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# Loyalty for sale? Military spending and coups d'etat

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**Abstract** Coups d'etat continue to be common around the world, often leading to changes in leaders and institutions. We examine the relationship between military spending and coups and find that (i) successful coups increase military spending by more than failed attempts, and (ii) coups are more likely when military spending as a share of GDP is relatively low. Our identification strategy deals with the problem of reverse causality between coups and military spending by exploiting the conditional independence between a coup's outcome and the change in military spending that follows it. We interpret our results as evidence that the military may stage coups in order to increase its funding, and rule out several alternative explanations.

**Keywords** Coups · Income · Conflict · Military spending · Political economy

**JEL Classification** H56 · N40 · D72 · O17

## 1 Introduction

There is a growing consensus that political institutions and leadership matter for economic outcomes.[1] Political transitions and leadership changes often take place through coups d'etat, but coups remain a little understood political phenomenon. Political scientists have long argued that low military spending may trigger coups and that coups might be avoided by providing the military with sufficient budgetary resources. For example, in his classic study, Nordlinger (1977: 70) cited the example of President Romulo Betancourt in Venezuela, who "managed to serve out his entire constitutional term of office—the first time this had occurred in that country's military-dominated history—by providing the officers with the best salaries, rapid promotions, and a generous allotment of fringe benefits". The debate as to

[1] For example, see the seminal papers by Acemoglu et al. (2001) and Jones and Olken (2005).

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the importance of military salaries (and corporate interests more generally) as an important cause of coups persists to this day. For example, while Beeson (2008) argues that "neglect of military salaries" was partly responsible for the high number of coups faced by Corazon Aquino in the Philippines, Lee (2008) counters that "[i]n overlooking factors other than the military's corporate interests, Beeson limited his ability to understand fully the probability of future coups."

In this paper we examine the relationship between military spending and coups.[2] We first present a theoretical outline that leads to two empirical predictions: (i) successful coups result in larger increases in military spending than failed coups, and (ii) coups are more likely when military spending is relatively low. Most of the paper is devoted to an empirical analysis that uncovers evidence that supports these two predictions. For this analysis we use data for 153 countries over the 1963–1999 period, which includes coups, information on whether they succeeded or failed, military spending, and other country level variables. The coup data come from Belkin and Schofer (2003); the data on military spending and on the size of the military are taken from the U.S. Arms Control and Disarmament Agency, which is widely regarded as one of the most complete sources of historical military spending data and the best in terms of within country consistency.

The main difficulty in studying coups empirically is that the variables that determine whether coups happen, including military spending, can also be affected by coups. This reverse causality is problematic because, if ignored, it would keep us from estimating the true impact that military spending has on coups. To illustrate this point, suppose that whenever the government fears that a coup is about to take place, it increases military spending in an attempt to prevent it. In this case, we might find that high levels of military spending are followed by coups. However, this is not because high military spending triggers coups, but rather because the expectation of a coup leads to an increase in military spending. Not accounting for reverse causality could lead us to an incorrect conclusion.

We first test empirical prediction (i), dealing with the endogeneity problem, by limiting our attention to cases in which coups occurred, comparing the impact of success and failure on military spending. This approach is analogous to treating the outcome of a coup as a natural experiment, creating a control group of failed coups and a treatment group of successful coups, and is similar to the strategy used by Jones and Olken (2009) to study the impact of assassinations.[3] Our identifying assumption is that the outcome of a coup is independent of the post-coup change in military spending, conditional on all relevant observable variables. This allows us to use a difference-in-differences test for whether successful coups have a different impact on military spending than failed coups. We check for the validity of our identification assumption in several ways. First, we plot the trends in military spending around the time of a coup, for both successful and failed coups, and see that the trends are similar. We then divide the coups into two groups, successful and failed, and compare the group sample means for each variable evaluated on the year before the coup. We find no difference except that mean average military spending (as a fraction of GDP) before a successful coup is lower than before a failed coup, suggesting that greater military spending does not improve a coup's probability of success. To see whether any of these variables is a

[2] We define coups as attempts to overthrow the government by a small military coalition. As it will become clear later, coups are quite distinct from civil wars.

[3] As part of their seminal research on leadership, Jones and Olken (2009) use the outcome of assassination attempts to estimate the impact of changes in leadership on institutions and war. They restrict their sample to cases in which a weapon was used (e.g., the gun was fired, the bomb exploded), so that the outcome of the assassination attempt can be taken as random.

good predictor of a coup's outcome, we regress a coup's outcome on a number of controls evaluated the year before the coup; none of these variables predict the success or failure of coup attempts.

We compare military spending before and after each coup, and find that successful and failed coups differ significantly in their impact on military spending, with successful coups leading to changes in military spending that are about 25 % larger than the changes following failed coups. To further deal with the concern that unobservables may affect both coup outcomes and the changes in military spending that follow them, we re-run our regressions using only coups that resulted in casualties. Our reasoning is that these are coups where the outcome is likely to have been uncertain *ex ante*, and so where systematic differences in unobservables are less likely. Our results are stronger when we focus on this reduced sample.[4]

We then test prediction (ii) empirically, and do so by estimating a panel specification that looks at whether military spending is correlated with the incidence of coups. We use fixed effects to control for time-invariant country characteristics (e.g., institutions) that can affect income, military spending and coups. We find a negative and significant relationship between military spending and coups: within a country, years with lower military spending are followed by periods in which the probability of a coup is higher. For the average country-period pair, we find that increasing military spending as a share of GDP by one percentage point leads to a 1.5 percentage point decline in the probability of a coup in the following five-year period (where the mean is 18 %).[5] To put this into context, a one standard deviation increase in military spending lowers the probability of a coup in the following five years in the average country-period pair from 18 % to 8 %.[6] Our results are consistent with the view that military spending matters for coups: coups are more likely when military spending is low relative to a country's average, and successful coups are followed by larger increases in military spending than failed coups. We argue that one plausible explanation for this pattern is that coups are often staged by militaries that wish to increase their funding.[7]

This paper contributes to the literature on the economic causes and consequences of coups; the seminal papers in this literature are Zuk and Thompson (1982) and Londregan and Poole (1990, 1996). This paper is most closely related to Zuk and Thompson (1982), who look at the impact of regime type and coups on military spending. They find that military regimes have higher military spending as fractions of their budgets, but show no differential growth in military spending per capita. Similarly, they find that successful coups have a small positive impact on military spending as a fraction of the budget, but not on the growth rate of military spending per capita. They interpret their results as evidence that concerns about military spending are not a primary cause of coups. Our study differs in a number of important respects. First, we deal with reverse causality through our empirical

[4] We look at a number of other variables one and three years after a coup, and check whether the means differ significantly depending on the coup's outcome. We find no significant differences across success and failure except in institutions. This suggests that other policies and outcomes do not change differentially depending on a coup's outcome.

[5] We have tried to follow the growth regression literature as closely as possible, and hence our use of five-year periods. By looking at a five-year interval we allow for a window during which military spending may have an effect on coups.

[6] We also find that income measures have a significant negative relationship with coups when no fixed effects are entered, which is consistent with the literature (e.g., Londregan and Poole 1990). However, this result vanishes when we enter fixed effects.

[7] There are a number of alternative mechanisms that could connect military spending and coups, and our findings allow us to refute a number of them (as we discuss in Sect. 6).

design. Second, we look at more countries and more years, and we include country or region fixed effects throughout, thus controlling for time-invariant country or region specific effects. Finally, instead of using GLS, we deal with heteroscedasticity and serial autocorrelation by using clustered standard errors when doing inference; this is a better fix than using GLS, which requires assumptions about the functional form of the heteroscedasticity or the use of a biased estimator. In turn, this bias could lead us to conclude that there is no effect when in fact there is one.

Londregan and Poole (1990) estimate a simultaneous equation model using time series methods. They find that income per capita, economic growth and coups in the recent past are important predictors of future coup attempts. Our paper differs primarily in its focus on military spending and the use of a new identification strategy to deal directly with the endogeneity problem. Collier and Hoeffler (2005) show that income measures affect the likelihood of coups in Africa, while Collier and Hoeffler (2007) find that the risk of a coup d'etat has a non-monotonic impact on military spending. Powell (2012) finds that greater military spending per soldier reduces the probability of coup attempts, and interprets it as evidence that soldiers who are better funded are more content, and so less likely to stage a coup.[8] Our paper differs primarily in its emphasis on addressing the problem of reverse causality, which has implications for the empirical models we specify. Belkin and Schofer (2003) construct a coup risk measure based on past coups, the strength of civil society, and regime legitimacy. Finally, there is an extensive literature on the military; classic studies include Huntington (1957), Finer (1962), Luttwak (1969), Tullock (1974) and Nordlinger (1977).

This paper's main contribution is to the empirical study of coups, and it is closely related to a small but growing theoretical literature on the military and its role in political transitions. The first agency model of the military is due to Feaver (2003), who used it to explain civil-military relations in the United States. Acemoglu et al. (2010) build on Acemoglu and Robinson (2001, 2005) to show the circumstances under which the military may rebel against the elite, stage a coup, and establish a military dictatorship. In their model, an elite may pay the military high wages to avoid coups. Besley and Robinson (2010) look at the optimal size of the military, and conclude that a government may choose to pay it an efficiency wage in order to avoid coups. Leon (2013) looks at the relationship between war, coups and institutions, and shows that there is a non-monotonic relationship between the frequency of war and the likelihood of a coup. Mbaku (1991) studies the military as a rent-seeking interest group and looks at the determinants of military spending. Sutter (2000) presents a model of coups d'etat based on Tullock (1974). Our empirical findings lend support to a key feature of many of these models: that the military may stage coups if it is not properly funded.

The rest of this paper proceeds as follows: Sect. 2 presents our theoretical outline, while Sect. 3 describes our data. Section 4 establishes empirical fact (i), Sect. 5 establishes empirical fact (ii), and Sect. 6 concludes.

## 2 Empirical hypotheses

Our starting premise is that military officers care about military funding more than civilians. Military spending can benefit them directly (legally, through higher wages and improved

[8] However, he finds that changes in military spending do not affect the probability of a coup attempt.

equipment; or illegally, through opportunities for corruption) and indirectly (because they care about the institution and their friends and colleagues who are part of it, or because they care about their country and a better funded military is better able to fight). A direct implication is that military officers will prefer situations in which military spending is high over situations in which it is low (*ceteris paribus*). Of course, in practice they will need to trade off a number of factors. If funding is important, we should expect to see military spending go up after successful coups; if military spending does not go up, then military spending is not an important factor in the military's decision process. In other words, if funding is important, the following must be true:

**Hypothesis 1**: Successful coups result in larger increases in military spending than failed coups.

Even if the military prefers situations in which funding is greater, the question remains as to whether it will act in order to increase its funding. In particular, (a) does the action have to be a coup d'etat, and if so, (b) is the military willing and able to stage one? If the answer to either one of these two questions is no, then we should find no relationship between military spending and coups. On the other hand, if the following is true, then both statements (a) and (b) must be true:

**Hypothesis 2**: Coups are more likely when military spending is relatively low.

Although in this paper we do not test for the determinants of military spending, it is not unreasonable to think that it might be set too low, even if that triggers a coup. In most countries budgeting decisions require compromise between different interest groups, and this might lead to an outcome that is unsatisfactory to the military.

We take these two predictions to the data and find support for both of them: first, successful coups lead to changes in military spending that are larger than those that would have taken place if the coups had instead failed. Second, there is a correlation between low within country military spending (as a share of GDP) and the probability of a coup. We argue that a plausible interpretation that is consistent with both findings is that the military's desire for more generous military funding is a motivation for coups. In Sect. 6 we discuss and rule out a number of alternative explanations for our results.

## 3 Data on coups and military spending

We use a dataset with observations for 153 countries for the 1963–1999 period, which includes coups, their outcomes, military spending, and other country level variables. The coup data come from Belkin and Schofer (2003). There are a number of different coup datasets, and they differ across two key dimensions: on how they define coups, and on whether they report failed as well as successful coups. Given our interest in military spending, we want our definition of coups to be limited to cases in which the military is a key actor. Belkin-Schofer proves useful because they define coups as actions aimed at removing the 'regime' by a 'small military coalition', which includes most coups, but leaves out insurrections and coups led by civilians, which are altogether very different events. Belkin-Schofer is also one of the databases that includes both successful and failed coups, and it is comprehensive in terms of both country and time coverage.

We have coup information for 4,760 country-years, with coups taking place in 247 country-years. That is, coups occur in slightly more than 5 % of our country-years. Although coups are infrequent, close to half of the 153 countries in the dataset experienced at

least one coup between 1963 and 1999. The differences across regions are stark, with countries in Sub-Saharan Africa and Latin America experiencing the most coups. Coups have become much less common worldwide: from the 1960s to the 1990s, coups in Sub-Saharan Africa have halved while those in Latin America have decreased by more than two-thirds.[9]

We use data on political regimes from Cheibub et al. (2010), which is rooted in the datasets in Alvarez et al. (1996) and Przeworski et al. (2000). Like them, Cheibub et al. (2010) classify regimes into just two categories, democracy and dictatorship, arguing that a binary measure is more appropriate because changes in the middle range of the polity measure can be difficult to interpret. We use two of their variables: 'democracy', which equals 1 if the country is democratic and 0 otherwise; and 'military regime', which equals 1 if the country is ruled by the military and 0 otherwise.[10]

The data on military spending and on the size of the military were collected from the "World Military Expenditures and Arms Transfers" reports produced by the U.S. Arms Control and Disarmament Agency. These are widely regarded as one of the most complete sources of historical military spending data and are particularly well suited for looking at changes over time, as they were collected under the supervision of the same individual from the early 1960s to the early 1990s, ensuring some degree of within country consistency over time.[11]

We use data on GDP, population, and the allocation of countries to regions from the World Bank Development Indicators (2009). Our data on political instability come from Banks (2001); we use the 'weighted conflict index' variable, which is listed by Powell (2012) as a good predictor of coup outcomes. We use data on casualties resulting from coups from Marshall and Marshall (2010), corrected for missing values using news reports we collected from the New York Times Archive. For more details on all variables please see the appendix. Summary statistics for all key variables are shown in Table 1.

## 4 Coup outcome and military spending

### 4.1 Specification

In this section we establish our first empirical result: (i) successful coups increase military spending by more than failed attempts. In order to test how successful coups affect military spending we need to take into account that military spending might be trending. We need to distinguish the true impact of experiencing a successful coup from the trend, and it is possible that trends differ across regions and between times with and without coups. A natural way to proceed is to follow the approach used by Jones and Olken (2009) to examine the impact of assassinations on institutions and war. We limit our attention to cases where coups took place, and compare instances in which the coups succeeded with instances in which

[9] Tables A1–A4 in the online Appendix (http://www.caths.cam.ac.uk/personal/gleon/loyalty_appendix) summarize the data in more detail.

[10] Table A5 in the online Appendix (http://www.caths.cam.ac.uk/personal/gleon/loyalty_appendix) shows that most coups are staged against non-democracies. However, whether a coup succeeds or fails appears to be unrelated to whether the target regime is democratic. Perhaps not surprisingly, the vast majority of successful coups lead to non-democratic regimes, while most failed coups result in the regime type remaining unchanged.

[11] Table A6 in the online Appendix (http://www.caths.cam.ac.uk/personal/gleon/loyalty_appendix) shows average military spending as a percentage of GDP by country-year, separated by region and decade.

**Table 1** Summary statistics

| | Mean | Std. deviation | Observations |
|---|---|---|---|
| Coups | 0.05 | 0.22 | 4,760 |
| Military expenditures/GDP (total = 100) | 4.47 | 6.53 | 3,988 |
| Military expenditures (millions, 2000 $) | 5,763 | 28,471 | 4331 |
| GDP per capita (2000 $) | 5,080 | 7,656 | 4,144 |
| GDP (millions, 2000 $) | 145,645 | 636,387 | 4,147 |
| Population (in Millions) | 31.55 | 112.11 | 4,678 |
| Size of military (in millions) | 0.15 | 0.41 | 4,653 |
| Democracy | 0.39 | 0.49 | 5,905 |
| Military regime | 0.21 | 0.41 | 5,931 |
| Instability | 3,024 | 7,748 | 4,595 |

Notes: Coups is a binary variable equal to 1 if there was at least one coup in that country-year, 0 otherwise; Democracy is a binary variable that equals 1 if the country was democratic and 0 othewise; Military Regime equals 1 if the government was in the hands of the military, 0 otherwise; Instability measures political instability and is from Banks (2001)

they failed. We use a difference-in-differences specification, where our natural experiment is experiencing a successful coup; treated units are those where a successful coup took place, while the controls are those in which the coup failed. This allows us to estimate an average treatment effect: the average impact on military spending from experiencing a successful coup instead of a failed one.

This approach eliminates the problem caused by the possible endogeneity of coup attempts. However, for us to correctly estimate the impact of successful coups on military spending, the grouping variable (in our case whether the coup succeeds or fails), needs to be conditionally independent from the variable of interest (military spending after the coup). This requires that we control for selection into and out of the treatment group, so that once we have controlled for the factors that affect a coup's probability of success, we can take the outcome of a coup to be independent of the changes in military spending that follow it. This is the 'common trends' condition that allows us to use failed coups as counterfactuals.[12] Figure 1 shows the trends in military spending for successful and failed coups, both before and after the event. The trends are constructed by fitting lines through the annual average military spending for each group (without controlling for other observables). The figure shows that military spending follows similar trends for both successful and failed coups. This is true both before and after a coup, the main difference being that in the case of successful coups the trend is shifted upward.

In the next section we present a number of empirical tests that provide further support for the common trends assumption. More generally, for the common trends condition to be valid it must be that assignment, once we control for observables, is independent of the change in military spending following a coup. There are a large number of observables that could determine whether coups succeed or fail. In a recent study, Powell (2012) considers these variables and concludes that a coup's probability of success is significantly related to political instability, regime type, soldier quality, the quantity of military personnel, and

[12]That is, it allows us to say that if one of the successful coups had instead failed, military spending would have changed as in the control group of failed coups.

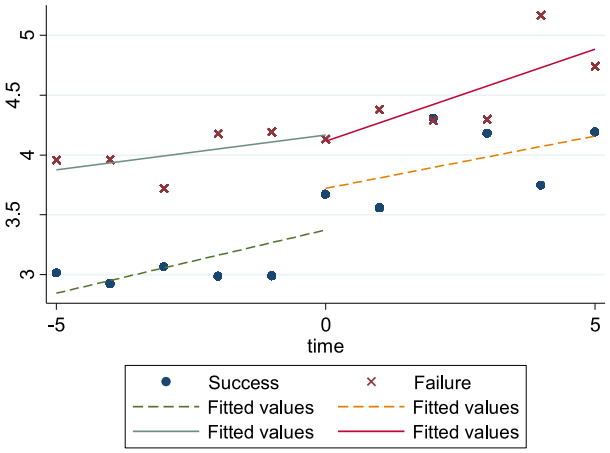


**Fig. 1** Trends in military spending/GDP. The trends are constructed by fitting lines that go through the mean military spending for each group in each year $t$, where $t = 0$ corresponds to the year in which the coup took place. Negative values of $t$ refer to years before the coup; positive values refer to years after the coup

whether the regime is military. These are measured by the Banks (2001) 'weighted conflict index' variable, whether the regime is democratic, military spending per soldier, the size of the armed forces and whether the regime is military, respectively. We control for all of these variables and argue that, conditional on these controls, success is independent of the changes in military spending brought about by the coup. This requires that the outcome of a coup does not depend on unobservables that also affect the change in military spending following the coup. Possible unobservables include the coup plotter's talent, which might affect whether the coup succeeds but also the plotter's ability to increase military spending afterwards; or expected shocks (e.g., to income) that may affect the coup's outcome but also future military spending. However, it is unlikely that ability plays a role in the plotter being able or willing to increase military spending after a successful coup, and we later show empirical evidence that helps rule out this possibility. We also find evidence suggesting that expected shocks are unlikely to be driving the outcome of coups. There may be other unobservables, of course, and to deal with this possibility we repeat our estimation using only coups that resulted in casualties. In these coups the outcome is more likely to have been *ex-ante* uncertain, and so it is more plausible that success is unconditionally independent of changes in military spending. Our main specification is:

$$m_{i,t} = \alpha + \beta_1 c_{i,t} + \beta_2 s_i + \beta_3 c_{i,t} s_i + \beta_4 x_{i,t} + u_{i,t}, \tag{1}$$

where $m$ is military spending, $i$ refers to a specific coup, and $t$ indexes time. The year of a coup is $t = 0$, with $t < 0$ counting the years before the coup, and $t > 0$ counting the years afterwards. The binary variable $c_{i,t}$ equals 0 before coup $i$ and 1 after it; the variable $s_i$ equals 0 if coup $i$ failed, and 1 if it succeeded. The coefficient $\beta_1$ captures the impact of failed coups on military spending, while $\beta_1 + \beta_3$ measures the impact of successful coups on military spending. By looking at whether $\beta_3$ differs from zero we can establish whether successful coups have an impact on military spending that differs significantly from that of failed coups.

We expect that success leads to larger spending increases, so that $\beta_3 > 0$, where $\beta_3$ is the average treatment effect:

$$\beta_3 = E[m|\text{success}, x] - E[m|\text{failure}, x],$$

where the identification assumption is that a coup's outcome is uncorrelated with the error $u_{i,t}$ in (1); that is,

$$E[u_{it}|x_{it}, \text{success}] = E[u_{it}|x_{it}, \text{failure}] = 0.$$

The implication of this assumption is that once we include all relevant controls, coups that succeed would have led to the same expected change in military spending, had they instead failed, as coups that actually failed. The controls $x_{i,t}$ include the size of the military the year before the coup, as this may affect the coup's outcome; income per capita (or income and population separately), which can affect both military spending and the outcome of a coup; and regional and decade fixed effects, as we know that there is substantial heterogeneity across regions and over time (where the number of observations precludes the estimation of country or year effects). We also need to control for regime type, as it potentially affects both the coup outcome and military spending. We do this by including a dummy for whether the regime the year before the coup was democratic, and a dummy for whether the government was in the hands of the military.[13]

### 4.2 Results

Our identification strategy requires that we compare spending before and after coups, which becomes problematic when coups occur in consecutive years. We drop these coups, which reduces our sample to 157 coups, but in the online Appendix we report results for a second approach in which we group coups that take place in consecutive years into a single event, and compare spending before the first of these coups with spending after the last of them.[14]

We first test for the extent to which the observable variables cited as determinants of a coup's outcome have a clear impact on the outcomes of coups. Table 2 shows the sample means for a number of variables, evaluated for country-years in the year prior to a coup. We separate the observations based on the coup attempt's outcome, and test for whether the difference between the sample means is significant. It is striking that most of these variables have the same mean across groups. The one exception is military spending as a percentage of GDP, where the mean is lower for successful coups. The fact that militaries with lower spending are more likely to succeed suggests that spending is unlikely to affect a military's ability to stage successful coups. However, we should interpret this result with caution because it does not arise when military spending is measured in levels, and it is based on a cross-country average.

We also look at whether these variables can predict the outcome of a coup. We do this by estimating the following specification:

$$s_i = \alpha + \gamma_1 m_{i,-1} + \gamma_2 x_{i,-1} + \varepsilon_{i,0}. \tag{2}$$

The idea is to see whether these variables, either on their own or jointly, can help predict the outcome of a coup. Table 3 presents the results; it reports the estimated coefficients of logit regressions where the dependent variable is the binary coup outcome: 1 if the coup succeeded, and 0 otherwise. On the right-hand side we include a measure of military spending,

[13] We use the binary variable for democracy created by Cheibub et al. (2010). As they have argued in this journal, changes within the middle range of the Polity scale are difficult to interpret, a problem they avoid by defining a binary variable. Not all non-democracies are military regimes; for example, there are a large number of civilian autocracies.

[14] The online Appendix can be found at http://www.caths.cam.ac.uk/personal/gleon/loyalty_appendix.

**Table 2** Comparing the treatment and control groups

| | Comparing successful and failed coups, year before coup | | | | | |
|---|---|---|---|---|---|---|
| | Failure | Obs. | Success | Obs. | Difference (failure–success) | $p$-Value (two-sided $t$-tests) |
| Military Exp/GDP$_{t-1}$ | 4.86 | 55 | 3.05 | 62 | 1.81 | 0.02 |
| | (5.38) | | (2.47) | | | |
| Military Exp$_{t-1}$ (log) | 5.32 | 60 | 4.99 | 66 | 0.33 | 0.30 |
| | (1.81) | | (1.81) | | | |
| GDP per capita$_{t-1}$ (log) | 6.38 | 51 | 6.23 | 62 | 0.15 | 0.43 |
| | (1.14) | | (0.92) | | | |
| GDP$_{t-1}$ (log) | 8.30 | 51 | 8.19 | 62 | 0.11 | 0.73 |
| | (1.67) | | (1.70) | | | |
| Population$_{t-1}$ (log) | 1.92 | 64 | 1.95 | 71 | −0.03 | 0.89 |
| | (1.14) | | (1.37) | | | |
| Size of military$_{t-1}$ (log) | −3.75 | 62 | −3.82 | 67 | 0.07 | 0.82 |
| | (1.54) | | (1.70) | | | |
| Democracy$_{t-1}$ | 0.26 | 66 | 0.27 | 71 | −0.01 | 0.89 |
| | (0.44) | | (0.45) | | | |
| Military regime$_{t-1}$ | 0.41 | 66 | 0.34 | 71 | 0.07 | 0.39 |
| | (0.50) | | (0.48) | | | |
| Instability$_{t-1}$ | 3.27 | 61 | 3.03 | 68 | 0.24 | 0.81 |
| | (5.30) | | (5.68) | | | |

Notes: Standard deviations are in parentheses. Military expenditures as a fraction of GDP and in levels are from the U.S. Arms Control and Disarmament Agency. Military expenditures and GDP are in millions of US $ (2000), GDP per capita is in US $ (2000), population and the size of the military are in millions. Democracy and Regime measure whether the country is democratic and whether it is ruled by a military government, respectively. Instability is measured in thousands of units. All variables are dated the year before the coup

a number of controls, and region and decade fixed effects. We find that all of the coefficients are insignificant, with the exception of the log of income per capita in column 1. In all four columns, an F-test cannot reject the null hypothesis of all coefficients (excluding the fixed effects) being jointly equal to zero. Again, we should note that military spending appears to have no impact on a coup's outcome. These results suggest that a coup's outcome is exogenous with respect to these observable variables evaluated the year before the coup takes place. Although in what follows we control for these variables, there is no compelling evidence that they affect the outcome of a coup.

Table 4 presents our main results on how a coup's outcome affects military spending. Columns 1–3 use military spending as a fraction of GDP, measured between 0 and 100, as the dependent variable. In all three cases the post-coup dummy $\beta_1$, which captures the effect of failed coups on military spending, is negative; the success dummy $\beta_2$, which shows the difference between the success and failure groups before the coup, is also negative. The impact of successful coups, measured by $\beta_1 + \beta_3$, is positive but insignificant. However, the only effect we can identify is the interaction captured by $\beta_3$, which is the difference between the impact of successful and failed coups on military spending. In all cases it is positive and significant. The estimated difference in the first column is 1.4 percentage points; in columns 2 and 3 it is around 0.8 of a percentage point. This difference is quite large, considering that mean military spending in the year prior to a coup for countries where the coup

**Table 3** Predicting coup outcome

| | Logit | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| | Coup success$_t$ | Coup success$_t$ | Coup success$_t$ | Coup success$_t$ |
| Military Exp/GDP$_{t-1}$ | −0.099 | −0.109 | | |
| | (0.094) | (0.102) | | |
| Military Exp$_{t-1}$ (log) | | | −0.377 | −0.445 |
| | | | (0.379) | (0.390) |
| GDP per capita$_{t-1}$ (log) | −0.520* | | −0.130 | |
| | (0.298) | | (0.289) | |
| GDP$_{t-1}$ (log) | | −0.559 | | −0.049 |
| | | (0.375) | | (0.333) |
| Population$_{t-1}$ (log) | | 0.446 | | 0.270 |
| | | (0.434) | | (0.458) |
| Size of military$_{t-1}$ (log) | 0.287 | 0.371 | 0.490 | 0.403 |
| | (0.249) | (0.465) | (0.448) | (0.476) |
| Democracy$_{t-1}$ | −0.791 | −0.779 | −0.354 | −0.426 |
| | (0.862) | (0.857) | (0.764) | (0.760) |
| Military regime$_{t-1}$ | −0.689 | −0.686 | −0.392 | −0.404 |
| | (0.690) | (0.684) | (0.618) | (0.615) |
| Instability$_{t-1}$ | −0.006 | −0.005 | 0.012 | 0.011 |
| | (0.053) | (0.052) | (0.049) | (0.050) |
| Region and decade FE | YES | YES | YES | YES |
| Test: all coefficients | $\chi 2(6)$: 3.46 | $\chi 2(7)$: 3.45 | $\chi 2(6)$: 1.74 | $\chi 2(7)$: 1.95 |
| (excl. fixed effects) | $p$-Val.: 0.75 | $p$-Val.: 0.84 | $p$-Val.: 0.69 | $p$-Val.: 0.96 |
| Observations (# of coups) | 99 | 99 | 100 | 100 |
| $R$-Squared/pseudo $R^2$ | 0.13 | 0.13 | 0.10 | 0.10 |

Notes: * Significance at the 10 % level, ** at the 5 % level, *** at the 1 % level. Standard errors are clustered by country and reported in parentheses. Coup Success is a binary variable that equals 1 if the coup succeeded and 0 if it failed. Military Exp/GDP is measured between 0 and 100, Military Exp and GDP are measured in millions of US $ (2000), GDP per capita is in US $ (2000), population and the size of the military are in millions. Democracy equals 1 if the country was democratic and 0 otherwise; Military Regime equals 1 if the government was in the hands of the military, 0 otherwise. Instability is measured in thousands

succeeds is 3.05; this difference is over 25 % of the initial value of military spending. Interestingly, the political variables ‘democracy’, ‘military regime’ and ‘instability’ are largely insignificant.

In columns 4–6 we repeat the regressions but use the log of military spending in levels as the dependent variable. We do this because the effect we found could be generated mechanically if successful coups lead to larger drops in GDP than failed attempts, thus resulting in a larger increase in military spending as a fraction of GDP. The new coefficients have the same signs as before, and are significant except in column 4 where controls and fixed effects are excluded. The impact is a 7.7 % increase in military spending from success in column 4, and more than 25 % in columns 5 and 6. The magnitude of this effect is substantial, and similar

**Table 4** Difference-in-differences (one year before and after)

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Military Exp/GDP | Military Exp/GDP | Military Exp/GDP | Military Exp (log) | Military Exp (log) | Military Exp (log) |
| Post-coup dummy ($\beta_1$) | −0.421 | −0.490* | −0.386 | −0.012 | −0.106 | −0.135 |
| | (0.374) | (0.287) | (0.288) | (0.161) | (0.097) | (0.092) |
| Success dummy ($\beta_2$) | −1.815** | −0.672 | −0.635 | −0.334 | −0.163 | −0.167 |
| | (0.807) | (0.469) | (0.446) | (0.344) | (0.131) | (0.117) |
| Post_coup × success | 1.438** | 0.812** | 0.740* | 0.077 | 0.251** | 0.271** |
| dummies ($\beta_3$) | (0.686) | (0.370) | (0.382) | (0.218) | (0.124) | (0.120) |
| GDP per capita (log) | | −1.122*** | | | 0.293*** | |
| | | (0.397) | | | (0.087) | |
| GDP (log) | | | −1.559*** | | | 0.421*** |
| | | | (0.420) | | | (0.079) |
| Population (log) | | | −0.026 | | | 0.026 |
| | | | (0.548) | | | (0.113) |
| Size of military$_{t-1}$ (log) | | 0.558*** | 1.668*** | | 0.949*** | 0.633*** |
| | | (0.179) | (0.446) | | (0.058) | (0.092) |
| Democracy$_{t-1}$ | | −1.885** | −1.295 | | 0.106 | −0.053 |
| | | (0.896) | (0.797) | | (0.170) | (0.154) |
| Military regime$_{t-1}$ | | −1.130 | −0.944 | | 0.020 | −0.027 |
| | | (0.693) | (0.570) | | (0.124) | (0.128) |
| Instability$_{t-1}$ | | −0.017 | −0.004 | | 0.010 | 0.007 |
| | | (0.034) | (0.034) | | (0.009) | (0.008) |
| Region and decade FE | NO | YES | YES | NO | YES | YES |
| Δ after successful coup ($\beta_1 + \beta_3$) | 1.017 | 0.322 | 0.354 | 0.065 | 0.145 | 0.136 |
| Test: successful coup not 0 | 0.33 (0.567) | 0.11 (0.740) | 0.06 (0.809) | 0.68 (0.412) | 0.46 (0.501) | 0.86 (0.359) |
| Observations | 243 | 194 | 194 | 257 | 196 | 196 |
| $R$-Squared | 0.022 | 0.383 | 0.444 | 0.007 | 0.896 | 0.910 |

Notes: * Significance at the 10 % level, ** at the 5 % level, *** at the 1 % level. Standard errors are clustered by country and reported in parentheses. Military Exp/GDP is measured between 0 and 100, Military Exp and GDP are in millions of US $ (2000), GDP per capita is in US $ (2000), population and the size of the military are in millions. Instability is measured in thousands. Test is an F-test, with the F-statistic followed by the $p$-value in parentheses

in size to that estimated in columns 2 and 3. Overall, Table 4 shows that successful coups lead to changes in military spending that are larger than those following failed coups.[15]

Table 5 shows the results when we restrict our sample to coup attempts that resulted in casualties. All coups with non-zero casualty counts are included; we do not make use of the number of deaths because sometimes they are reported as approximations (e.g., "40–50 dead") and sometimes no numbers are given (e.g., "heavy casualties were reported"). The coefficients are of a larger magnitude, and their signs are the same as before, with the difference in the change in military spending across successful and failed coups still being significant.[16]

Table 6 compares the means of the main control variables the year before and the year after the coup, separating successful and failed coups. Only the institutional measures show significant differences, something that is not surprising given that most successful coups lead to non-democratic regimes. The means for all other variables are not significantly different, suggesting that other policies are not affected by a coup's outcome.[17]

This section presents evidence that successful coups lead to changes in military spending that are larger than those following failed coups. This is the first of our two empirical hypotheses; we now proceed to test the second.

## 5 Military spending and coup attempts

### 5.1 Specification

In this section we establish our second empirical finding: coup attempts are more likely when military spending as a share of GDP is relatively low. If our hypothesis is correct and coups are staged in order to increase military spending, we would expect that a country is more likely to experience a coup when little is spent on its military. This suggests that a panel specification with fixed effects would be a natural framework to use, and we regress a measure of coups on military spending, income and a number of control variables:

$$\text{coup}_{it} = \alpha + \beta_1 \text{milexp}_{it-1} + \beta_2 \text{income}_{it-1} + \beta_3 \text{controls}_{it-1} + \eta_t + \psi_i + \varepsilon_{it}, \qquad (3)$$

[15] In Table A7 in the online Appendix (http://www.caths.cam.ac.uk/personal/gleon/loyalty_appendix) we show the results when we include coups in consecutive years. We count these coups as one event, so that the pre-coup year is the one before the first coup, and the post-coup year is the first after the last coup. We treat the event as successful if any of these coups succeeded. We also include a control variable equal to the number of years included in the event. Again we find a significant difference in the change in military spending depending on a coup's outcome. In Table A8 in the online Appendix (http://www.caths.cam.ac.uk/personal/gleon/loyalty_appendix), columns 1–4 repeat the main estimation but include data from three years before and three years after a coup. This enables us to better estimate the trends in the data, but the number of coups goes down to 80. (We cluster the standard errors to correct for serial autocorrelation, as suggested in Bertrand et al. 2004.) Once again, we find that successful coups lead to changes in military spending that are larger than the changes following failed coups. These results are significant in columns 1, 2 and 4 (and the $p$-value for the interaction term in column 3 is 0.11). The estimated magnitudes are similar: roughly 1 percentage point in columns 1 and 2 and over 30 % in columns 3 and 4. In columns 5–8 we allow for regional time trends, and we find that our estimates remain largely unchanged once we include these trends.

[16] Tables A9 and A10 in the online Appendix (http://www.caths.cam.ac.uk/personal/gleon/loyalty_appendix) show that the effect is entirely due to changes following successful coups against non-democracies; changes in military spending following successful coups against democracies are indistinguishable from those following failed coups.

[17] Table A11 in the online Appendix (http://www.caths.cam.ac.uk/personal/gleon/loyalty_appendix) replicates this table but looking at the means 3 years after a coup.

**Table 5** Difference-in-differences: coups with reported deaths (one year before and after)

| | (1) Military Exp/GDP | (2) Military Exp/GDP | (3) Military Exp (log) | (4) Military Exp (log) |
|---|---|---|---|---|
| Post-coup dummy ($\beta_1$) | −0.819 | −0.688 | −0.178 | −0.245 |
| | (0.597) | (0.590) | (0.192) | (0.199) |
| Success dummy ($\beta_2$) | −1.063 | −0.690 | −0.150 | −0.343 |
| | (0.643) | (0.601) | (0.309) | (0.236) |
| Post_coup × success dummies ($\beta_3$) | 1.679* | 1.589* | 0.522** | 0.566** |
| | (0.853) | (0.800) | (0.245) | (0.271) |
| GDP per capita (log) | −0.582 | | 0.563** | |
| | (0.600) | | (0.214) | |
| GDP (log) | | −0.736 | | 0.662*** |
| | | (0.512) | | (0.158) |
| Population (log) | | −0.377 | | −0.065 |
| | | (0.622) | | (0.205) |
| Size of military$_{t-1}$ (log) | 0.964*** | 1.664*** | 0.990*** | 0.599*** |
| | (0.203) | (0.403) | (0.094) | (0.103) |
| Democracy$_{t-1}$ | −0.884* | −0.268 | 0.221 | −0.099 |
| | (0.657) | (0.723) | (0.326) | (0.248) |
| Military regime$_{t-1}$ | −0.122 | −0.041 | 0.146 | 0.117 |
| | 0.567 | (0.495) | (0.258) | (0.178) |
| Instability$_{t-1}$ | −0.145** | −0.140** | 0.006 | 0.007 |
| | (0.062) | (0.054) | (0.016) | (0.017) |
| Region and decade FE | Yes | Yes | Yes | Yes |
| Δ after successful coup ($\beta_1 + \beta_3$) | 0.86 | 0.901 | 0.344 | 0.321 |
| Test: successful coup not 0 | 2.38 (0.136) | 3.14 (0.089) | 5.20 (0.031) | 3.38 (0.078) |
| Observations | 60 | 60 | 62 | 62 |
| $R$-Squared | 0.671 | 0.713 | 0.884 | 0.911 |

Notes: *Significance at the 10 % level, ** at the 5 % level, *** at the 1 % level. Standard errors are clustered by country and reported in parentheses. Military Exp/GDP is measured between 0 and 100, Military Exp and GDP are in millions of US $ (2000), GDP per capita is in US $ (2000), population and the size of the military are in millions. Democracy equals 1 if the country was democratic and 0 otherwise; Military Regime equals 1 if the government was in the hands of the military, 0 otherwise. Instability is measured in thousands. Test is an F-test, with the F-statistic followed by the $p$-value in parentheses

where $i$ indexes the country and $t$ indexes time. The variable coup$_{it}$ measures whether there was a coup attempt (regardless or whether it succeeded or failed) in a five-year period; it equals 1 if there was at least one coup in the five-year period, and 0 otherwise. We work with five-year periods because they allow for a window during which the effect of military spending may materialize. There are seven periods: 1965–1969, 1970–1974, 1975–1979, 1980–1984, 1985–1989, 1990–1994 and 1995–1999. The right-hand side variables are all evaluated in the year before the five-year interval begins, i.e., 1964, 1969, 1974, 1979, 1984, 1989 and 1994.[18] This should reduce the possibility of simultaneity, as it is less likely that coups in a given five-year period affect military spending and other variables a year before the start of that period. Military spending is measured as a percentage of GDP, and income

[18]The results are similar if we shift the start of the five-year periods one year backwards or forward. The year dummies are for these seven years.

**Table 6** Comparing the treatment and control groups

| | Comparing successful and failed coups, Two-sided *t*-tests (year before coup) | | | | | | Comparing successful and failed coups, Two-sided *t*-tests (year after coup) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Failure | Obs | Success | Obs | Difference | *p*-Value | Failure | Obs | Success | Obs | Difference | *p*-Value |
| GDP per capita (log) | 6.38 | 51 | 6.23 | 62 | 0.15 | 0.43 | 6.40 | 54 | 6.26 | 66 | 0.15 | 0.45 |
| | (1.14) | | (.92) | | | | (1.20) | | (.941) | | | |
| GDP (log) | 8.30 | 51 | 8.19 | 62 | 0.11 | 0.73 | 8.38 | 54 | 8.14 | 66 | 0.24 | 0.43 |
| | (1.67) | | (1.70) | | | | (1.76) | | (1.58) | | | |
| Population (log) | 1.92 | 64 | 1.95 | 71 | −0.03 | 0.89 | 2.00 | 69 | 1.93 | 75 | 0.08 | 0.71 |
| | (1.14) | | (1.37) | | | | (1.19) | | (1.27) | | | |
| Size of military (log) | −3.75 | 62 | −3.82 | 67 | 0.07 | 0.82 | −3.59 | 67 | −3.86 | 72 | 0.27 | 0.27 |
| | (1.54) | | (1.70) | | | | (1.56) | | (1.66) | | | |
| Democracy | 0.26 | 66 | .27 | 71 | −0.01 | 0.89 | 0.26 | 69 | 0.08 | 75 | 0.18 | 0.00 |
| | (0.44) | | (0.45) | | | | (0.44) | | (0.27) | | | |
| Military regime | 0.41 | 66 | .34 | 71 | 0.07 | 0.39 | 0.42 | 69 | 0.733 | 75 | −0.31 | 0.00 |
| | (0.50) | | (0.48) | | | | (0.50) | | (0.45) | | | |
| Instability | 3.27 | 61 | 3.03 | 68 | 0.24 | 0.81 | 2.25 | 68 | 2.70 | 73 | −0.45 | 0.47 |
| | (5.30) | | (5.68) | | | | (3.84) | | (3.49) | | | |

Notes: Standard deviations are in parentheses. GDP is in millions of US $ (2000), GDP per capita is in US $ (2000), population and the size of the military are in millions. Democracy and Regime measure whether the country is democratic and whether it is ruled by a military government, respectively. Instability is measured in thousands of units. All variables are dated the year before the coup

is GDP per capita or GDP and population entered separately. We control for the size of the military, whether the regime is democratic, whether it is military, and for political instability.[19] We also include year dummies $\eta_t$ and country dummies $\psi_i$, while $\varepsilon_{it}$ is the error term. The inclusion of fixed effects allows us to control for all time invariant country-specific factors that may affect the likelihood of a coup.[20] The fixed effects transformation implies that we identify the effect of military spending on coups from within country variation only.

Specification (3) is based on a growth regression and is in the spirit of that used by Londregan and Poole (1990), and we estimate it using both OLS (so that it corresponds to a linear probability model) and conditional logit. We should note that these estimates should be interpreted as correlations and not as causal relationships. The coup variable, which measures whether there was a coup or not in the five-year period, has a mean of 0.18, indicating that in roughly 18 % of the five-year intervals there was at least one coup. The other variables are measured annually, although only in years before the five-year periods begin, and the means and standard deviations are similar to those in the full dataset.[21]

### 5.2 Results

In Table 7 we show the panel results for specification (3). The first two columns exclude the country fixed effects, and we find that the coefficients on military spending and the income measures (GDP in column 1 and GDP per capita in column 2) are negative and significant. The size of the military is significant only in column 2, while the coefficient on military regime is positive and significant in both columns. Finally, instability is positive and significant in both columns. These results are consistent with Londregan and Poole (1990, 1996), who showed that higher income per capita is correlated with a lower probability of a coup.

In columns 3 and 4 we introduce country fixed effects.[22] Military spending is still negative but the estimated coefficient is larger, and the results are significant at the 1 % level. This shows that greater military spending in the year before the start of a five-year period is associated with a lower probability of a coup attempt in that period. Specifically, a one percentage point increase in military spending at the mean (from 4.66 to 5.66) results in a small reduction in the probability of at least one coup in the next five years, from 18 % to 16.5 %. However, the result is substantial when we consider a one standard deviation change in military spending (from 4.66 to 11.44), which would imply a reduction in the likelihood of a coup from 18 % to 8 %. Of course, a one standard deviation increase in this case is quite large, but the large differences in military spending that we observe in practice can explain

[19] We use the binary variable for democracy created by Cheibub et al. (2010). In the online Appendix (http://www.caths.cam.ac.uk/personal/gleon/loyalty_appendix) we show that our results are robust to using the polity2 measure of democracy instead of the binary variable.

[20] This eliminates the bias that would arise from the omission of time-invariant country-specific characteristics, which include institutions, whether the country is a primary commodity exporter (O'Kane 1987), and ethnic fractionalization (Jackman 1978). In recent years new evidence has come to light suggesting that existing cross-country correlations disappear once fixed effects are entered. For example, Acemoglu et al. (2008) show that fixed effects eliminate the observed cross-country correlation between income and democracy.

[21] See Table A12 in the online Appendix (http://www.caths.cam.ac.uk/personal/gleon/loyalty_appendix) for more details.

[22] In both cases an F-test rejects the null hypothesis that all fixed effects are equal, suggesting that they need to be included.

**Table 7** Military spending and coups (5 years)

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | $Coup_t$ (5 years) | $Coup_t$ (5 years) | $Coup_t$ (5 years) | $Coup_t$ (5 years) | $Coup_t$ (5 years) | $Coup_t$ (5 years) |
| | Cross-country | | Fixed effects | | Conditional logit | |
| Military Exp/$GDP_{t-1}$ | −0.002 | −0.005** | −0.015*** | −0.015*** | −0.148** | −0.143*** |
| | (0.002) | (0.002) | (0.004) | (0.004) | (0.060) | (0.050) |
| GDP per $capita_{t-1}$ (log) | −0.060*** | | 0.001 | | −0.789 | |
| | (0.015) | | (0.079) | | (0.876) | |
| $GDP_{t-1}$ (log) | | −0.072*** | | −0.010 | | −0.574 |
| | | (0.016) | | (0.077) | | (0.893) |
| $Pop_{t-1}$ (log) | | 0.034 | | −0.059 | | 2.919 |
| | | (0.025) | | (0.157) | | (2.206) |
| Size of $military_{t-1}$ (log) | −0.025** | 0.006 | 0.032 | 0.039 | 0.516 | 0.478 |
| | (0.011) | (0.025) | (0.044) | (0.051) | (0.412) | (0.434) |
| $Democracy_{t-1}$ | 0.057 | 0.066* | −0.106 | −0.106 | 0.098 | 0.136 |
| | (0.040) | (0.040) | (0.094) | (0.094) | (0.658) | (0.678) |
| $Military\ regime_{t-1}$ | 0.137*** | 0.135*** | −0.105 | −0.106 | −0.238 | −0.181 |
| | (0.048) | (0.048) | (0.092) | (0.092) | (0.583) | (0.592) |
| $Instability_{t-1}$ | 0.005* | 0.006* | 0.006** | 0.006** | 0.105*** | 0.108*** |
| | (0.003) | (0.003) | (0.002) | (0.002) | (0.028) | (0.028) |
| Year FE | Y | Y | Y | Y | Y | Y |
| Country FE | N | N | Y | Y | Y | Y |
| Observations | 681 | 681 | 681 | 681 | 302 | 302 |

Notes: * Significance at the 10 % level, ** at the 5 % level, *** at the 1 % level. Standard errors in parentheses. All standard errors are clustered at the country level. Coup (5 years) is equal to 1 if there was at least one coup in the 5 year period, and 0 otherwise. The periods are 1965–1969, 1970–1974, 1975–1979, 1980–1984, 1985–1989, 1990–1994, 1995–1999. GDP is in millions of US$ (2000), GDP per capita is in US$ (2000), population and the size of the military are in millions. Democracy equals 1 if the country was democratic and 0 othewise; Military Regime equals 1 if the government was in the hands of the military, 0 otherwise. Instability is measured in thousands of units. All variables are dated the year before the a five year period starts

an important part of the differences in the incidence of coups.[23] In columns 5 and 6 we run conditional logit regressions to check for the robustness of the result, although in this case we lose about half the countries in the dataset since they do not experience any coups in the sample period.

These results are robust to changing the years used to construct the five-year intervals (i.e., starting in 1964 or 1966), and to including a lagged dependent variable, in this case

[23] A surprising result is that income has no impact on coups once fixed effects are entered. It is also interesting that the size of the military and the type of regime (whether democratic or whether a military dictatorship) lose their predictive power in the presence of country fixed effects. Only instability remains significant, with its coefficient largely unchanged. There is the concern, however, that this variable is mechanically related to coups. The results are largely unaffected when this variable is removed.

coups in the preceding five-year period.[24] In summary, the evidence in this section shows that lower military spending within a country is correlated with an increase in the incidence of coups, establishing our empirical finding (ii).[25]

## 6 Alternative explanations and concluding remarks

There are a number of alternative possible mechanisms that could establish a relationship between military spending and coups. Two of these represent threats to identification: (a) the coup plotter's talent or ambition can affect both a coup's outcome and the plotter's ability to increase military spending after a successful coup, and (b) expected shocks to income, for example, that affect both the outcome of a coup and changes in military spending. Alternative (a) is difficult to test directly because the coup plotter's talent is unobservable. However, Table 5 shows that our results are robust to focusing only on coups with casualties, and in these the coup plotter's talent is more likely to be independent of coup outcome. Furthermore, Table 6 shows that successful and failed coups do not seem to differ, one year later, in variables like GDP, GDP per capita and political instability, that could also be affected by a coup plotter's talent. Likewise, these tables seem to rule out alternative (b), as there appear to be no differences in variables that would be affected by shocks.[26]

Another mechanism is that (c) after a successful coup, the new government needs to consolidate its power through repression, which shows up as an increase in military spending. However, this does not explain why a fall in military spending would increase the likelihood of a coup. It is also at odds with the finding that political instability is the same across successful and failed coups. A fourth alternative is that (d) the effect we find is largely due to decreases in military spending following failed coups, as governments that survive a coup punish their militaries. This can be ruled out too: if military spending falls following a failed coup because the military is being punished, there is no reason why lower military spending before an attempt would be correlated with the likelihood of a coup. Furthermore, it is also inconsistent with Fig. 1, which shows that coups lead to an upward shift in the military spending trend for successful coups and virtually no change for failed coups. A fifth possibility is that (e) coups are staged for other reasons, but once in power the military acts opportunistically and increases military spending; yet this cannot explain why lower military spending increases the likelihood of a coup. Finally, (f) lower military spending reflects a smaller military that can more easily coordinate when staging a coup. This alone, however, cannot explain why military spending goes up following a successful coup.

This paper studies coups d'etat empirically and finds evidence consistent with the hypothesis that coups are staged by the military in order to increase military expenditures. We show that coups are more likely after years of relatively low military spending, and that

[24] The coefficients are insignificant and have a negligible impact on our estimates, while the inclusion of a lagged dependent variable introduces a number of econometric complications. For example, Nickell (1981) showed that a lagged dependent variable causes the parameter estimates to be inconsistent when fixed effects are entered.

[25] In Table A13 in the online Appendix (http://www.caths.cam.ac.uk/personal/gleon/loyalty_appendix) we show that the results are robust to using the polity2 variable as a measure of democracy (instead of a binary definition). In Table A14 in the online Appendix (http://www.caths.cam.ac.uk/personal/gleon/loyalty_appendix) we repeat the estimation but separate the impact of military spending depending on whether the country is democratic or not the year before the five-year period begins.

[26] Although it could be possible that successful coups lead to changes in policy that completely prevent these shocks, this seems unlikely.

successful coups result in increases in military spending that are significantly larger than those following failed coups. Naturally, a number of open issues remain. One question that follows naturally from our results is whether the relationship we have documented between military spending and coups has changed over the four decades covered in our sample. We have shown that coups have become much less common in most regions of the world: is the decline in the number of coups due to a change in the way the military responds to economic incentives? More interestingly, is there any connection between the mechanism we have identified, how it may have changed over time, and the recent waves of democratization? Have these new democracies been "bought" through the provision of generous military funding, or has the military's role in politics changed? Future research should address all of these very important issues.

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## Appendix A: Appendix: Data description

The main units of observation are (country, year) pairs.

**Coup**: This is a binary variable that is equal to 1 if at least one coup occurred, and 0 otherwise. It is taken from the dataset by Belkin and Schofer (2003), where a coup is defined as an attempt to remove the 'regime' by a 'small military coalition.' To construct their data, Belkin and Schofer (2003) compiled a list of coups from a number of academic articles, and complemented it with data from Keesing's Contemporary Archives. They checked the accuracy of this list by consulting regional experts and resolving conflicting cases with information from the New York Times and Foreign Broadcast Information Service. More details can be found in their paper.

**Coup Success**: This is a binary variable that equals 1 if at least one coup was successful in the given (country, year). It is constructed by using data from Banks (2001) and Powell and Thyne (2011) to determine whether a coup was successful or not. These databases agree in all but a small number of cases, which we confirmed by looking at the New York Times Archive.

**Military Spending**: This variable is from the U.S. Arms Control and Disarmament Agency. We compiled a number of annual reports with data on military spending, the size of the military, and some country characteristics. Our measure includes all military expenditures in the (country, year), including both operational expenses (e.g., salaries) and arms purchases. The U.S. Arms Control and Disarmament Agency reports this data in two ways: in millions of US dollars (2000) and as a fraction of GDP.

**Size of the Military**: This variable is from the U.S. Arms Control and Disarmament Agency. It is measured in millions.

**GDP, Population**: The GDP and population variables are from the World Bank Development Indicators (2009). GDP is measured in millions of US dollars (2000). Population is measured in millions.

**Democracy**: This variable is the 'democracy' variable from Cheibub et al. (2010) and it equals 1 if the regime is a democracy and 0 if it is a dictatorship. The Cheibub et al. (2010) dataset is rooted in the Alvarez et al. (1996) and Przeworski et al. (2000) datasets and shares with them the classification of regimes into just two categories: democracy and dictatorship.

**Polity2**: The polity2 variable is a version of the Polity IV index that has been corrected to allow for its use in time series analysis. The Polity IV index codes three key aspects of a country's political system: (i) competitiveness and openness in the process of executive recruitment, (ii) constraints on the chief executive, and (iii) competitiveness and regulation of political participation. A weighted sum of the components is used to construct two summary variables, measuring democracy on a scale of 0 to 10 (the DEMOC score) and autocracy on a scale of −10 to 0 (the AUTOC score). The Polity IV index is the sum of these two sub-indexes.

**Military Regime**: This variable is constructed from the 'regime' variable in Cheibub et al. (2010). The regime variable can be equal to parliamentary democracy, semipresidential democracy, presidential democracy, monarchic dictatorship, military dictatorship, and civilian dictatorship. Our variable is equal to 1 if 'regime' equals 'military dictatorship', and 0 otherwise.

**Instability**: We use the variable S18F2 'Weighted Conflict Index' from Banks (2001), which is the same used by Powell (2012). This variable is calculated by giving weights to scores on assassinations, general strikes, guerrilla warfare, government crises, purges, riots, revolutions, and anti-government demonstrations. This variable takes very large numerical values, and so in the regressions we measure it in thousands.

**Casualties**: This data is from the Center for Systemic Peace database by Marshall and Marshall (2010), complemented with data we collected from the New York Times Archive. We coded it as a binary variable; 0 if no deaths were reported, 1 if at least one death was reported.

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