afrique de l'Ouest: celui entre les éleveurs transhumants et les agriculteurs sédentaires. En 2018 seulement, le bilan estimé des affrontements entre éleveurs et agriculteurs au Nigéria est de 1 300 victimes et 300 000 personnes déplacées. Ces tensions menacent la stabilité, le développement économique et la sécurité alimentaire déjà affaiblis en Afrique de l'Ouest. En effet, la transhumance transfrontalière des éleveurs pendant la saison sèche est une activité économique dont l'importance régionale est reconnue par la Communauté économique des États de l'Afrique de l'Ouest (CEDEAO). Cette pratique relève également d'une stratégie d'adaptation au changement climatique essentielle pour les États sahéliens qui ont développé un avantage comparatif dans la production et l'exportation de bétail avec leurs voisins. Cependant, la mise en place d'un cadre juridique harmonisé autour de cette pratique est entravée par des problèmes de coordination entre les États côtiers (principaux destinataires des flux de bétail) et les États sahéliens (principaux fournisseurs de flux de bétail). La croissance du secteur agricole nigérian par l'expansion des terres agricoles menace les derniers pâturages ouverts et les couloirs de transhumance. En effet, le Nigéria est confronté à une pénurie de terres arables pour une population rurale croissante. La concurrence pour les derniers pâturages nigérians est-elle un facteur de violence entre les éleveurs nomades venus du Niger et les agriculteurs nigérians ? Des preuves empiriques récentes suggèrent que la migration des éleveurs dans les zones agricoles voisines (courte transhumance) est associée à un risque plus élevé de conflit éleveur-agriculteur. Cependant, aucune analyse n'a encore questionné le rôle de l'accès aux pâturages lors de transhumances longues et coûteuses. Cet article analyse les implications sécuritaires de la transhumance transfrontalière entre le Niger et le Nigéria à l'échelle de cellules de 0,5x0,5 degrés entre 2006 et 2016. En utilisant des techniques de panel spatial et des données satellitaires sur la couverture terrestre, il questionne l'importance des stratégies d'accaparement des prairies comme une cause des récents conflits éleveurs-agriculteurs au Nigéria. Les résultats obtenus coïncident peu avec l'idée que l'accaparement des dernières ressources en pâturage est le principal motif de ces conflits. De plus, nous trouvons un effet de débordement géographique négatif et significatif des pâturages sur

le risque de conflit éleveurs-agriculteurs dans les cellules voisines. Ainsi, il apparaît que c'est davantage l'absence de pâturages aux alentours que leur présence sur place qui affecte le coût d'opportunité des éleveurs à entrer en conflit. In fine, l'économie des pays sahéliens liée au commerce du bétail est menacée par l'instrumentalisation politique du conflit entre éleveurs et agriculteurs passant par l'utilisation de la rhétorique "*envahisseurs versus agriculteurs*".

CONCLUSION GÉNÉRALE

Ce travail de thèse étudie trois formes récurrentes de conflits internes dans les pays à faibles revenus et à revenus intermédiaires; à savoir les conflits civils, les conflits politiques et les conflits intercommunautaires. Il montre que les causes profondes (ou systémiques) de ces évènements sont multiples mais que les avancées des méthodes empiriques et l'accès aux données désagrégées permettent de mieux appréhender ces origines. Ce travail de thèse montre alors l'interconnexion des enjeux nationaux (décisions publiques) et individuels (choix de l'appropriation violente) dans l'émergence de conflits internes. En effet, il met en garde sur la capacité qu'ont les décisions publiques à agiter des tensions préexistantes et parfois latentes. Les causes structurelles des conflits ont rarement des solutions car elles sont difficilement modifiables. Ce travail de thèse montre que si les causes structurelles ne poussent pas toujours les pays qu'elles concernent dans des conflits perpétuels, elles les rendent néanmoins vulnérables à des périodes d'instabilité liées à des chocs externes. Leurs effets peuvent être retardés dans le temps et dépasser les frontières nationales. Elles constituent de ce fait des risques pour la sécurité et le développement des pays en développement.