SSOAR

Open Access Repository
www.ssoar.info

Extraction and Violent Resistance in the Early Phases of State Building: Quantitative Evidence From the "Maji Maji" Rebellion, 1905-1907

De Juan, Alexander

Veröffentlichungsversion / Published Version
Zeitschriftenartikel / journal article

Zur Verfügung gestellt in Kooperation mit / provided in cooperation with:
GIGA German Institute for Global and Area Studies

Dieser Beitrag ist mit Zustimmung des Rechteinhabers aufgrund einer (DFG geförderten) Allianz- bzw. Nationallizenz frei zugänglich. / This publication is with permission of the rights owner freely accessible due to an Alliance licence and a national licence (funded by the DFG, German Research Foundation) respectively.

Empfohlene Zitierung / Suggested Citation:
De Juan, A. (2016). Extraction and Violent Resistance in the Early Phases of State Building: Quantitative Evidence From the "Maji Maji" Rebellion, 1905-1907. *Comparative political studies*, *49*(3), 291-323. https://doi.org/10.1177/0010414015617962

Nutzungsbedingungen:
Dieser Text wird unter einer Deposit-Lizenz (Keine Weiterverbreitung - keine Bearbeitung) zur Verfügung gestellt. Gewährt wird ein nicht exklusives, nicht übertragbares, persönliches und beschränktes Recht auf Nutzung dieses Dokuments. Dieses Dokument ist ausschließlich für den persönlichen, nicht-kommerziellen Gebrauch bestimmt. Auf sämtlichen Kopien dieses Dokuments müssen alle Urheberrechtshinweise und sonstigen Hinweise auf gesetzlichen Schutz beibehalten werden. Sie dürfen dieses Dokument nicht in irgendeiner Weise abändern, noch dürfen Sie dieses Dokument für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, aufführen, vertreiben oder anderweitig nutzen.
Mit der Verwendung dieses Dokuments erkennen Sie die Nutzungsbedingungen an.

Terms of use:
This document is made available under Deposit Licence (No Redistribution - no modifications). We grant a non-exclusive, non-transferable, individual and limited right to using this document. This document is solely intended for your personal, non-commercial use. All of the copies of this documents must retain all copyright information and other information regarding legal protection. You are not allowed to alter this document in any way, to copy it for public or commercial purposes, to exhibit the document in public, to perform, distribute or otherwise use the document in public.
By using this particular document, you accept the above-stated conditions of use.

gesis Leibniz-Institut für Sozialwissenschaften

Mitglied der Leibniz-Gemeinschaft

Diese Version ist zitierbar unter / This version is citable under:
https://nbn-resolving.org/urn:nbn:de:0168-ssoar-55358-3

Comparative Political Studies
2016, Vol. 49(3) 291–323
© The Author(s) 2015
Reprints and permissions:
sagepub.com/journalsPermissions.nav
DOI: 10.1177/0010414015617962
cps.sagepub.com
SAGE

Extraction and Violent Resistance in the Early Phases of State Building: Quantitative Evidence From the "Maji Maji" Rebellion, 1905-1907

Alexander De Juan[1]

Abstract

Does extraction increase the likelihood of antistate violence in the early phases of state-building processes? Although research has focused on the impacts of war on state building, the potential "war-making effects" of extraction have largely been neglected. The article provides the first quantitative analysis of these effects in the context of colonial state building. It focuses on the "Maji Maji" rebellion (1905-1907), the most substantial incidence of anticolonial violence in Eastern Africa. Analyses based on a new historical data set confirm the correlation between extraction and resistance. More importantly, they reveal that distinct strategies of extraction produced distinct outcomes. Although the intensification of extraction in state-held areas created grievances among the population, it did not drive the rebellion. Rather, the results indicate that the expansion of extractive authority threatened the interests of local elites and provoked effective resistance. This finding provides insights into the mechanisms driving the "extraction–coercion cycle" of state building.

[1]GIGA German Institute of Global and Area Studies, Hamburg, Germany

Corresponding Author:
Alexander De Juan, GIGA German Institute of Global and Area Studies, Neuer Jungfernstieg 21, 20354 Hamburg, Germany.
Email: dejuan@giga-hamburg.de

Keywords
colonial, conflict processes, state building, extraction

Introduction

Violence, extraction, and state building are intrinsically linked (Finer, 1975; Herbst, 2000; Tilly, 1990). Numerous empirical studies have investigated how war can increase extraction and state capacity more generally (Ames & Rapp, 1977; Centeno, 1997; Jaggers, 1992; Thies, 2006, 2007). The potential "war-making" effects of extraction, however, have largely been neglected. This is surprising. Numerous substantial tax revolts indicate that extraction can contribute to antistate violence (Burg, 2004, 2004; Hopcroft, 1999; von Trotha, 1994; Young, 1994). From a theoretical perspective, the effects of extraction on intrastate war are considered key to the state building "extraction–coercion cycle": Resistance against extraction motivates investments in administrative and coercive state capacity, whereas increased state capacity supports effective extraction that increases the likelihood of antistate resistance (Finer, 1975; Tilly, 1990). This article proposes and tests arguments about how extraction can lead to antistate violence.

I base my theoretical arguments and empirical analysis on a broad understanding of extraction in line with previous research on state building (e.g., Lamborn, 1983; Levi, 1989; Tilly, 1990). For Charles Tilly (1990), extraction ranges "from outright plunder to regular tribute to bureaucratized taxation" (1990, p. 181). It encompasses a variety of activities and may target a variety of resources, ranging from the state's direct exploitation of raw materials (e.g., through state-owned enterprises) to the enactment and enforcement of policies, rules, and regulations requiring contributions from the population—monetary (i.e., taxation) or in kind (e.g., agricultural products, labor). What is essential is that activities are being implemented by state actors and/or institutions and have the primary purpose of generating economic rents.

States that aim to foster extraction have two principal options. The first involves those areas where the state already has a firmly established extractive authority. It consists of *intensifying* extraction by increasing the amount of taxes, forced labor, or agricultural goods collected from the population. This can create economic hardship and result in grievances that can motivate rebellion. Alternatively, states may try to *expand* their extractive authority by stripping non-state elites of their extractive capacities and gains. This may lead to conflicts between state and non-state actors and trigger resistance from local strongmen (Cohen, Brown, & Organski, 1981; Mahmud, De Luca, & Vargas, 2012). I argue that the expansion of extraction is substantially

more likely to lead to violence than the intensification of extraction because it motivates elite participation in rebellion, something that is essential for translating grievances into effective mobilization and organizing sustained antistate resistance.

The connections between extraction and violence are certainly not deterministic. The effects of extraction are highly contingent on state–society relations more generally. They depend on the level of political participation, the redistribution of state income, and the provision of basic public services. Such interaction effects make it difficult to investigate the role of extraction in violence. Focusing on a specific instance of state building makes it easier to deal with these issues. Redistribution and participation were minimal in many colonial states, and state–society relations were more or less confined to extraction and repression. Consequently, analyses of colonial state building allow for a more limited but also more focused and less challenging analysis of the arguments presented above. I therefore focus my empirical analysis on this specific type of state building.

I investigate my argument in the context of the so-called "Maji Maji" rebellion in the former colony of German East Africa in the years 1905 to 1907. The revolt was the greatest uprising in early colonial East and Central Africa (Becker, 2004; Koponen, 1995) and engulfed half of the colony's territory, which encompassed today's Tanzania, Burundi, and Rwanda. Previous historical research has emphasized that extraction was essential in driving the rebellion. The colonial administration's activities focused on "coercive exploitation" (Tilly, 1990)—that is, the extraction of "tropical" goods needed in the metropolis (Bald, 1970; Koponen, 1995). Although it seems plausible that the rebellion was related to German extractive practices, no systematic quantitative analysis has investigated whether and how extraction actually led to violent opposition.

I have collated a comprehensive historical data set, mainly from unpublished historical sources, that features information on various dimensions of extraction as well as geocoded violent-event data. The empirical section of the article combines district-level comparisons with more fine-grained statistical analysis. It exploits the fact that extraction strategies differed substantially for the colony's two principal extractive goods, cotton and rubber. Contrary to qualitative accounts of the Maji Maji rebellion, the findings indicate that grievances resulting from the intensification of cotton extraction can only partly explain the rebellion. Rather, it seems to have been the expansion of extraction into the lucrative rubber economy that threatened local elites' political and economic authority and thereby led to widespread antistate violence.

These findings make two main contributions to the literature. First, they provide new insights into the mechanisms driving the "extraction–coercion

cycle." The state-building consequences of extraction may be particularly strong for specific strategies of extraction associated with specific periods of state building. Second, they add to the literature on natural resource extraction and violence more generally, suggesting that it may not be the degree of extraction or state capacity but rather the process of state expansion into resource-rich areas that increases the risk of political instability.

Extraction and Violent Resistance

Extraction is a key element of statehood. It represents the vast bulk of state activity in the early phases of state building (Mann, 1984; Tilly, 1990). Every state's survival depends on its ability to extract resources that allow it to maintain and expand its authority. Extraction is "the central task for the state to master before pursuing any other goals" (Levi, 1981; Thies, 2007, p. 717; Tilly, 1990). Extractive activities also strongly influence state–population interactions. They constitute a fundamental intervention into social life (Campbell, 1993). This can provoke opposition, most notably in phases of "primitive accumulation of power" (Cohen et al., 1981)—that is, the early phases of state building, when "traditional" orders are strong and the state is only in the process of expansion and consolidation. Revolts against new taxes were frequent in the early phases of European (Burg, 2004; Hopcroft, 1999; Lamborn, 1983; Strayer & Taylor, 1939) and colonial state building (Kilson, 1966; Redding, 2000; Scott, 1977).

But how and when does extraction lead to violence? A first strand of literature, focusing mainly on taxation, emphasizes that extraction may increase the risk of violence because it creates socioeconomic grievances among the population. Such grievances may ease mass mobilization and constitute the breeding ground for large-scale violent resistance (Gurr, 1970). For example, Charles Tilly emphasizes that it is the economic burden of tax extraction that causes opposition in the state-building and state-making processes (Tilly, 1990). In a similar vein, Migdal (1975) and Scott (1977) emphasize that extraction is more likely to lead to rebellion if it is particularly rigid and does not leave any economic flexibility to citizens in times of economic crisis. Finally, Lamborn (1983) argues that taxation creates grievances and violence if it is not legitimized by beneficial government programs (see Campbell, 1993).

Another perspective, focusing mainly on natural resources, highlights the fact that extraction can increase the risk of violence, as economic rents motivate non-state elites to use violent means to establish and/or defend control over resource-rich areas against the state (Collier & Hoeffler, 2004; see overview in Humphreys, 2005). Mahmud and colleagues (2012) suggest a

persuasive theoretical argument according to which resource booms are likely to lead to violence if the ownership of resources is not defined a priori. Uncertainty and competition between state and non-state actors may incite preemptive action and lead to civil war, especially if high stakes associated with resource control prevent meaningful negotiation (see also Dube & Vargas, 2013).

Building on this literature, I argue that the state's strategy for increasing extraction is of significant importance for the risk of violence as distinct strategies of intensification and expansion exert distinct effects in terms of creating grievances and competition among state- and non-state elites.

Intensification and Expansion of Extraction

We know that states do not emerge "full blown." Colonial states are no exception. Particularly the early phases of colonial state building are marked by high levels of unevenness: The state is strong in some pockets (Herbst, 2000; Mann, 1984), most notably where colonial explorers, troops, and administrative agents established their initial presence. From here, it evolves in a recurrent process of consolidation and enlargement (Levi, 1989). The alternating phases of state building are accompanied by associated strategies for maximizing revenues: the intensification and expansion of extraction.

As part of the process of consolidation, states may *intensify* extractive activities in those areas where they have already been able to establish an effective presence and monopolize extraction. Snyder (2006) refers to "public extraction" when states fully control the extraction process and the income generated by it. In these areas, states may raise additional revenues by increasing levels of taxation, implementing additional economic regulations, raising tariffs, or fostering natural resource extraction.

Alternatively, parallel to processes of enlargement, states may also further *expand* their extractive authority across their territory. In phases of early state building, areas of "public extraction" coexist with areas of "private extraction" where private economic actors still enjoy exclusive, unregulated, and untaxed control over the income generated by resources (Snyder, 2006). The expansion of extraction refers to the state's attempts to bring additional areas under state control by replacing preexisting systems of reciprocal rights and obligations with its own extractive system—turning "private" extraction into "public" extraction.

Following a general argument by Jeffrey Herbst (2000), I assume that the alternation between phases of intensification and expansion is driven by cost–benefit considerations. Expansion is a costly exercise. Most notably, it requires investments to establish institutions for monitoring and ensuring

compliance (Levi, 1989). Given the massive resource constraints of most colonial states (von Trotha, 1994), such investments are unlikely as long as the expected revenue surplus may also be met at a lower cost by intensifying extraction in areas already under effective state control. However, the potential for intensification in a given territory is limited. With every additional tax, economic regulation, or drive for forced labor, potential subsequent revenue increases diminish. Decreasing returns increase the strategic value of expansion and make a state's shift from intensification to expansion more likely.[1]

The following section elaborates on the effects of these strategies on the population and on competition among the state and non-state elites in line with the previous research outlined above.

The Effects of Intensification and Expansion

Both strategies of extraction can create grievances among the population at large. The intensification of extraction has especially unequivocal and direct economic consequences. Increasing taxation, regulation, and forced labor may eventually reach a point where it exceeds people's economic possibilities and undermines subsistence (Migdal, 1988; Scott, 1977). Historical cases seem to support the argument that the resulting grievances can directly translate into violent resistance. It has been argued that rising taxes threatened local peasants' livelihoods and motivated peasant rebellions across Europe (Brustein & Levi, 1987). Similar effects have been observed in colonial states. In Kenya, increasing demand for forced labor eventually exceeded what the local population considered acceptable, creating anger that led to violent conflict (Brantley, 1981). The introduction of a hut tax in late-19th-century Sierra Leone had already caused resentment among the population; the subsequent enactment of a per capita tax led to open rebellion (Bursian, 1910).

The economic effects of expansion are less clear. If the expansion targets regions without preexisting non-state tributary systems, novel state demands do create substantial absolute costs for the respective population—similar to the effects of intensification. In other cases, however, state demands may simply replace similar tributary claims by non-state elites, without absolute economic effects on the population. In either case, however, it may be the institutional novelty of expansion that creates grievances. Institutional reconfigurations may produce socioeconomic change—for example, when the expansion introduces new instruments of extraction (e.g., forced labor) or enforces adaptations of productive behavior (e.g., introduction of new crops). Economic-exchange relations may take a turn for the worse in that people may not have to pay more but receive less in return (e.g., Redding, 2000).

Although preexisting tributary systems may have rested on specific legitimizing traditions, early state expansion has most often relied on brute force (Herbst, 2000; von Trotha, 1994). These changes may create strong antistate grievances among the population.

Although these different types of grievances may both be equally conducive to antistate mobilization, I do not assume that any one of them is a sufficient condition for outright rebellion. Peace research strongly suggests that grievances will translate into rebellion only if collective action is facilitated by influential leaders. As Scott (1977) argues, the difference between everyday forms of resistance and open conflict may be explained in terms of organizational and strategic capacities. Elites provide leadership, coordinate troops, and ensure internal discipline (Brown, 1997). Thus, effective rebellions require a coalition of local elites and the population to provide for effective organization of collective action and sufficient participation to ensure success (Brustein & Levi, 1987; see also Lamborn, 1983). Consequently, extraction is most likely to lead to violence if it contributes to the creation of such coalitions by fomenting grievances among the population *and* by creating motives for rebellion among influential non-state elites. The following paragraphs outline the divergent effects of intensification and extraction on non-state elites and elite competition.

Remember that intensification refers to areas where the state already monopolizes extraction. In these areas, non-state elites have already been (forcefully) deprived of their authority. Thus, control over the extraction process is clearly defined a priori, and the economic rents expected via intensification do not incite competition between the state and non-state elites (Mahmud et al., 2012). Moreover, the disempowerment of non-state elites has often been followed by their integration into the state system. In many early European and colonial states, the state's extraction activities relied on intermediaries (Levi, 1989). In return for their acceptance of the state's authority, their support for tax collection, and their provision of labor, local strongmen received a share of taxes, new rents to distribute, or preferential access to economic goods (Lonsdale & Berman, 1979; von Trotha, 1994). Thus, once integrated into the state's extractive system, non-state elites do not necessarily suffer from intensified extraction but may actually profit from it. This reduces the probability of unified and widespread elite opposition to intensification.

Expansion, however, has direct effects on non-state elites. It represents an intervention into any preexisting economic relationship and thus threatens local elites' economic gains. Contrary to situations of intensification, control over the extraction process and its benefits is contested between the state and non-state actors (Mahmud et al., 2012). Brustein and Levi (1987) point

out that the state's introduction of taxation effectively undercut the nobility's power base in 16th- and 17th-century Europe, as it threatened to destroy local patron–client relationships. Similarly, in many colonial states, the expansion of taxation threatened local elites as they lost their economic benefits (von Trotha, 1994). Submission to the state's claims was seen by the population as the ultimate evidence of obedience to alien authority (Callahan, 2002; Lonsdale & Berman, 1979). Consequently, expansion is likely to create conflict and competition between the state and non-state elites (Mahmud et al., 2012). This may motivate preemptive or reactive violence with broad-based support from local strongmen capable of providing organizational and strategic leadership (Brustein & Levi, 1987; Lamborn, 1983; Mahmud et al., 2012).

Thus, although both strategies of extraction contribute to creating grievances, I expect elite participation and effective mass mobilization to be more likely in the context of expansion, leading to higher risks of violence than in contexts of intensification. The empirical section of the article aims to investigate this hypothesis.

The German Colonial State and the Maji Maji Rebellion

The German colonial project started as a private enterprise. In 1884, a young German named Carl Peters founded the Society for German Colonization (which was later renamed the Deutsch Ostafrikanische Gesellschaft [German East-African Society], DOAG). Peters had high ambitions: procuring colonies for Germany, improving the international status of the German Reich, and securing personal profit. He undertook a series of expeditions through East Africa, signing obscure treaties that made local authorities cede their land to the DOAG "for all time" (Bückendorf, 1997). Over the years, the DOAG expanded its territory and its activities. This process was violently interrupted by the so-called "Arab Revolt," which ravaged the coast of the colony in 1888 (Iliffe, 1979). Bismarck intervened on behalf of the DOAG and sent a military expedition that crushed the rebellion (Bückendorf, 1997). Following this intervention, all administrative functions were transferred from the DOAG to the imperial government (Iliffe, 1979).

Extraction by the Colonial State

From the metropolitan state's perspective, the colony of German East Africa primarily served an economic purpose: exploiting and exporting resources

that were not available in Germany. In Bismarck's words, "The winning and founding of colonies is nothing more than one expedient for developing German economic life" (Bismarck, 1885 as quoted in Koponen, 1995, p. 170). Extractive activities focused on maximizing the export of agricultural goods. It was originally planned that production would be ensured through large-scale German-led plantations. However, the colonial government soon had to recognize that the German output was increasing much more slowly than the metropolis had anticipated (Bald, 1970). The colonial state administration therefore refocused its strategy on indigenous production.

The main type of extractive activity focused on forcing Africans to produce cash crops sought by the German administration (Koponen, 1995). German "farming inspectors" were to use all necessary means to ensure the effective cultivation of crops prioritized by the colonial government (Koponen, 1995). Communal production schemes were established, relying heavily on short-term forced labor. Taxation was introduced to increase the labor supply and induce the production of cash crops: It created the need for the population to raise cash by working on plantations or to cultivate products accepted by the administration as in-kind tax payment—notably rubber (Bursian, 1910). In addition, German extractive activity also aimed at exploiting economic surplus when raw products entered the local markets. Concrete activities included the establishment of government-controlled market halls (they were mandatory and charged a fee), the introduction of a so-called business tax (*Gewerbesteuer*) on local commercial activities, and an increasing number of more decentralized (district-level) economic regulations and price controls aimed at strengthening the state's access to revenues generated in the local economy (Bald, 1970).

The Maji Maji Rebellion

Although violence was endemic to the colony, the Maji Maji rebellion represented a new dimension of resistance, affecting nearly half of the territory. It started in August 1905 in the southern Kilwa district and quickly spread to the south and the west as well as northward into Dar es Salam. The rebels staged numerous substantial attacks on German convoys and stations, often with several thousand fighters (Bührer, 2011; Götzen, 1909; Gwassa, 1973; Iliffe, 1967, 1979; Nigmann, 1911). Despite its initial successes, the rebellion was crushed within less than 2 years. It has been estimated that rebels killed 15 Europeans and 400 African soldiers, whereas the number of dead among rebels and noncombatants is estimated to be between 100,000 and 300,000 (Iliffe, 1979; Koponen, 1995).

The causes of the rebellion have been the subject of lively academic debate. The first explanation highlights the oppressive and extractive character of German colonial rule as well as the hardships and grievances among the population (Gwassa, 1973; Iliffe, 2009; Sunseri, 1997). The second explanation stresses the role of a unifying ideology. In 1904, a healer from the Matumbi Mountains was said to have been possessed by one of the major spirits in the region (Larson, 2010). He distributed medicine that would prevent any harm from German bullets that would turn into water when touching combattants skin ("maji," meaning water in Kiswahili), thereby facilitating large-scale resistance (Gwassa, 1973; Iliffe, 1979). The third explanation argues that what mattered more were local conflicts among the various ethnic groups, which rebelled against the Germans to realize their political and material interests (Becker, 2004; Greenstein, 2010; Sunseri, 1997). In the remainder of this article, I aim to provide the first quantitative analysis of the background of the rebellion, focusing on the role of extraction.

Hypotheses on Extraction and Violence in German East Africa

To differentiate between strategies of extraction, I follow Dube and Vargas (2013) and de la Sierra (2014) in using the specificities of natural resources to investigate the effects of their extraction. Overall, German extraction centered heavily on cotton and rubber (Bald, 1970; Gwassa, 1973; Koponen, 1995). The extraction of these goods constituted the backbone of the colonial economy. Prior to the rebellion, the German metropolis' demand for both products increased substantially, inciting an actual "resource boom" for both products in the colonies. German rubber imports tripled from 1885 to 1905, whereas cotton imports—already substantially higher—increased by another 30% (Koponen, 1995). Consequently, the colonial government greatly amplified the extraction of both products.

The extraction strategies for each product, however, differed significantly. The state fostered cotton production by forcefully increasing agricultural outputs in cotton-growing state and settler strongholds along the coast. Rubber extraction, however, was promoted by expanding German production and regulation from the coast into the vast rubber-growing and trading hinterland of the southern districts.[2] Consequently, analyzing these goods from a comparative perspective allows for insights into how these differences across strategies affected the connection between extraction and violence. The following paragraphs provide additional information on the specificities of extraction of both products.

Intensification of Extraction—Cotton Production

The state's attempts at increasing cotton production followed the logic of intensification. Most notably, the extractive drive focused on areas of the colony that had already been under firm extractive control of the state (Bückendorf, 1997; Bührer, 2011; Pesek, 2005). This was made possible because cotton—contrary to rubber (see below)—was cultivated on plantations. Although it required certain climatic conditions, the state administration and private settlers were rather flexible in terms of selecting the geographical location of major production sites. In line with cost–benefit arguments suggested above, it was a rational decision to concentrate plantation schemes in areas of strong state presence and established extractive institutions. More than half of all cotton plantations were concentrated in only six coastal districts. These were the areas where the first German stations had been established and where the state had already forcefully ended any non-state extractive activities when it crushed the so-called "Arab Revolt" in 1888/1889.[3] When the rebellion ended, influential non-state elites had either been executed or co-opted as state-sponsored intermediaries, the so-called "Akida" or "Jumbe." Thus, when the state started to enforce cotton production prior to the Maji Maji rebellion, its activities constituted an intensification of a public extractive system established more than 10 years earlier.

There is no doubt that for the population, the intensification of cotton extraction brought tremendous human and economic burden. Increasing forced labor did not just mean the loss of personal freedom; people had to abandon their own agricultural activities, something that led to massive socioeconomic hardship for entire villages (Gwassa, 1973). On plantations, workers were often at the mercy of brutal German plantation owners. Most importantly, from 1902 on, the colonial government introduced numerous communal cotton schemes across southern coastal districts. These schemes were implemented under the auspices of local intermediaries who were often particularly brutal in their extractive activities (Bald, 1970; Klein-Arendt, 2005; Tetzlaff, 1970). There is ample qualitative evidence that the intensification of cotton production actually created widespread grievances against the colonial state (Gwassa, 1973; Iliffe, 1967, 2009).

For local elites, however, the consequences of intensification in coastal districts were much more ambiguous. As mentioned above, many of them were already part of the state system. The most influential "Akida" even received a German state salary as precolonial governance had been replaced by German rule and administration (Gunzert, 1929; Koponen, 1995). For local elites, communal plantation schemes provided new economic opportunities: They were charged with administering the plantations and were

allowed to keep a certain share of cotton incomes (Bursian, 1910; Gwassa, 1973). Consequently, the intensification of extraction did not constitute a threat to their political position or economic revenues. Firm state control over the extraction process prevented competition between the state and influential non-state actors. In fact, local elites relied on the German administration to uphold their privileged and lucrative position in the cotton economy, and they profited from its intensification (Bursian 1910; Gwassa, 1973; Klein-Arendt, 2005).

To summarize, the intensification of cotton production generated particularly strong socioeconomic grievances but was more ambiguous in terms of its effects on non-state elites. In line with the general theoretical arguments presented above, I therefore expect that intensified extraction in cotton-producing areas was not a primary driver of violence, leading me to my first concrete hypothesis:

> **Hypothesis 1:** The location of cotton-production sites did not determine the location of violent events during the Maji Maji rebellion.

Expansion of Extraction—Rubber Production

The state's attempts at increasing rubber production followed the logic of expansion. It targeted the main rubber-growing areas in the hinterlands of the Kilwa and Lindi districts. Contrary to cotton cultivation, the colonial administration was not flexible in selecting production sites for rubber. When the "rubber boom" started, Germans were only in the process of experimenting with rubber cultivation; until 1910, nearly all of the rubber produced in the colony originated from wild vines in the major rubber forests of the southern districts (Bald, 1970; Koponen, 1995). Thus, in trying to foster rubber extraction, the state had no choice but to expand its activities into these areas with previously only marginal state presence and extraction. Whereas nine of the 10 coastal stations had been established before 1890, the first German outpost in the main rubber-growing region, Donde, was established in 1901 with the beginning of the state's extractive intervention into the area. Thus, when the state started to forcefully increase rubber exports around the turn of the century, it was introducing new economic demands into these areas rather than intensifying ongoing extractive activities.

There is no doubt that the increased presence and activity of the state and the introduction of new economic claims brought about socioeconomic change and burden. The expansion process, however, had a less pronounced economic effect on the population than the intensification of cotton production. Many people working in the local rubber economy were already

integrated into a non-state extractive system. Local strongmen profiting from the rubber boom coerced local rubber collectors by means of financial advances on future rubber collection (Becker, 2004; Larson, 2010; Sunseri, 2009). The German extractive activities focused on taking over of the preexisting system. Compared with cotton production, forced labor played a negligible role in the German strategy (Bald, 1970; Koponen, 1995). Increasing German control of local rubber markets actually generated some modest improvements for many people. Regulations reduced big traders' leverage, and price controls created some transparency for rubber collectors and petty traders (Becker, 2004; Krajewski, 2005; Larson, 2010).

The situation was different for local elites. Many had become rich through the rubber trade, tributes from caravan traders, the employment of rubber collectors, or their own rubber plantations (Bald, 1970; Monson, 1993; Wright, 1985). The state's extraction drive was intended to transfer these non-state economic gains to the colonial regime. The extractive activities comprised the enactment and enforcement of state-sponsored economic regulations and price controls, the introduction of mandatory public market halls, and increased taxation. The number of foreign rubber traders increased drastically from approximately 200 in 1902 to up to 700 in 1905 (Wright, 1985), and tax agents followed closely (Larson, 2010; Wright, 1995). These activities constituted an outright attack on local economic networks and eroded "the ability of chiefs to accumulate wealth and attract followers" (Becker, 2004; Larson, 2010; Sunseri, 2009). Most notably, these big men were influential enough to potentially mobilize hundreds or thousands of people (Becker, 2004; Krajewski, 2005; Larson, 2010; Wright, 1995).

In sum, the expansion of extraction into rubber production may certainly have created socioeconomic change and grievances among the population, but what was much more pronounced in terms of its negative impacts on local elites and the resulting conflicts of interest with the state administration. As argued above, I believe that elite alienation in rubber-producing areas was a major driving force of the rebellion, leading me to my second concrete hypothesis:

> **Hypothesis 2:** The location of rubber-production sites determined the location of violent events during the Maji Maji rebellion.

The Role of Taxation in Intensification and Expansion

In addition to the two main agricultural objects of exploitation, I also consider a specific *instrument* of extraction. As described above, taxation was one tool of state extraction, alongside other measures undertaken either to

foster agricultural production or to access the profits of local economic-exchange relations. I pay particular attention to taxation rather than to other instruments, because it was perceived by the German administration as particularly powerful and effective (Bursian, 1910) and because it is easier to empirically investigate taxation than to analyze more indirect forms of extraction.

The German administration introduced a hut tax in 1898, according to which every household had to regularly pay a certain amount to the colonial administration (Bursian, 1910). As mentioned above, the tax was explicitly not intended as an instrument for revenue generation. Rather, its primary purpose was to increase the local labor supply for agricultural production. This specific purpose of the tax also led to a specific pattern of implementation: The tax was focused on regions with a high concentration of prioritized agricultural goods. Consequently, taxation accompanied both the intensification and the expansion of extraction in cotton- and rubber-producing areas, respectively (Bursian, 1910); tax incomes were highest in rubber- and cotton-producing districts (Becker, 2004; Koponen, 1995; Larson, 2010).

As taxation was used as an instrument of extraction in both cotton- and rubber-producing areas, investigating the main effects of taxation on violence would not add much information about the varying effects of expansion and intensification. If I identified the expected association between taxation and violence, we still would not know whether this effect was driven by factors associated with expansion or by factors associated with intensification. Analyzing the conditional effects of taxation, is more promising. Assuming that taxation is a valid proxy for the levels of extraction (i.e., it correlates with other instruments such as regulations and price controls), the geographical variation in taxation within individual agricultural sectors (cotton and rubber) should indicate how much the state pushed extraction across various cotton- and rubber-producing areas.

In line with the hypothesis presented above, I expect that high levels of taxation represented a threat to non-state elites in rubber-producing areas and should therefore be associated with a higher risk of violence in rubber-growing areas than in other parts of the colony. In cotton-producing areas, however, taxes primarily represented a burden for the population, while creating some economic opportunity for local intermediaries. Consequently, I do not expect taxation to be more conducive to violence in cotton-producing areas than in other regions. This leads me to my third and final hypothesis:

> **Hypothesis 3:** The association between the level of taxation and violence has been particularly strong in rubber-producing areas whereas there was no similar interactive effect in cotton-producing areas.

Empirical Strategy, Data, and Results

The research design combines two levels of analysis. Given the high spatial concentration of the rebellion in the southern regions, I first compare the 22 districts of the colony to see whether rebellious districts differed from the others in any systematic way. Next, I investigate extraction and violence on a more disaggregated level. The following subsections introduce the data and present the results of the district-level comparisons and the quantitative analysis.

Colonial Data

All the analyses presented below are based on a newly compiled historical data set. It draws on three main sources, which are briefly outlined below (more detailed information on individual historical data as well as on how they have been processed is presented in the online appendix).

The first is the yearly reports of the German Imperial Colonial Office, which include substantive statistical annexes on the colonies. These reports are a rich source of information and include detailed numbers regarding state personnel or the activities of missionary societies. Most notably, I draw on the 1904/1905 yearly report for information on tax incomes per districts/German stations prior to the beginning of the rebellion (1904).

The second source is a number of thematic maps produced by the colonial government as well as various private colonial and missionary societies. These maps display the locations of military and missionary stations, the borders of the colony's districts, and the locations of various plantations and of roads and caravan routes. The "Economic Atlas of the German Colonies" (Wirtschaftsatlas der Deutschen Kolonien) was particularly useful for the measurement of the main explanatory variables. The atlas was prepared by an influential German nongovernmental organization that aimed to support the economic development of German colonies (Kolonialwirtschaftliches Kommittee). The atlas includes comprehensive economic maps, with detailed geographical information on the exact location of the major production sites of all economically relevant natural resources and agricultural products in German East Africa. Most notably, I use information on the major rubber- and cotton-production sites provided in the economic map published in 1906.

Finally, the third source, which was used to obtain information on the location of violence, is the weekly issues of the *German East African Newspaper* (*Deutsch-Ostafrikanische Zeitung, DOAZ*) for the period under investigation. The *DOAZ* was edited in Dar es Salam. From 1905 on, it featured a special section called "News from the areas of disturbances," which

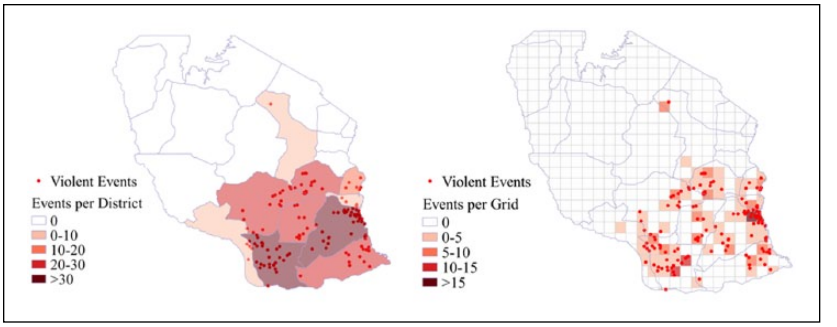

Figure 1. Violent events, 1905-1906, per district and per grid cell.

contained information on clashes in the rebellious districts. To obtain a precise idea of the geographical distribution of violence during the rebellion, I have created a newspaper-based geolocated event data set and have geolocated a total of 231 events. Figure 1 displays the distribution of violent events per district and per grid cell (see empirical analysis below).

Taken together, these data provide unique insights into the German colonial state and the Maji Maji uprising. The fact, however, that these data stem from a highly autocratic regime and are more than 100 years old may raise doubts regarding their accuracy. For example, the *DOAZ* may have underreported violence so as to play down the extent of the rebellion. Officials may have had incentives to under- or over-report on some issues. Although I cannot rule out the possibility that some of the data are inaccurate, there are nevertheless good reasons to assume that they allow for meaningful analysis.

First, the *DOAZ* was in fact very critical of the colonial government. It was shut down twice—once because it printed a report on Governor von Rechenberg's alleged intimate relations with one of his servants (Schmidt, 2008). It certainly underreported interethnic clashes. This, however, does not jeopardize my analysis: I intentionally focus on violence against the state and not on factional fighting.

Second, most of the information used in this article was either militarily important to the German government, thus creating incentives for accurate reporting (for example, road networks), or difficult to manipulate (for instance, the tax income had to be transferred into the German budget). In other cases, it is hard to think of reasons that colonial staff would have manipulated the data—for example, on the location of rubber forests or cotton plantations.

Finally, colonial agents were eagerly trying to provide as detailed and as accurate maps of the colony as possible (Hafeneder, 2008). Comparisons of

historical georeferenced maps with current national boundaries demonstrate that these attempts were quite successful. To account for any remaining geographical inaccuracies, the data set uses a comparably crude scale, with 50 km × 50 km grid cells as the smallest units of analysis.

District-Level Comparisons

I begin with simple district-level visual inspections and statistical tests. These analyses are not meant to provide any causal claims. Their objective is to investigate whether the strong north–south divide of the rebellion coincides with patterns of extraction and variations in extractive goods and strategies. Such district-level associations provide for an initial assessment of the plausibility of the hypotheses and are a helpful frame of reference for interpreting the more systematic quantitative analysis presented below.

Figure 2 illustrates the geographical distribution of some features of the colonial state. In each figure, the different shades represent quartiles that divide the districts into four equal groups according to the values of the respective indicators. The darker shades represent higher values. Each map is assigned the coefficient of the respective indicator's correlation with the number of violent events as well as the measure of statistical significance for this association (Spearman rank correlation coefficients).

I use three different proxies from the sources described above—namely, (a) the total value of taxes collected per district in the year prior to the uprising, (b) the number of rubber sites per district size, and (c) the number of cotton plantations per district size.[4] A look at the spatial distribution of the first two variables indicates that tax incomes were particularly high and rubber forests particularly frequent in the southern districts where violence erupted in 1905. The number of cotton plantations, however, is only weakly correlated with violence. If we look at similar plots for a number of other characteristics of the colonial state—such as the number of missionaries, the number of security personnel, the accessibility in terms of road length, or the overall number of Germans (all per district size)—we see that none displays a comparable correlation with the spatial variation of violence during the uprising.

One has to be cautious in drawing conclusions from these rather crude district-level comparisons. Nonetheless, this initial exploratory analysis of district-level data seems to lend some support to the proposition that economic narratives were behind the uprising, as mentioned above. Most importantly, the variation between the findings for cotton and for rubber lends support to the argument that the specificities of rubber extraction made it a more conflictual process than cotton extraction.

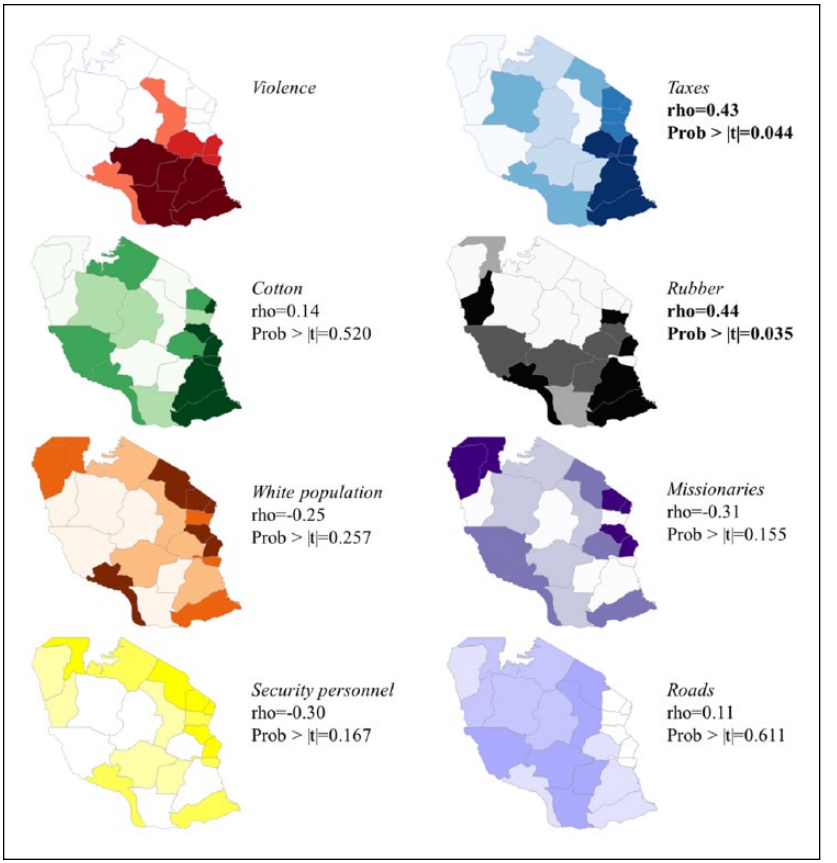

Figure 2. District-level comparisons.

Cross-Sectional Analysis

Districts were the only meaningful and formalized administrative units of the German colonial state. As they were not subdivided into more numerous second-tier units that would allow for statistical analyses on a more disaggregated level, I have created an artificial grid comprising 450 50 km × 50 km cells covering the colony's territory. The size of the cells mirrors the objective of providing a sufficient number of cases for meaningful statistical analysis while taking into account the potential imprecisions resulting from colonial maps. The horizontal and vertical outer boundaries of the grid-net have been defined randomly.

For the main models, I have created a binary "occurrence of violence" variable that has the value "1" if at least one violent event took place within a cell's boundaries during the Maji Maji rebellion of 1905-1907.[5] The indicators for levels of extraction correspond to the district-level comparisons: I use the number of cotton plantations and rubber forests per grid cell. Colonial statistical reports provide information on the absolute value of taxes collected by each of the German stations. Tax collection was mainly confined to areas easy to reach from German stations (Pesek, 2005). Consequently, the levels of taxation varied substantially according to distance from stations, rather than population size. To proxy for tax burden per grid cell, I use the tax revenue of the nearest German station responsible for the respective area according to the administrative setup of the territory (meaning that the cells' centroids and the German station have to be within the same district), weighted by the geographical distance from the grid cell's centroid to the station.[6] I have log-transformed the quotient to account for excessive variation in distances and increase normality of the left-skewed variable.

I also consider a number of control variables in the statistical analysis. The first one is the number of Germans per cell. In addition, I consider the approximate locations of previous phases of violence (I use a dummy variable that has the value "1" for all grid cells that had previously seen violent clashes with the colonial state according to Nigmann, 1911). Roads may have eased the deployment of troops and increased military action in areas connected to road networks (Herbst, 2000). The respective control variable is the length of all roads within the grid cells. Missions ran stations and schools across the colony. For each grid cell, I consider the number of baptisms in the nearest missionary station, weighted by the distance to the station (log-transformed). It may be possible that the likelihood of violence is affected by the duration of continuous state presence in a specific region. I use information on the date of the establishment of every German station that existed in 1905 to calculate the number of years it had been present when the rebellion began. Finally, I consider the number of security personnel per nearest station, weighted by the distance and log-transformed.[7]

Table 1 presents the results of simple logistic regressions with standard errors clustered by district to account for serial correlation and heteroscedasticity.[8] The results indicate a highly significant positive correlation between tax extraction and the likelihood of violence. There is only a weak correlation between cotton extraction and violence. This association wanes in the full model, which considers all three variables of extraction. Models 3 and 4 indicate a significant correlation between rubber extraction and violence.

Table 2 displays the results of conditional fixed-effects logistic regression, controlling for differences across the colony's 22 districts.[9] The findings

Table 1. Logit Models (Without Fixed Effects)—Extraction and Violence.

	(1)	(2)	(3)	(4)
German pop	−0.025*	−0.015	−0.004	−0.021*
	(0.014)	(0.012)	(0.008)	(0.013)
Station/years	−0.055	−0.033	−0.028	−0.065
	(0.068)	(0.063)	(0.064)	(0.065)
Prev violence	−0.223	0.059	0.169	−0.226
	(0.539)	(0.531)	(0.524)	(0.541)
Road length	1.044***	1.687***	1.880***	1.025***
	(0.400)	(0.347)	(0.356)	(0.383)
Military/dist (ln)	−0.241	−0.252	−0.186	−0.208
	(0.248)	(0.380)	(0.379)	(0.265)
Mission/dist (ln)	−0.310	−0.328	−0.415	−0.396*
	(0.234)	(0.226)	(0.279)	(0.206)
Taxation/dist (ln)	0.910***			0.867***
	(0.187)			(0.195)
Cotton		0.406*		0.127
		(0.215)		(0.185)
Rubber			0.844***	0.831***
			(0.211)	(0.160)
Constant	−9.734***	−0.650	−1.213	−9.558***
	(1.964)	(1.289)	(1.313)	(1.804)
Observations	437	437	437	437
AIC	292.268	342.294	327.057	278.765
BIC	324.908	374.933	359.696	319.564
Log likelihood	−138.134	−163.147	−155.528	−129.382

Note. Standard errors in parentheses. AIC = Akaike information criterion; BIC = Bayesian information criterion.
*$p < .10$. **$p < .05$. ***$p < .01$.

mirror those outlined above. The indicators for taxation and rubber extraction are significantly correlated with the outcome variable, whereas there is no indication of a significant role of cotton extraction in this more conservative model specification.

Due to the nonlinear nature of the model specifications, we cannot judge the substantive significance of the associations. I therefore estimate the predicted probabilities of violence occurrence as a function of extraction. Holding all other variables at their respective means and moving from the minimum to the maximum level of tax extraction increase the likelihood of violence from

Table 2. Logit Models (With Fixed Effects)—Extraction and Violence.

	(1)	(2)	(3)	(4)
German pop	−0.007	−0.005	−0.004	−0.005
	(0.008)	(0.007)	(0.007)	(0.007)
Station/years	0.167**	0.151**	0.153**	0.166**
	(0.079)	(0.074)	(0.073)	(0.084)
Prev violence	0.087	0.117	0.142	0.029
	(0.450)	(0.450)	(0.459)	(0.469)
Road length	0.839	0.921	0.950	0.819
	(0.689)	(0.678)	(0.687)	(0.715)
Military/dist (ln)	−0.206	0.200	0.219	−0.282
	(0.386)	(0.259)	(0.264)	(0.421)
Mission/dist (ln)	−0.201	−0.253	−0.195	−0.330
	(0.338)	(0.344)	(0.340)	(0.353)
Taxation/dist	0.787*			0.821*
(ln)	(0.426)			(0.460)
Cotton		0.414		0.283
		(0.273)		(0.266)
Rubber			0.593**	0.586**
			(0.233)	(0.236)
Observations	183	183	183	183
AIC	165.157	166.120	161.977	160.568
BIC	187.623	188.586	184.443	189.454
Log likelihood	−75.579	−76.060	−73.988	−71.284

Note. Standard errors in parentheses. AIC = Akaike information criterion; BIC = Bayesian information criterion.
*$p < .10$. **$p < .05$. ***$p < .01$.

0% to more than 70%. The simulated effect of rubber extraction is comparable, with a difference of approximately 55% in the likelihood of violence between the minimum and the maximum level of rubber extraction.

Next, I turn to my third hypothesis on the conditional effects of taxation. In line with the general arguments presented above, we should expect a positive interaction effect for taxation and rubber, whereas we should not find any similar effects for cotton. Results are weaker for the interaction than for the main effects[10] but mirror the expected associations: Higher levels of taxation are more harmful in areas with particularly lucrative rubber reserves—apparently, the state's extractive drive into these regions represented a particularly substantial threat to non-state elites' economic interests.

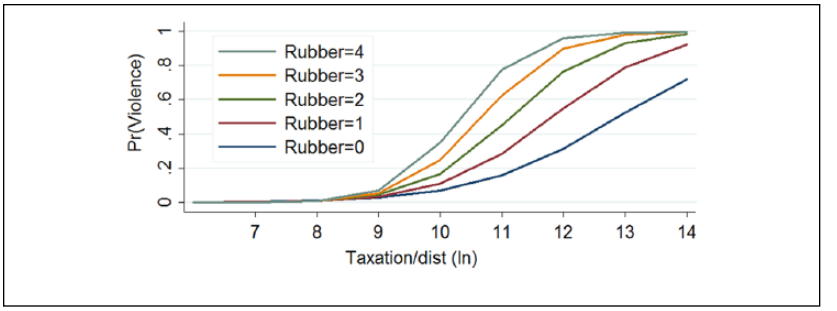

Figure 3. Predictive margins—Interaction of rubber and taxation.

Figure 3 illustrates the interaction effect. In general terms, the figure reflects the strong individual effect of taxation on the risk of violence. More importantly, it shows that similar levels of taxation were substantially more conducive to violence in areas of high rubber reserves as compared with other regions of the colony. Or interpreted the other way around, similar levels of taxation created more substantial risks of violence in rubber-producing areas.

These results lend support to the article's main hypotheses. Even more so as they clearly mirror the findings from the district comparisons—not only in terms of the general correlation between the indicators for extraction and violence but also with respect to the divergent findings for rubber on the one hand and cotton extraction on the other.

Robustness Checks

This section briefly summarizes the main findings of additional analyses intended to further scrutinize the main correlations presented above, focusing on the role of ethnicity, an instrumental variables approach, and auxiliary estimations that aim to narrow down the mechanisms linking the expansion of extraction to violence.

The Role of Ethnic Groups

The district-level fixed effects included in the main models implicitly control for district-level variations in ethnic composition. Considering, however, that previous qualitative analyses have emphasized that participation in the rebellion varied across ethnic groups, I estimate additional models with explicit ethnic controls.

I rely on information on precolonial ethnic organization from Murdock (1967), Gennaioli and Rainer (2007), and Nunn (2008). Murdock provides detailed information on various precolonial characteristics of African ethnic groups, georeferenced by Nunn (2008). I have estimated the main models with ethnic-group fixed effects. This does not substantially affect the main associations found between cotton, rubber, and violence. Taxation, however, seems to be sensitive to ethnic controls. The interaction of taxation with rubber has the right sign but is not statistically significant; the interaction with cotton turns weakly statistically significant but is negative (see Tables 13 and 14 in the online appendix).

This variation of results may be a consequence of the massively reduced sample size. Two thirds of the observations are dropped when ethnic-group dummy variables are included in the models (reducing the number of observations in the district-level fixed-effects models by another 25%). If I consider individual ethnic characteristics deemed particularly relevant in terms of capacity for mobilization (the degree of ethnic centralization and settlement patterns) rather than actual ethnic-group fixed effects, the findings mirror the results of the main models presented above (see Tables 15 and 16 of the online appendix).[11] These results increase my confidence that the associations presented above have not been driven by differences across ethnic groups.

Instrumental Variable Approach

It is unlikely that violence during the Maji Maji rebellion influenced levels of rubber extraction before the rebellion. Nonetheless, potential endogeneity issues cannot be ruled out in the multivariate regressions presented above. Moreover, although the main models control for a number of theoretically relevant factors, the results may still be biased due to other unobserved variables. As a second robustness check, I have estimated two-stage least squares (2SLS) models that exploit exogenous variation, induced by an instrumental variable (for example, Imbens and Angrist, 1994).

The geographical distribution of wild rubber vines is driven by exogenous climatic and soil conditions. *Landolphia kirkii*, the rubber species most prevalent in the former German East Africa, grows best in hot and humid areas with low elevation and sandy soils (Ehrhardt, 1903; Schnee, 1920; Sethuraj & Mathew, 1992). I have created a simple additive index using data on elevation from the Shuttle Radar Topography Mission (SRTM; elevation below 500 m), information on climatic conditions from a study on rainfall and temperature in German East Africa (Marner, 1940; "very hot and humid" regions), and data on soil properties from the European Soil Portal for Africa

(minimum 50% sand in soil). Given these arbitrary thresholds as well as the additive character and composition of the index, it is unlikely that the index affects the risk of violence through causal channels other than the presence of rubber vines. Most notably, neither individual components nor the index itself is correlated with German settlement patterns. The first-stage regression presented in the online appendix shows that the instrument is a statistically significant predictor of the presence of rubber. Second-stage estimations confirm the previous findings on the positive association between rubber extraction and violence (see Tables 17 and 18 in the online appendix).[12]

The Role of Change and the Role of Elites in the Expansion of Extraction

As argued above, the expansion of extraction differs from its intensification in two main respects. First, expansion is associated with entirely novel demands and socioeconomic change. Second, it is likely to exert more substantial negative effects on local non-state elites. Observable differences between the effects of rubber and cotton extraction may therefore be a consequence of either of these two specificities. The following paragraphs aim to provide some empirical evidence in support of my theoretical claim that threats to the non-state elites were decisive.

Political and economic power in rubber-producing regions was dependent on having control over the main trading routes (Becker, 2004). Consequently, "big men" resided close to the traditional caravan routes (Larson, 2010). If the argument about the effects of expanded rubber extraction on local elites holds, we would expect violence to be particularly likely in rubber-growing areas along these routes. If, however, expansion was related to rebellion due to the novelty of the state's economic demands, there would be no reason to expect such an association. I have identified the route locations with a map published in 1892 and interacted the distance to the nearest trading route with the number of rubber forests per grid cell. As expected, the interaction term is negative and statistically significant in models with and without fixed effects (see Table 19 in the online appendix). Thus, among regions subject to the expansion of extraction, those areas that were likely controlled by influential non-state elites saw the strongest association between rubber production and violent resistance.

Next, I look at the internal organization of the rebellion. If the expansion of rubber extraction led to violence because it threatened southern strongmen, events requiring particular organizational resources should also have been more frequent in rubber-producing areas. If, however, expansion was

associated with violence because of the specific grievances that novel economic demands created among the population at large, we would not necessarily expect a higher degree of centralized organization in rubber-growing regions. I extract information from the violent-event data set about events that reportedly involved more than 1,000 rebel fighters or that constituted an organized attack on German missionary or military stations. The latter displayed patterns of military strategy that required centralized and strategic planning (Bührer, 2011; Gwassa, 1973). I have reestimated the main models with this alternative outcome variable and have found that the occurrence of large-scale events was more likely in rubber-growing areas. In the full model with fixed effects, only rubber is associated with the occurrence of these events at conventional levels of statistical significance (see Table 20 in the online appendix).

These two auxiliary analyses are certainly not "hard tests" that would allow for strong confirmation of a causal relationship between threats to the vested interests of local elites and the occurrence of violence. They are, however, much more in line with this specific causal mechanism than the counterargument that the expansion of extraction increased the risk of violence because of the specific grievances it created among the population at large.

Conclusion

This article has presented an initial quantitative analysis of the connection between extraction and violent anticolonial resistance. Overall, the findings lend support to the argument that distinct strategies of extraction produce distinct outcomes in terms of violent antistate rebellion in the early phases of state building.

German attempts to increase cotton production and trade were mainly based on an intensification strategy with strong negative effects on the population (Bald, 1970; Koponen, 1995; Sunseri, 1997). However, as has been noted elsewhere, brutal extraction was a feature of the colonial state across most areas of the colony, not just in the cotton-growing districts (Becker, 2004; Tambila, 1981). The expansion of extraction into rubber-growing areas, however, threatened the vested interests of influential local elites and created resentment among local "big men" able to draw thousands of people into violent conflict (Becker, 2004; Krajewski, 2005; Larson, 2010; Wright, 1995). The qualitative evidence underscores the fact that such elites actually played a crucial role in mobilizing fighters, coordinating rebel troops, and planning large-scale attacks (Gwassa, 1973).

Certainly, the study is limited in that it focuses on one specific instance of antistate violence only. Replications in other contexts are needed to

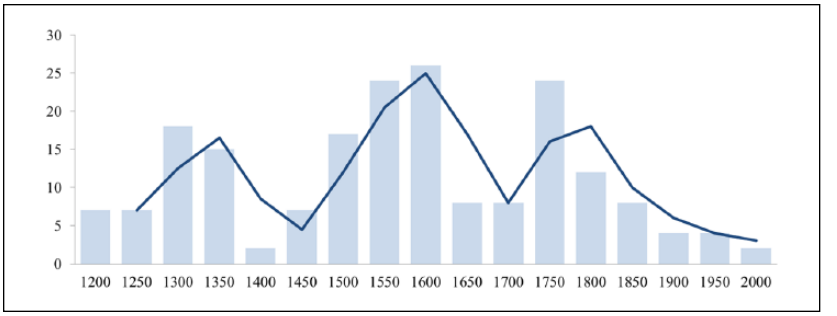

Figure 4. Number of major tax rebellions in Europe according to Burg (2004).

corroborate the results. Nonetheless, the findings from this single case study may have important theoretical implications for two research strands.

First, they inform our understanding of long-term state-building processes. As the state consolidates territorial control, opportunities for the further expansion of extractive authority decrease while the process of extractive monopolization provides additional prospects for the intensification of extraction. If the former is substantially more likely to lead to violence than the latter, the dynamics of the "extraction–coercion cycle" may change over time. Most notably, we would expect increasingly strong associations between extraction and violence, up to a tipping point. From here on, the intensification of extraction promises greater economic gains than the expansion of extraction, which means weaker associations between extraction and violence. From this point on, the "extraction–coercion cycle" should slow down, reducing the violence-producing and state-building effects of further extraction.

I do not possess the data needed to investigate such potential long-term implications. Moreover, the extraction–coercion cycle is certainly strongly affected by simultaneous economic, social, and political developments. It is nonetheless interesting to look at longer term changes in the absolute numbers of a specific type of extraction-related conflict. Burg lists hundreds of instances of protest and rebellion related to taxation (Burg, 2004). The list is certainly not exhaustive. Moreover, we do not know whether temporal trends signify specific developments in tax-related violence or mirror more general conflict trends. Still, Figure 4 indicates that it may be worthwhile to investigate these arguments further. We see that the development of absolute numbers of tax rebellions in Europe corresponds to what one would expect from cyclical developments, with phases of significant tax-related violence followed by phases of limited violence. Moreover,

as suggested above, these developments seem to flatten following a peak in the first half of the 16th century. Further analysis of single cases as well as long-term qualitative and quantitative analysis may provide additional evidence that confirms or challenges the hypotheses presented in this article.

Second, insights from colonial times may contribute to the development of hypotheses on the effects of natural resource extraction under contemporary conditions of weak statehood. Numerous previous studies have emphasized that state institutions play a crucial role when it comes to associations between natural resource extraction and intrastate violence. They show that the capacity, the quality, and the democratic nature of institutions matter (e.g., Basedau & Richter, 2014; Snyder, 2006; Snyder & Bhavnani, 2005). The findings presented in this article underscore the possibility that another factor may also be relevant: trends of state expansion into resource-extraction areas and the associated effects on the economic and political interests of local elites (Mahmud et al., 2012; Snyder, 2006). From such a perspective, abundance and high levels of extraction per se may not increase the risk of violence if the respective regions are not targeted by the state for the expansion of extraction or if they have already been brought under effective state control. Empirical studies may, for example, investigate whether increased state penetration into resource-rich remote areas has contributed to violence in places such as Indonesia or the Democratic Republic of Congo, where long distances from political centers to resource-rich areas were favorable to the creation of non-state extractive systems that were later targeted by states' expansion of extraction.

Acknowledgments

I am grateful to Jan Pierskalla, Max Montgomery, and Matthias Basedau for comments on a previous version of the article. I thank John Martin Preuss, Lennart Garbes, and Elena Holtkotte for their excellent research assistance.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This article has been prepared in the framework of the research project "The Territorial Dynamics of Colonial State-Building" funded by the Gerda Henkel Foundation.

Notes

1. The alternation between intensification and expansion is certainly driven not only by time and decreasing returns. Changing market prices for resources or the identification of new resources may motivate strategic reorientations. Both strategies may also be followed simultaneously: States can increase extraction in one area and at the same time expand extraction into others.
2. Certainly, cotton extraction was not only intensified but also expanded into new areas to some degree. Similarly, some rubber-growing areas had already been under effective state control prior to the rebellion. Nonetheless, historical evidence suggests substantial qualitative differences in terms of the main extractive strategies for each product and the associated impacts on the population and local elites as outlined above.
3. This early uprising has been traced back to local elites' resistance to the introduction of tariffs, a myriad of new taxes and measures to bring land and traditional caravan routes under the state's control (Bückendorf, 1997; Bührer, 2011). In the light of the theoretical arguments suggested in this article, the revolt may therefore be interpreted as a violent reaction against initial processes of expansion in the earliest phase of colonialization.
4. Normalizing variables per population size rather than per geographical size of districts would be conceptually more convincing. The bivariate correlations between cotton, rubber, and taxes normalized by estimated population size in 1904 correspond to the correlations presented above. The results are not presented here, as I doubt the reliability of the population numbers provided in German statistical reports: Numbers vary substantially across years, indicating that administrators repeatedly corrected their estimates (results available on request).
5. I have also made use of an alternative measurement for violence. Nigmann (1911) provides information on the location of major clashes involving German troops. I have geolocated these events for the period of the Maji Maji rebellion, creating a measure of violence that is independent from the newspaper reports. The results of estimations with this alternative measure correspond to the main results presented below (see Tables 4 and 5 in the online appendix).
6. I have georeferenced maps from the so-called *Military Orientation Book for German East Africa*, prepared by the German military in 1911. It contains detailed maps that display thousands of individual road sections, including information on travel time. I have measured the length of 100 straight lines with a minimum distance of 25 kilometers and compared distances with travel times as indicated on the maps. The correlation is .95, which indicates that the distances correspond to travel time for the scaling used in this study.
7. The main models include controls that have been emphasized in previous qualitative analyses of the Maji Maji rebellion. I have also estimated models with additional controls emphasized in more general research on violent conflicts: population density, precipitation, and the location of caravan route junctures (as proxies for economic development in terms of agriculture and trade). Tables 6 and 7 of the online appendix present the results of these models.

8. Alternatively, I have estimated a rare events logit model, an ordinary least squares (OLS) model on the log-transformed count variable with and without fixed effects, and a negative binomial regression on the count variable—again, with and without fixed effects. The findings correspond to those of the main models (see Tables 8, 9, and 10 in the online appendix).
9. To account for potential spatial clustering below the district level, I have estimated additional models that control for a spatial lag of the outcome variable. All the findings correspond to those of the main models (see Tables 11 and 12 in the online appendix).
10. Correlations are statistically significant only in models without fixed effects, and they are more sensitive to changes of model specifications (detailed results in Table 3 of the online appendix; robustness checks in Tables 5, 7, 9, 10, 12, 14, and 16).
11. I use an index of political centralization, measured as the number of jurisdictional hierarchies beyond the local level, originally constructed by Gennaioli and Rainer (2007).
12. The Kleibergen–Paap Wald *F* statistics are above the critical values of relative bias suggested by Stock and Yogo (2005). As I have used only one instrument, it has been impossible to test for exogeneity using Hansen J statistics. I have therefore also run an additional 2SLS model, including a dummy for the presence of rivers, as wild vines supposedly grow near running water (National Research Council, 2008). Hansen J statistics indicate that we cannot reject the null hypothesis of exogenous instruments. The second-stage model confirms the correlations found in previous models.

References

Ames, E., & Rapp, R. T. (1977). The birth and death of taxes: A hypothesis. *The Journal of Economic History*, *37*, 161-178.

Bald, D. (1970). *Deutsch-Ostafrika 1900-1914* [German East Africa 1900-1914]. Munich, Munich: Weltforum Verlag.

Basedau, M., & Richter, T. (2014). Why do some oil exporters experience civil war but others do not? Investigating the conditional effects of oil. *European Political Science Review*, *6*, 549-574.

Becker, F. (2004). Traders, big men and prophets: Political continuity and crisis in the Maji Maji rebellion in Southeast Tanzania. *Journal of African History*, *45*, 1-22.

Brantley, C. (1981). *The Giriama and colonial resistance in Kenya, 1800-1920*. Berkeley: University of California Press.

Brown, M. E. (1997). The causes of internal conflict: An overview. In M. Brown (Ed.), *Nationalism and ethnic conflict: An international security reader* (pp. 3-25). Cambridge, MA: MIT Press.

Brustein, W., & Levi, M. (1987). The geography of rebellion. *Theory and Society*, *16*, 467-495.

Bückendorf, J. (1997). *"Schwarz-weiss-rot über Ostafrika!": deutsche Kolonialpläne und afrikanische Realität* ["Black-white-red over East Africa!": German colonial plans and African reality]. Münster, Germany: LIT Verlag.

Bührer, T. (2011). *Die Kaiserliche Schutztruppe für Deutsch-Ostafrika: Koloniale Sicherheitspolitik und transkulturelle Kriegführung, 1885 bis 1918* [The imperial colonial army for German East Africa: Colonial security policy and transcultural warfare, 1885 to 1918]. München, Germany: Oldenbourg Verlag.

Burg, D. F. (2004). *World history of tax rebellions: An encyclopedia of tax rebels, revolts, and riots from antiquity to the present*. New York, NY: Routledge.

Bursian, A. (1910). *Die Häuser- und Hüttensteuer in Deutsch-Ostafrika* [The hut tax in German East Africa]. Jena, Germany: G. Fischer.

Callahan, M. P. (2002). State formation in the shadow of the Raj: Violence, warfare and politics in colonial Burma. *Southeast Asian Studies*, *39*, 513-536.

Campbell, J. L. (1993). The state and fiscal sociology. *Annual Review of Sociology*, *19*(1), 163-185.

Centeno, M. A. (1997). Blood and debt: War and taxation in nineteenth-century Latin America. *American Journal of Sociology*, *102*, 1565-1605.

Cohen, Y., Brown, B. R., & Organski, A. F. K. (1981). The paradoxical nature of state making: The violent creation of order. *The American Political Science Review*, *75*, 901-910.

Collier, P., & Hoeffler, A. (2004). Greed and grievance in civil war. *Oxford Economic Papers*, *56*, 563-595.

de la Sierra, R. S. (2014). *On the origin of states: Stationary bandits and taxation in Eastern Congo* (University of Columbia working paper).

Dube, O., & Vargas, J. F. (2013). Commodity price shocks and civil conflict: Evidence from Colombia. *The Review of Economic Studies*, *80*, 1384-1421.

Ehrhardt, K. (1903). *Die geographische Verbreitung der für die Industrie wichtigen Kautschuk- und Guttaperchapflanzen* [The geographical distribution of the rubber and gutta-percha plants important to the industry]. Halle, Germany: Gebauer-Schwetschke.

Finer, S. E. (1975). State- and nation-building in Europe: The role of the military. In C. Tilly (Ed.), *The formation of national states in Western Europe* (pp. 84-163). Princeton, NJ: Princeton University Press.

Gennaioli, N., & Rainer, I. (2007). The modern impact of precolonial centralization in Africa. *Journal of Economic Growth*, *12*, 185-234.

Götzen, G. A. (1909). *Deutsch-Ostafrika im Aufstand 1905/06* [German East Africa during the uprising 1905/06]. Hamburg, Germany: Walter De Gruyter Incorporated.

Greenstein, E. (2010). Making history: Historical narratives of the Maji Maji. *Penn History Review*, *17*(2), Article 4.

Gunzert, T. (1929). Eingeborenenverbände und -verwaltung Deutsch-Ostafrikas. Koloniale Rundschau [Indigenous groups and administration in German East Africa]. *Heft*, *7*, 209-214.

Gurr, T. (1970). *Why men rebel*. Princeton, NJ: Princeton University Press.

Gwassa, G. C. K. (1973). *The outbreak and development of the Maji Maji war 1905-1907* (1st ed.) (W. Apelt, Ed.). Köln, Germany: Rüdiger Köppe.

Hafeneder, R. (2008). *Deutsche Kolonialkartographie 1884-1919* [German colonial cartography 1884-1919] (Dissertation zur Erlangung des akademischen Grades

eines Doktors der Ingenieurwissenschaften). Universität der Bundeswehr, München, Germany.

Herbst, J. (2000). *States and power in Africa: Comparative lessons in authority and control*. Princeton, NJ: Princeton University Press.

Hopcroft, R. L. (1999). Maintaining the balance of power: Taxation and democracy in England and France, 1340-1688. *Sociological Perspectives*, *42*, 69-95.

Humphreys, M. (2005). Natural resources, conflict, and conflict resolution uncovering the mechanisms. *Journal of Conflict Resolution*, *49*, 508-537.

Iliffe, J. (1967). The organization of the Maji Maji rebellion. *The Journal of African History*, *8*, 495-512.

Iliffe, J. (1979). *A modern history of Tanganyika*. Cambridge, UK: Cambridge University Press.

Iliffe, J. (2009). *Tanganyika under German rule, 1905-1912*. Cambridge, UK: Cambridge University Press.

Imbens, G. W., & Angrist, J. D. (1994). Identification and estimation of local average treatment effects. *Econometrica*, *62*, 467-476.

Jaggers, K. (1992). War and the three faces of power war making and state making in Europe and the Americas. *Comparative Political Studies*, *25*, 26-62.

Kilson, M. (1966). *Political change in a West African state: A study of the modernization process in Sierra Leone*. Cambridge, MA: Harvard University Press.

Klein-Arendt, R. (2005). Ein Land wird gewaltsam in Besitz genommen. Die Kolonie Deutsch-Ostafrika [A country is being forcefully taken in possession: The colony German East Africa]. In F. Becker & J. Beez (Eds.), *Der Maji-Maji-Krieg in Deutsch-Ostafrika, 1905-1907* (pp. 28-58). Berlin, Germany: Ch. Links Verlag.

Koponen, J. (1995). *Development for exploitation: German colonial policies in mainland Tanzania, 1884-1914*. Helsinki, Finland: LIT Verlag.

Krajewski, P. (2005). Dampfer und Dhaus. Küstenhandel und Landwirtschaft vor dem Krieg (1890-1905) [Steamers and Dhaus: Coastal trade and agriculture before the war (1890-1905)]. In F. Becker & J. Beez (Eds.), *Der Maji-Maji-Krieg in Deutsch-Ostafrika 1905-1907* (pp. 49-58). Berlin, Germany: Ch. Links Verlag.

Lamborn, A. C. (1983). Power and the politics of extraction. *International Studies Quarterly*, *27*, 125-146.

Larson, L. (2010). The Ngindo: Exploring the center of the Maji Maji rebellion. In J. Giblin & J. Monson (Eds.), *Maji Maji* (pp. 71-114). Leiden, The Netherlands: Brill.

Levi, M. (1981). The predatory theory of rule. *Politics & Society*, *10*, 431-465.

Levi, M. (1989). *Of rule and revenue*. Berkeley: University of California Press.

Lonsdale, J., & Berman, B. (1979). Coping with the contradictions: The development of the colonial state in Kenya, 1895-1914. *The Journal of African History*, *20*, 487-505.

Mahmud, A., De Luca, G., & Vargas, J. F. (2012). *The politics of resource booms*. Bogota, Colombia: Universidad del Rosario.

Mann, M. (1984). The autonomous power of the state: Its origins, mechanisms and results. *European Journal of Sociology/Archives Européennes de Sociologie*, *25*, 185-213.

Marner, J. (1940). *Die klimatischen Bedingungen für die Siedlung von Nordeuropäern in den Tropen* [The climatic conditions for settlement of north Europeans in the tropics]. Hamburg, Germany: Hammerich & Lesser.

Migdal, J. S. (1975). *Peasants, politics, and revolution: Pressures toward political and social change in the third world*. Princeton, NJ: Princeton University Press.

Migdal, J. S. (1988). *Strong societies and weak states: State-society relations and state capabilities in the third world*. Princeton, NJ: Princeton University Press.

Monson, J. (1993). From commerce to colonization: A history of the rubber trade in the Kilombero Valley of Tanzania, 1890-1914. *African Economic History*, *21*, 113-130.

Murdock, G. P. (1967). *Ethnographic atlas: A summary*. Pittsburgh, PA: The University of Pittsburgh Press.

National Research Council. (2008). *Lost crops of Africa: Volume III: Fruits*. Washington, DC: National Academies Press.

Nigmann, E. (1911). *Geschichte der kaiserlichen schutztruppe für Deutsch-Ostafrika* [History of the imperial colonial army for German East Africa]. Berlin, Germany: E.S. Mittler und Sohn.

Nunn, N. (2008). The long-term effects of Africa's slave trades. *Quarterly Journal of Economics*, *123*, 139-176.

Pesek, M. (2005). *Koloniale Herrschaft in Deutsch-Ostafrika: Expeditionen, Militär und Verwaltung seit 1880* [Colonial reign in German East Africa: Expeditions, military and administration since 1880]. Frankfurt aM, Germany: Campus Verlag.

Redding, S. (2000). A blood-stained tax: Poll tax and the Bambatha rebellion in South Africa. *African Studies Review*, *43*(2), 29-54.

Schmidt, H. I. (2008). Colonial intimacy: The Rechenberg scandal and homosexuality in German East Africa. *Journal of the History of Sexuality*, *17*, 25-59.

Schnee, H. (1920). *Deutsches kolonial-lexikon* [German colonial lexicon]. Quelle & Meyer.

Scott, J. C. (1977). *The moral economy of the peasant: Rebellion and subsistence in Southeast Asia*. New Haven, CT: Yale University Press.

Sethuraj, M. R., & Mathew, N. T. (1992). *Natural rubber: Biology, cultivation and technology*. Amsterdam, The Netherlands: Elsevier.

Snyder, R. (2006). Does lootable wealth breed disorder? A political economy of extraction framework. *Comparative Political Studies*, *39*, 943-968.

Snyder, R., & Bhavnani, R. (2005). Diamonds, blood, and taxes a revenue-centered framework for explaining political order. *Journal of Conflict Resolution*, *49*, 563-597.

Stock, J. H., & Yogo, M. (2005). Testing for weak instruments in linear IV regressions. In D. W. K. Andrews, J. H. Stock, & T. J. Rothenberg (Eds.), *Identification and inference for econometric models: Essays in honor of Thomas Rothenberg* (pp. 80-108). Cambridge, UK: Cambridge University Press.

Strayer, J. R., & Taylor, C. H. (1939). *Studies in early French taxation*. Cambridge, MA: Harvard University Press.

Sunseri, T. (1997). Famine and wild pigs: Gender struggles and the outbreak of the Majimaji war in Uzaramo (Tanzania). *Journal of African History*, *38*, 235-259.

Sunseri, T. (2009). *Wielding the ax: State forestry and social conflict in Tanzania, 1820-2000*. Athens, Greece: Ohio University Press.

Tambila, A. (1981). *A history of the Rukwa region (Tanzania) ca. 1870-1940: Aspects of economic and social change from precolonial to colonial times* (Doctoral dissertation). University of Hamburg, Germany.

Tetzlaff, R. (1970). *Koloniale Entwicklung und Ausbeutung* [Colonial development and exploitation]. Berlin, Germany: Duncker u. Humblot.

Thies, C. G. (2006). Public violence and state building in central America. *Comparative Political Studies*, *39*, 1263-1282.

Thies, C. G. (2007). The political economy of state building in Sub-Saharan Africa. *The Journal of Politics*, *69*, 716-731.

Tilly, C. (1990). *Coercion, capital, and European states: AD 990-1990*. Oxford, UK: Basil Blackwell.

von Trotha, T. (1994). *Koloniale Herrschaft: zur soziologischen Theorie der Staatsentstehung am Beispiel des "Schutzgebietes Togo"* [Colonial reign: On the sociological theory of state formation using the example of the "protectorate of Togo"] Tübingen, Germany: Mohr Siebeck.

Wright, M. (1985). East Africa, 1879-1905. In J. D. Fage, R. Oliver, R. A. Oliver, & G. N. Sanderson (Eds.), *The Cambridge history of Africa* (pp. 539-589). Cambridge, UK: Cambridge University Press.

Wright, M. (1995). Maji Maji—Prophecy and historiography. In D. Anderson & D. H. Johnson (Eds.), *Revealing prophets: Prophecy in Eastern African history* (pp. 124-142). London, England: James Currey.

Young, C. (1994). *The African colonial state in comparative perspective*. New Haven, CT: Yale University Press.

Author Biography

Alexander De Juan is a visiting professorial fellow for International Administration and Conflict Management at the University of Konstanz and a senior research fellow with the GIGA German Institute of Global and Area Studies in Hamburg. He holds an MA in peace studies and international politics and a PhD in political science from the University of Tübingen. His research focuses on the causes of violent conflict as well as on state and institution building.