Shocked Leaders: The Influence of Environmental Shocks on the Likelihood of a Coup d'état

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Abstract

What is the influence of environmental shocks on the likelihood of coup attempts? The academic literature on the causes of coups has been focused primarily on economic and institutional factors, as well as on individual motivations. However, what has been neglected so far is the influence of environmental factors, specifically environmental shocks. This is surprising since environmental shocks have been considered a determinant for other forms of political violence. I argue that environmental shocks could both increase and decrease the risk for coup attempts: they could increase the risk for coup attempts due to reduced economic growth and state revenue together with an increased risk for mass protest after such shocks. Opposed to that, environmental shocks could also reduce the incentives for coups and impair their execution by destroying critical infrastructure, thus making them less likely. To examine this relationship, I combine data on natural disasters by the International Disaster Database (EM-DAT) with data on coup attempts by Powell and Thyne (2011). The results show that the risk for coup attempts is decreased after environmental shocks. This implicates that in their immediate aftermath environmental shocks exert a pacifying effect on the risk of coups, which furthers our understanding of the causes of coup attempts.

Introduction

In March 2012, parts of the Malian military staged a coup d'état and occupied the presidential palace and several other government buildings, effectively seizing power (Center for Climate & Security, 2012). What has led up to this event, which ended 20 years of democracy? Before the military seized power, Mali underwent significant changes, both societal and environmental, that are thought to have promoted this outcome: on the one side, Mali had a recent history of conflicts and slow economic development (Centre for Africa Europe relations,

2019). On the other side, the years preceding the coup were characterized by diminished rainfalls and increasing temperatures, severely impairing agriculture, and food security (ibid.). What is more, in the weeks before the coup large parts of the country were hit by a massive drought which devastated whole regions and displaced hundreds of thousands of people (Center for Climate & Security, 2012; Centre for Africa-Europe Relations, 2019). Why, however, would a political leader be at risk of getting ousted after a natural disaster, such as a drought? More specifically, how and why would such a disaster, which can be defined as an unforeseen and sudden event that causes great damage and human suffering and is caused by nature (CRED, 2022), increase the risk for a coup attempt?

Coup attempts are defined as legal and overt attempts by the military or other elites within the state apparatus to unseat the sitting executive (Powell & Thyne, 2011, 252). So far, the research on the causes of coups has primarily focussed either on motivation of key regime supporters and leader decisions (Horowitz, 1981; Bueno de Mesquita & Smith, 2010) or structural factors like the level of democratization and broader economic trends (Bodea et al., 2017; Galetovic & Sanhueza, 1999). For instance, Bueno de Mesquita and Smith (2010) argue that policy shocks or ill health of a leader can cause coup attempts. The former can provide an opportunity to remove a leader that has lost legitimacy, while the latter leaves supporters in a state of uncertainty, pushing them towards taking matters into their own hands (ibid.). Bodea et al. (2017), instead demonstrate the importance of structural factors like regime type.

Environmental shocks, sometimes also simply referred to as natural disasters, have so far not been considered as a potential cause for coups attempts, despite their far-reaching impacts. This is surprising as environmental shocks such as floods or earthquakes are known to influence other types of violence and political events, such as civil wars and protests (Eastin, 2018; Nelson, 2010; Salehyan & Hendrix, 2014; Schleussner et al. 2016). Furthermore, it has been demonstrated that coup attempts and other events such as riots and civil wars are

sometimes manifestations of the same root causes, like instability or a low level of democratization (Bodea et al., 2017). Thus, it would make sense to examine whether this similarity subsists when it comes to environmental shocks.

In this thesis, I want to answer the following research question: What is the influence of environmental shocks on the likelihood of a coup attempt? There is good reason to believe that environmental shocks increase domestic instability in a country, which in turn increases the risk for a coup. More specifically, environmental shocks cause a decrease of the revenue generated by states, which leaves less revenue available to distribute among the key regime supporters. This might create discontent and reduce their loyalty, which in turn, increases the risk of a coup attempt. Furthermore, environmental shocks have the ability to create widespread grievances and protests, which again potentially increases the risk for a coup attempt (Galetovic & Sanhueza, 1999; Koehler & Albrecht, 2021). At the same time, environmental shocks could also reduce the risk of coup attempts by diminishing state revenue and leaving behind an economy in shambles, thus reducing the incentive for any struggles for power (Fearon, 2008). Additionally, the conducting of a coup could be impaired by environmental shocks as destroyed infrastructure make big military manoeuvres costly and complicated (Salehyan & Hendrix, 2014). To empirically analyse this possible link between environmental shocks and coups attempts, I will combine information from the International Disaster Database (EM-DAT) (2022) with a dataset by Powell and Thyne (2011) that measures the global instances of coups over time.

In the following sections, I will first present an overview of the research on coups which will be followed by a theory part in which I outline the different pathways of the causal connection between environmental shocks and coup attempts. After this follows my methods section in which I want to discuss the type of statistical analysis I am going to conduct in detail, as well as present and describe my dependent variable and the different independent variables.

Additionally, this section should give an overview of the different data that I will draw on. Hereafter, I will present my analysis and discuss my findings in a separate section. There I will bring the findings in line with previous works and also talk about the limitations of this paper.

Literature review

The academic literature on coups can be roughly divided into two strands: one focuses on causes and the other on consequences. Within the strand on causes, a change in the research focus and the weighting of possible explanations for coups can be observed. Earlier works on coups have often focussed on the relationship between the military and the civil society (Horowitz, 1981; Luttwak, 2016). Within this strand, the individual beliefs and motivations of military personnel were considered to be of great importance for any subversive actions (Horowitz, 1981). More current research, however, has moved beyond individual motivations and has additionally examined more broader and structural causes for coup attempts. For instance, most scholars have emphasized the importance of the state of the national economy (Bueno de Mesquita & Smith, 2017; Galetovic & Sanhueza, 2000; Sudduth, 2017). A stable and prosperous economy will keep the key supporters happy and legitimizes the leaders' hold on power, decreasing the likelihood of coup attempts. For instance, Sudduth (2017) has argued that good economic performance will reduce the willingness of coup plotters to turn against a leader. In contrast, Kim (2016) points out that the effect of poor economic performance on the risk of coup attempts is not consistently supported by empirical studies and that a differentiation between permanent and transitory economic shocks is necessary.

A second factor that is often considered to be important, is the condition and organization of the military (Powell, 2012). As Powell (2012) demonstrates, a military that receives a lot of funding and is well organized could become too powerful and potentially pose

a risk for incumbents. As a result, leaders want to balance the military in such a way that it protects them from threats like public uprising or foreign invaders, while at the same time keeping it weak enough to reduce the risk of coups attempts (Powell, 2014; Sudduth, 2017). This is one way of the leader to prevent coup attempts, a strategy referred to as "coup-proofing" (Quinlivan, 1999; Powell, 2014). The strategy includes the separation of the military branches and the prevention of a single overarching organization, limiting the funding, as well as frequent exchanging of commanders (Sudduth, 2017).

The literature around the causes of coups attempts frequently highlights a third important factor: regime type or level of democratization (Bell, 2016; Bodea et al. 2017; Bueno de Mesquita & Smith, 2010). Generally, the scientific consensus is that autocratic regimes are significantly more prone to coup attempts than democracies (Bueno de Mesquita & Smith, 2010). Bueno de Mesquita and Smith (2017) even go so far as to say that democracies are virtually immune to coup attempts. The reason for this lies presumably in the structure and size of the of the group of people that hold stakes in the current government, also sometimes referred to as the ruling coalition, and the effect of dissatisfaction: the ruling coalition in democracies consists of everyone who voted for the ruling party or the incumbent, therefore the power is distributed among many people (Choi & Kim, 2018). Opposed to that, in autocracies the ruling coalition often constitutes of merely a handful of people (ibid.). In such systems, a few essential key regime supporters hold tremendous power as opposed to big coalition systems like democracies (ibid.). Therefore, an autocratic leader who is facing unsatisfied key supporters is at risk of getting toppled (ibid.). The support of a democratic leader, by contrast, is shared among many individuals who can express their dissatisfaction primarily in elections (Bueno de Mesquita & Smith, 2010).

In addition to these three key factors, a variety of other determinants are assumed to influence the likelihood of coup attempts. These include the presence of other conflicts,

protests, and previous coup attempts (Croissant et al., 2018; Lehoucq & Pérez-Liñán, 2014; Powell, 2012). For instance, Powell (2014) and Koehler and Albrecht (2021) show that armed insurgency or widespread protests can pose a risk for a leader. These types of events can create a legitimacy crisis for a leader and potentially threaten a whole regime (ibid.). Under such conditions, supporters might be tempted to take over control (ibid.). However, the risk for coup attempts does not end at this point: similar to other forms of violence that can create further violence, coup attempts beget coup attempts and countries can sometimes be caught in a vicious cycle of coups and follow-up coups (Londregan & Poole, 1990; Powell, 2012).

In contrast to the scholarly literature that focuses on the causes of coups, relatively few scholars have focused on examining the effects of coups (Thyne, 2017). For instance, Thyne (2017) shows that coups can shorten the duration of civil wars by influencing the bargaining process between the government and opposing forces (ibid.). At other times, however, coups seem to ignite civil wars in the first place (ibid.). The relationship between both therefore does not seem to be straightforward. Relatedly, Powell (2014) points out that not only coups, but also coup-proofing measures alone can under certain conditions increase the risk for civil war. The assumed mechanism here is that as the military is artificially held weak, it becomes significantly harder for it to adequately fulfil its tasks, for example suppressing an insurgency (Powell, 2014). Thus, the capacity of rebel forces to engage in combat is enhanced and their chances for military success are increased (ibid.).

Coups might also influence democratic transitioning (Marinov & Goemans, 2013; Powell, 2014; Varol, 2012). However, the potential for transition is heavily debated and the findings do not always point in the same direction (Koehler and Albrecht, 2021). Some scholars argue that successful coups can actually promote an autocratic system to transition to a democracy (Powell, 2014; Zengin, 2022). For instance, Zengin (2022) shows that depending on the economic development, coups might have a positive effect. In contrast, Koehler and

Albrecht (2021) find that coups can trigger more political instability and reproduce autocracy instead of replacing it with democracy.

So far, empirical studies and theoretical approaches have ignored natural disasters as a potential cause for coup attempts, even though the consequences of such disasters are far-reaching (Benson & Clay, 1994; Popp, 2006; Wiyanti & Halimatussadiah, 2021). This is surprising as natural disasters are frequently the object of analysis when it comes to other forms of political violence and are thought by many authors to be an important determinant for certain forms of violence, especially civil wars (Barnett & Adger, 2007; Couttenier & Soubeyran, 2013). Both the analysis and debate in the literature, however, revolve mostly around civil wars and almost never around the specific effect of natural disasters on political leaders, let alone coups. In the rare cases where natural disasters are in fact considered for the analysis of leader survival, it is only for their potential to spark mass uprisings (Bueno de Mesquita, 2010). However, popular uprisings that topple a leader, like revolutions, constitute an attack on the political leadership from outside the state apparatus, opposed to coup attempts which originate from the inside (Powell & Thyne, 2011). It is remarkable that natural disasters so far have not been seriously examined for their potential effect on coup attempts. This is especially surprising since some consequences of natural disasters are preconditions that are known or assumed to increase the likelihood of coup attempts, notably economic crisis, reduced legitimacy of the government, and public unrest (Belkin & Schofer, 2003; Galetovic & Sanhueza, 1999; Powell, 2012). A thorough and exhaustive analysis that includes natural disasters and also considers their impact on the leadership as well as on the public is missing so far.

Theory

Environmental shocks can have a wide range of consequences, including economic effects and grievances among the population (Benson & Clay, 1994; Carlin et al., 2014; Popp, 2006; Wiyanti & Halimatussadiah, 2021). Starting with the former, environmental shocks can severely affect the economy: the destruction of infrastructure and the overall devastation of whole regions can lead to increased inflation, increased commodity prices, crop failure, housing problems, reduction in manufacturing, and other effects that negatively influence the national economy (e.g., Botzen et al., 2019; Popp, 2006). For example, the 1991-1992 drought in Zimbabwe lead to a 25% reduction in volume of manufacturing output, shortages of water, electricity, a reduction in demand, and high inflation (Benson & Clay, 1994). Recent findings show a worsening of this trend: economic losses and adverse effects due to environmental shocks significantly increased in the last few decades, particularly in poorer countries (Botzen et al., 2019; Toya & Skidmore, 2007). This might be due to several reasons, with one being the increased number of environmental shocks due to climate change (Botzen et al., 2019). Additionally, environmental shocks can also impact the financial resources of governments: for one thing, they can hamper tax collecting efforts of the state (Morrissey et al., 2016; Popp, 2006). For example, certain regions can simply become unreachable (Popp, 2006). For another thing, environmental shocks can also strain the fiscal balance as expenditures rise due to post-disaster measures, such as different forms of emergency response, rehabilitation, and reconstruction (Wiyanti & Halimatussadiah, 2021).

Another effect of environmental shocks that is in parts related to the economic consequences is their ability to prompt anger and frustration towards the political leadership (Carlin et al., 2014; Gray et al. 2014). The loss of lives, livelihoods, and sustaining of injuries after environmental shocks can all play into broadly shared grievances of the population against the government and can be further exacerbated by a downturn of the economy that often

follows natural disasters (Carlin et al., 2014). This resentment can be further reinforced if the reaction of the government after such a shock event is insufficient or even missing completely (ibid.). It could be argued that environmental shocks are an external force that is beyond the government's control, and grievances would therefore not be directed against political leaders. However, the response of governments after environmental shocks has been shown to be crucial to overcome the consequences of environmental shocks and substantially influences the reaction of the general public to the disaster and whether resentments toward the government emerge or not (Flores & Smith, 2013; Noy & Nualsri, 2011). A case in point is Mexico after the earthquake in 1985 in which the ruling Institutional Revolutionary Party (PRI) mostly limited its actions to establishing a curfew to prevent looting instead of rebuilding and carrying out aid work (Bueno de Mesquita et al., 2003). This lack of action fuelled anger in the population and ultimately led to widespread protests (ibid.). The example of Mexico highlights how inaction by the government can, amongst other things, lead to widespread frustration and grievances among the population, as well as to protest. This shows that environmental shocks, such as the earthquake in Mexico in 1985, can have tremendous political effects.

Events such as the earthquake in Mexico highlight another consequence of environmental shocks, namely the displacement of a large number of people. Especially in developing countries the parts of the population that are affected by shocks often end up in refugee camps (Gray et al., 2014). While this dire situation alone can fuel anger and desperation, it also brings large numbers of people together, enabling communication and social exchange and eventually enabling these people to organize themselves and protest (Flores & Smith, 2013). This is precisely what happened in Mexico in 1985 and ultimately lead to the ousting of the PRI (Bueno de Mesquita et al., 2003).

Protests and bought loyalty

In the current literature a common distinction can be found between vertical and horizontal threats for the survival of political leaders and most studies so far have focussed on one of these (Croissant et al., 2018; Hanson, 2018). Vertical threats refer to threats for political leaders, both democratic and autocratic, that come from within the circle of supporters, i.e., the ruling coalition, whereas horizontal threats refer to mass protests and widespread anti-regime demonstrations (ibid.). However, it has been shown by recent works that both types of threats are sometimes closely connected to each other, which becomes clear when taking a closer look at mass protests (Croissant et al., 2018, Koehler & Albrecht, 2021). Mass protests, as I have already established, can be caused by environmental shocks: grievances and anger because of high casualties and damages after natural disasters, together with many people being bundled up in camps can often result in widespread and organized mass protests that pose a threat to leaders (Flores & Smith, 2013; Galetovic & Sanhueza, 1999). For the normal day-to-day control of the population, political leaders usually employ police or other non-military security forces (Koehler & Albrecht, 2021). However, during mass protests these forces can quickly become overwhelmed, and leaders subsequently have to rely on the military as a last resort to keep these protests in check (ibid.). This constitutes a dangerous situation for a leader, as her or his survival depends entirely on the military, which now is forced to choose to repress the masses, side with them, or seize power itself (Croissant et al., 2018; Yukawa et al., 2022). In this situation the military might not be able to successfully suppress protests or a crackdown on the protests could reinforce them (Croissant et al., 2018). This puts the military at risk of getting sanctioned, deposed, or even prosecuted in case the protests successfully achieve a regime change (ibid.). A coup attempt in which the military tries to seize power itself might therefore appear as a viable option (ibid.). As such, along with the destruction and displacement, environmental shocks bring an increased risk for these so-called “endgame

scenarios" with them, in which a leader's survival hinges completely on the willingness of the military to suppress the uprising. In such a scenario the risk for coup attempts is drastically increased.

It might, however, not only be the concern for a potential loss of power that prompts the military to attempt a coup. As Powell (2012) points out, widespread protests and anger with the current leader can constitute a window of opportunity for would-be coup plotters. Under such conditions in which large parts of the population perceive a leader as illegitimate, a coup may be an especially viable option for the military as the current government no longer enjoys public support (Carlin et al., 2014; Powell, 2012). The removal of a leader might therefore appear as just and the seizure of power by the military can be perceived as legitimate (Powell, 2012). While one could argue that public support plays a negligible role in autocratic regimes, it has been shown that outcomes of coups attempts are partly dependent on public opinion and coup plotters are therefore often cognizant of public support (Powell, 2012). One reason for this might be that coup plotters could quickly be caught up in an "endgame scenario" themselves if the public support for a coup is low and large parts of the population subsequently start to protest (ibid.). To conclude, it can be noted that environmental shocks can cause widespread anti-regime protests that endanger regime supporters and the position of the military as a whole. Additionally, environmental shocks can lead to the loss of legitimacy of a leader, both among his supporters and the broader population. Both widespread protests and a loss of legitimacy of the leader can move supporters to attempt a coup.

However, environmental shocks could potentially also pose a direct horizontal threat to leaders, as opposed to the somewhat indirect way via the general public and mass protests. To understand how environmental shocks could increase the risk for coup attempts by directly affecting the ruling elite, it is useful to take a closer look at the structure of the political system and the role of the leader. To survive, political leaders, both democratic and autocratic, must

make sure that supporters are sufficiently rewarded (Bueno de Mesquita & Smith, 2010). The type of reward, however, depends on the number of members in the ruling coalition of a political system, which can be defined as the group of people that hold some stake in the current government (Choi & Kim, 2018; Bueno de Mesquita & Smith, 2003). In countries with a large ruling coalition, i.e. democracies, the ruling coalition usually constitutes of everyone who has voted for the current government and the people that were voted into office (Bueno de Mesquita & Smith, 2003). In such a setting the rewards usually constitute of common goods or beneficial policies (ibid.). These rewards can be used and enjoyed by many people. In contrast, systems with a small ruling coalition, i.e., autocracies, these rewards tend to be mostly in the form of private rewards as there are fewer key supporters (ibid.). These private rewards usually constitute of money or material favours handed out to a few individual supporters (ibid.). The size of the ruling coalition has also implications for how leaders can lose power in case they fail to provide rewards: leaders in democracies that fail to provide rewards to their supporters are at risk of being voted out (Bueno de Mesquita & Smith, 2010). In contrast, autocratic leaders are likely to be removed forcefully by their essential supporters in the form of a coup since votes play either no or only a minor role (ibid.).

This shows why coup attempts are more likely in countries with a small ruling coalition, i.e., autocratic countries. It also shows that generating revenue is extremely important for autocratic leaders, as they need to pay off their key supporters. It is conceivable that environmental shocks increase the risk for coup attempts by directly affecting the amount of private rewards to regime supporters, thereby increasing the risk for coup attempts specifically in autocratic regimes. One important way for a leader to generate revenue and reward supporters is through the taxation of the population (Bueno de Mesquita et al., 2003). As mentioned earlier, environmental shocks can effectively deny state control over affected areas and therefore make taxation impossible. Additionally, the dire state in which environmental

shocks can leave the economy can also reduce tax revenue (Noy & Nualsri, 2011). Besides shrinking tax revenues, countries are often faced with significantly reduced exports after experiencing environmental shocks (Hadri et al., 2017). This means that not only is the tax revenue of a leader potentially in danger after environmental shocks, other sources of income through exports of certain goods or resources could also be threatened. This could in effect mean that autocratic leaders can only provide reduced amounts of private rewards to their key supporters. As a result, dissatisfaction among key supporters rises who then could try to take matters into their own hands and improve their situation and stage a coup (Bueno de Mesquita & Smith, 2003).

In addition to crippling tax revenue and diminishing income from exports, environmental shocks can potentially impair the amount of private rewards in yet another way. In small ruling coalition systems, providing financially intense post-disaster aid or financing reconstruction measures can be risky as resources are not allocated to supporters anymore, which could increase dissatisfaction and reduce their loyalty (Bueno de Mesquita & Smith, 2010). If this loss of loyalty due to reduced private rewards occurs, the risk for coup attempts is increased (ibid.). However, autocratic leaders could choose to not finance any aid efforts to help the population and instead save their budget and continue to reward their essential supporters (ibid.). This seems to be precisely what is happening: Noy and Nualsri (2011) find that especially countries with a high accountability to a large electorate, i.e., democratic countries, engage more actively in rebuilding and other post-disaster measures than their more autocratic counterparts. The latter often cut the already low public spending even more (ibid.). Since the extent of the economic damage after natural disasters partly depends on the governmental reaction to them, such a constrained spending behaviour can multiply the adverse economic effects of a country (ibid.). From the standpoint of Bueno de Mesquita's and Smith's (2010) selectorate theory, one could therefore argue that autocratic leaders will try to cut losses

to secure the rewarding of their supporters. This, however, is counterproductive on the long run as the economic damages only increase (Noy & Nualsri, 2011) and thus available resources for rewarding supporters diminish. Therefore, by not mitigating the consequences of environmental shocks, leaders only postpone the risk of a coup attempt to a later point.

In summary, environmental shocks can weaken economies and therefore reduce tax revenue, while additionally impairing the ability of a state to collect taxes. Since environmental shocks create the need for further spending to prevent a worsening of the situation, they can thus drain a leader's resources even further. Because of that, environmental shocks potentially pose a serious threat to autocratic leaders because they prevent them from carrying out a crucial task: rewarding their supporters to further secure their loyalty. Thereby, environmental shocks could increase the risk of one-time supporters turning against their leader and attempting to coup. Additionally, environmental shocks possess the power to spark mass protests and effectively create a coup-promoting "endgame", which endangers both democratic and autocratic leaders. This leads me to my first hypothesis:

Hypothesis 1: Environmental shocks increase the risk for coup attempts.

Increased costs and reduced rewards

The likelihood of coup attempts could be influenced by environmental shocks in a way that is different to the mechanisms already described. To better understand this last causal mechanism, it makes sense to first take a closer look at the potential rewards of coups and the decision-making process of coup plotters. The decision to attempt a coup can be understood in a framework as presented by Powell (2012) and Bueno de Mesquita and Smith (2017) in which coup plotters decide if the rewards of attempting to coup outweigh the consequences that await plotters in the case the attempt fails. Bueno de Mesquita and Smith (2017) argue that a decision

to attempt a coup will be made if regime supporters are not sufficiently rewarded to secure their loyalty and expect to receive higher rewards or payoffs by seizing power or supporting the ones who do. The weighing of rewards versus costs and risks takes place on an individual as well as on an organizational level. An individual, in this case a member of the military, seeks to act in a way that maximizes her or his interest, for example by seeking the highest possible reward or payoff (Powell, 2012). The decision to coup would, therefore, be linked to prospects of higher rewards. On an organizational level, factors such as the funding and influence of the military determine the occurrence of a coup (ibid.). If the funding or the influence of the military is perceived as in danger or as unfavourable, a coup might be attempted to secure the current status or a more favourable position.

It is specifically this weighing of risks and rewards where environmental shocks could substantially influence the decision-making process of potential coup plotters. Coup attempts are a concerted effort by large parts of the military to seize power by capturing important buildings, regions, checkpoints, and arresting key figures (Powell, 2012). As Salehyan and Hendrix (2014) have pointed out, the effects of environmental shocks can seriously restrict the manoeuvrability and logistics of the military and armed groups in general and change the tactical environment to their disadvantage, for example by destroying infrastructure. As the fighting itself becomes more complicated on unfavourable terrain and the upkeep and supply of fighting units with food and ammunition is exacerbated, the costs of all military endeavours, including coup attempts, are potentially increased (ibid.). However, environmental shocks do not only impair the execution of coups and thus increase the costs. Fearon (2008) argues that combative actions to seize power are less likely in a setting in which the "prize" or reward of fighting is low and just not worth it. As environmental shocks can leave behind an economy in shambles with potentially less revenue the state can extract, the rewards of a successful coup for plotters would be severely diminished, making any effort to take over control less attractive.

One would therefore expect that key supporters refrain from any attempts to overthrow the leader after environmental shocks as it would not only it be harder to do so, but the potential rewards of seizing power are, if anything, reduced. At the same time, the consequences, and personal risks in case of failure have not changed for coup plotters. To summarize, by destroying infrastructure and damaging the economy and potentially reducing tax revenue the costs of coups might be increased, while the rewards of succeeding are decreased, making a coup harder to conduct and less profitable. This leads to my second hypothesis:

Hypothesis 2: Environmental shocks decrease the risk for coup attempts.

Methods

I assess the impact natural disasters have on the prevalence of coup attempts, looking at 54 African countries from 1991 to 2019. The African continent was specifically chosen as the object of analysis since 78% of all coup attempts since 1991 occurred in African countries (Powell & Thyne, 2011). My unit of analysis is country-year data, giving information of the number of coup attempt observations in a country in a given year. The specific timeframe of this analysis was chosen to avoid including data from the Cold War era since this might introduce skewed results (Barracca, 2007). One reason for this is that the relationship between the military and the civil society changed significantly after the Cold War in most countries, with generally reduced levels of popular support for military interventions, especially coups (ibid.). Another one is that foreign aid was a more important source of income for many autocratic regimes during that era (Ahmed, 2012; Dunning, 2004; Masaki, 2016). Since such conditions potentially allow for different dynamics when it comes to risks for coup attempts and environmental shocks, an exclusion of this time period seems reasonable.

Dependent variable

To measure coup attempts, I will use data coming from Powell and Thyne (2011). The dataset covers information on coup attempts in 171 countries (ibid.). In their study, Powell and Thyne (2011) define coup attempts as "illegal and overt attempts by the military or other elites within the state apparatus to unseat the sitting executive" (Powell & Thyne, 2011, 252). Generally, coup attempts happen most often in Africa, followed by the Americas, the Middle East and Asia (ibid.). Since 1991, there have been 116 attempted coups in Africa, while there were 33 in the rest of the world (ibid.). Powell and Thyne (2011) collect information on coup attempts by conducting historical research and comparing the findings to 14 other earlier academic sources on coups (ibid.). Based on this dataset, I use the variable *Coup attempts* as my dependent variable (Table 1). This variable measures the number of attempted coups in African countries in a year, both of successful and not successful attempts.

Independent variables

For operationalizing and measuring environmental shocks, I use data provided by the International Disaster Database (EM-DAT) (Version 2022-12-04) of the Centre for research on the Epidemiology of Disasters (CRED). The CRED defines disasters as an unforeseen event of usually rapid onset which causes significant damage, destruction, and human suffering (CRED, 2022). This definition of disasters is congruent with the definition of environmental shocks in other studies (Eastin, 2018; Salehyan & Hendrix, 2014). For a disaster to be included by the EM-DAT it must have either caused ten or more casualties, affected 100 or more people, caused the declaration of a state of emergency, or must have resulted in the affected country calling for international assistance (EM-DAT, Version 2022-12-04). Generally, the number of natural disasters steadily increased over the last decades, as did the number of people killed,

displaced or otherwise affected (Kharb et al., 2022). The EM-DAT differentiates between natural and technological disasters, the former includes shock events like floods and droughts, while the latter includes man-made disasters like oil spillage or transport accidents (CRED, 2022). For this analysis, I focus only on natural disasters as opposed to man-made disasters. This is due to the fact that natural disasters have no human origin and therefore entail no direct responsibility. This potentially alters the effect a disaster has on the population of a country, since if there is a clear perpetrator, frustration and anger are likely directed towards this perpetrator, as opposed to a political leader. Based on the EM-DAT, I use two independent variables that measure the extent of environmental shocks. This is done to differentiate between the two causal mechanisms: as outlined in the theory chapter, there are two assumed ways of causality between environmental shocks and coup attempts, one emphasizing the importance of generating revenue and the other highlighting the dangers of widespread public discontent and unrest. Therefore, I will first use the variable *Number of environmental shocks*, which measures the number of environmental shocks a country experienced in a year, as can be seen in Table 1. Second, I will use the number of people affected by these environmental shocks per year per country in the form of the variable *People affected by environmental shocks* (Table 1). The variable *Number of environmental shocks* allows to see the effect of all environmental shocks on the likelihood of coup attempts, whereas *Number of people affected by environmental shocks* can potentially proxy the likelihood for grievances in the population and subsequent protests. Additionally, I want to account for the possibility of a time delayed effect of environmental shocks in a separate model. Because of that, I created a lagged version of both independent variables. For that, the number of environmental shocks and the number of people affected by environmental shocks were lagged one year. The lag of one year was chosen based on previous studies (Bodea et al., 2017; Koehler & Albrecht, 2021). Such a lag allows to account for the effect of disasters that occurred late in the year, possibly only influencing

the risk for coup attempts in the following year (Bodea et al., 2017; Koehler & Albrecht, 2021). Additionally, Flores and Smith (2013) argue that after environmental shocks it can take up to a year until protests develop.

Control variables

In addition to my independent variables, I use several control variables that might influence the occurrence of coup attempts or the relationship between environmental shocks on coup attempts. Firstly, I capture coup attempts in the preceding year with the variable *Coup previously*. This binary coded variable is also based on the dataset by Powell and Thyne (2011) and measures whether in any given year a coup happened in the previous year. I control for previous coup attempts as it has been established by previous research that coup attempts can create follow-up coup attempts (Lehoucq & Pérez-Liñán, 2014; Londregan & Poole, 1990). Secondly, I include a measure of *Conflict* in the analysis. Conflict has been shown to be positively associated with coup attempts (Bell & Sudduth, 2017). The data for this variable comes from the Uppsala Conflict Data Program (UCDP) (2022) which captures all types of conflicts present in countries. For my analysis, I control for the presence of any ongoing conflict in countries in any year in the form of a binary variable, as can be seen in Table 1. Thirdly, to control for any economic effects, I include the variable *GDP per capita* as a variable, which is a measurement frequently included by other studies (Belkin & Schofer, 2005; Galetovic & Sanhueza, 1999; Flores & Smith, 2013). In this analysis it controls for the capacity of a leader to reward supporters. For this measure I use data coming from the World Bank (2022). Additionally, I include a fourth variable that measures *Regime type*. Higher levels of democracy are associated with a reduced risk of coup attempts, whereas more autocratic countries are associated with a higher risk (Bodea et al. 2017; Bueno de Mesquita & Smith,

2010). For this, I use data coming from the Varieties of Democracy (V-Dem) (2022) dataset. The variable *Regime type* measures the level of democratization of a country, with 0 being the lowest and 9 being the highest level of democratization (Table 1). Lastly, I include the variable *Protest* in the analysis. This variable counts the number of protests in a year and is included to measure anti-government protests. A high number of protests should theoretically increase the likelihood of "endgames" and therefore of coup attempts (Galetovic & Sanhueza, 1999). For my measure of protests, I use data coming from the Social Conflict Analysis Database (SCAD) by Salehyan et al. (2012). This dataset covers various forms of protests, including pro-government violence and other forms of violent clashes (ibid.). For this analysis, however, only non-violent protests and strikes were included to avoid any overlapping with the *Conflict* variable, as well as to account for the specific scenario described by Koehler and Albrecht (2021) in which non-armed and non-violent protests create an "endgame scenario".

Table 1. Descriptive statistics of the dependent variable, independent variables, and control variables.

	Minimum	Maximum	Mean	Std. Deviation	N
Coup attempts	0	5	.09	.351	1549
Number of environmental shocks	0	9	.93	1.239	1549
Number of environmental shocks (lagged)	0	9	.90	1.208	1549
People affected by environmental shocks	0	23000000	259271.90	1145685.47	1549
People affected by environmental shocks (lagged)	0	23000000	262443.60	1154646.02	1549
Coup previously	0	1	.08	.275	1549
Conflict	0	1	.25	.431	1549
GDP per capita	285	38444	4446.49	5616.16	1465
Regime type	0	9	3.45	2.33	1549
Protest	0	471	7.53	19.75	1279

Results

For this analysis I created three different models to assess the effect of environmental shocks on coup attempts under varying circumstances: Model 1 shows the effect of only the independent variables on coup attempts, Model 2 adds control variables to that, while Model 3 assesses the lagged effect of environmental shocks on coup attempts. Since the dependent variable, *Coup attempts,* measures count data and is additionally overdispersed, I use a negative binomial analysis in all three models. The confidence interval for the analysis lies at the 5% level. Additionally, there is no instance of multicollinearity between the different variables.

Table 2. Negative-binomial regression analysis: Determinants of coup attempts.

	Model (1)	Model (2)	Model (3)
(Constant)	-2.224***	-1.574***	-1.573***
	(.101)	(.219)	(.221)
Number of environmental shocks	-.201*	-.184*	
	(.085)	(.090)	
Number of environmental shocks (lagged)			-0.187*
			(.088)
People affected by environmental shocks	0.000	0.000	
	(.000)	(.000)	
People affected by environmental shocks (lagged)			0.000
			(.000)
Coup attempt in previous year		.781***	0.794***
		(.211)	(.210)
GDP per capita		0.000***	0.000***
		(.000)	(.000)
Regime type		-0.152**	-0.154**
		(.048)	(.048)
Conflict		0.387*	0.350
		(.193)	(.192)
Protest		0.008***	0.008***
		(.002)	(.002)
N	1549	1231	1231
Deviance	747.615	553.642	552.675
AIC	1008.521	791.320	790.471
BIC	1024.557	832.244	831.271

Note: OLS regression coefficients with standard error in brackets.
***p<0.001, **p<0.01, *p<0.05.

Model 1 is showing the potential effect of only the two independent variables *Number of environmental shocks* and *Number of people affected by environmental shocks* on the dependent variable, *Coup attempts*. It can be observed that the number of environmental shocks a country experiences in a year is indeed negatively influencing the risk for coup attempts and is statistically significant. This means that as the number of environmental shocks increases, the risk for coup attempts decreases. This finding supports the second hypothesis, indicating that environmental shocks have a stabilizing or pacifying effect. For the variable *People affected by environmental shocks* the relationship with the dependent variable is positive. However, the relationship is not statistically significant, indicating that the number of people affected by environmental shocks is not influencing the risk of coup attempts in any meaningful way. This variable therefore provides evidence for neither of the two hypotheses. It could, however, indicate that the people affected by environmental shocks do not necessarily develop grievances immediately after such shocks, or that those grievances do not matter for the risk of coup attempts.

In addition to the two independent variables, Model 2 includes a set of control variables to examine whether any effect detected in Model 1 persists after controlling for certain factors. Even after including a set of control variables, the relationship between environmental shocks and coup attempts is still negative and statistically significant. By contrast, the variable *People affected by environmental shocks* remains insignificant. This result could indicate that environmental shocks affect the risk of coup attempts as outlined in the theory section: the overall effectiveness of all armed groups, including the military, is reduced as a result of reduced movement capabilities, impaired logistics, and a generally unfavourable tactical environment after environmental shocks (Bergholt & Lujala, 2012; Salehyan & Hendrix, 2014). Another reason could be that during times of environmental shocks coups could simply become less profitable. As could be established in previous sections, environmental shocks do

after all significantly damage the economy and tax extraction, perhaps leaving behind a smaller "prize" to obtain during a coup. Therefore, by increasing the opportunity costs of coup attempts and decreasing potential rewards in case of success, it could make sense for essential regime supporters to hold on to their current position. Attempts to overthrow a regime could therefore make the most sense when the possibilities to do so and the rewards are higher. By that explanation, coups would exhibit a similar mode of operation that is found in other forms of conflict in the aftermath of environmental shocks (Bergholt & Lujala, 2012; Salehyan & Hendrix, 2014).

As for the control variables, coup attempts in the previous year are statistically significant and positively influence the risk of coup attempts, as was to be expected based on previous research (Bodea et al., 2017; Gassebner et al., 2016). The influence of *GDP per capita* on coup attempts is also significant. This is surprising as this variable has been shown by other authors to negatively influence the risk of coup attempts (Kim, 2016; Powell, 2012). However, Koehler and Albrecht (2021) also find a positive effect of GDP per capita, suggesting that the relationship between GDP per capita and coup attempts is not completely straight forward. The level of democratization is negatively influencing the risk of coup attempts. This effect is highly significant and in line with previous research (Bodea et al., 2017; Powell, 2012; Bueno de Mesquita & Smith, 2017). The variable for conflict is also positive and statistically significant, showing that if conflict was present in a certain year, the risk for coup attempts was increased. Lastly, there is a significant positive effect of the number of protests on the risk of coup attempts.

To further ensure the robustness of the results, I conduct an additional analysis as can be seen in Model 3. For that, I lagged both independent variables by 1 year to account for a potentially delayed effect of environmental shocks. The coefficients and significance for *Number of environmental shocks* and *People affected by environmental shocks* remain similar

with the former still being negative and statistically significant while the latter is still not statistically significant. This indicates that the number of environmental shocks have an effect on coup attempts in the year of their occurrence, as well as the following year. The control variables are mainly unchanged except for *Conflict*, which loses its statistical significance.

While no evidence could be found for H1 this is not to say that the first hypothesis of my analysis is necessarily wrong. Environmental shocks could still increase the risk for coup attempts under certain conditions that could not be fully captured in this analysis. In the models only the immediate and the one-year lagged effect of shocks were considered. As mentioned in the methods section, the lag of one year was chosen based on previous studies (Bodea et al., 2017; Koehler & Albrecht, 2021; Flores & Smith, 2013). However, it is conceivable that certain consequences of environmental shocks build up over time, affecting the decision of supporters to plot a coup only after a respective period of time. Especially when considering the effect of people being affected by shocks and subsequent protests that result in a dangerous endgame for rulers, it is thoroughly possible that anger against the regime needs to build up first, as does the organization of widespread protests. Additionally, there are examples of autocratic leaders trying to prevent the gathering of disaster-affected people to delay or stave off the risk of dangerous protests (Bueno de Mesquita & Smith 2010; Flores & Smith, 2013).

As with the potentially delayed effect of protests, it might be that negative economic effects increase the coup risk only after a prolonged time. Bueno de Mesquita and Smith (2010) bring up the concept of a "rainy day fund" that some leaders establish. By accumulating financial reserves in times of prosperity, it is possible for leaders to survive short economic shocks (Bueno de Mesquita & Smith, 2010). In the case of environmental shocks, leaders could therefore compensate for a limited time any losses created through environmental shocks with such a fund.

Conclusion

In this thesis, I set out to answer the question of how environmental shocks influence the likelihood of coup attempts. By answering this question, I tried to fill the gap I identified in the literature: even though environmental shocks are known to create conditions that increase the risk for coup attempts, they have not been considered by researchers as determinants of coup attempts so far. This is particularly surprising as environmental shocks have been a frequent object of analysis for their effect on other forms of violence, particularly civil wars.

In the theory section, I argued that environmental shocks might influence the risk for coup attempts in two ways. Firstly, they could create "endgame scenarios" by causing mass protests, as well as by reducing the revenue a leader can use to reward his key supporters, thus increasing the risk of coup attempts. Secondly, by destroying infrastructure and creating an unfavourable tactical setting, environmental shocks could make coup attempts more difficult, while simultaneously leaving behind a damaged economy and less state revenue, thereby reducing incentives for coup attempts. The results of my analysis support the second hypothesis, namely that environmental shocks reduce the risk for coup attempts. More precisely, it is the number of environmental shocks that reduce the risk for coup attempts in the immediate aftermath of such shocks, as well as a year later. The number of affected people, however, appears to not be relevant for the risk of coup attempts.

While a preliminary result for the effect of environmental shocks on the likelihood of coup attempts could be established, several valuable avenues for future research emerge in the analysis. Firstly, to shed more light on the exact causal mechanisms by which environmental shocks influence the risk of coups, it would make sense to verify the results with a different measurement of environmental shocks. This could be, for example, a measure of economic

damages caused by environmental shocks, as this would make it possible to more precisely assess the economic effect. Furthermore, in this analysis the focus was entirely on the African continent since coup attempts occur significantly less in other parts of the world (Powell & Thyne, 2011). However, as Gunderson (2010) demonstrates communities and regions get affected differently by natural disasters. As some regions are more shock resilient than others it makes sense to expand the analysis to other regions in the world, thereby taking region-specific effects into account. Lastly, foreign aid from other states or from NGO's could not be included as factors in my analysis, though they potentially significantly influence the coup risk by playing into the reward mechanism: previous research has shown that foreign aid at times increases corruption in recipient states, gets channelled away from intended areas and individuals and can entrench autocratic regimes by providing them with more funds (Flores & Smith, 2013; Bader & Faust, 2014; Licht, 2010). Therefore, even if environmental shocks diminish tax revenue, foreign aid could compensate for such losses and could be worth considering by future research attempts.

With regards to policy implications, it might seem that environmental shocks pose no risk for governments and leaders, as they apparently only reduce the risk of coups. However, this assessment only holds true in the short run. If coup attempts behave like other forms of conflict, which appears to be the case at least regarding their short-term effects, it might very well be that after an initial pacifying effect, the risk for coup attempts increases after a certain amount of time. In times of a growing risk of extreme weather events and natural disasters due to climate change, policymakers should therefore be wary of the effect of environmental shocks on regime stability and coup risk until further research is available that examines the effects in the long run.

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