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ORIGINAL ARTICLE

Coup-proofing: latent concept and measurement

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Abstract

The study of coup-proofing holds significant importance in political science as it offers insights into critical topics such as military coups, authoritarian governance, and international conflicts. However, due to the multifaceted nature of coup-proofing and empirical inconsistencies with existing indicators, there is a need for a more profound understanding and a new measurement methodology. We propose a new measure of the extent of coup-proofing, utilizing a Bayesian item response theory. We estimate the extent of coup-proofing using a sample of 76 countries between 1965 and 2005 and theoretically relevant observed indicators. The findings from the estimation demonstrate that the extent of coup-proofing varies across regime type, country, and time. Furthermore, we verify the construct validity of our measurement.

Keywords: civil-military relations; coup-proofing; latent variable; bayesian item response theory

Military coups are considered a significant challenge in civil–military relations, as they constitute almost half of all irregular leadership changes (Goemans, 2008) and 60 percent of all extra-constitutional leadership changes in autocracies (Svolik, 2012). To gain a thorough understanding of military coups, it is crucial to comprehend the concept of coup-proofing, which consists of the various strategies that leaders implement to prevent a coup. This is because the efficacy of coup-proofing strategies has a significant impact on the course of events during a military coup, as well as the patterns and outcomes that result from such occurrences. The study of coup-proofing is essential for comprehending not only authoritarian rule but also a wide range of topics related to civil wars and international conflicts (Belkin and Schofer, 2005; Pilster and Böhmelt, 2011; Svolik, 2012; Talmadge, 2015; Braithwaite and Sudduth, 2016; Bell and Sudduth, 2017; Narang and Talmadge, 2018; Powell, 2019; Gandhi and Lawrence Sumner, 2020).

The literature on coup-proofing measures suggests that their impact on military coups is inconsistent. Counterbalancing, which is the most widely implemented coup-proofing measure, has varying effects on military coups depending on factors such as the types of security forces, the data used to capture security forces, and the stages of coups. Powell (2012) finds no significant relationship between the number of effective ground combat organizations and coup attempts or outcomes. Powell (2012) also shows that the presence of paramilitary forces significantly reduces the likelihood of coup attempts and their success rates. Böhmelt and Pilster (2015)'s research demonstrates that the likelihood of coups and their chances of success increase until a tipping point is reached, where there are two equally strong military organizations. After reaching this turning point, however, the likelihood increases once again. De Bruin (2018, 2020a, 2020b)'s research does not find evidence that counterbalancing measures prevent coup attempts but does confirm their inhibiting effect on successful coups.

If counterbalancing is intended to reduce coup plotters' ability and opportunity to organize a coup, why does it not prevent coup attempts from the start? Studies have also indicated that coup-proofing is not always successful and may lead to military backlash (Albrecht, 2015a,

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2015b; Bell and Sudduth, 2017). To better understand the effectiveness of coup-proofing, it is crucial to develop a more accurate measure of the concept, given the theoretical debate and empirical inconsistencies surrounding it. Recent research points out the importance of combining numerous coup-proofing measures to prevent coups (Böhmelt *et al.*, 2017; Brooks, 2019; De Bruin, 2020a; Kenwick, 2020, appendix; Reiter, 2020). As an alternative to using a single observable proxy for coup-proofing, we can think of coup-proofing as a latent variable whose proxies capture only a portion of its underlying value. However, few methodological attempts have been made to develop a reliable coup-proofing measurement.

Our study defines coup-proofing as the extent to which the military's capacity to carry out coups is reduced and the costs associated with coup attempts are increased. We model how the different indicators relate to an unobserved trait, the degree of coup-proofing. Assessing the extent of coup-proofing presents a challenge owing to the latent nature of this construct. Stated differently, there is uncertainty regarding the appropriate indicators and their respective weighting to effectively measure the degree of coup-proofing across multiple domains. We address this issue by implementing a statistical model that integrates a weighting procedure for the coup-proofing components during estimation. To assess the weighting of various coup-proofing components, the methodology employed in this study does not rely on the arbitrary assignment of weights or theoretical assumptions. Instead, the appropriate weighting is determined based on the available data.

We employ a Bayesian item response theory (IRT) framework to estimate the extent of coup-proofing across 76 countries between 1965 and 2005. The degree of coup-proofing is denoted by a range of indicators that reduce the military's ability to execute coups and raise the associated costs. Through this approach, we are able to unify the various dimensions of coup-proofing into a continuum, which ranges from low to high. Our findings show that coup-proofing levels vary significantly between regimes and over time. Furthermore, we demonstrate construct validity by conducting discriminant validity and demonstrating the predictive power of our newly measured coup-proofing.

In response to the growing demand for a comprehensive measure of coup-proofing, which has not yet been developed, we propose a novel composite indicator (Quinlivan, 1999; Talmadge, 2015; Albrecht, 2015b; De Bruin, 2020a; Reiter, 2020). Our measure provides a more comprehensive evaluation of coup-proofing by capturing multiple dimensions of the construct and taking into account the inherent uncertainty of the latent variable. This study contributes to the measurement of coup-proofing and highlights its applicability in examining the application of conceptual frameworks across various relevant domains, including the dictator's power-sharing dilemma, the guardianship dilemma, and the military defection (McMahon and Slantchev, 2015; Lutscher, 2016; Dworschak, 2020; Paine, 2021; Neu, 2022).

1. Coup-proofing: conceptualization and relevant indicators

A coup d'état is a sudden and violent takeover of a government by the military, typically with the aim of ousting the current political leadership. Military coups often involve the use of force, and the military leaders who execute the coup frequently assume control of the government (Luttwak, 1979; Quinlivan, 1999; Singh, 2014). Huntington (1957)'s seminal work on civil–military relations argues that professionalizing the military can make it subservient to civilian authority. Nonetheless, a group of scholars indicates that military professionalism does not always imply military submission to civilian leadership, and that in the absence of an effective constraint mechanism, a professionalized military can overthrow civilian leadership (Finer, 1974; Feaver, 1996; Janowitz, 1961).

Political leaders implement coup-proofing strategies to prevent the military from intervening in politics using force. However, the definition of coup-proofing varies among scholars (Reiter, 2020). Some studies define it as measures to reduce the military's coup-making capabilities by

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counterbalancing and purging military officers (Sudduth, 2016, 2017b; De Bruin, 2020a). Other scholars suggest that coup-proofing also includes co-optive strategies to lower the military's motivation to stage a coup by providing material and political benefits (Powell, 2014; Powell *et al.*, 2018; Brooks, 2019; Reiter, 2020).

Our research primarily focuses on the aspects of coup-proofing that limit the military's ability to stage a coup and increase the cost of doing so. As Sudduth (2016: 4) intuitively notes, co-optive or spoiling aspects of coup-proofing, such as providing funding and granting access to the military's national policy decision-making, increase the military's coup-making power, thereby increasing the likelihood of a successful coup (Svolik, 2013; Acemoglu *et al.*, 2010). A key objective of coup-proofing is not only to prevent a coup from being attempted but also to thwart its "success" if it is carried out. Therefore, coup-proofing should be conceptualized as the degree to which the military's ability to execute coups is diminished while the associated costs of coup attempts are increased. This conceptualization aligns with the overarching objective of coup-proofing, which seeks to prevent both the attempt and the successful execution of a coup.

It is noteworthy to clarify why we think the "extent of coup-proofing" is the appropriate label for the latent trait we try to measure. A group of studies use the term, "coup-proofing effort," and discuss how coup-proofing effort is influenced by coup-risk (Belkin and Schofer, 2003, 2005; Böhmelt and Pilster, 2015; Sudduth, 2017a, 2017b). In our study, Θ_{it}, the value of the latent variable for country i and year t, is essentially a fixed parameter. The problem with categorizing coup-proofing as an *effort* is that it can lead to implicit theoretical assumptions about how theta arise. There is no definite consensus on how coup-proofing arises in the existing literature. Some studies suggest that leaders or regimes implement coup-proofing measures as the likelihood of a coup increases (Biddle and Zirkle, 1996; Quinlivan, 1999; Belkin and Schofer, 2003; Thyne, 2010; Pilster and Böhmelt, 2012), while others indicate that coup-proofing measures are more likely to be implemented as the likelihood of a coup decreases (Braithwaite and Sudduth, 2016; Sudduth, 2017b). If we categorize coup-proofing as *effort*, there is a possibility of overinterpreting the strength of the empirical evidence by making unwarranted assumptions about the process through which Θ_{it} originates. Instead, we clarify our empirical contribution using the concept of the *extent* of coup-proofing, recognizing that we do not deduce the process through which Θ_{it} arises, but rather how relevant indicators relate to an unobserved trait, coup-proofing, as a fixed parameter.

Paine (2021) uses the term "strong coup-proofing *institutions*" to conceptualize the strength of coup-proofing. We might consider employing "institution" as a conceptual label for coup-proofing. The challenge lies in the fact that the term *institution* is conventionally utilized in the existing literature to denote individual security or military organizations.[1] Labeling the unobservable latent trait as coup-proofing "institution" would not only cause confusion with existing research, but also fails to adequately capture the comprehensive nature of the latent trait. For example, security "institution" is one of the many manifestations of the unobservable latent trait we are trying to measure.

In what domains can the extent of coup-proofing be observed, which restricts the capacity of the military to execute successful coups? Numerous works have emphasized the significance of counterweights, such as security forces outside the military chain of command, that eliminate the military's capacity to plan and execute successful coups (Quinlivan, 1999; Belkin and Schofer, 2005; Böhmelt and Pilster, 2015; Thyne, 2017; Albrecht and Eibl, 2018; De Bruin, 2018; Florea, 2018; Mehrl and Choulis, 2021). Counterbalancing mechanisms play a crucial role in preventing coups by introducing obstacles that make it difficult for coup attempts to be coordinated. Counterbalancing makes it more difficult for high-ranking officials to organize a coup face-to-face (Singh, 2014; Albrecht and Eibl, 2018). Detection or monitoring is an

[1]Other studies employ the term "coercive institutions" to describe security apparatus as a measure against coups (Grietens, 2016; De Bruin, 2019).

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important factor that hinders coup plotters' coordination. Bürkner (2017, 2019) and De Bruin (2020b) elaborate on this point, explaining that presidential guards and paramilitary groups can proactively monitor and detect suspicious movements of the regular military, thereby preventing coup plotters from seizing important targets. Multiple internal security agencies with overlapping jurisdiction are able to continuously monitor the loyalty of the military with independent communication channels to leaders, preventing coup plotters from recruiting sympathizers and advancing their plans (Quinlivan, 1999: 133).

Even if a coup occurs, security forces outside the military chain of command are more likely to fight against it because they develop institutional interests distinct from the interests of the regular military (De Bruin, 2020b: 133). Overall, an increase in the number of security forces serves as an indicator of the level of coup-proofing, which aims to reduce the military's ability to carry out a coup and raise the costs associated with executing a coup.

Security forces are required to directly control the violent aspects of the military's ability to stage a coup. The civilianization of cabinet posts is an important indicator that reflects the diminishing political influence of the military, serving as a safeguard against coups. This is based on the premise that militaries with greater political resources are more likely to effectively orchestrate a coup (Acemoglu *et al.*, 2010; Svolik, 2012; Sudduth, 2016). The "civilization" of the military's political power, as shown by the presence of civilian elites in cabinet positions, can increase the coup-proofing effects of the counterbalance. Civilianizing cabinet positions consolidate political leaders' control over security forces and facilitates institutional reforms intended to counterbalance the military. Civilianizing cabinet positions can also increase the costs for the military to plot and carry out a coup because it increases non-military political support for a leader by allocating cabinet positions to civilian elites.

In particular, political leaders can fill interior and defense positions with civilian elites, such as their relatives and loyalists, rather than the military elite. The purpose of this measure is to ensure that security forces under the Ministry of Interior and Defense, such as regular armed forces and interior troops, are capable of preventing and putting down a coup. For example, armed forces such as the interior troops and the national police (the National Gendarmerie), which are normally commanded by the Minister of the Interior, played a crucial role in thwarting Lieutenant Kelly Ondo Obiang's 2019 coup attempt in Gabon. When uniformed politicians occupy these cabinet positions, there is a risk that they may favor and assist military intervention in politics or coup attempts (White, 2017). Appointing civilian elites to non-security cabinet positions in the Ministry of Justice and Foreign Affairs is also crucial for judicial oversight and the prosecution of coup plans, as well as to prevent the military from exploiting its influence to seek foreign support from other countries (Barany, 2019).

Appointment of civilian ministers to cabinet positions has been found to strengthen the support base of political leaders, as it serves as a mechanism for distributing patronage and improving the government's efficacy (Anene, 1997; Kroeger, 2020). The outcome of this strategy is that various ethnic groups and social factions within society are garnered as potential allies, thereby reinforcing the objective of thwarting military coups, as Huntington (1957) similarly highlights in his analysis of subjective civilian control. Moreover, cabinets comprised of "non-military" civilian elites, such as relatives of political leaders and technocrats (Gandhi and Lawrence Sumner, 2020), are less resistant to organizational reforms and counterbalances aimed at reducing the military's ability to stage a coup.

One could argue that the level of civilization found in these cabinets does not accurately reflect the extent of coup-proofing. This is because the level of civilization varies greatly across different regime types, but remains relatively consistent within the same regime type, such as a military regime. Even in military regimes such as those in Africa, however, a number of studies demonstrate a gradual civilianization of cabinet positions as a result of military leaders' decision to reduce the likelihood of military coups (Anene, 1997; Eizenga, 2021).

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It is also important to note that the extent of coup-proofing is not always manifested in dramatic changes such as the removal of military officers. Preventing the military from "penetrating" a particular cabinet post, regardless of whether it was previously held by a military officer or a civilian elite, can also be an important coup-proofing manifestation, as the military's influence in a number of areas, such as control of internal security forces, judicial control, and foreign affairs, ultimately increases its political power and coup-making capabilities. Obviously, it is difficult to ascertain the precise situation within the regime that could allow us to "observe" the continued civilianization of the cabinet. The fact that the military has not gained or regained control of key cabinet positions, however, can be considered the extent of coup-proofing.

Purges and decreases in military expenditure are also indicators of the extent of coup-proofing. By purging disloyal officers and heads of security organizations, leaders not only eliminate potential threats but also send a signal to potential coup plotters that they are capable of identifying them (Roessler, 2011; Braithwaite and Sudduth, 2016; Sudduth, 2017b; Boutton, 2019). Several studies suggest that increasing military spending may reduce military resentment and their inclination to intervene in politics (Bove and Nisticò, 2014; Leon, 2014; Powell *et al.*, 2018). However, as Powell (2014) notes, expanding the military's size and political influence through an increase in defense spending may enhance their ability to carry out coups. As such, we should consider reducing military spending as a key component of the extent of coup-proofing. A substantial decrease in military spending would deprive potential coup plotters of resources, making it more difficult for them to overthrow the government.

Scholars place a greater emphasis on the application of a variety of coup-proofing measures, which include multiple aspects that collectively contribute to the coup-proofing strategy's effectiveness. De Bruin (2020a: 18) points out that different combinations of coup-proofing tactics could exist. Although the efficacy of coup-proofing is subject to debate, extant research reveals that political leaders typically employ a variety of such strategies (Quinlivan, 1999; Albrecht, 2015b; Talmadge, 2015; Reiter, 2020). The implementation of a civilianized cabinet could aid in the execution of measures that have the potential to trigger military retaliation, such as establishing counterbalancing security forces and conducting purges. Highly coup-proof regimes can show the simultaneous manifestation of multiple coup-proofing indicators, which indicates the regime's comprehensive coup-proofing.

It is crucial to identify which theoretically relevant variables manifest in the extent of coup-proofing. However, the existing literature lacks an adequate effort to establish a measurement for coup-proofing based on cross-national time data. Prior studies have employed a Bayesian item response method to gauge conceptually distinct constructs. While Gandhi and Lawrence Sumner (2020) concentrates on the consolidation of political leaders' absolute power over elites, Kenwick (2020) focuses on civilian control, which refers to the degree of subordination of the military to civilian leadership. The measure of coup-proofing utilized in our study is distinct from measures of power consolidation and civilian control in terms of its underlying conceptual framework. Although the extent of coup-proofing may be a factor in a political leader's consolidation of power, it does not guarantee authority over all societal forces besides the military.

The concept of civilian control involves the subordination of the military across all policy domains of the state by the civilian leadership, while coup-proofing aims to decrease the likelihood of a military coup. Although these concepts are conceptually distinct, they are closely related in the context of civil–military relations. In terms of scope, civilian control is more comprehensive than coup-proofing (Brooks, 2019: 385). Kenwick (2020: 2) points out that coup-proofing and civilian control can be viewed as means and ends, respectively, and that their relationship is indeterminate. Therefore, he argues that it is essential to quantify coup-proofing using measurement modeling, specifically IRT, as he carried out in his study. In addition, he emphasizes the importance of investigating the causal effect of coup-proofing on civilian control (Kenwick, 2020: appendix).

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In our study, we can assess the conceptual distinctiveness of the constructs put forth in the works of Gandhi and Lawrence Sumner (2020) and Kenwick (2020) by comparing them with our own measure. While their model incorporates regime indicators and party types to gauge the consolidation of authoritarian power and civilian control on a broader level, our model focuses on different types of security forces to capture the extent of coup-proofing not accounted for in their work. To evaluate the construct validity of our measurement, we can determine whether and to what extent the two concepts listed above are related to ours.

2. Modeling coup-proofing

2.1 Scope of analysis

Our research estimates the extent of coup-proofing in 76 countries between 1965 and 2005, covering 2947 country-years. We carefully select the sample countries to maximize the use of relevant data on coup-proofing while remaining theoretically relevant. Initially, we exclude long-term democracies, which have been democratic throughout the period of our study. As De Bruin points out, long-term democracies are not at risk of facing a coup, therefore coup-proofing is unnecessary in such democracies (De Bruin, 2019). Furthermore, established democracies do not provide the necessary variations in the manifestations of coup-proofing that we plan to assess, such as the purge of military officers and the creation of security forces outside the formal chain of command.

Our study focuses on non-democratic and younger democratic countries that have experienced authoritarian rule and military intervention in politics. We analyze 76 countries that existed between 1965 and 2005 to assess whether significant variations in the extent of coup-proofing, not only among countries but also across time. Our analysis utilizes available data on manifestations of coup-proofing. However, due to data limitations, our sample only covers approximately 60 percent of non-democracies that existed between 1965 and 2005.[2] We acknowledge that our research is limited in its ability to draw conclusions about the dynamics of coup-proofing in established democracies. Nonetheless, we can infer the coup-proofing in non-democratic and young democracies through our estimation analysis, despite not covering the entire world population. With the availability of the most recent information on the various coup-proofing manifestations, we can broaden the scope of our analysis sample by including as many non-democracies as possible in future analyses. A complete list of countries in our IRT sample is available in Table 1 in the Appendix.

2.2 Latent variable and item-response approach

The objective of our study is to measure the extent of coup-proofing, a latent trait. Political science research increasingly employs a latent variable approach to capture previously unmeasured political concepts. These concepts range from power consolidation in authoritarian regimes to major power support signals (Quinn, 2004; McManus and David Nieman, 2018; Reuning *et al.*, 2019; Fariss *et al.*, 2020; Gandhi and Lawrence Sumner, 2020; Kenwick and Maxey, 2020; Smith and Spaniel, 2020; Terechshenko, 2020). Similarly, we can view the level of coup-proofing as a continuous latent variable that varies from low to high. Using Bayesian IRT, we account for the uncertainty in observed manifestations and incorporate it into statistical estimation. On the basis of solid theoretical foundations, we identify observable manifestations of coup-proofing, such as institutional counterbalance and the civilianization of cabinet positions.

One challenge that arises is accurately determining the weights assigned to each indicator in order to measure the extent of coup-proofing. How can one assign weights accurately among different indicators of coup-proofing and avoid arbitrary weight assignment? In our study, the coup-

[2]Democracies and non-democracies are determined by the Polity IV score of 7.

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proofing indicator weights are determined as part of the estimation process, as rather than relying on theoretical assumptions about the relative importance of items (Smith and Spaniel, 2020). This approach generates a discrimination score that indicates how well the item distinguishes between low and high levels of coup-proofing, and this item parameter estimate serves as an "implicit" weight (Stucky, 2009; Traissac and Martin-Prevel, 2012).

A known limitation of the additive indexing method is that it only provides a point estimate of the actual quantity of interest. This does not allow for a more comprehensive understanding of uncertainty around the parameter estimates. Taking into consideration the measurement uncertainty of an unobservable trait, Bayesian IRT can produce both point estimates as well as full posterior distributions (Bürkner, 2017, 2020). In Bayesian IRT, point estimates are single values that summarize the posterior distribution and are often used to represent the "best guess" or most likely value of a parameter. It provides a more informative representation of the parameter estimates because researchers can report both point estimates and credible intervals, which capture the uncertainty surrounding point estimates.

Bayesian IRT employing the Markov chain Monte Carlo (MCMC) sampling method has several advantages over the conventional maximum-likelihood estimation (MLE) method, such as the assurance of convergence. MCMC sampling is designed to explore the posterior distribution of latent traits and other parameters in IRT model. This method guarantees convergence to the target distribution given sufficient iterations. This convergence assure is particularly advantageous for models with high-dimensional parameter spaces or models that are sensitive to initialization values, for which the MLE method does not guarantee convergence. Bayesian methods address certain limitations of MLE, including reduced efficiency in smaller sample sizes and inaccurate parameter estimation when dealing with extreme response patterns (Bürkner, 2020).

In IRT, the latent traits and model parameters often have distributions that are not Gaussian or linear. MLE is based on the assumption of asymptotic normality, which may not always be true. MCMC sampling makes it possible to estimate complex posterior distributions, such as those that are not Gaussian or linear. This flexibility improves the accuracy of parameter estimation and provides more reliable inference (Ansari and Jedidi, 2000; Baker and Kim, 2004).

The IRT's uni-dimensionality assumes that all items in the model should represent a single latent trait—the extent of coup-proofing (Hattie, 1985; van der Linden and Hambleton, 2013). To ensure the uni-dimensionality of our measure, we exclude items such as family members in positions of power that capture another trait—leaders' attempts to consolidate their power (Gandhi and Lawrence Sumner, 2020).[3] The more a regime reduces the military's ability to stage a coup and increases the cost of such a coup, the more likely it is that signs of the extent of coup-proofing will become apparent. In our study, increasingly positive values of estimated coup-proofing correspond to higher levels of coup-proofing, while increasing negative values indicate decreasing levels of coup-proofing.

2.3 Items that identify the extent of coup-proofing

As previously discussed in the conceptualization section, various manifestations of coup-proofing can be observed across multiple domains. In this section, we describe the procedure and data employed to generate dichotomous items for the analysis of the two-parameter (2PL) IRT model. The first group of items corresponds to the presence of security forces, such as presidential guards and paramilitary organizations, to counterbalance the military with other security forces. The second group of items refers to the presence of civilian elites in various cabinet positions, which can reduce the military's coup-making capacity and increase the cost of a coup. A purge item denotes the elimination of disloyal military officers. Lastly, the reduction in the defense spending indicates a decrease in the material capabilities of the military.

[3]It is essential to note that the underlying items, such as counterbalancing and cabinet civilianization, may have multi-dimensionality, but they combine to imply a single latent trait—the extent of coup-proofing.

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Security forces are recording the existence of additional security forces beyond the traditional military forces of the army, navy, and air force, and whether these forces serve as a "counterweight" to the military. To construct our measures, we use De Bruin's State Security Forces Dataset (SSFD), which includes 375 security forces in 110 countries from 1960 to 2010 (De Bruin, 2019). Previous studies have included regular forces, such as army and marine corps troops, to devise measures of counterbalancing (Belkin and Schofer, 2005; Pilster and Böhmelt, 2011). However, scholars have raised concerns about the consistency and accuracy of the cross-national data on counterbalancing, which relies on the International Institute for Strategic Studies' *Military Balance* (Colgan, 2011; De Bruin, 2019). In contrast, the SSFD provides more precise measures of security forces and counterbalancing because it uses consistent inclusion criteria. Moreover, the SSFD data provide comprehensive information on various security forces, including those that exist outside the regular military chain of command.

We consider two conceptual dimensions using indicators from the SSFD data. First, the creation of a coercive apparatus to counterbalance the military can be evaluated based on the presence of a variety of security forces outside the regular armed forces. Second, the functional features of security forces are related to the central idea behind coup-proofing. As Quinlivan argues, coup-proofing is "to prevent troops from moving on the centers of the regime, and a task is best accomplished by a ground-based parallel military (Quinlivan, 1999: 142)." If security forces are stationed near the capital and operate outside the regular military chain of command, they can serve as effective counterweights to a coup d'état. To capture the variety of security forces, we use dichotomous indicators of security forces, such as the presidential guard, secret police, militarized police, interior troops, militia, and border guards from the SSFD data. These indicators take the value of 1 if one or more of each security force exists and 0 otherwise.

The IRT model used in our study includes two dichotomous indicators from the SSFD data sets, namely *Military unit independent* and *Military counterweight present*, in addition to indicators of different types of security forces. The indicator *Military unit independent* is coded as 1 if there exists more than one military unit that reports to the regime through at least one supervising body distinct from that of the regular military, and 0 otherwise. Similarly, the indicator *Military counterweight present* is coded as 1 if there exists more than one military unit stationed within 60 miles of the capital outside the regular military chain of command, and 0 otherwise.

The presence of civilian elites in cabinet positions indicates whether non-military civilian elites hold different cabinet positions. To determine this, we use the Military Participation in Government data compiled by White (2017). The data enable us to identify whether defense, interior, justice, and foreign affairs positions are occupied by non-military civilian elites or active-duty military officers. Additionally, we identify whether civilian elites hold security-related or non-security-related cabinet positions outside these four areas. Dichotomous indicators have a value of 1 when non-military civilian elites occupy these cabinet positions, and a value of 0 when active-duty military officers hold them. This allows us to track changes in cabinet positions from civilian elites to military officers and vice versa.

A purge of military officers is a case in which a leader demotes and discharges military officers from key positions. A political leader uses this method not just to directly replace dishonest military members with loyalists but also to send a signal to potential coup plotters. The Military Purges in Dictatorships (MPD) data focus on individuals who have legitimate access to physical forces capable of violence (Sudduth, 2020). While the Banks Cross-National Time Series Data Archive also provides information about purges (Banks and Wilson, 2021), it includes the purges of civilian elites. Since our study focuses more on coup-proofing strategy limited to the military, the MPD data are more appropriate for our conceptualization. Military purge takes the value 1 in a year when one or more military purges occur and 0 otherwise.

Defense budget reduction is a material aspect of coup-proofing. By allocating fewer resources to the military, a regime can limit the military's material capability (Acemoglu *et al.*, 2010; Powell, 2014; Powell *et al.*, 2018). The National Material Capabilities data version 5.0 provides

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Table 1. Indicators of the extent of coup-proofing

Indicators (items)	Expectation
Security forces	
Military counterweight	↑
Border guard	↑
Military independent	↑
Militia	↑
Interior troops	↑
Militarized police	↑
Secret police	↑
Presidential guard	↑
Civilian elites in cabinet positions	
A civilian elite in a non-security position	↑
A civilian elite in a security position	↑
A civilian elite in foreign affairs position	↑
A civilian elite in a justice position	↑
A civilian elite in an interior position	↑
A civilian elite in a defense position	↑
Purge and defense budget reduction	
A purge of military officers	↑
A decrease in the military spending	↑

information about each state's total military budget for each year from 1816 to 2012 (Singer *et al.*, 1972). Reductions in the defense budget may indicate a decline in the material capability of the military, but they may also be the result of external shocks unrelated to coup-proofing (e.g., the end of a war). Obviously, we cannot identify all factors that influence the reduction in military spending, but by excluding cases occurring up to three years after the end of an interstate war, we can remove the external factor that clearly influences the reduction. We utilize the Correlates of War (COW) data on interstate wars to determine when a war begins and ends (Maoz *et al.*, 2019). To ascertain the decrease in military spending, we compare each year's military spending to the average of the previous three years. Except for cases occurring up to three years after the end of an interstate war, a decrease in military spending is coded as 1, while an increase or consistency is coded as 0.

The first column of Table 1 provides a summary of the items that are designed to measure the extent of coup-proofing. The second column indicates an upward arrow if the item is expected to increase the level of coup-proofing in the given country-year.

2.4 IRT model specification

We estimate the extent of coup-proofing in 2947 country-years between 1965 and 2005 by analyzing 76 nations using the country-year as the unit of analysis. We utilize various items that are relevant to different dimensions of coup-proofing, as mentioned in the preceding section. We use a 2PL IRT model that can be fitted using the R package, `brms`. The 2PL model evaluates levels of coup-proofing by examining observable manifestations, which take the following mathematical form:

$$Pr(Y_{itj} = 1|\Theta_{it}, \beta_j, \alpha_j) = \frac{\exp[\alpha_j(\Theta_{it} + \beta_j)]}{1 + \exp[\alpha_j(\Theta_{it} + \beta_j)]} \quad (1)$$

where $Pr(Y_{itj} = 1)$ is a probability that takes the value 1 if item j is observed in country i in year t and 0 otherwise. For example, if a purge of military officers or a paramilitary force is observed in country i in year t, this indicator takes the value of 1; otherwise, it is 0. If a civilian elite holds the position of Minister of the Interior or Minister of Defense, the value will be 1, whereas the value

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will be 0 if the position is held by a military officer. We can therefore interpret Θ_{it} as the latent extent of coup-proofing in country i at time t. A higher Θ_{it} indicates a greater level of coup-proofing.

Each item has two parameters: the item easiness parameter β_j and the item discrimination parameter α_j. We can interpret β_j as the easiness of item j, as a higher β_j implies a higher probability of correctly answering a given latent variable. When β_j is large and positive, it indicates that the item is easier to implement.[4] The other parameter, α_j, determines how well the items discriminate between regimes across different levels of coup-proofing. An item is better able to discriminate between regimes as α_j increases. In a 2PL model, we assume that α_j is positive for all items, which is a reasonable assumption for our data set in which a $y = 1$ always indicates coup-proofing.[5]

To conduct IRT modeling, we rely on the R package `brms` which allows for Bayesian estimation in Stan using MCMC sampling via adaptive Hamiltonian Monte Carlo (Hoffman and Gelman, 2014; Bürkner, 2019; Bürkner and Vuorre, 2019). `brms` enables us to predict the parameters of interest using the distributional regression framework (Bürkner, 2017, 2020). We place a normal prior on Θ_{it}, which represents the latent trait, such that $\Theta_{it} \sim N(0,\ 1)$.[6]

Additionally, we use a normal prior $\beta_j \sim N\ (0,\ 10)$ as an easiness parameter to constrain β_j to a reasonable range of values to avoid having the posterior distribution excessively influenced by the prior. To force α_j to be positive, we assign the weakly informative prior $\alpha_j \sim$ Gamma(4, 3), assuming that all items contribute to the latent variable in the same direction.[7]

3. IRT estimation results

The extent of coup-proofing in 76 countries from 1965 to 2005 is estimated.[8] The 2PL IRT model generates posterior distributions for three parameters: discrimination, easiness, and latent levels of coup-proofing across countries and time.

To interpret the results of the Bayesian IRT model, it is crucial to assess whether the model achieves convergence. The $\hat{R}$ convergence diagnostic compares the between- and within-chain

[4]Some R packages, such as `brms` and `eRm`, work with easiness parameters, while most definitions of the 2PL model use $\Theta_{it} - \beta_j$, in which case $-\beta_j$ denotes item difficulty (Jeon and Rijmen, 2016). The two formulations are equivalent because β_j can be transformed into the difficulty parameter.

[5]Our model is unlikely to be identified unless informative priors are specified and α_j is set to a positive value. This is because a switch in the sign of α_j can be corrected for by a switch in the sign of $\Theta_i + \beta_j$ without a change in the overall likelihood. Specifically, when we consider the logistic function used in our 2PL model, the corresponding mathematical function is as follows: $P(y = 1) = \text{logistic}(\alpha_j(\Theta_i + \beta_j))$. When we allow α_j to have both positive and negative values, it means that an increase in the latent trait level Θ_i can result in either an increase or decrease in the probability of a correct response, depending on the sign of α_j. This lack of identification makes it impossible to estimate unique and separate values for α_j and $(\Theta_i + \beta_j)$ because any switch in the sign of α_j can be compensated by a switch in the sign of $(\Theta_i + \beta_j)$, without affecting the overall likelihood of the model. By constraining α_j to be positive, the 2PL model becomes identified, allowing for meaningful estimation and interpretation of the discrimination parameter and the latent trait.

[6]Specifically, our model assigns a unique Θ to each country-year by letting each country-year has its own intercept. Accordingly, if a country-year has a great deal of very precise data, the estimate will be adjusted less. If a country-year has less or more uncertain data, that country-year will be pooled more (Gelman and Hill, 2006; McElreath, 2018). To achieve this, we apply a hierarchical prior of the form $\Theta_{it} \sim$ Normal$(0,\ \sigma_\theta)$ for each parameter Θ_{it} per country-year, where a common standard deviation parameter is σ_θ, and $\sigma_\theta \sim N(0,\ 1)$. Here, σ_θ determines the distribution of Θ_{it} (Bürkner, 2019).

[7]Assigning a weakly informative prior, Gamma(4, 3), to the α_j parameter indicates that we anticipate positive alpha values. A successful convergence is achieved. In addition, we investigate the case in which a normal prior (0, 10) is assigned to α_j, as in Gandhi and Lawrence Sumner (2020). The normal distribution, also known as the Gaussian distribution, is a continuous probability distribution that is often used as a prior for parameters with no specific constraints. In this case, the Normal(0, 10) prior implies that we have prior beliefs about the alpha parameter following a normal distribution. Convergence occurs in this instance as well, indicating that the normal prior enables our model to accurately identify the appropriate parameter values.

[8]To achieve convergence and sufficient sample sizes, we ran four chains for 5000 iterations, with 2500 warmup.

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estimates for model parameters and other univariate quantities of interest. If the chains do not mix well, $\hat{R}$ exceeds 1. All $\hat{R}$ values in our IRT models are less than 1.01 (refer to Figure 3 in the Appendix), indicating conformity with conventional criteria. Bulk-ESS refers to the effective sample size based on the rank-normalized draws. A higher Bulk-ESS implies better performance, conventionally requiring at least 100 times the number of chains. For instance, if four chains are running, the rank-normalized effectiveness should be at least 400. In our IRT model, most parameters have a Bulk-ESS higher than 400. MCMC chains converge to the same target distribution if they mix well individually (i.e., quickly jumping up and down) and overlay one another simultaneously. A graphical summary of the marginal posterior densities and the MCMC chains indicates that the chains are well-mixed individually (refer to Figure 4 in the Appendix).

Figure 1 presents posterior estimates of the easiness and discrimination features of the coup-proofing indicators (items). In panel (a), we observe that establishing a *militarized police* is easier than establishing a *presidential guard* or *secret police*. Substantively, if we want to witness a presidential guard and secret police, the regime needs to be highly coup-proofed. In contrast, we observe a militarized police even in regimes with a low level of coup-proofing.

The easiness parameters for *military counterweight* and *military independent* are both quite low, indicating that we can observe the formation and maintenance of these security organizations only when a regime has a very high degree of coup-proofing. These patterns of security organization easiness parameters align with the well-known idea that constructing security organizations that directly counterbalance the military is difficult (Sudduth, 2017a).

As for the civilianization of the military in cabinet posts, we find that *civilian foreign affairs* and *civilian justice* have higher easiness of parameter values than *civilian interior* and *civilian defense*. This suggests that a regime needs to be more coup-proofed than others show civilianization of cabinet positions which influence the use of force. In contrast, the civilianization of cabinet positions, which has little effect on the use of force, does not necessitate a high level of coup-proofing to manifest.

In panel B of Figure 1, we observe how well each item discriminates across degrees of coup-proofing. A large discriminating parameter estimation value for a given item indicates effective differentiation between country-years with high and low levels of coup-proofing. Notably, the *military counterweight* and *military independent* items exhibit the highest estimation values among the security forces items, corresponding to the lowest easiness parameter values. Similarly, the *military counterbalance* and *military independent* items show the highest estimation values among the security organization items, also corresponding to the lowest easiness parameter values. These findings suggest that *military counterbalance* and *military independent* are hard to implement, but they effectively differentiate the extent of coup-proofing across observations.

Several characteristics of the estimated discrimination parameter values are worthy of consideration. We observe that the discrimination parameter values for *civilian foreign affairs* and *civilian justice* are quite high despite their easiness parameter values being very high. This suggests that these two items distinguish between regimes with a low level of coup-proofing and those with a moderate level, but not a high level.

Also, the discrimination parameter values for *civilian defense* and *civilian security position* are small relative to those of *civilian non-security position* and *civilian interior*. Civilian oversight of defense and security positions should be able to distinguish a regime's degree of coup-proofing more effectively than oversight of non-security positions, as we think security-related positions are more crucial to coup-proofing. As stated in the previous section, however, our IRT model does not rely on theoretical assumptions regarding the relative importance of items; instead, item weights are determined as part of the estimation process.

Based on these estimated results, we can infer that control over the interior ministry is just as important for preventing coups as control over the defense and security forces. Regimes utilize the interior troops or national gendarmerie to suppress a coup, although not all ministries of the interior have armed forces. Due to their geographical proximity and more rapid access to

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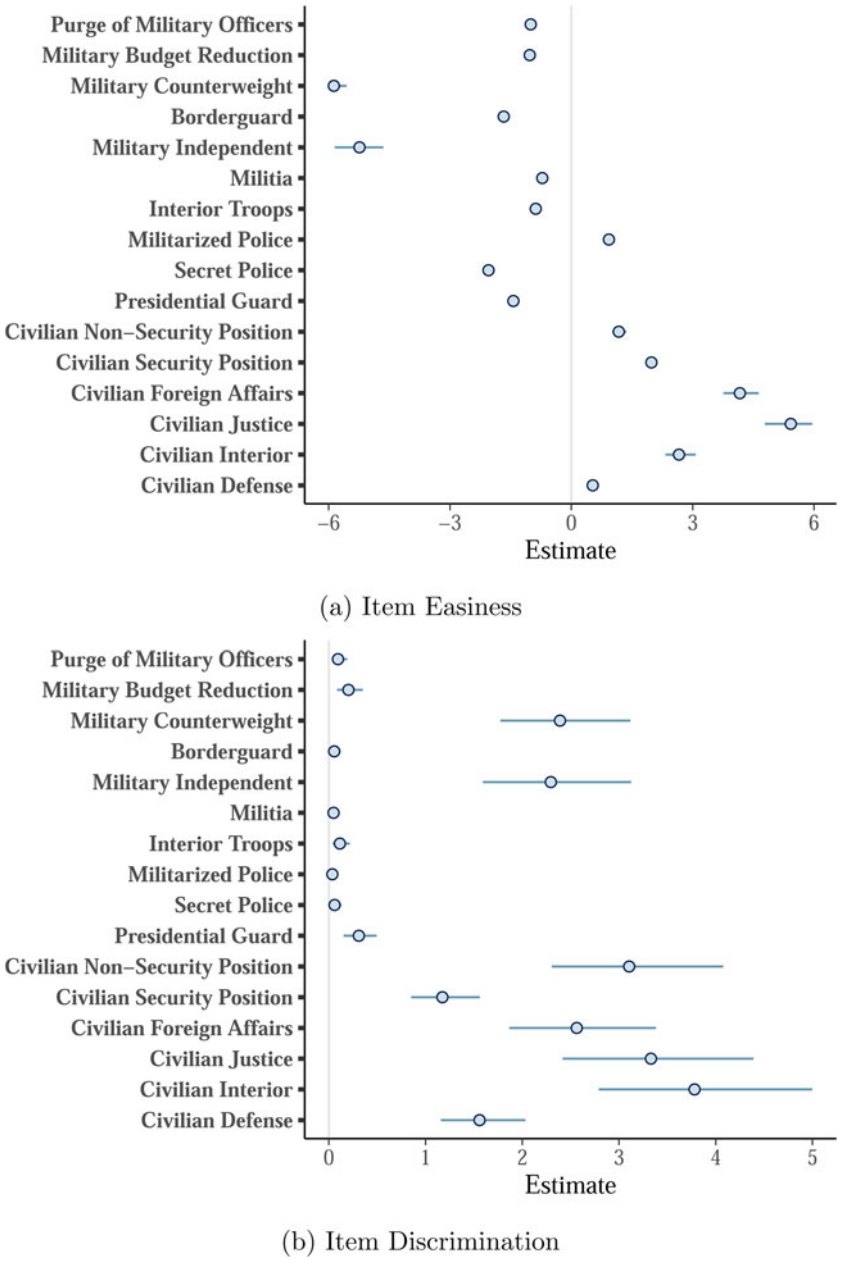


Figure 1. Estimates of easiness (a) and discrimination (b) parameters for each of the 16 indicators in the IRT model. Dots represent means of posterior distribution, and bands represent 2.5–97.5 percent highest posterior density credible intervals.

internal coup plots, these armed groups affiliated with the interior ministry may be more effective at preventing coups than traditional military forces. Therefore, civilian oversight of an interior ministry can be an important coup-proofing factor, which may explain the unexpectedly large value of the discrimination parameter.

The values of the discriminant parameters can also differ depending on the inclusion or exclusion of an item. Considering the exploratory nature of our modeling on the extent of coup-

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proofing, we can observe how the pattern of estimation results differs when we exclude items associated with non-security cabinet positions. Figure 1 in the Appendix displays the posterior estimates of the easiness and discrimination parameters for the coup-proofing indicators (items). The estimates are presented after excluding the indicators for *civilian non-security position*, *civilian foreign affairs*, and *civilian justice*. The easiness parameter values do not change relative to the pattern of estimation results shown in Figure 1 of the main text. However, the discrimination parameter values for *civilian interior* and *civilian security position* become smaller than the value of *civilian defense*. Despite the fact that these results are consistent with the conventional notion that civilian oversight of the defense cabinet is essential, what constitutes a "good" item and how item selection should occur depends on a variety of factors, such as content validity and item clarity. Our exploratory approach to item selection has the potential to facilitate the development of future coup-proofing models that are more consistent with the researcher's theoretical objectives.[9]

The IRT model's posterior estimate of coup-proofing levels, denoted as θ, is our primary interest. We display the posterior mean estimate distributions for all 2947 country-years between 1965 and 2005 in Figure 2, with a mean estimate of −0.002 and a range of −1.79 to 1.89. Figure 3 highlights interesting patterns in the differences of mean distributions for various authoritarian regimes.[10] When comparing single-party (b) and personalist regimes (c) to military regimes (a), we observe that military regimes exhibit the lowest average level of coup-proofing. This result is consistent with the conventional wisdom that military regimes do not actively work to reduce their military's capability to stage coups.

It is also interesting to compare estimated distributions to empirical findings from previous studies on the relationship between counterbalancing and authoritarian regimes. Escribà-Folch *et al.* (2020) discovered that counterbalancing mechanisms are more common in personalist regimes than in single-party and military regimes. Our study finds that personalist regimes (c) exhibit a higher level of coup-proofing than military regimes (a), but a lower level of coup-proofing compared to party regimes (b). It is important to note that our primary objective is to measure the overall level of coup-proofing, not a single coup-proofing mechanism.[11] Finally, we find that monarchies (d) have the highest level of coup-proofing among authoritarian regimes. This finding suggests that monarchies are more likely than other authoritarian regimes to reduce the military's coup-making capability and increase coup costs (Gandhi and Lawrence Sumner, 2020).

By comparing mean estimates over time for two countries, we can improve our understanding of how our estimates correspond to real-world situations. Figure 4 illustrates the variation in estimates of the extent of coup-proofing over time for Pakistan (a) and Mexico (b). The figure shows that not only do our estimates vary within a single country but also that cross-national differences exist. Panel (a) of Figure 4 shows that the era of civilian leaders, such as Zulfikar Ali Bhutto and Benazir Bhutto, had far higher levels of coup-proofing than the era of military leaders, such as Muhammad Zia-ul-Haq and Pervez Musharraf. This pattern is consistent with our earlier finding that military regimes have a lower level than democracies and other types of authoritarian

[9]As with our original IRT model, we performed construct validity checks on the model with three non-security-related cabinet positions excluded. In Figure 2 of the Appendix, the Pearson's r values for civilian control and power consolidation for the discriminant validity assessment are 0.321 and 0.202, respectively, indicating that the excluded model is less similar to the original model for civilian control, but more similar for power consolidation. Nonetheless, both are below the 0.40–0.60 range for a moderate association, confirming discriminant validity. As shown in Table 3 of the Appendix, the excluded model has negative effects on coup success and attempt, but only for fixed effect models.

[10]The Polity IV score of 7 or less categorizes 87 percent of regimes in our study sample as non-democratic, and the remaining 13 percent as democratic.

[11]Furthermore, while Escribà-Folch *et al.* (2020) rely on data from the International Institute for Strategic Studies, our study makes use of De Bruin (2019)'s new security organization data.

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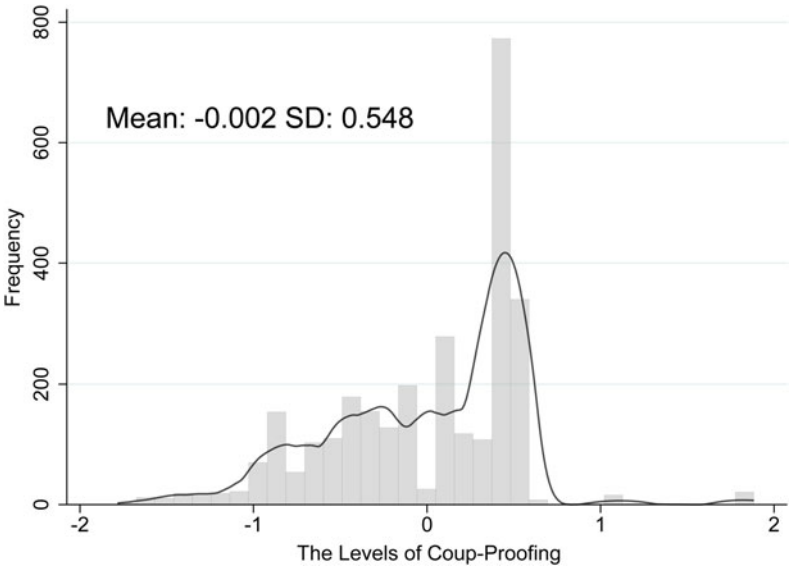


Figure 2. Distributions of latent measures of the level of coup-proofing.

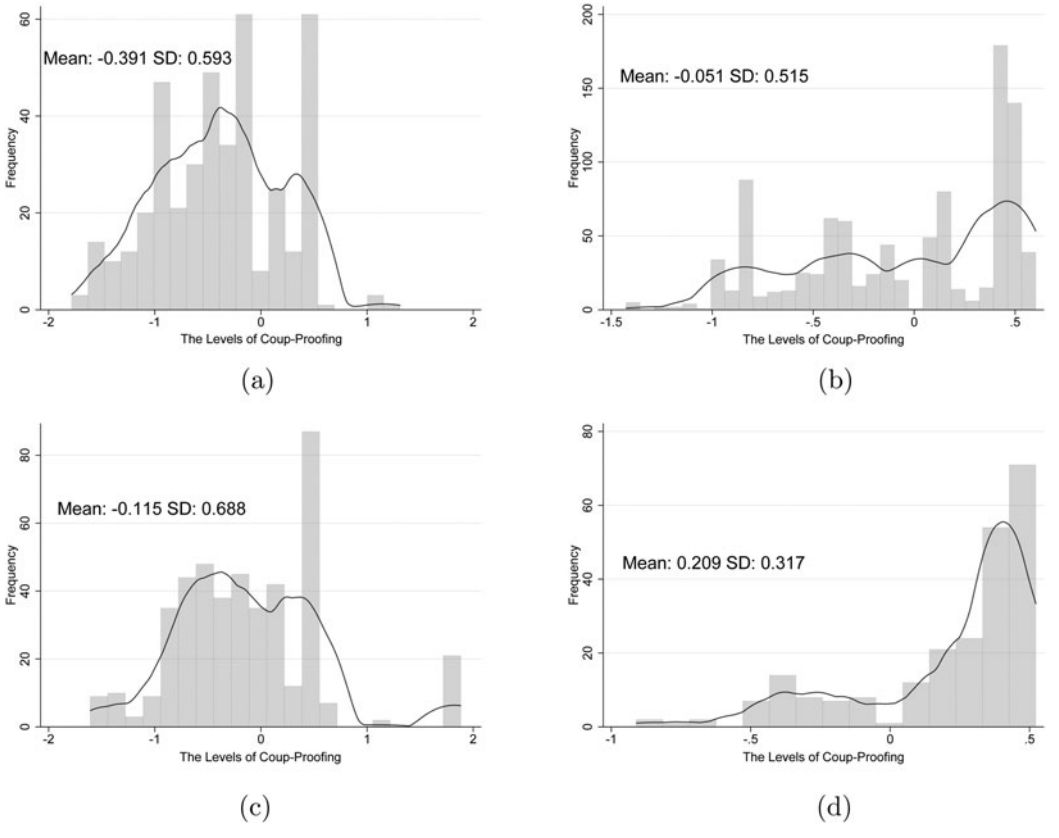
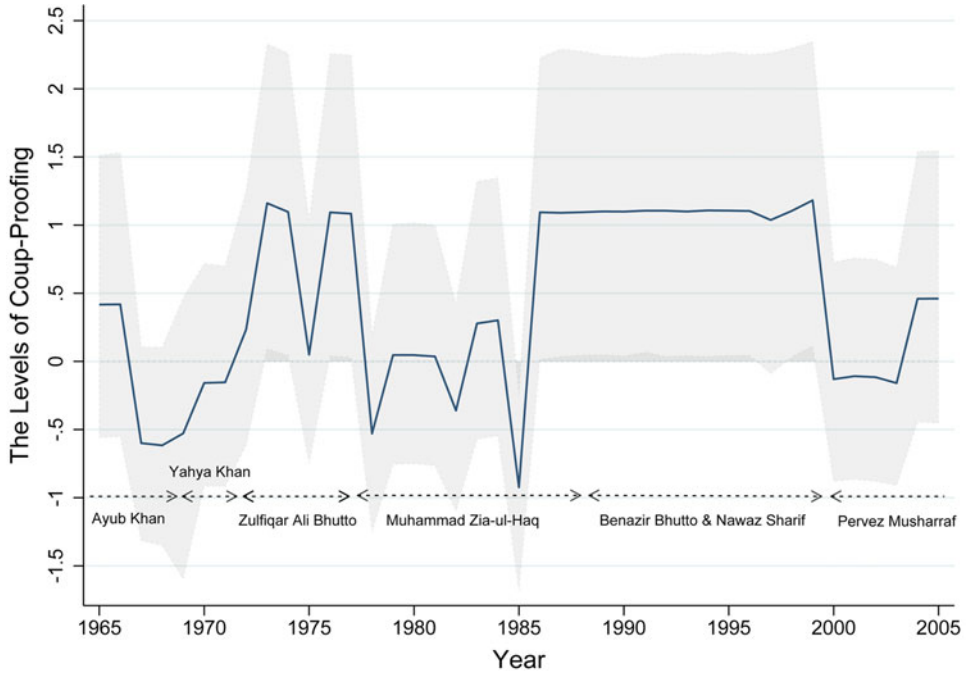
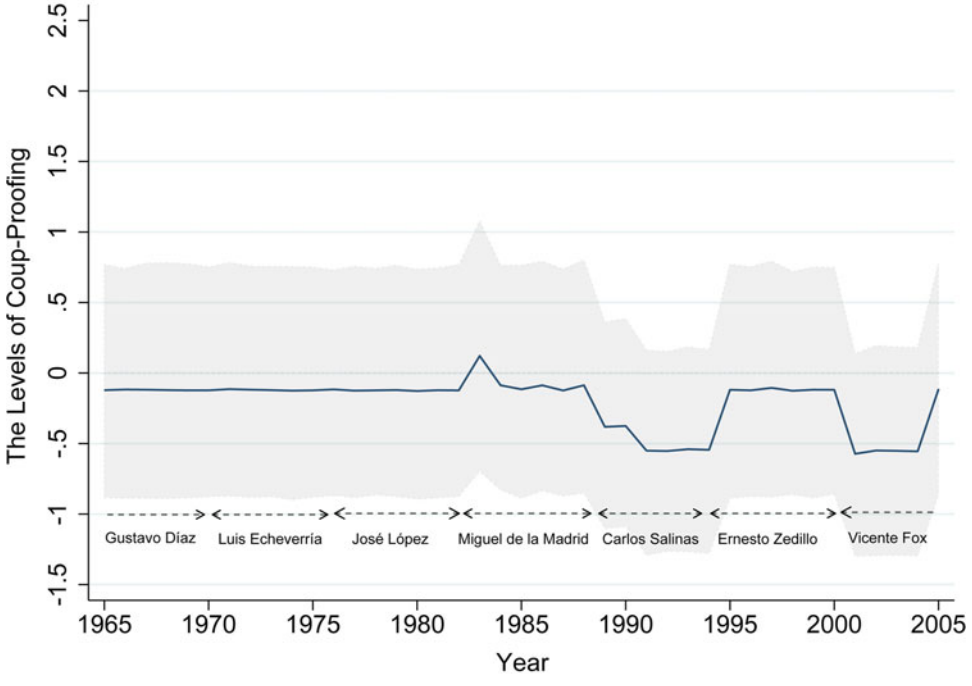


Figure 3. Distributions of latent measures of the level of coup-proofing depending on the different types of authoritarian regimes (static IRT model): (a) military regimes (412 country-years), (b) party regimes (981 country-years), (c) personal regimes (447 country-years), and (d) monarchy regimes (232 country-years).

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(a)



(b)

Figure 4. Levels of coup-proofing in (a) Pakistan and (b) Mexico between 1965 and 2005. The mean posterior estimates of coup-proofing are indicated by a solid line. The bands around the solid line represent 95 percent credible intervals.

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regimes. Additionally, the estimates also vary over the course of a leader's tenure in power, as seen with Zulfikar Ali Bhutto, Muhammad Zia-ul-Haq, and Pervez Musharraf.

In Pakistan, Benazir Bhutto attempted to reduce the military's capability following her party's election victory in 1988 by removing military personnel from the intelligence agency and her cabinet (Shafqat, 1997). Despite the fact that Bhutto and her civilian successor, Nawaz Sharif, frequently compromised with the military throughout the 1990s, the estimation results reveal their decisions to tighten their grip on the military.

In contrast to Pakistan, where coup-proofing levels fluctuate drastically, Mexico's levels are relatively stable, with the exception of two presidents, Carlos Salinas and Vicente Fox. This consistency aligns with Mexico's historically stable civil–military relations, which have been dominated by the Institutional Revolutionary Party (Díez, 2012). Pakistan's extremely volatile coup-proofing levels contrast starkly with Mexico's relatively low coup-proofing levels.

3.1 Construct validity of coup-proofing measurement

Construct validity refers to the extent to which a measure accurately assesses what it is supposed to measure. When assessing something that cannot be measured or observed directly, it is important to examine construct validity. Examining discriminant validity helps establish construct validity by demonstrating that two concepts that should not be related are, in fact, not related (Grant and Kelly, 2008). Determining discriminant validity involves examining the degree of correlation between coup-proofing and civilian control and consolidation of power. Furthermore, we can assess construct validity by examining whether our operationalization of a concept yields plausible and interesting results in light of a preexisting hypothesis (Adcock and Collier, 2001). If our measurement of coup-proofing has construct validity, we should observe a consistent negative effect on both the attempt and success of a military coup.

Figures 5 and 6 show that our measure of extent of coup-proofing and Kenwick's measure of civilian control have a moderate correlation, with a Pearson's r value of 0.541. A moderate association between measures in the range of 0.40–0.60 can indicate that the measures being examined are valid measures of different but related concepts. This finding supports Kenwick's speculative argument that coup-proofing and civilian control are distinct but related concepts. Pearson's r value for the comparison with power consolidation, on the other hand, is a very low 0.093, indicating a higher discriminant validity. This demonstrates that coup-proofing and power consolidation are measuring completely different concepts.

It is important to demonstrate that, despite their correlation, the two measures of civilian control and coup-proofing do not produce the same scores. To achieve this goal, we conduct a comparative analysis of how the levels of civilian control and coup-proofing change over time within the same country. Using a static IRT model, we illustrate in Figure 7 the respective posterior estimates of the extent of coup-proofing and civilian control over time in Guatemala. Between 1965 and 1985, a lengthy military regime governed Guatemala. Although Vinicio Cerezo's civilian leadership was established following the 1986 election held under the new constitution, the military continued to wield political influence behind the scenes until 1996, when the 36-year civil war between the government and the guerrilla ended.

In Figure 7, the extent of coup-proofing is highly correlated with civilian control, but it also vary over time. For instance, between 1970 and 1982, the extent of coup-proofing fluctuated significantly, whereas civilian control was relatively stable. In contrast, levels of civilian control plummeted overtime after 1990, while the extent of coup-proofing remained largely unchanged. As Kenwick noted, additional theoretical analysis and empirical investigation will be required in future research to fully comprehend the indeterminate relationship between civilian control and coup-proofing.

We also assess construct validity by determining whether our operationalization of a concept yields plausible and interesting results. If the objective of coup-proofing is to reduce the military's capability, then counterbalancing, a key component of coup-proofing, should have negative

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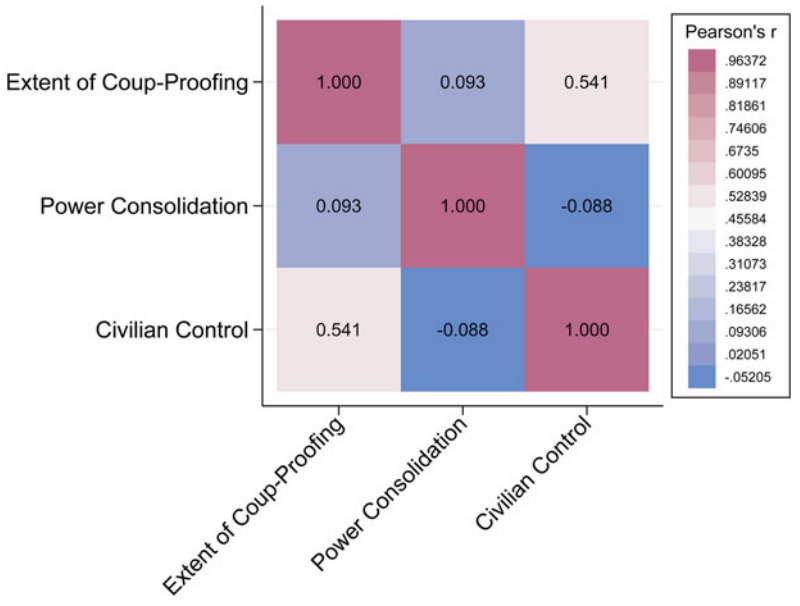


Figure 5. Correlations between coup-proofing and civilian control and power consolidation.

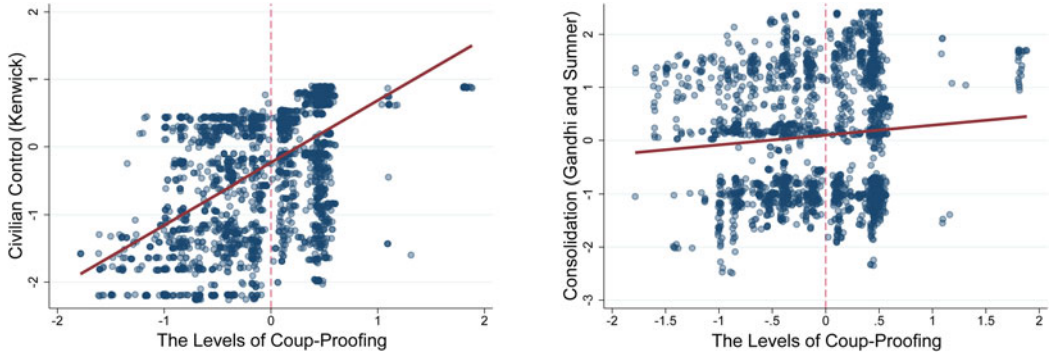


Figure 6. Coup-proofing, civilian control, and consolidation of power.

effects on both coup attempts and coup success, according to the conventional wisdom. Nonetheless, as demonstrated by a number of studies, counterbalancing has inconsistent effects on military coup attempts and success (Powell, 2012; Böhmelt and Pilster, 2015; De Bruin, 2018, 2020a, 2020b). If our measurement of the extent of coup-proofing has reasonable construct validity, we can observe a consistent negative impact on the attempt and success of a military coup.

We conduct a logit analysis to test the effects of our measure of coup-proofing, with coup attempt and coup success as dependent variables and coup-proofing as the independent variable. Fixed effects in a logit model lead to a significant number of observations (about 40 percent) being dropped from our analysis. Thus, it is also possible to estimate linear probability models using ordinary least squares with and without country-fixed effects to determine how much cross-country versus within-country comparisons influence estimation results.

We utilize data on global coups from Powell and Thyne (2011), which distinguishes between coup attempts and successful coups. To adjust for temporal dependence, we use the number of years that elapsed between coup attempts in a country, as well as its square and cube, in our

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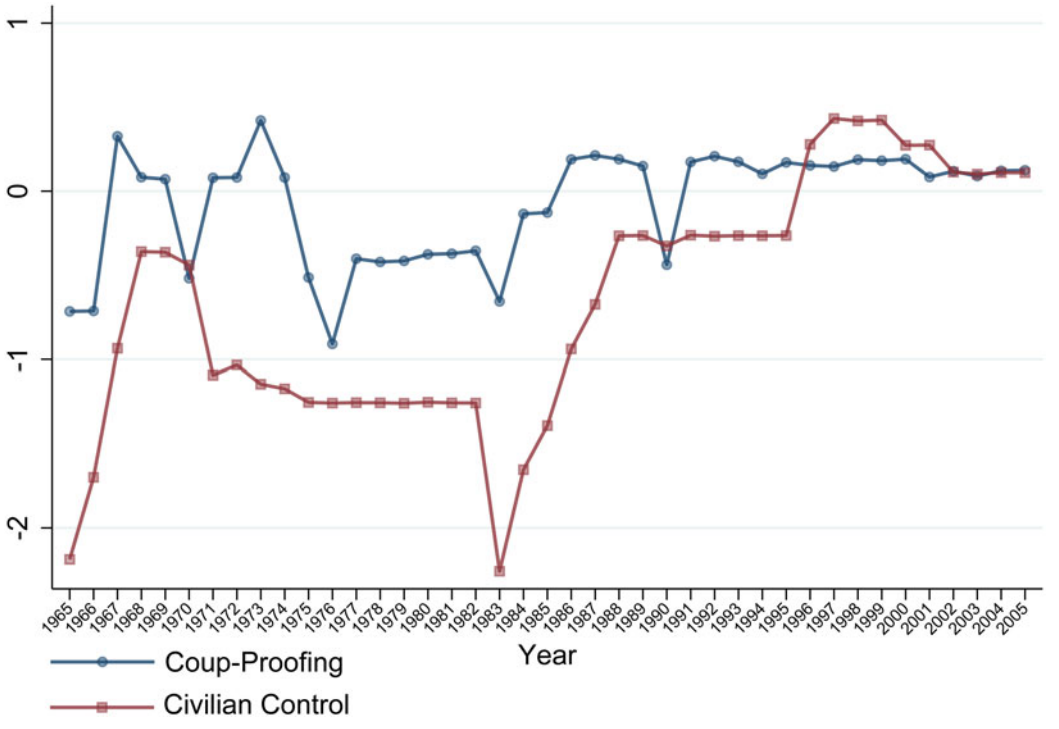


Figure 7. Coup-proofing and civilian control (Guatemala).

Table 2. Effects of coup-proofing on military coups, 1965–2005

	(1) Attempt Logit	(2) Success Logit	(3) Attempt Logit	(4) Success Logit	(5) Attempt LPM	(6) Success LPM	(7) Attempt LPM	(8) Success LPM
Coup-proofing	−0.43**	−0.44**	−0.58***	−0.41*	−0.016**	−0.016*	−0.028***	−0.021*
	(0.18)	(0.22)	(0.20)	(0.23)	(0.0074)	(0.0089)	(0.0098)	(0.012)
Constant	−2.39***	−2.69***	−3.76***	−2.10***	0.076***	0.067***	−0.0037	0.0088
	(0.26)	(0.24)	(0.43)	(0.24)	(0.016)	(0.013)	(0.017)	(0.016)
N	2947	2947	1781	1708	2947	2947	2947	2947
Fixed effects	No	No	Yes	Yes	No	No	Yes	Yes
Log lik.	−410.0	−413.5	−354.8	−355.4	891.4	876.7	950.4	933.6

Notes: Robust standard errors are in parentheses.
Controls for time dependence are included but not shown.
*p < 0.10, **p < 0.05, ***p < 0.01.

models (Carter and Signorino, 2010). At the country level, we apply cluster-robust standard errors to ensure consistent standard errors. Table 2 presents the estimation results, which demonstrate that our coup-proofing measures have negative effects on coup attempts and coup success. Both the Linear Probability Model (LPM) with fixed effects and the LPM model without fixed effects yields coefficients that are statistically significant. It indicates that the effect of coup-proofing on military coups varies not only across countries but also within each country. When including two additional control variables, such as democracy and per capita GDP, we find that the negative and statistically significant effects of coup-proofing persist only for military coup attempts, as shown in Table 2 of the Appendix.

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Overall, the distribution of our coup-proofing measurement is consistent with conventional wisdom. In addition, we demonstrate the construct validity of our measurement by comparing its divergent validity to measures of civilian control and consolidation of power. We also demonstrate additional construct validity by proving that the extent of coup-proofing negatively impacts coup attempts and success.

4. Conclusion

In this study, we examined the extent of coup-proofing. We conceptualized coup-proofing as the degree to which the regime reduces the military's coup-making capabilities and increases the costs of a military coup. We regard the extent of coup-proofing as a latent variable assuming that the indicators reflect a fraction of its underlying value.

While understanding the overall level of coup-proofing is critical in explaining military coups and other significant topics in political science, there have been few reliable measures developed in the past. To address this deficiency, we utilized Bayesian IRT to identify several items that capture the observable indicators of the extent of coup-proofing, including various types of security forces, the civilianization of various cabinet posts, the purge of military officers, and the reduction of military spending. The analysis derived posterior mean estimates of the levels of coup-proofing between 1965 and 2005 across countries and time. Several validation checks and distributions of coup-proofing estimates confirmed the reliability of the measurement.

To what extent do various political science topics benefit from the utilization of our new measure of the extent coup-proofing? The measure allows for a thorough examination of the impact of coup-proofing on regime or leader survival. As the level of comprehensive coup-proofing rises, the military's war-fighting capability decreases, leading to an increase in civil war incidents and prolonged civil war duration. The new coup-proofing measurement also allows an analysis of the trade-offs between coup-proofing and external threats (McMahon and Slantchev, 2015).

A growing number of works are examining military defection from a theoretical perspective (Lutscher, 2016; Dworschak, 2020; Neu, 2022). However, extensive empirical research is still needed to investigate the timing and circumstances of defection. While coup-proofing reduces the military's ability to stage a coup and lowers the likelihood of success, it simultaneously increases the probability of military discontent and defection to the leader. Examining the circumstances that lead to military defections in this paradox is of great theoretical interest. Our new coup-proofing measure allows us to develop and test cross-national time analyses of military defection topics.

Supplementary material. The supplementary material for this article can be found at https://doi.org/10.1017/psrm.2023.63. To obtain replication material for this article, https://doi.org/10.7910/DVN/Z5S7VK

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