USING A SEMI-PARAMETRIC ANALYSIS TO UNDERSTAND THE OCCURRENCE OF COUPS D'ÉTAT IN DEVELOPING COUNTRIES

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Abstract

This paper examines the factors that make a political regime more vulnerable to overthrow given the number of years elapsed since the regime's inception. By analyzing a relatively large dataset of 102 countries over the last 35 years and using the event history analysis (Cox regression model, frailty model), the present work builds upon previous theoretical attempts to offer a new empirical contribution to the understanding of the event of coup d'état. The main findings of this

study indicate that non-democratic political regimes accelerate the recurrence of coup plots. Such a vulnerability to coup episodes is increased in low income economies. In contrast to previous research, I reach a nuanced conclusion with regard to the influence of military spending on the duration of periods of political stability. The study further uncovers the fact that the duration between two successive coup episodes seems not to be significantly affected by either internal or external crises. Finally, the results of the model confirm the existence of "coup trap" phenomena.

Keywords: Coup d'état, regime vulnerability, event history analysis, developing countries.

It was as terrible and hypnotic as the weather;

Some were wholly charmed, and some terrified.

Such effects are expected:

We have always with us - the unadventurous

(Herschberger, 1941: 416)

Introduction

There has probably never been a more controversial kind of event in the modern era than what is commonly referred to as a 'Coup d'état'. Although the term does not mean much in French (nor in English), and perhaps adds more confusion than it alleviates, the dramatic consequences of this event on not only the country where it occurs but also on the entire balance of power and peace of the international community could be considerable. The power of the controversy associated with this event cannot be better described than by the hopes and dreams this episode brings to a fraction of the population,

and, at the same time, the fear and anxiety with which it fills the other portion. Over the past decades, millions of people around the world have lived and died with the eternal hope to be able one day to witness this event in their countries. Others have been tortured and murdered in the course of the very event desired by so many. If we now recognize that, in the majority of developing countries, most regime changes have not been achieved through constitutional or democratic channels but rather through violent (or sometimes orderly) coups, the understanding of this event's determinants becomes even more crucial. Both present and past historical experiences have shown that although the outcomes commonly fall into one of two familiar categories – either success or failure – the roots of the event differ significantly from one country to another and in some instances from one period to another within the same country. In other words, the political and economic conditions that generate an increasing need felt by certain groups of the population often referred to as "the elite" to engage in this revolutionary episode could play exactly the opposite role in another society or time period to prevent and warn these groups from attempting a coup d'état (Bradley, 1936; Calvert, 1979; O'Kane, 1993; Stauffer, 1974). Despite a disparity of circumstances, there are common conditions that continue to play a key role in preparing the ground and in establishing the political, judicial and economic environment for the 'right' person or group of persons to emerge and grasp the opportunity.

In this paper, I examine the factors that make a political regime more vulnerable to overthrow given the number of years elapsed since the regime's inception. The hypothesis I propose to test is that the duration (i.e. remaining time) until the occurrence of a coup plot depends to a large extent on a set of prerequisite economic, political and historical conditions. By analyzing a relatively large dataset of 102 countries over the last 35 years, the present work builds upon previous theoretical attempts made by several scholars (Auvinen, 1997; Bartelson, 1997; Londregan and Poole, 1990; O'Kane 1993) to offer a new empirical contribution to the understanding of the event of coup d'état. I argue that the timing of this event is a pivotal indicator which we need to decipher the role and the causal interdependence with other factors to better understand the likelihood of the event's occurrence.

In the following sections, I begin by briefly presenting an overview of the main conclusions of the literature that has studied this event. Next, I describe the approach followed in the present research along with the variables used in its statistical methodology. Finally, I discuss the findings of this empirical contribution and address some of its potential drawbacks. The conclusion of this paper is presented in the last section.

A coup…until the next coup: literature review

"The coup has been a well-known political procedure as long as there have been rulers to overthrow and the force with which to overthrow them" (Li and Thompson, 1975: 81).

Several theoretical studies have tried to elaborate a universal definition of coups that could accurately describe the change of political regimes in a large sample of heterogeneous societies. Galetovic and Sanhueza (1999) stress some of the distinctive features of coups. First, the masses do not participate directly in their execution; the coups are the business of the elite. This conclusion is further supported by the pioneering work of Calvert (1979), who argues that precisely because the techniques of executing a coup are available only to a small elite (e.g., military forces) they cannot be the "*common property of the masses*" (Calvert, 1979: 90). The value of these techniques is only appreciated by those who can handle them (Wang, 1998).

Second, the episode of coup d'état has always been a swift one (Zald and Berger, 1978). If the plot lasts more than 48 hours, it is likely that it will end in failure. Third, although coup episodes can be extremely bloody, in many cases the mere threat of a military intervention has been enough to overthrow the current ruler (Jackman, 1978; Wells, 1974). This definition of coup is consistent with the description formulated by McGowan (2003) following his historical study of the political instability experienced by the majority of sub-Saharan African states over the second half of the last century.

Coups are "events in which existing regimes are suddenly and illegally displaced by the action of a relatively small group, in which members of the military, police or security forces of the state play a key role, either on their own or in conjunction with civilian elites such as civil servants, politicians and monarchs" (McGowan, 2003: 343). This description of coups stresses the importance of the population's obedience and their willingness to accept any leader (irrespective of the name or prior position) who manages to overthrow the present one. The role of the audience (the masses) is reduced finally to applauding or to giving its blessing to whomever "they are told" turns out to be the good person in this orchestrated "show". Any interaction between the audience and the actors is thus prohibited by the latter and automatically avoided by the former. This conclusion is also found in the work of Wang (1998: 671), who argues that "coups are basically the result of conflicts between elites with no connection to the masses".

Goldstone et al. (2010) assert that, with the exception of countries described as being fully democratic or fully autocratic, all alternative political regimes, whether partial autocracies or partial democracies with or without factionalism, have a significantly higher risk of adverse regime change (Wayman and Tago, 2009) (1). In addition to the political regime's nature, the authors showed that countries belonging to geographic regions known for their political instability are more likely to experience political conflicts and non-democratic regime changes. This conclusion is also shared by the pioneering work of Fossum (1967) and Lunde (1991), who theorize that the occurrence of a coup in one country could contribute either by imitation or conspiracy to "*triggering off coups in other countries*" (Fossum, 1967: 229).

Relying on a similar statistical analysis, Collin and Hoeffler (2005) and Londregan and Poole (1990) have addressed the issue of "coup trap" by stressing that the government that came to power by an extra-constitutional channel faces an internal contradiction. By claiming that its seizure of power was legitimate, it is implicitly legitimizing an equivalent prospective coup to replace it. In other words, if a tradition

develops in which coups are used to remove "bad governments", the executive authority might be unconsciously preparing the ground for the next coup (McGowan and Johnson, 1984; Wang, 1998). It is just a matter of time because noone is now questioning the previous coup's rationale and its ability to reach its supreme objective. As Lunde (1991) notes, once its effectiveness has been demonstrated, the coup becomes the "appropriate" political solution to tackle any perceived institutional problems.

McGowen (2003) finds, for instance, that 47.3% of coups in Africa were actually staged against existing military regimes that themselves came to power through illegal channels of power transition. Jenkins and Kposowa (1990, 1992), and Wang (1998) demonstrate that, in the case of Africa, military coups remain the principal form of regime changes regardless of the political system in place. Over the last four decades, countries like Bangladesh, Cambodia, Bolivia, Thailand, Chad and Sudan have each experienced at least five coup episodes. On numerous occasions, these plots were staged during the very year following a previous coup (e.g., in Bangladesh in 1976, 1977, 1981 and 1982; in Comoros in 1975, 1992 and 2000; in Cambodia in 1976, 1977 and 1978; in Sudan in 1976, 1977 and 2000; in Chad in 1976, 1977, 1990, 1991 and 1992, and in Bolivia in 1980 and 1981).

Ibrahim (2009) explains the occurrence of successive military coups in countries like Pakistan, as the product of internal fissures and conflicting interests of local groups or centers of power and as the result of continuous change in the wider socioeconomic and political setting (Londregan and Poole, 1990). According to Ibrahim's study, the major obstacle that lies in the way of any theoretical or empirical attempts to formally identify the institutional and economic factors in play during the onset of a coup plot is the diversity of these factors and their self-interaction, which in certain circumstances could have controversial effects. For example, in an attempt to limit coup risk, a country may be inclined to significantly increase the share of military spending in the government budget (Jenkins and Kposowa, 1992; Maniruzzaman, 1992; Morrison and Stevenson, 1974). Such an increase will adversely impact the investment capacity of the government in other sectors of the economy and thereby worsen local economic instability.

This view is corroborated by Henderson and Singer (2000) who demonstrate that the more a country's limited revenues are diverted toward military spending, the more likely the country will experience truncated economic development coupled with the increasing eagerness of its militarized elements to usurp political authority. Well-structured and well-trained officer corps that have benefited for many years from the favors of local authorities can suddenly decide that the current economic instability constitutes a threat to domestic social peace and therefore provide compelling reasons to question the legitimacy of a political regime (Wang, 1998). The government's "goodwill" strategy to secure itself against its eternal "beloved enemy" can turn out to be a strategy to dig its own grave. The notion of the people's army has, in this case, prevailed over that of state's army or, as in some cases, the army of only its own commanders. Henderson and Singer (2000) make the strongest claim when they state that: "Political leaders cannot buy the military, but can only rent them" (Henderson and Singer, 2000: 290).

As Powell (2009) points out, without the existence of the circumstances or structural attributes that encourage coup instigators and the general public to support an unconstitutional seizure of power, any attempts to overthrow the current government are likely to fail. This conclusion is largely supported by Belkin and Schofer's (2003) hypothesis, according to which, a distinction should be made between the background causes, which make any coup plot possible, and the triggering causes. Background causes usually reflect the organizational structure of the government, its political regime and in some cases the long-term social perception of its legitimacy (Thompson, 1975: Auvinen, 1997). Triggering causes are factors that precipitate the occurrence of the episode, generally following a particular event such as an economic crisis, an internal riot or a growing insurgency.

A related explanation of coup occurrence developed by several scholars (Jackman, 1978; Lunde, 1991; O'Kane, 1993) focuses on the existence of ethnic cleavages and rivalries between portions of the population. Jenkins and Kposowa (1990, 1992) distinguish two main reasons to explain the causal relationship between internal ethnic tensions and the increased hazard of coup recurrence. First, a large degree of cultural diversity can create a divergence in the perception of the notion of citizenship between local populations. The larger the number of ethnic groups, the less unified the population will feel, and the greater the political instability will be (Jackman, 1978). The second reason, ethnic dominance, is derived from the first one. In a multi-ethnic society, it is highly plausible that one ethnic group (not necessarily the dominant one in terms of population percentage) will control the local political landscape with widespread support from neighboring countries that share the same ethnic or religious beliefs (Fossum, 1967).

In these circumstances, one might expect that a sentiment of dissatisfaction, envy or even revolt would develop among oppressed groups. The more an ethnic group finds itself marginalized and exploited at the periphery of the social and political spheres, the more inclined it will be to challenge the legitimacy of the central authority chosen by, and therefore acting solely in favor of, the minority's interests. Auvinen (1997) asserts that "By monopolizing access to cabinet posts and top positions in military and parastatal enterprises, dominant groups stir up ethnic hostilities, thereby provoking [a] coup" (Auvinen, 1997: 178). It is not surprising to find that countries like Chad, Burundi, the Philippines, Guatemala, Bangladesh, Thailand and Ethiopia have all experienced ethnic cleavages or internal upheavals during the same year of at least four of the coup attempts that were staged against established political regimes.

Research hypotheses and modeling of the coup occurrence

The present study differs from some of the recent ones in several important aspects. To the best of my knowledge, most empirical studies that have analyzed the determinants of the coup d'état (with the exception of the original work of Lunde (1991)) have not attributed an importance to the factors controlling for the time prior to the occurrence of the event. To date, most researchers have used mainly logistic regression

models to study this event (Auvinen, 1997; Belkin and Schofer, 2003; Galetovic and Sanhueza, 1999; Maniruzzaman, 1992).

In the present study, I follow a different approach by controlling for the importance of time until the event's occurrence. This kind of research, often referred to as survival analysis, is commonly used in industrial life-testing experiments, and particularly in clinical and epidemiologic follow-up studies (Balshaw and Dean, 2002; Fan and Li, 2002; Gibler and Vittinghoff, 2004). In recent years, this approach has gained momentum among researchers in the social sciences. Several scholars have begun to integrate event history analysis into their methodological approaches to better apprehend the occurrence of a variety of political phenomena (e.g., ethnic war, civil war, regime failure or foreign policy conflict).

Models analyzing the time-to-onset of an unemployment period, a downturn in the economic growth or a stock market crash have applied some variation of survival analysis to help quantify the instantaneous risk that an event will take place at time $t + \Delta t$, given that the studied subject survived to the time t (Congdon, 1994; Smith and Smith, 2001). The Cox semi-parametric model is used in the present study in accordance with several prior academic studies. This model assumes no particular distribution for the shape of the hazard function, which significantly simplifies the modeling and, ultimately, the interpretation of the results calculated using the method of maximum partial likelihood (Senese and Quackenbush, 2003). According to the Cox model's specifications, the hazard rate can be expressed as a function of a baseline rate and a vector of both time variant and invariant covariates:

$$h_i(t) = h_0(t)e^{\beta_1 x_{i1} + \ldots + \beta_k x_{ik}}$$

Where $h_i(t)$ is the hazard function at time t for country i, $h_0(t)$ is the baseline hazard function at time t (or the hazard for a subject to experience the event when the values of all independent variables are set to zero), β is the vector of regression coefficients and X_k is the kth vector of the covariates recorded for country i. The proportional hazards assumption (PH), which presumes that changes in the levels of independent variables will produce proportionate changes in the hazard function that are independent of time, is estimated by:

$$\frac{h_i(t)}{h_0(t)} = e^{(\beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_k X_k)}$$

The probability that the country i will experience a coup plot at time t_i, given the number of countries k that are at risk of experiencing a coup at time t is estimated by:

$$\frac{h_i(t_i)}{\sum_{k \in R(t_i)} h_k(t_i)} = \frac{h_0(t_i)e^{(X_i\beta)}}{\sum_{k \in R(t_i)} h_0(t_i)e^{(X_k\beta)}} = \frac{e^{(X_i\beta)}}{\sum_{k \in R(t_i)} e^{(X_k\beta)}}$$

Since our dataset includes several countries with multiple coup events during the period under observation, the use of the standard survival model (the Cox proportional hazards model), which assumes in its basic form that all events are statistically independent, appeared inappropriate to capture the expected correlation between two successive coup episodes. This correlation is often found in a process with a sequential order of events in which an event cannot occur until the prior one has actually taken place (Anderson et al., 1997; Box-Steffensmeier and Zorn, 2002; Fan and Li, 2002; Gibler and Vittinghoff, 2004; Grieco, 2001; Krustev, 2006; Ratcliffe et al., 2004). To account for the recurrence of events, I decided first to follow the new and growing methodological trend within the sociological and political literature (Balch-Lindsay et al., 2008; Box-Steffensmeier and Zorn, 2002; Ezell et al., 2003; Krustev, 2006; Ulfelder and Lustik, 2005; Senese and Quackenbush, 2003) to test for a set of alternative models referred to as "variance-corrected proportional hazards models".

Despite being statistically robust, these alternative models do not seem to fully capture some of the fundamental characteristics of the dataset structure. In fact, these models do not account for two major characteristics that seem to simultaneously coexist in the model. The first is the expected unobserved heterogeneity of the data, which Ezell et al. (2003) explain as "*an unmeasured, intraclass correlation where subjects have constant but unequal probabilities of experiencing the event of interest*" (Ezell et al., 2003: 117). Applied to the present model, this would mean that, by implicitly accounting for the heterogeneity in the dataset, I recognize that some countries are in fact more likely than others to experience recurrent coup events within a shorter period of time (McGowan and Johnson, 1984). Krustev (2006) theorizes that this unobserved heterogeneity is inherently related to immeasurable variables, such as the historical or cultural background of a country.

The second characteristic is the time (duration) to event dependence between successive coup episodes which Ezell et al. (2003) define as "the situation where a subject's probability of experiencing a future event is genuinely affected by the occurrence of previous events (…) the mean duration time between events is modified with the occurrence of previous events" (Ezell et al., 2003: 118). Thus, I propose to test the assumption that some subjects (i.e., countries) with relatively short durations until the occurrence of their first coup d'état (under the observation period) are more likely to experience shorter second and third (and so on) duration periods until the occurrence of the following events. To account for these two characteristics, I explore some revised approaches recently proposed by several authors who suggest the use of a frailty model. These frailty semi-parametric models have recently gained momentum among researchers in epidemiological and social behavior studies (Anderson et al. 1997; Box-Steffensmeier et al., 2007; De Boef and Box-Steffensmeier, 2006; Fan and Li, 2002; Gibler and Vittinghoff, 2004; Klein, 1992; Krustev, 2006). The attractiveness of these models comes from the fact that they extend the proportional hazard models by adding a random effect into the baseline hazard to capture the intra-cluster correlation (Li and Ryan, 2002; Ratcliffe et al., 2004). In this respect, several scholars have expressed deep concerns that failure to account for this situation might cause some severe statistical

misspecifications such as an inflated test of significance and/or a significant bias of the parameter estimates toward zero (Ezell et al., 2003). According to Congdon (1994), "Neglecting frailty biases downwards attributes regression effects and leads to an estimated hazard that rises less slowly than the true hazard as the time or duration in the state increases" (Congdon, 1997: 278).

Data and key indicators

The dataset includes 232 coup events identified in 102 countries over a period of 35 years ranging from 1973 to 2008. As the ultimate purpose of this study is not to measure the degree of success or outcome of this event but rather to study the factors that accelerate or delay the time until its occurrence, I consider more appropriate to look at this episode through a larger window. In other words, rather than focusing only on successful coup episodes and running the risk that the amount of information in the model would be limited to specific cases where certain factors that are not captured by the model (i.e., factors that accompanied its execution) played the major role in shaping the final outcome, I propose to include in the present model all types of coup events regardless of the final outcome: that is all successful coups, attempted (failed) coups and coup plots.

This approach is mainly motivated by the paper's primary goal, to study factors influencing the period until this event occurrence more than the way it was carried out. To capture the regional characteristics, if any, of such a political event, I decide to include in the sample countries from various geographical locations: Africa (46%), Latin America (22%), Asia (17%), Middle East (12%) and Eastern Europe (7%). As expected, out of the 232 total studied coup events, countries from the African continent had recorded most cases (144 events) over the period under observation, while the Eastern European region experienced the lowest frequency of event occurrence. Table 1 provides summary statistics of all coup plots identified in the dataset.

Table 1: Summary statistics

Regions	Countries	Number of coup plots	Number of countries experiencing			Number of coups per decade		
			> 2 coups	> 5 coups	> 7 coups	1974-1984	1985-1997	1997-2008
Africa	47	144	24	10	3	63	54	27
Middle East	12	11	2	-	-	7	4	-
Asia	16	34	5	3	-	16	9	9
Latin America	22	38	7	-	-	17	15	6
Eastern Europe	6	5	-	-	-	3	1	1

The event (coup plot) for which I propose to model the time until its occurrence is a binary variable coded 1 for reported plots or attempted coups in the year under observation (regardless of its outcome) and 0 otherwise. Since separating military from non-military coups seems to be a "highly dubious exercise" (O'Kane et al., 1986) I decide, for the purpose of the current study, to ignore such a distinction and to account for both events as a single event.

I recognize the existence of a great deal of debate in the literature about whether the use of violent military intervention increases the likelihood of success of any coup attempt (Fossum, 1967; Jenkins and Kposowa, 1990, 1992; Wang, 1998). However, as I have stated above, because the analysis of this political event's outcome is not the ultimate objective of this paper, we can readily justify the approach of not accounting for the nature of coup instigators, whether these are civil or officer corps. Additionally, past coup episodes have taught us that, when preparing for a coup plot, only in extremely rare scenarios has one of these two parties intervened solely without an implicit coordination with the other (McGowan, 2003; McGowan and Johnson, 1984; Zuk and Thompson, 1982). Why? Simply because, to overthrow a civilian government reigning with the threat of its military arm, one would need the same power counter-structure, which is to say a civilian branch supporting a military action, or vice-versa. This conclusion is echoed by the definition elaborated by McGowan and Johnson (1984), who refer to the coup plots as "events in which existing regimes are suddenly and illegally displaced by the action of relatively small groups, in which members of the military, police, or security forces of the state play a key role, either on their own or in conjunction with a number of civil servants or politicians" (McGowan and Johnson, 1984: 634). The information on the occurrence of coups used to create the dependent variable was obtained from the dataset compiled by the Center for Systemic Peace (CSP), which has tracked all coup episodes in countries with population greater than 500,000 during the period 1960 – 2008.[2]

Measuring the impact of political stability

The first variable **[Political regime]** is derived from the Polity IV dataset. As originally constructed in the Polity IV dataset, this variable is a 21-point scale indicator ranging from -10 to 10 with -10 denoting a situation of full autocracy and 10 describing a highly democratic regime. This covariate is calculated as a weighted average of several other variables controlling for the competitiveness of political participation, the openness of executive recruitment and the constraints on the chief executive. For the purpose of this study, I decide to adjust this covariate slightly to code it 1 if it initially scores more than 7 for democratic regimes, and 0 otherwise. I propose to investigate the statistical significance of the hypothesis that where the political leader is selected through a non-democratic channel, with unlimited authority over all legislative institutions, the ground is set for a growing discontent among the local population in a way that may encourage recurrent attempts to seize power through extra-constitutional channels.

In contrast, I suspect that peoples who publicly and democratically elect their leaders from among officially declared candidates with no major restrictions imposed over their freedom of action or speech are less motivated to overthrow the government or support any illegal coup (Bartelson, 1997; Belkin and Schofer, 2003; Goldstone et al.,

2010; Marshall and Jaggers, 2009). In other words, the prospect of a future election within a short and regular period of time by which the performance of the government is "judged" according to the will of its people makes any attempt at a risky coup unjustified and likely unacceptable by the population because it is staged against their "will" (Londregan and Poole, 1990). In light of these characteristics of political regimes, I expect to find:

> H1: A *positive empirical relationship between the frequency of coup occurrence and the situation where the ruler is making the rules of the states as opposed to the situation where the ruler is made according to the rules of the state*.

To extend the above analysis of the impact of political systems on the time duration until the onset of coup episode, I supplement the above covariate with additional variable [**Political right**] that captures the status of democracy and freedom in the country. The construction of this variable is based on the information compiled through the Freedom in the World Survey conducted by the Freedom House Organization over the last four decades. The indicator is structured according to a 7-point scale that reflects progressively higher levels of deterioration of political right and civil liberties. It is coded 1 if it scores less than 3 in the 7-point scale and denotes a country with a fully democratic political regime (i.e, freedom of expression and widespread application of the rule of law) and 0 in the opposite situation (2).

In recent years, many generations of local populations have grown up with only one leader or one political party. In these situations, they had come to accept them as leader(s) for life, or to perceive them as a part of the national flag that could never be removed. The opposite reasoning is also valid in countries where the local government, after spending numerous years in power, tends to deviate from the right path (if it had ever had one). In these cases, some fractions of the elite may find it to be the appropriate time to start a new multi-year (or perhaps multi-decade) governing cycle. To capture the importance of the present regime's durability on the hazard of its political survival, I include a dummy variable **[Coup trap]** measuring the political life of a government. The variable is coded 1 if the country has experienced at least one coup over the last three years and 0 otherwise. I propose to test the hypothesis that:

> H2: *The occurrence of coups in recent years could shorten the periods between successive coups in the near future, what Collier and Hoeffler (2005) refer to as a black hole of repeated regime changes generated from within*.

Measuring the impact of internal and international conflicts

Several scholars (Auvinen, 1997; Bartelson, 1997; Jackman, 1978; Jenkins and Kposowa, 1990, 1992) have studied the issue of ethnic wars and the role this event plays in the country's political stability. In this endeavor, I propose to further develop this research and to test the hypothesis that;

> H3: *The existence of internal ethnic cleavages tends to increase the hazard of political instability and accelerates coup attempts*.

I include a dichotomous variable coded 1 for the years experiencing the event of ethnic war and 0 otherwise (lagged variable). These war events are defined as major armed or violent conflicts between local authority on one side and ethnic minorities or politically organized groups that seek to overthrow the central government on the other side (Jenkins and Kposowa, 1992; Marshall, Gurr and Harff, 2009). The variable [**Ethnic War**] is obtained from the State Failure Problem Set (PITF) on Internal Wars and Failure of Governance (Marshall, Gurr and Harff, 2009).

Potential coup perpetrators normally factor into their benefit/risk assessment of a prospective plot the fact that any attempt to overthrow the local authority could be resisted (sometimes through a military force) by external allies, which makes the probability of its success significantly lower. The role played by geopolitics in coup attempts is captured in this model by examining whether:

H4: *Countries that have signed one or more defensive or political treaties would be less likely to experience rapid recurrent coup events.*

The information regarding the variable [**Alliance**] used in the analysis is derived from the Correlates of War Formal Alliance dataset, which identifies all alliances that were formally established between at least two states during the last two centuries (Gibler and Sarkees 2004). This variable is coded 1 for the year in which a given country maintains a formal alliance treaty with one or more countries and 0 otherwise.

To test whether a political regime becomes more vulnerable to a coup plot when it decides to engage in a conflict against one or multiple parties or when facing a foreign policy crisis either with the international community or a group of countries, I include the covariate [**Foreign policy crisis**] (lagged variable). The latter is derived from the International Crisis Behavior Project (ICB), which covers all international and foreign policy crises for the period 1918-2006. The covariate is coded 1 for the year a country is facing an international or foreign policy crisis and 0 otherwise.

Measuring the impact of economic development

To complete the analysis of the factors that determine the duration until coup occurrence, I include a covariate controlling for the level of a country's economic development. Factors such as the deterioration of the GDP per capita or the continuous increase of the level of unemployment are often regarded as the primary causes of the erosion of public support, of internal demonstrations and of criticism of local governments' economic policy. I follow several scholars' suggestions and include in various specifications of the present model the level of [**GDP/capita**] as a proxy for local economic conditions (Belkin and Schoffer, 2003; Collier and Hoeffler, 2005; Londregan and Poole, 1990; McGowan and Johnson, 1984; Thompson, 1975). I suspect that:

H5: *A reduction in the individual income level creates a general sentiment of discontent among the population about the local authority, which would accelerate attempts by the elite to seize the reins of power.*

Measuring the impact of Military Expenditure

Military investment represents for some countries the bulk of government investments (Jenkins and Kposowa, 1992; Maniruzzaman, 1992; Morrison and Stevenson, 1974). Today, it is widely accepted among dictators that the easiest way to keep the army away from any aspiration to executive power is to increase the army's standard of living compared to the civilian population. Such a strategy ensures that for army commanders, the risk of losing their current privileges, should the potential military plot fail, will be much higher than the expected windfall resulting from the low probability of its success (Calvert, 1979; Collier and Hoeffler, 2005; McGowan, 2003).

A political leader can also use this investment to create or boost his own armed groups to counterweigh the power of the national military forces. This "palace army" has often absorbed the major share of the military investment and become sort of a privileged army with the ultimate role of controlling (or, to be more politically correct, one might say 'guiding') the regular army of the people. This argument is also shared by Belkin and Schofer (2003), who theorize that the government, in an attempt to neutralize any military threat to the established executive power, may decide to divide its army into several competing and mutually rival forces with a clear mandate to monitor each other at the expense of any organizational effectiveness or potential harmony that might otherwise be required during a time of warfare. This hypothesis is also found in the work of Quinlivan (1999), who stresses the importance for a political establishment to keep the status-quo by creating multiple internal security agencies with overlapping jurisdictions that report independently to the executive power with the goal of constantly monitoring each other's loyalty to the central authority. Based on the above, I expect that:

H6: *An increase in the military spending tends to reduce the hazard of coup recurrence and thus to prolong the political life of established regimes.*

To measure the statistical robustness of this hypothesis, I include a covariate controlling for the total military spending as a percentage of GDP [**Military expenditures/GDP**] in a given year (logged variable).

Empirical findings

Table 2 presents the results of the Cox regression model applied to the coup events. Columns 1 and 2 report the results of the conditional risk set model based on the elapsed time approach (i.e., a country is considered at risk of experiencing a coup episode from the time it enters the period under observation) and the gap time approach (i.e., a country is considered at risk only from the year of occurrence of the previous coup event), respectively.[4] These two risk set approaches are commonly used in the academic literature in the presence of a process of multiple failure events with a particular

sequential order (Balshaw and Dean, 2002; De Boef and Box-Steffensmeier, 2006; Schaubel and Cai, 2004).

Table 2: Cox regression estimates for the recurrence of coup d'état during the period 1973 to 2008

	Conditional Cox regression model with elapsed time approach (Model 1)	Conditional Cox regression model with gap time approach (Model 2)
Political regime	-0.849*** (0.234)	-0.838*** (0.228)
Coup trap	0.506*** (0.167)	0.427 (0.512)
Ethnic war	0.107 (0.245)	0.358* (0.223)
Alliance	0.475** (0.190)	0.470** (0.187)
L(Military expenditures/GDP)	-0.115** (0.048)	-0.118** (0.049)
L(GDP/capita)	-0.333*** (0.068)	-0.317*** (0.065)
Foreign policy crisis	0.423 (0.262)	0.365 (0.269)
LogLik	-598.13	-728.32
Wald Test	55.31***	52.71***
N	3552	3558

* $p < 0.10$; **$p < 0.05$; ***$p < 0.01$ (two-tailed); Standard errors are given in parenthesis.
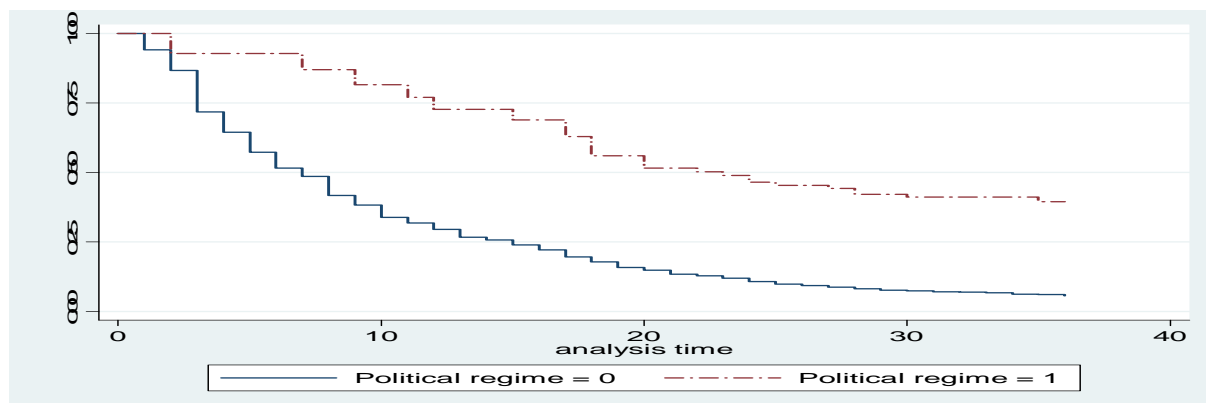
Irrespective of the specification used in the model, a coup is less likely to be staged in democratic societies in which political leaders are openly and freely elected by their people. This finding supports Bartelson's (1997) view that a democratic regime built upon a minimum level of harmony of interests between the state and the society makes any illegitimate seizure of power through coup plots superfluous, if not inconceivable. This finding is also consistent with Jackman's (1978) strong statistical evidence that an increased electoral turnout and political mobilization, reflecting a high degree of acceptance of the conventional process of elite succession, will in fact decrease the probability of a coup.

It is not surprising to find that out of the 102 countries studied, only Argentina in 1997, Paraguay in 2000, Benin in 1995, Bolivia in 1984 and the Philippines in 1990 have in fact experienced coup attempts during the first 10 years of the establishment of a fully democratic political regime. Figure 1 confirms this conclusion by showing that most authoritarian regimes are more likely to experience a coup plot during the first years of their establishment. By contrast, only 25% of the totalitarian countries in the sample have managed to avoid a coup event during the first 15 years of their regimes' power.

Model 1 provides a firm statistical support to Collier and Hoeffler's (2005) and Londregan and Poole's (1990) conclusions that countries could fall into what they describe as a "black hole" of political instability, or a "coup trap". The model shows that countries that have experienced at least one coup episode over the last three years have around 60% more chance to experience shorter periods of political stability until the next coup episode than countries with no history of coups. For countries like Bangladesh,

Chad, Mauritania and Comoros that have experienced more than seven coup plots over the period under observation, more than half of these episodes were staged during the three year period that immediately followed the previous coup.

Fig. 1: Kaplan-Meier survival function for political regime

Despite the strong initial assumption formulated as a result of prior theoretical research, the present model has yielded a positive and statistically significant coefficient for the covariate **[Alliance].** This result suggests that countries that have close foreign policy relations with other states through treaties or alliances are likely to face plots more frequently and at a faster pace than countries with no formal international alliances. Do these findings imply that countries that enter an alliance expose themselves to higher risk of coup? It is difficult to draw such a stark conclusion. One way of interpreting this result is by assuming that countries maintaining strategic alliances could face coups staged by groups (whether civilian or military) supported financially and morally by member states of other challenging alliances. Obviously, the outcome of such a plot will depend to a large extent on the respective political and military powers of the two opposing alliances. A country could thus become a battlefield for an indirect confrontation between the two major powers leading the two alliances. In these circumstances, a simple coup d'état against a given political regime might in fact hide a long-standing fight to control the international balance of power. Examples from the real world are countless.

The negative and significant coefficient of military spending in both models provides additional evidence for the claim that the public policy of allocating a significant part of the government budget to "please" its military arm plays a role in prolonging the duration of the political establishment's sovereignty. This finding is understandable in light of the fact that a period of political stability is expected to last much longer when the military forces have the impression that their part of the cake is constantly growing, regardless of whose parts are consequently shrinking (Wang, 1998). Lastly, and in line with our hypothesis above, internal economic development captured by a growing national income per capita to reflect an efficient economic policy implemented by the government appears to substantially diminish the need felt by the population to remove such a government.

I now turn to investigate the validity of the underlying assumption of the results generated by Table 2, the proportionality of the hazard (PH) function. According to Box-Steffensmeier et al. (2003): "PH requires that the effect of a change in the independent variable is to shift the hazard of the event of interest by a factor of proportionality and that the size of the shift remains constant over time" (Box-Steffensmeier et al., 2003: 34). Since I suspect that the magnitude of this effect for some of the covariates present in the model could change over the period under observation, I therefore propose to test the proportionality assumption using the widely-run Schoenfeld residuals test to detect any correlation between the residuals of the model and the time (Senese and Quackenbush, 2003). Table 3 reports the results of the Schoenfeld residuals test. Although the global test does not allow us to reject the hypothesis of an overall proportionality of the covariates present in the model, according to the covariate-specific test, there is statistical evidence that covariates [**Ln(Militaryexpenditures/GDP**] and [**Ln(GDP/capita)**] violate the assumption of PH. In other words, the influence of the covariates is expected to vary as time passes and as we approach the failure time (in our case, the onset of coup events).

Table 3: Schoenfeld residuals analysis to test the model's proportionality assumption

	rho	chi2	df	Prob>chi2
Political regime	-0.05	0.78	1.00	0.37
Coup trap	-0.01	0.03	1.00	0.85
Ethnic war	-0.04	0.01	1.00	0.92
Alliance	-0.00	0.00	1.00	0.99
L(Military expenditures/GDP)	-0.12	5.35	1.00	0.02
L(GDP/capita)	0.15	3.61	1.00	0.05
Foreign policy crisis	0.01	0.11	1.00	0.74
Global test		10.07	7.00	0.18

This statistical conclusion is confirmed by Fig. 2 and Fig. 3, which show that the residuals of these two covariates tend to trend slightly either upward or downward across time. This finding provides an additional support to the above conclusion regarding the violation of the (PH) assumption for these two covariates.

I follow the approach suggested by several authors (Balch-Lindsay, Enterline and Joyce 2008; Box-Steffensmeier et al., 2003; Box-Steffensmeier and Zorn, 2001; Grieco, 2001; Krustev, 2006; Senese and Quackenbush, 2003, Ulfelder and Lustik, 2005) to relax the proportional hazard assumption of the standard Cox model by introducing an additional interaction term between the covariate and the time to test for any statistical significance of the influence variation across time. As Grieco (2001) points out, this method allows us to capture "the immediate effects that are induced by the variables on

the hazard of recurrence and determine if these effects remain constant, intensify, or wane over time".

Fig. 2: Scaled Schoenfeld test for test for
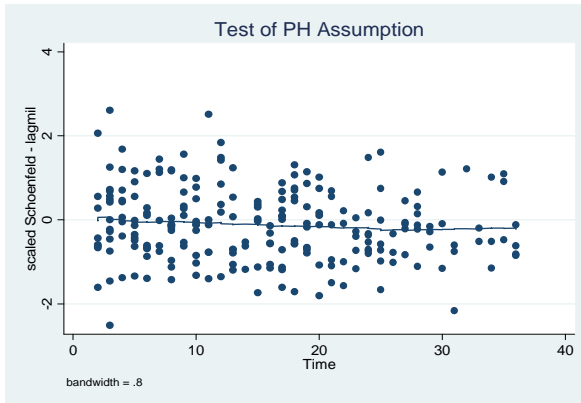 *the covariate military expenditures*
  GDP/capita
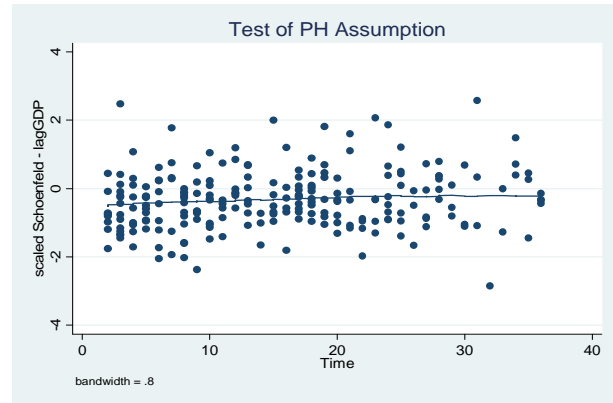   *Fig. 3: Scaled Schoenfeld covariate*

Table 4 reports the results of the Cox conditional gap time model when assuming a non-proportionality of the hazard for the covariates [**Ln(GDP/capita)**] and [**Ln(Military expenditures/GDP**]. I follow Ezell et al.'s (2003) and Box-Stefensmeier et al.'s (2007) recommendations to estimate the gap time model with stratification; which, according to the latter, "seems the most natural variance-corrected model for repeated events (…), as it explicitly orders sequential events and baseline hazards are allowed to vary by the number of events experienced" (Box-Stefensmeier et al., 2007: 239). The hazard for a political regime in a country i to experience its *kth* coup plot at the time t given the vector of regression coefficient β and observed covariates X_k, can therefore expressed as:

$$h_{ik}(t) = \lambda_{0k}(t - t_{k-1})e^{\beta_1 x_{i1} + \ldots + \beta_k x_{ik}}$$

As shown in table 4, the coefficients capturing the nature of political regimes remain statistically significant. The influence of the political system on the rapidity of coup occurrence becomes insignificant, however, for regimes in place for more than 20 years. This ambiguity seems to result from the fact that after several years in power, non-democratic political leaders no longer fear to be overthrown because of their totalitarian regimes. One may infer from this finding that a dictatorship, if not overthrown in the first few years of its establishment, will most probably have long years to live (Lunde, 1991). According to the present sample, only non-democratic regimes in Nepal (2002), the Democratic Republic of Congo (2004) and Qatar (1995) have faced coup plots after 20 years of absence of any extra-constitutional attempts for the transfer of political power. I hence join Londregan and Poole (1990) in their conclusion that political leaders who came to power by extra-legal means are more likely to be ousted than their legally appointed counterparts mainly during the first years of their rule (Fig. 4).

Fig. 4: Hazard of coup occurrence for political regimes between 1973 and 2008

Most specifications of the model provide additional convincing evidence to our hypothesis that the onset of ethnic wars accelerates the occurrence of coup attempts in subsequent years (Jenkins and Kposowa, 1992; Wang, 1998). The political fragility and the incapacity to expand authority over the whole territory in the periods that follow the outbreak of internal wars explain the statistical significance of this covariate. The ethnic tensions and the frustration sentiments among the local population as a result of these wars have proven to be a powerful predictor of potential recurrent coup plots.

The covariate Military spending/GDP appears to be unrelated to the hazard of recurrence of coup plots, as its coefficient fails to obtain a statistical significance for most specifications. This finding does not support my original hypothesis and Jenkins and Kposowa's (1990) statistical finding that "a strong military is more likely to intervene" (Jenkins and Kposowa, 1990: 862). One way of looking at the statistical insignificance of this covariate can be derived from Quinlivan's (1999) conclusion that the survival of a political establishment (particularly in totalitarian regimes) depends on the loyalty and the effectiveness of its security services more than on its reliance on the regular army. The covariate capturing the interaction of military expenditures with time is, however, significantly different from 0 in most specifications, suggesting that, although military spending does not seem to influence the period between two successive coup episodes, a sustained increase of military spending appears to substantially reduce the risk that the government will be overthrown during the long run. This result appears to be at odds with Jenkins and Kposowa (1992) who argue on the contrary that, in certain developing countries, the stronger the military resources are, the weaker are the civilian institutions and the higher the likelihood for the executive power to be overthrown by the army.

The coefficient for the covariate GDP/capita confirms the original hypothesis. In various specifications, the coefficient is negative and statistically significant, which supports the conclusion above regarding the effect of national income deterioration on the short duration of political stability. The growing discontent of the population about the economic and social conditions will prepare the ground for the elite to take the lead in questioning the legitimacy of the government (Bartelson, 1997; Fossum, 1967; Jenkins and Kposowa, 1992; Londregan and Poole, 1990). In many developing countries, such a

deterioration of the average income hides in addition an unequal distribution of the national wealth, with a small fraction of the population controlling a large portion of the national wealth at the expense of the low and middle classes. In these circumstances, the unequal distribution of the domestic wealth can also play a major role in accelerating the ousting of a local government that has allowed, intentionally or through mismanagement of public funds, a long-term disequilibrium of the social and economic landscapes of the country (O'Kane, 1993; Stauffer, 1974). This influence appears however to wane over time as confirmed by the positive coefficient of the interaction term between the *GDP/capita* and time. As years pass, the population, particularly in developing countries, tends to accept poverty as a "divine fatality" and thus does not blame their leaders for it or use it as a pretext to question the legitimacy of those who trapped them in this destiny.

Table 4: Estimation of Cox conditional gap time model
for coup episodes between 1973 and 2008.

	Model 1	Model 2	Hazards of coups at different time intervals	
			T < 10 years	T > 20 years
Political regime	-	-0.797***	-0.645***	-1.363
		(0.235)	(0.216)	(1.076)
Political rights	-0.579***	-	-	-
	(0.194)			
Coup trap	0.535	0.518	0.570	-
	(0.519)	(0.513)	(0.523)	
Ethnic war	0.386*	0.367*	0.388	-
	(0.225)	0.220)	(0.250)	
Alliance	0.409**	0.436**	0.386*	1.510
	(0.192)	(0.190)	(0.201)	(0.267)
L (Mil. spending/GDP)	0.053	0.055	0.116	-2.172
	(0.076)	(0.078)	(0.085)	(1.326)
L(GDP/capita)	-0.376***	-0.367***	-.400***	2.188**
	(0.080)	(0.079)	(0.079)	(0.914)
Foreign Policy Crisis	0.292	0.304	0.328	--
	(0.276)	(0.274)	(0.311)	
Mil. Spending * Time	-0.013***	-0.013***	-.019***	0.078
	(0.005)	(0.004)	(0.005)	(0.046)
GDP * Time	0.003	0.003	0.006**	-0.098**
	(0.003)	(0.002)	(0.002)	(0.032)
No. of Obs	3558	3558	1921	781
Loglikelihood	-725.53	-723.05	-590.06	-17.10
Wald test	53.73***	56.64***	62.64***	2856***

* $p <0.10$; **$p <0.05$; ***$p <0.01$ (two-tailed); Standard errors are given in parenthesis.

The coefficient of the covariate Alliance provides additional support to my finding above, which refutes the original hypothesis. Developing countries that have signed treaties of alliance are likely to experience coup plots more rapidly than other countries

not participating in any alliance. In most specifications of the model, this covariate seems to have a great influence on shortening the time until the event's occurrence. Finally, the consistent but insignificant positive coefficient associated with the covariate capturing the occurrence of international crisis, although it appears in the same direction of my intuitive hypothesis above, it does not allow me to draw a firm statistical conclusion on the relationship between external vulnerability and the acceleration of occurrence of internal instability in the political establishment.

As shown in Table 1, many countries have experienced several successive coups over the period under observation, while others faced few or, in some cases, no major political instability. To further examine such a disparity between countries like Bangladesh, Chad, Burundi or Sudan (to cite only those) that went through more than five coups over the last 30 years and countries like Algeria, Costa Rica, India or Malaysia that have had none, I now propose to investigate the possibility of the existence of some unmeasured or perhaps unobservable heterogeneities that could explain why some countries might be more susceptible than others to experiencing repeated coup events.

In this last part of this article, I test the hypothesis that countries sharing unmeasured factors such as common historical backgrounds (Fossum, 1967), cultural beliefs, or in certain cases religious guidance, tend to have more correlated event hazards than other countries (5). The hazard function with unmeasured frailty term is estimated by:

$$h\left(t_i / x_i, \xi_i\right) = h_0(t_i)e^{\beta_1 x_{i1} + \dots + \beta_k x_{ik} + \varphi \xi_i}$$

where the ξ_i is a frailty term from a probability distribution (i.e., gamma distribution) for the *i*th country.

The hazard rate is now conditional on both the covariates and the frailty term. According to Klein (1992), ignoring the existence of potential dependence among subjects, sharing some unobserved effects, can in fact induce erroneous conclusions. As pointed out by those scholars who used frailty models to investigate the likelihood of a particular event occurrence (Anderson et al., 1997; Box-Steffensmeier et al., 2007; Congdon, 1994; Ratcliffe et al., 2004) when implicitly accounting for a random effect (i.e., frailty effect), the Cox regression is expected to gain significantly in terms of coefficient bias reduction by capturing the multiplicative effect, if any, of the hazard rate of each subgroup of countries (Klein, 1992). I follow Klein's (1992), Ratcliffe et al.'s (2004) and Anderson et al.'s (1997) suggestion to assume a Gamma distribution for the frailty, estimated with an EM algorithm (6).

Column 1 of Table 5 displays the results of the standard frailty model that controls for heterogeneity by incorporating a random effect but does not control for event dependence. The conditional frailty model – which, according to Box-Steffensmeier et al. (2007), appears to be "superior to alternative models when repeated event processes are characterized by both event dependence and heterogeneity" (Box-Steffensmeier et al., 2007: 238) – is presented in column 2. This second model, in addition to including a random effect to account for heterogeneity, stratifies cases by event number to implicitly account for a separate baseline for the hazard of each coup event (De Boef and Box-

Steffensmeier, 2006). Hence, this second specification is expected to simultaneously incorporate both characteristics that are present in the model, that is, event dependence and within-subject random effect (Anderson et al., 1997; Box-Steffensmeier et al., 2007; De Boef and Box-Steffensmeier, 2006; Klein, 1992; Ratcliffe et al., 2004). The hazard function is thus given by:

$$h_{ik}(t) = \lambda_{0k}(t - t_{k-1})e^{\beta_1 x_{i1} + \ldots + \beta_k x_{ik} + \xi_i}$$
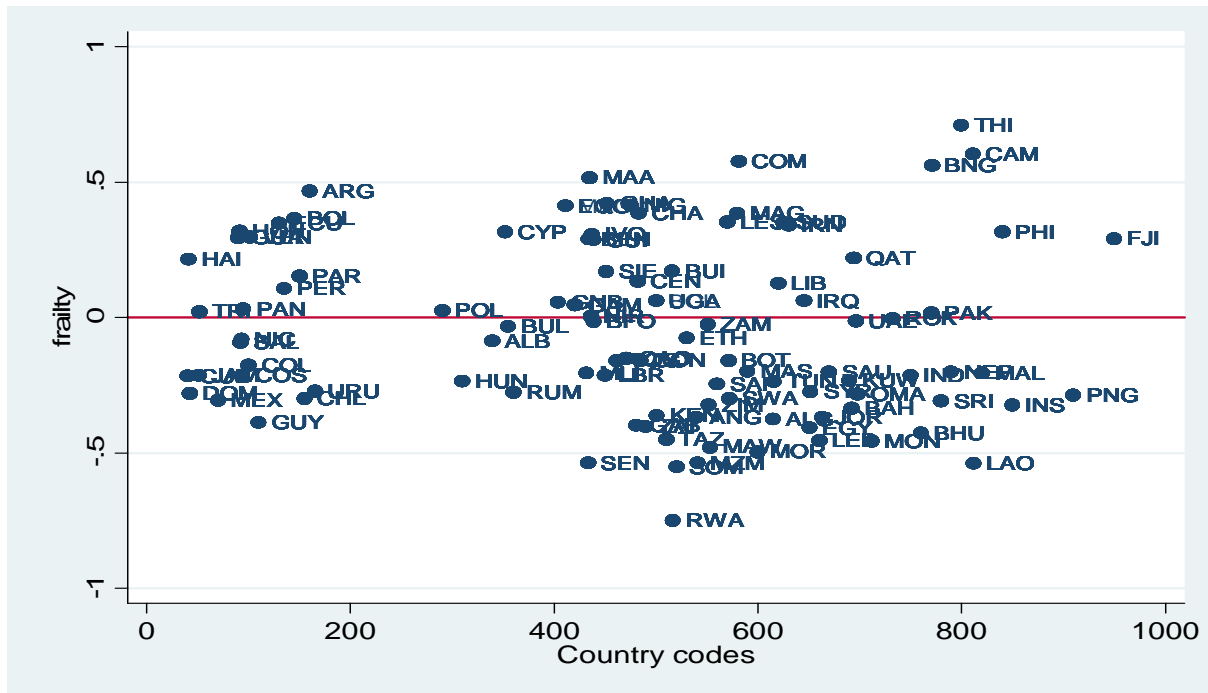
Based on the results from the standard frailty model, I find additional firm analytical support to the earlier finding that the nature of the political regime is significantly associated with the duration of internal political peace. Authoritarian systems are more exposed to the risk of frequent coups. This risk is reduced by 60% for democratic regimes compared with alternative political regimes, controlling for all other covariates. Countries that entered alliance treaties or that had a history of political instability are also expected to experience shorter periods of political peace before being put at risk of coup plots. Once again, I cannot use the coefficient of the covariate capturing the occurrence of internal or external conflicts to confirm or reject the initial hypothesis that the latter increases the fragility of the central authority and, therefore, its vulnerability to recurrent coup plots. The significance of the frailty term (θ) at the 0.001 level confirms the presence of an unobserved heterogeneity in the present model, which provides a support to the hypothesis above: that some countries are more prone than others to experience coup plots due to unmeasured factors. Fig. 5 plots the frailty estimates by country. Countries that are positioned above the line crossing the frailty level 0 are considered to have higher frailty. Thailand, Comoros, Mauritania, Cambodia and Bangladesh are, according to the model, more prone to experience coup plots than those below the 0 reference line, which are countries projected to experience much longer periods of political stability.

Table 5: Estimated Cox regression model with frailty term.

Covariates	Frailty model (Gamma distribution)	Conditional frailty model (Gamma distribution)
Political regime	-0.919***(0.239)	-0.889***(0.241)
Coup trap	0.477** (0.148)	0.214 (0.555)
Ethnic war	0.384* (0.221)	0.408* (0.226)
Alliance	0.527** (0.206)	0.537***(0.183)
Foreign policy crisis	0.351 (0.243)	0.396 (0.247)
L(Military spending/GDP)	-0.107* (0.055)	-0.099* (0.054)
L(GDP/capita)	-0.410***(0.104)	-0.427***(0.106)
θ	0.53***	0.40**
Likelihood ratio for θ	19***	4.2**
I-Likelihood	-961.222	-727.216
Log-Likelihood	-906.614	-681.045

* $p < 0.10$; **$p < 0.05$; ***$p < 0.01$ (two-tailed); Standard errors are given in parenthesis.
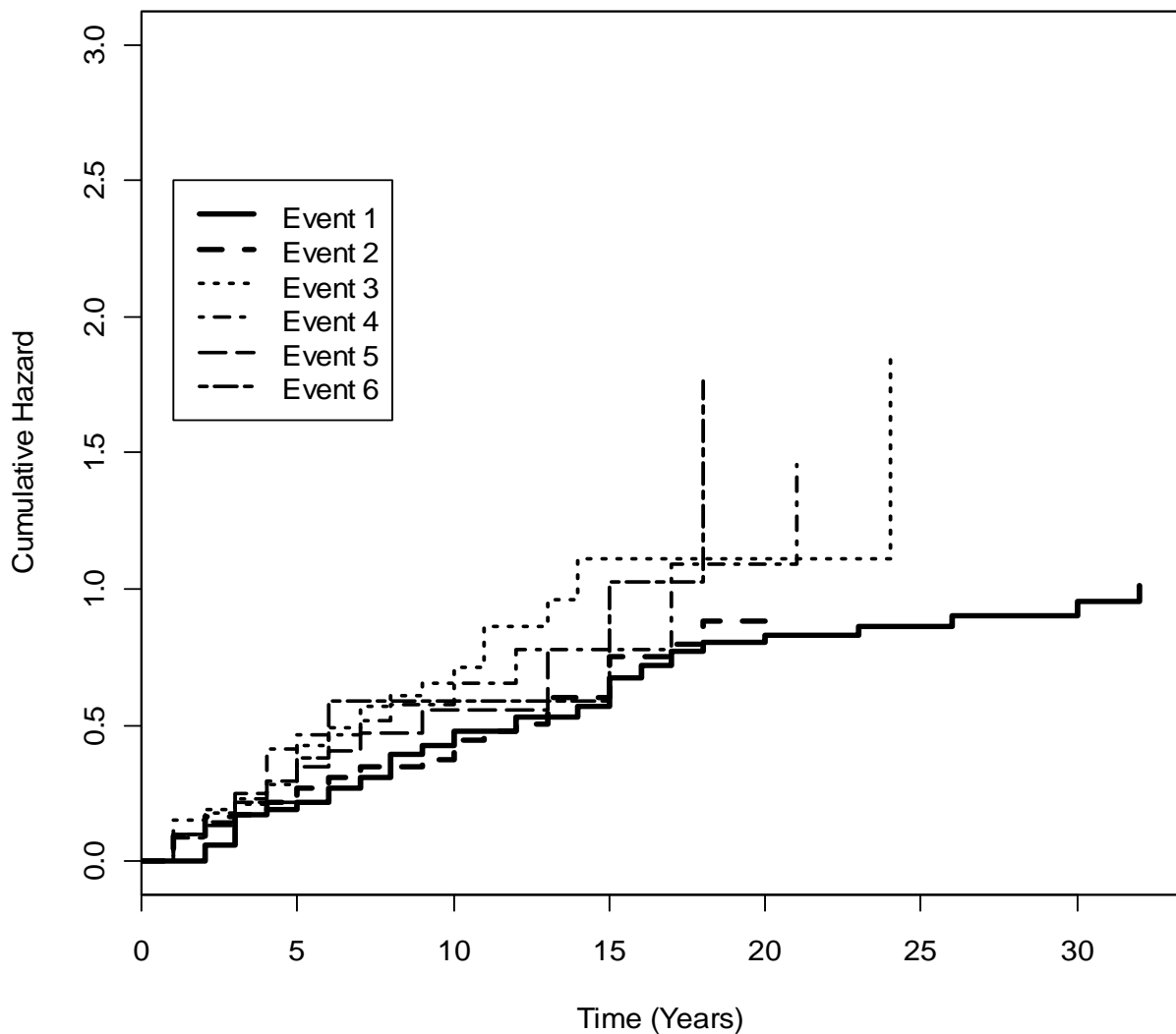
Fig. 5: Estimated frailties by country

The results of the conditional frailty model in column two are generally similar to the standard frailty model and confirm all our previous findings. The significance of the (θ) variance at the 0.01 level in the conditional frailty model lends a firm statistical support to the hypothesis that for certain groups of countries experiencing coup plots rapidly accelerates future use of such illegitimate means to seize power, either because coups become an accepted tool to overthrow fragile political institutions or because successive illegal attempts to control the executive authority finish by destabilizing the local political system even further. I therefore join several scholars in suggesting that, for a given country, the fact that a coup was staged in an earlier period affects the likelihood for the country to face similar episodes in subsequent periods, which is what Collier and Hoeffler (2005) rightfully refer to as the "coup trap" phenomenon. According to McGowan and Johnson (1984), this coup trap could be the result of a vicious circle in which economic decline leads to political instability and military intervention to fill the vacuum left by politicians, which in turn produces more economic volatility that further undermines the legitimacy of political institutions.

As shown in Fig. 6 above, each coup event clearly displays a different cumulative hazard function curve, which provides support to the above assumption of event dependence. The hazard function curve for the fourth, fifth and sixth events appear more shrunken than those for the first three events. This suggests that countries are more likely to face coup plots within shorter time periods if they have already had similar previous episodes of political instability. I can thus conclude that the risk for a country to experience a second and subsequent coup events increases as the country faces its first

coup, second coup, etc. Phrased differently, the more a country experiences coup events, the more it finds itself trapped in such an illegitimate mechanism of executive power succession. This finding yields further support for the hypothesis of the vicious circle of political instability in some developing countries. Successive coup plots undermine the fragile political establishment, thus making it more susceptible to experiencing a new one.

Fig. 6: Estimated cumulative hazards by coup events

As shown in Fig. 6 above, each coup event clearly displays a different cumulative hazard function curve, which provides support to the above assumption of event dependence. The hazard function curve for the fourth, fifth and sixth events appear more shrunken than those for the first three events. This suggests that countries are more likely to face coup plots within shorter time periods if they have already had similar previous episodes of political instability. I can thus conclude that the risk for a country to

experience a second and subsequent coup events increases as the country faces its first coup, second coup, etc. Phrased differently, the more a country experiences coup events, the more it finds itself trapped in such an illegitimate mechanism of executive power succession. This finding yields further support for the hypothesis of the vicious circle of political instability in some developing countries. Successive coup plots undermine the fragile political establishment, thus making it more susceptible to experiencing a new one.

Conclusion

Despite wide theoretical and empirical contributions that have analyzed the determinants of coup event occurrence in developing countries, few scholars have attempted to use event history analysis to better apprehend the role played by the time factor in the onset of this extra-constitutional succession of executive power. In this study, I examined 232 coup episodes that occurred in more than 100 countries over the last 35 years. I built on previous theoretical contributions and used the Cox regression model, which has gained momentum in recent years, particularly in the social sciences. The main findings of this study indicate that the existence of non-democratic political regimes accelerates the recurrence of coup plots. Such a vulnerability to coup episodes is increased in low-income economies. In contrast to previous research, I reach a nuanced conclusion with regard to the influence of military spending on the duration of periods of political stability. The study further uncovers the fact that the duration between two successive coup episodes seems not to be affected by either internal or external crises. To account for coup event dependence and possible unobserved factors that might explain why some countries are more prone to coup episodes than others, I re-estimated the original model by introducing a frailty term using a conditional gap time approach to capture both characteristics. Overall, the results confirm the initial findings. The significance of the frailty term provides support to the hypothesis of the proneness of some countries to coup episodes compared to others. These countries seem to be trapped in unstable political conditions, a situation that confirms the conclusions reached by several scholars about what is now widely known as the "coup trap".

Notes

1. Auvinen (1997) found strong statistical support for his hypothesis of an inverted U-curve relationship between regime type and political instability. The author showed that, while mildly authoritarian regimes appear to come under tremendous pressure as a result of internal riots or demonstrations, regime vulnerability drops sharply in case of totalitarian central authorities.
2. The accuracy of certain episodes was verified through various alternative sources of information.
3. According to the Freedom in the World Survey, countries whose combined average ratings for Political Rights and for Civil Liberties fell between 1.0 and 2.5 were designated "Free"; between 3.0 and 5.5 "Partly Free," and between 5.5 and 7.0 "Not Free."
4. I strongly believe that the amount of information contained in each coup could be significantly different from one episode to the next because the experience gained during the prior coup attempt

usually serves as a "lesson" for local authorities to try to avoid the coup's future recurrence. Thus, I suspect that models that account for such an event dependence by stratifying the parameter estimation according to each event number would be more appropriate for studying these episodes (De Boef and Box-Steffensmeier, 2006).

5. This hypothesis was initially developed by Wells (1974), Jenkins and Kposowa (1990; 1992) and O'Kane (1993) who argue that factors such as colonial heritage or territorial contagion might have played a crucial role in determining the degree of country's proneness to a recurrent coup activity.

6. I am grateful to Janet M. Box-Steffensmeier and Kyle A. Joyce for sharing some of the replication materials used in their articles. The materials are available on the authors' respective websites:
   http://dvn.iq.harvard.edu/dvn/dv/Steffensmeier   and
   http://psfaculty.ucdavis.edu/kjoyce/research.html.

References

Anderson, P., Klein, J., Knudsen, K., and Palacios, R., 1997. "Estimation of Variance in Cox's Regression model with Shared Gamma Frailties." *Biometrics* 53(4), pp. 1475-1484.

Auvinen, J., 1997. "Political Conflict in Less Developed Countries 1981-1989." *Journal of Peace Research* 34(2), pp. 177-195.

Balch-Linday, D., Enterline, A., and Joyce, K., 2008. "Third-Party Intervention and the Civil War Process." *Journal of Peace Research* 45(3), pp. 345-363.

Balshaw, R. and Dean, C., 2002. "A Semi-parametric Model for the Analysis of Recurrent-Event Panel Data." *Biometrics* 58(2), pp. 324-331.

Bartelson, J., 1997. "Making Exceptions: some Remarks on the Concept of Coup d'état and its History." *Political Theory* 25(3), pp. 323-346.

Belkin, A., Schofer, E., 2003. "Toward a Structural Understanding of Coup Risk." *Journal of Conflict Resolution* 47(5), pp. 594-620.

Box-Steffensmeier, J., and Zorn, C., 2001. "Duration models and Proportional hazards in Political Science." *American Journal of Political Science* 45(4), pp. 972-988.

Box-Steffensmeier, J., and Zorn, C., 2002. "Duration models for repeated events." *Journal of Politics* 64(4), pp. 1069-1094.

Box-Steffensmeier, J., De Boef, S., and Joyce, K., 2007. "Event Dependence and Heterogeneity in Duration Models: The Conditional frailty Model." *Political Analysis* 15, pp. 237-256.

Box-Steffensmeier, J., Reiter, D., Zorn, C., 2003. "Non-proportional Hazard and Event History Analysis in International Relations." *Journal of Conflict Resolution* 47 (1), pp. 33-53

Bradley, P., 1936. "Diplomacy by coup d'état." Annals of the American Academy of Political and Social Science 186, pp. 66-72.

Calvert, P., 1979. "The Coup: A Critical Restatement." *Third World Quarterly* 1(4), pp. 89-96.

Collier, P. and Hoeffler, A., 2005. "Coup Traps: Why does Africa have so many Coups d'état?" Paper presented at the annual meeting of the American Political Science Association, Washington, DC, Sep 01, 2005.

Congdon, P., 1994. "Analyzing mortality in London: Life-Tables with Frailty." *Journal of the Royal Statistical Society* 43 (2), pp. 277-308.

Cox, D., 1972. "Regression Models and Life-Tables." *Journal of the Royal Statistical Society* 34 (2), pp. 187-220.

De Boef, S., and Box-Steffensmeier, J., 2006. "Repeated events survival models: The conditional frailty models." *Statistics in Medicine* (25), pp. 3518-3533.

Ezell, M., Land, K., Cohen, L., 2003. "Modeling Multiple Failure Time Data: S Survey of Variance-Corrected Proportional hazards Models with Empirical Applications to Arrest Data." *Sociological Methodology* 33, pp. 111-167.

Fan, J. and Li, R., 2002. "Variable Selection for Cox's Proportional Hazards Model and Frailty Model." *The Annals of Statistics* 30(1), pp. 74-99.

Fossum, E., 1967. "Factors Influencing the Occurrence of Military Coups d'état in Latin America." *Journal of Peace Research* 4(3), pp. 228-251.

Fosu, A., 2002. "Political Instability and Economic Growth: Implications of Coups Events in Sub-Saharan Africa." *American Journal of Economics and Sociology* 61(1), pp. 329-348.

Galetovic, A., and Sanhueza, R., 1999. "Citizens, Autocrats, and Plotters: A model and New Evidence on Coups D'état." Centro de Economia Aplicada (CEA).

Gibler, D., Sarkees, M., 2004. "Measuring Alliances: The Correlates of War Formal Interstate Alliance Data set, 1816-2000." *Journal of Peace Research* 41(2), pp. 211-222.

Gibler, D., Vittinghoff, E., 2004. "Modeling clustered survival data from multicentre clinical trials." *Statistics in Medicine* 23, pp. 369-388.

Goldstone, J., Bates, R., Epstein, R., Gurr, T., Lustik, M., Marshall, M., Ulfelder, J., Woodward, M., 2010. "A Global Model for Forecasting Political Instability." *American Journal of Political Science* 54(1), pp. 190-208.

Grieco, J., 2001. "Repetitive Challenges and recurrent International Conflicts, 1918-1994." *International Studies Quarterly* 45(2), pp. 295-316.

Henderson, E., and Singer, D., 2000. "Civil war in the Post-Colonial World, 1946-92." *Journal of Peace Research* 37 (3), pp. 275-299.

Herschberger, R., 1941. "Coup d'état." *The Kenyon Review* 3 (4), pp. 416-417.

Ibrahim, A., 2009. "Guarding the state or protecting the economy. The Economic factors of Pakistan's military coups", Working Paper Series, No. 09-02, Development Studies Institute, London School of Economics and Political Science.

Jackman, R. 1978. "The Predictability of Coups d'état: A Model with African Data." *The American Political Science Review* 72 (4), pp. 1262-1275.

Jenkins, J. and Kposowa, J., 1990. "Explaining Military Coups D'état, Black Africa, 1957-1984." *American Sociological Review* 55 (6), pp. 861-875.

Jenkins, C., and Kposowa, A., 1992. "The Political Origins of African Military Coups: Ethnic Competition, Military Centrality, and the Struggle over the Postcolonial State." *International Studies Quarterly* 36(3), pp. 271-291.

Klein, J., 1992. "Semi-parametric Estimation of Random Effects Using the Cox Model based on the EM Algorithm." *Biometrics* 48(3), pp. 795-806.

Krustev, V., 2006. "Interdependence and the Duration of Militarized Conflict." *Journal of Peace Research* 43(3), pp. 243-260.

Li, R., Thompson, W., 1975. "The 'Coup trap' Hypothesis." *Journal of Conflict Resolution* 19(1), pp. 63-88.

Li, Y. and Ryan, L., 2002. "Modeling Spatial Survival data Using Semi-parametric Frailty models." *Biometrics* 58(2), pp. 287-297.

Londregan, J., and Poole, K., 1990. "Poverty, the Coup Trap, and the Seizure of Executive Power." *World Politics* 42(2), pp. 151-183.

Lunde, T., 1991. "Modernization and Political Instability: Coups d'état in Africa, 1955-85." *Journal Acta Sociologica* 34(1), pp. 13-32.

Maniruzzaman, T., 1992. "Arms Transfers, Military Coups, and Military Rule in Developing States." *Journal of Conflict Resolution* 36(4), pp. 733-755.

Marinov, N. and Goemans, H., 2008. "What Happened to the Coup d'état? International Responses to the Seizure of Executive Power." Paper presented at the annual meeting of the MPSA Annual National Conference, 2008.

Marshall, M., Gurr, T., and Harff, B., 2009. "State Failure Problem Set, Dataset and Coding Guidelines." Political Instability Task Force (PITF).

McGowan, P., 2003. "African military coups d'état, 1956-2001: frequency, trends and distribution." *Journal of Modern African Studies* 41(3), pp. 339-370.

McGowan, P., and Johnson, T., 1984. "African Military Coups d'état and Underdevelopment: A Quantitative Historical Analysis." *Journal of Modern African Studies* 22(4), pp. 633-666.

Morrison, G. and Stevenson, H., 1974. "Social Complexity, Economic Development and Military Coups d'état: Convergence and Divergence of Empirical Teats of Theory in Latin America, Asia, and Africa." *Journal of Peace Research* 2(4), pp. 345-347.

O'Kane, R., 1993. "Coups d'état in Africa: A Political Economy Approach." *Journal of Peace Research* 30(3), pp. 251-270.

O'Kane, R., Jackman, R., Johnson, T., McGowan, P., and Slater, R., 1986. "Explaining African Coups d'état." *The American Political Science Review* 80(1), pp. 225-249.

Powell, J., 2009. "Explaining the Occurrence and Outcome of Coups d'état." Paper presented at the Southern Political Science Association, 80th Annual Conference, New Orleans, 2009.

Quinlivan, J., 1999. "Coup-Proofing: Its Practice and Consequences in the Middle East." *International Security* 24 (2), pp. 131-165.

Ratcliffe, S., Guo, W., and Ten Have, T., 2004. "Joint Modeling of Longitudinal and Survival Data via a Common Frailty." *Biometrics* 60(4), pp. 892-899.

Schaubel, D., and Cai, J, 2004. "Regression Methods for Gap Time Hazard Functions of Sequentially Ordered Multivariate Failure Time Data." *Biometrika* 91(2), pp. 291-303.

Senese, P. and Quackenbush, S. (2003). "Sowing the seeds of Conflict: The Effect of Dispute Settlements on Durations of peace" *The Journal of Politics*, Vol. 65 (3) pp.0 0696-717.

Stauffer, R., 1974. "The Political Economy of a Coup: Transitional Linkages and Philippine Political Response." *Journal of Peace Research* 11(3), pp. 161-177.

Thompson, W., 1975. "Regime Vulnerability and the Military Coup." *Comparative Politics* 7(4), pp. 459-487.

Ulfelder, J., and Lustik, M., 2005. "Modeling transitions to and from democracy." Paper presented at the 2005 Annual Meeting of the American Political Science Association, September 1-4, 2005.

Wang, T. 1998. "Arms transfers and Coup d'etat: A Study on Sub-Saharan Africa." *Journal of Peace Research* 35 (6), pp. 659-675.

Wayman, F. and Tago, A., 2009. "Explaining the Onset of Mass Killing, 1949-87." *Journal of Peace Research* 20 (10), pp.1-17.

Wells A., 1974. "The Coup d'état in Theory and Practice: Independent Black Africa in the 1960s." *The American Journal of Sociology* 79(4), pp. 871-887.

Zald, M. and Berger, M., 1978. "Social Movements in Organizations: Coups d'état, Insurgency, and Mass Movements." *The American Journal of Sociology* 83 (4), pp. 823-861.

Zuk, G., Thompson, W., 1982. "The Post-Coup Military Spending Question: A Pooled Cross-Sectional Time Series Analysis." *The American Political Science Review* 76(1), pp. 60-74.