

**DEFENCE
AND PEACE
ECONOMICS**

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**Defence and Peace Economics**ISSN: 1024-2694 (Print) 1476-8267 (Online) Journal homepage: www.tandfonline.com/journals/gdpe20**Verification of Peace Accords and Military Expenditures in Post-Conflict Societies****Wakako Maekawa**

To cite this article: Wakako Maekawa (2024) Verification of Peace Accords and Military Expenditures in Post-Conflict Societies, *Defence and Peace Economics*, 35:3, 295-319, DOI: [10.1080/10242694.2022.2158648](https://doi.org/10.1080/10242694.2022.2158648)

To link to this article: <https://doi.org/10.1080/10242694.2022.2158648>



Published online: 19 Dec 2022.

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Verification of Peace Accords and Military Expenditures in Post-Conflict Societies

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ABSTRACT

Why is it that some governments ending a civil war in a negotiated settlement succeed in reducing military spending while others fail? Civil wars ending in peace agreements result in relatively low military expenditures; however, not all governments succeed in the reduction. I argue that implementing a third-party verification mechanism of peace accords helps reduce military spending in post-conflict societies because the verification mechanism facilitates the peace accord implementation by enabling reciprocal implementation and by increasing the cost of non-compliance through active information flow. Implementation of peace agreements reduces threats posed by both former and outside rebel groups. This makes the government decrease the military expenditure allocated to appease internal security threats. I tested this argument using 32 civil wars with a comprehensive peace agreement between 1992 and 2011. The results indicate that initiating a verification mechanism leads to lower military spending.

ARTICLE HISTORY

Received 4 July 2022

Accepted 12 December 2022

KEYWORDS

Military expenditure; civil war; verification mechanism; peace agreement; negotiated settlement

JEL CODES

D74; H56; H53

Introduction

Why is it that some governments ending a civil war in a negotiated settlement succeed in reducing military spending while others fail? A prominent feature of a negotiated settlement is that governments and rebel groups must cohabit without completely defeating the opponent (Wagner 1993). Thus, conflict parties are unable to guarantee the agreement terms credibly (Walter 1997), resulting in the breakdown of peace (Licklider 1995; Toft 2010a, 2010b). In this case, a signal of the commitment to obey the agreement plays a crucial role. A war-averse government, knowing that rebel groups rationally use military spending as screening, deliberately reduces its military spending to avoid sending a signal of reneging on the terms (Collier and Hoeffler 2006). Meanwhile, the government also has an incentive to increase military spending (Collier and Hoeffler 2007) to make the deterrence credible so that enforcing the agreement terms becomes possible. However, the literature on military spending does not explicitly explain how governments can solve such a dilemma. In post-conflict societies, third parties may solve dilemmas of military spending, successfully reducing government spending, which contributes to the consolidation of peace. Therefore, this study builds on the literature on third parties and civil war termination and military spending by investigating the relationship between third parties and military spending.

Boulden (2000) refers to verification as the process through which parties' compliance to the agreement terms is judged. It encompasses the gathering of information through monitoring activities directly by the parties themselves, and the use of such information to make judgments

about some or all aspects of the agreement's implementation (Boulden 2000, 45-46). I argue that such third-party verification mechanisms of a peace agreement solve such a dilemma, enabling the government to reduce military spending, because the verification mechanism facilitates the peace accord implementation by enabling reciprocal implementation and by increasing the cost of non-compliance through active information flow. Implementation of a peace agreement reduces threats posed by both former and outside rebel groups. This causes the government to decrease the military expenditure allocated to appease internal security threats. Thus, third-party verification mechanisms decrease military expenditure after a negotiated settlement. I tested this logic using a sample of post-conflict countries that signed comprehensive peace agreements between 1992 and 2011 (Joshi, Quinn, and Regan 2015a). The results indicate that the initiation of a verification mechanism of peace accords decreases military spending, thus supporting the hypothesis.

This paper contributes to both academic research and policy. First, it advances the current studies in civil war peace agreements. Extant studies show that peace agreements contribute to qualitative aspects of governance such as power sharing (Hartzell and Hoddie 2003, 2015; Hoddie and Hartzell 2003, 2005) or elections (Joshi and Quinn 2017; Matanock 2017, 2018), ultimately establishing peace (Quinn, Joshi, and Melander 2019; Joshi, Melander, and Quinn 2017; Joshi, Quinn, and Regan 2015a; Quinn, Mason, and Gurses 2007). My study shows how verification mechanisms in peace agreements contribute to other qualitative aspects of governance by investigating military spending in post-conflict societies. Second, this study contributes to the literature on military spending in general, especially military spending in civil war and post-civil war periods (Albalade, Bel, and Elias 2012; Armev and McNab 2019; Collier and Hoeffler 2006, 2007; Dunne, Perlo-Freeman, and Ron 2008). It shows that in post-civil conflict society, a third party could influence the reduction in military spending. Third, I advance the study of third parties and conflict management. Extant studies show that in post-conflict societies, third parties successfully manage conflict, reducing the risk of conflict recurrence (Doyle and Sambanis 2000; Fortna 2004; Hartzell, Hoddie, and Rothchild 2001; Mattes and Savun 2010; Quinn, Mason, and Gurses 2007). By advancing the third party's role in implementing peace settlements (Hauenstein and Joshi 2020; Joshi, Lee, and Mac Ginty 2017; Maekawa, Ari, and Gizelis 2019; Walter 2002), my study shows that a third party reduces military spending, which would further contribute to peace. Finally, by showing the relationship between verification and military spending, policymakers and practitioners interested in security sector reforms and military spending can find how such objectives can be achieved by including verification provisions in civil war peace agreements.

Literature Review

Military expenditures are influenced by both external and internal threats (Collier and Hoeffler 2002). Indeed, many studies demonstrate a positive correlation between civil wars and military expenditures (Albalade, Bel, and Elias 2012; Armev and McNab 2019; Collier and Hoeffler 2007; Dunne, Perlo-Freeman, and Ron 2008). During civil wars, governments increase military expenditures, as the traditional success function suggests that winning the contest depends on the player's efforts (Skaperdas 1996). Governments may also increase military spending as necessary to repress the political opposition (Terrell 1971). To maintain its position, the elite must drain resources from the masses (Whynes 1979); thus, the degree of threat from domestic opposition groups to dominant elites primarily influences the level of military expenditures (Maizels and Nissanke 1986). Dunne (1990) argues that the neoclassical approach to military expenditures assumes that given an external enemy's potential threat, the capability to deter aggression must be developed. Military expenditures as a reaction to threat have occurred in the context of domestic threats such as rebel groups or terrorism. For instance, Barros (2003) assumes that the military is the last deterrence resort against terrorism.

If military expenditures are a function of the contest with rebel groups, a government may reduce military spending following the termination of civil wars as the contest ends. Figure 1 shows

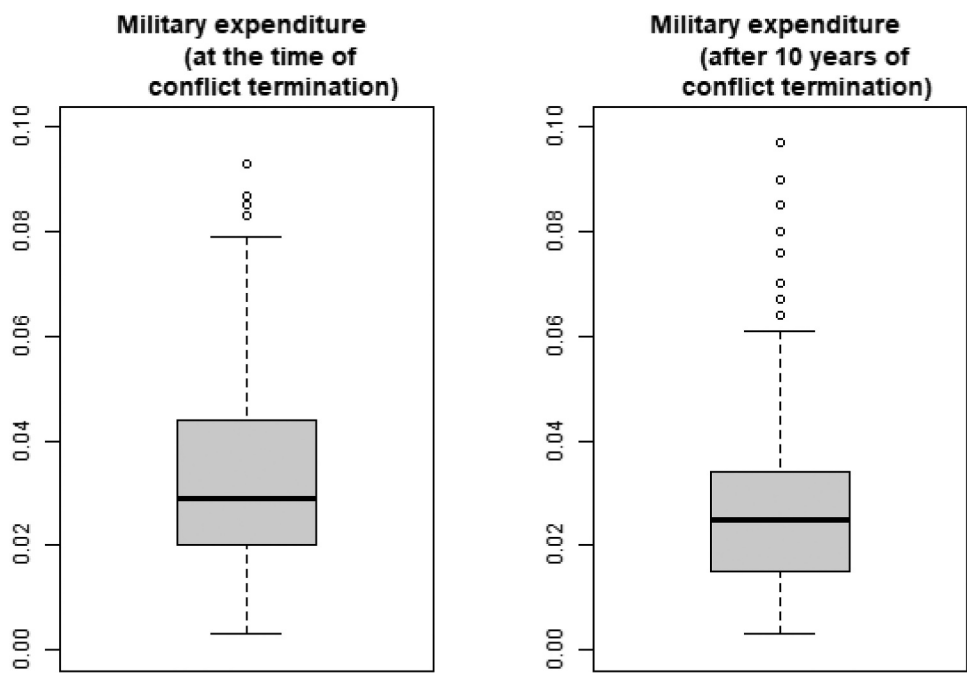


Figure 1. Military expenditure (as a percentage of GDP) at the time of conflict termination (top) and after 10 years of conflict termination (bottom) (Measurement is from Stockholm International Peace Research Institute).

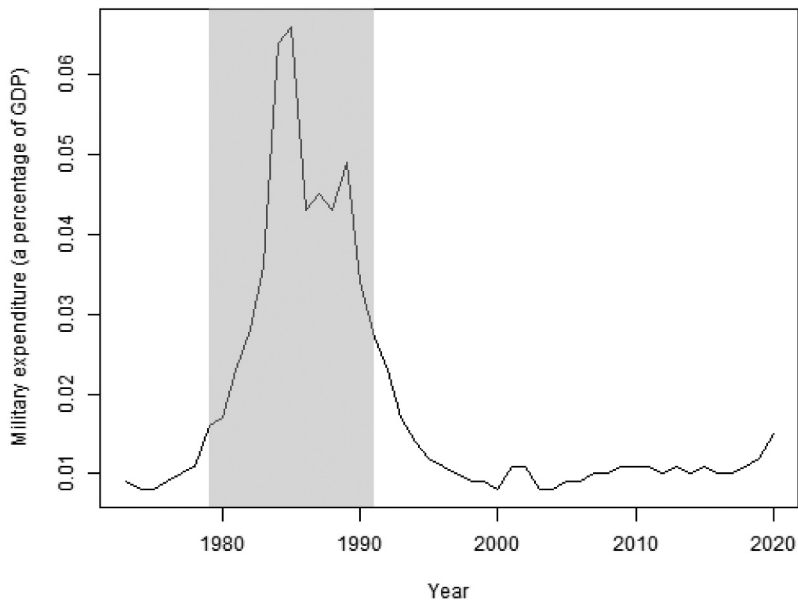


Figure 2. Military expenditure of El Salvador, 1973-2020 (Measurement is from Stockholm International Peace Research Institute).

descriptive statistics about what happens to military spending after civil wars.¹ The mean value of military expenditure as a percentage of GDP at the time of conflict termination is 0.036, while after 10 years of conflict termination it is 0.030. **Figure 2** illustrates how military spending rose during the civil war (grey area, 1979-1991) and remained low after the civil war in the case of El Salvador. The mean value of military expenditures during the civil war is 0.036 while that of military expenditures during other years is 0.010. Indeed, military expenditures that went up during the civil war were followed by reductions after its termination.

If military expenditures are a function of preemptive repression, a termination of a civil war may not be followed by a reduction in military spending because to make deterrence successful, threats must be perceived as sufficiently credible and that retaliation is doable (Schelling 1960). The credibility of a military deterrent depends on the level of spending (Collier and Hoeffler 2007); therefore, a government may maintain high military spending. However, in post-conflict societies, military spending can also play a signaling role. Collier and Hoeffler (2006) argue that a war-averse government, knowing that rebel groups rationally use military spending as screening, deliberately reduces its military spending to avoid sending a signal of reneging on the terms. A finding by Armeý and McNab (2019) may support such a signaling effect in post-conflict societies. Armeý and McNab (2019) find that for wars that end in a peace treaty, the share of military expenditures fall in the year succeeding the end of the civil war. If a peace treaty is a reflection of a war-averse government, the signaling effect explains why a government victory does not result in the reduction of defense spending while a civil war ending in a peace treaty does. Descriptive statistics show that conflict episodes terminated in peace agreement have lower military spending after 10 years on average than conflict episodes terminated in a one-sided victory (**Figure 3**).² The vertical lines of **Figure 3**

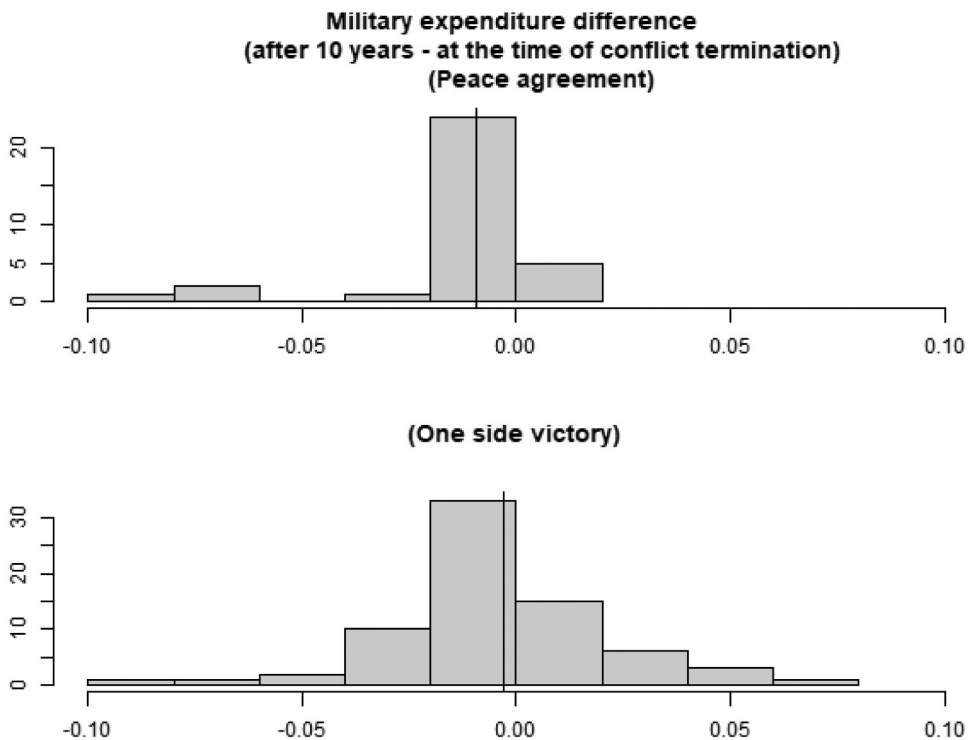


Figure 3. Military expenditure difference (as a percentage of GDP) (after 10 years of conflict termination – at the time of conflict termination) for different conflict outcomes. Peace agreement (top) and one side victory (bottom) (Measurement is from Stockholm International Peace Research Institute).

show mean values. The mean value for the case of a peace agreement is -0.009 while that of a one-sided victory is -0.003 .

However, the literature on the determinants of military expenditures has overlooked the variations in military expenditures after a negotiated settlement. The reduction levels vary significantly across cases (Figure 3). A negotiated settlement comes with a danger, specifically that rebel groups and the government cohabit after the termination of a civil war, while military victory destroys the loser's organization (Wagner 1993). Indeed, a negotiated settlement is more likely to break down than a military victory (Licklider 1995; Toft 2010a) because the combatants themselves are unable to commit credibly to the agreement's terms (Walter 1997). Because of a security dilemma, conflict parties may choose to hide weapons, leading to a unilateral defense enhancement (Walter 1999). In this sense, internal threats continue after the negotiated settlement. As such, a government may increase military spending to deter aggression, even if it desires peace. It determines the level of military expenditures by first making a strategic assessment of the threat and of the effectiveness of military spending in countering the threat (Dunne and Ron 2007, 919). However, regardless of such continuous internal threats, some of these governments successfully reduce military expenditures.

The question has been posed previously about why some governments ending a civil war in a negotiated settlement succeed in reducing military spending while others fail? One possible explanation is that the agreement's terms signal less government hostility, and rebel groups that receive the signal can communicate this intention, which helps the government to possibly reduce its military spending safely. In particular, a territorial pact involves high costs, thereby signaling the parties' commitment to peace (Jarstad and Nilsson 2008). Indeed, territorial power sharing reduces the risk of conflict recurrence (Hartzell and Hoddie 2007; Hoddie and Hartzell 2005). Another possible explanation is that third-party enforcement appeases the aggression of conflict parties. Indeed, whether third-party enforcement is credible has been thoroughly discussed. For instance, considering that not all third parties are willing to stay engaged militarily, their promises to enforce compliance may not be credible (Toft 2010a). However, empirical findings show that the presence of a third party results in less risk of conflict recurrence (Doyle and Sambanis 2000; Fortna 2004; Hartzell, Hoddie, and Rothchild 2001; Mattes and Savun 2010; Quinn, Mason, and Gurses 2007). Given post-conflict third-party guarantees, security threats posed by rebel groups may be low, resulting in less military spending. However, although these efforts may reduce such threats, as long as threats exist, albeit low, the government may try to deter aggression and thus enhance military expenditures.

Theoretical Argument

I argue that a third-party verification mechanism of a peace agreement solves such a dilemma, enabling the government to reduce military spending, facilitating the information flows about peace agreement implementation compliance. In post-conflict societies, uncertainty exists not only about military capabilities but also about the intentions of conflict parties. I argue that in such a situation, third-party verification encourages implementation of peace agreements by facilitating reciprocal implementation through shared information and by increasing the cost of noncompliance. Verifying implementation and sharing such information enable reciprocal implementation and encourages further implementation, solving security dilemmas. Verification mechanisms also make the information available to the public. This increases the cost of noncompliance and enforces compliance, leading to the implementation of the peace agreement. Implementation of the peace agreement reduces threats posed by former rebel groups as well as threats posed by other armed groups outside of peace agreements. As a result, the government reduces its military spending. I present the detailed logic below.

In a civil war, bargaining failure occurs due to uncertainty over military capabilities and resolve (Mattes and Savun 2010; Walter 2009). I argue that strategic dilemmas of military spending after negotiated settlements stem from uncertainty over the resolve of both conflict parties. Signing

a peace agreement is only the first step toward the long-term peace agreement implementation. Therefore, after signing a peace agreement, rebel groups are uncertain about whether their respective governments are willing to make concessions in exchange for peace (Walter 2009). Similarly, governments are also uncertain about whether rebel groups are spoilers, as parties could simply sign peace agreements for tactical reasons (Stedman 1997). A high degree of uncertainty exists, especially because the other side of the conflict parties cannot observe noncompliance during implementation (Hauenstein and Joshi 2020). Monitoring by conflict parties themselves would be extremely difficult because of the high accessibility of weapons and the possibility of hiding them (Walter 1999). In such a situation, third-party verification encourages implementation of peace agreements by facilitating reciprocal implementation through shared information and by increasing the cost of noncompliance.

First, both governments and rebel groups hesitate to demobilize due to vulnerability. After a negotiated settlement, rebel groups are required to relinquish their weapons, but they are reluctant to do so because this makes them unable to defend themselves and to threaten or use violence to enforce the agreement if the other side cheats (Downes 2004). This implies that even a rebel group willing to implement a peace agreement has incentives to retain weapons to enforce the agreement. While disarmament of rebel groups is incomplete, the implementation of the peace accord's other provisions could be delayed. For instance, in March 2007, the Ouagadougou Peace Agreement was signed in Côte d'Ivoire between President Laurent Gbagbo and rebel leader Guillaume Soro. The agreement guaranteed free, fair, open, and transparent presidential elections and initially intended for the presidential election to take place in early 2008, but it was postponed after resistance to disarming the militias and rebel forces.³ In South Sudan's case, because of delays in the creation of unified forces, the formation of the revitalized transitional government of national unity was postponed. Delays in implementing a peace agreement signal the lack of willingness to settle, further discouraging disarmament of rebel groups. In addition, as the implementation commitment reduces future challenges from other armed groups (Joshi and Quinn 2016), the inability to commit to the agreement's implementation induces internal threats posed by other armed groups, thus exaggerating spoiler problems (Stedman 1997).

Under such situations, verification mechanisms corroborate the collections of weapons, the movements of combatants, and the progress in their reintegration process. They may also establish verification sites where combatants are counted and an inventory of weapons is taken (Mattes and Savun 2010). Given the update of the state of disarmament, demobilization, and reintegration (DDR) through verification, reciprocal implementation emerges. Reciprocal implementation ensures that neither side gains an advantage during demobilization (Walter 1999), leading to further implementation of other provisions. Verification mechanisms indeed increase overall implementation of peace accords by minimizing mutual mistrust (Joshi, Lee, and Mac Ginty 2017).

Second, verification mechanisms facilitate implementation not only by enabling reciprocal implementation through shared information but also by increasing the cost of noncompliance. Credible signals enable parties to communicate information about intentions (Fearon 1995; Walter 1997). I argue that the verification mechanism sends a public signal of the war-averse intentions of conflict parties. Verification mechanisms make information on compliance available to the public. Because competition among conflict parties persists by changing their form after a negotiated settlement from bullets to ballots, publicly disclosed noncompliance is accompanied by the cost of losing social support. Through elections, noncompliance is ultimately sanctioned (Matanock 2017). In addition to the election itself coordinating actors' efforts at detecting and sanctioning noncompliance (Matanock 2017), verification mechanisms help such coordination by making unobservable information about noncompliance publicly available. This enforces compliance, leading to the implementation of peace agreements.

Once a peace agreement is implemented, it reduces threats posed by former rebel groups as well as threats posed by other armed groups. Indeed, the implementation of a peace agreement contributes to conflict reduction between the signatory (Jarstad and Nilsson 2008) as well as

between the government and other non-signatory groups (Joshi, Melander, and Quinn 2017; Joshi, Quinn, and Regan 2015a; Quinn, Joshi, and Melander 2019). If military expenditures are a function of the contest with rebel groups, decreased threats as a result of the implementation of a peace agreement enables the government to decrease military spending.

From these discussions, I propose the following:

Hypothesis: As a third-party verification mechanism is carried out, the government decreases military expenditures after the negotiated settlement.

A short case of Mozambique illustrates how the verification mechanism facilitated implementation of the DDR provision as well as implementation of electoral provisions and made compliance information available to the public, ultimately leading to a reduction in military spending. In October 1992, the government of Mozambique and the Resistência Nacional Moçambicana (Renamo) signed the General Peace Agreement (GPA). After the agreement, on December 1992, United Nations (UN) Security Council Resolution 797 established the UN Operation for Mozambique (ONUMOZ), calling upon the government of Mozambique and Renamo to cooperate fully with the ONUMOZ. This led to the creation of the Supervising and Monitoring Commission (CSC) as the central authority overseeing the implementation of the GPA (Alden 1995). As such, a verification mechanism was established. Among the ONUMOZ's tasks was to monitor and verify the disbanding of private and irregular armed groups.⁴ The UN team was in charge of organizing the registration of incoming soldiers and their weapons, including the examination of these arms, and the information gathered during the registration phase was passed on to the Ministry of Defence as well as to Renamo officials (Alden 1995). By mid-April 1994, 81% of Renamo soldiers were cantoned and 561 of them were demobilized.⁵ The UN assured that the members of the rebel group were disarmed and demobilized before they were transported to the district of their choice. Verification was not only for the rebels' DDR but also for the government's DDR. ONUMOZ was mandated to monitor the cantonment, disarmament, and demobilization of nearly 110,000 combatants from both sides (Vines 2013). In this sense, it facilitated reciprocal implementation of DDR. In this case, the DDR that was facilitated by the verification also led to implementation of another provision of the agreement: transforming Renamo into a political party and holding an election.

The verification mechanism also made the information on compliance of agreement available to the public. For instance, the UN Secretary General reported that 'Renamo was for quite some time reluctant to comply with the recommendations of the Case-fire Commission on two cases, Dunda and Salamanga, involving movement of Renamo troops after signature of the general peace agreement.'⁶ In this sense, information on noncompliance was publicly available. Such information was available before the election took place in 1994. From the next year on after 1994, military expenditures remained below 1.5 (as a percentage of GDP) (Figure 4).

Research Design

The hypothesis was tested using a sample of post-conflict countries that signed comprehensive peace agreements between 1992 and 2011. The sample includes 32 civil wars. The unit of analysis is peace agreement-year. The sample was obtained using the Peace Accord Matrix Implementation Dataset (PAM_ID; Joshi, Quinn, and Regan 2015a).⁷ Each peace agreement exits from the sample after ten years from the signing of the peace agreement.⁸ I defined the dependent variable, *Military expenditure*, as a percentage of the country's gross domestic product (GDP). Previous studies have used the same measurement in analyzing the determinants of military expenditures (Albalade, Bel, and Elias 2012; Collier and Hoeffler 2002, 2007; Maizels and Nissanke 1986; Phillips 2014). The measurement is from the Stockholm International Peace Research Institute (SIPRI) database.

The main independent variable is *Verification initiation*. In PAM_ID (Joshi, Quinn, and Regan 2015a), verification mechanism is defined as the creation of a UN, international, regional, or internal mechanism to monitor and verify the peace agreement's implementation (Joshi, Quinn, and Regan

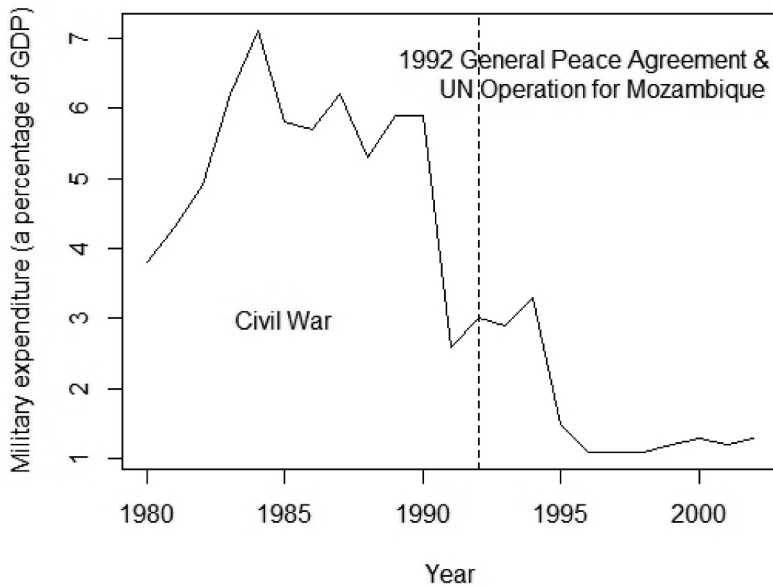


Figure 4. Military expenditure of Mozambique, 1980-2002 (Measurement is from Stockholm International Peace Research Institute).

2015b). In this dataset, the verification implementation variable captures the three levels of implementation of a verification mechanism on an annual basis for ten years since the comprehensive peace agreement was signed. A minimum, intermediate, and full level of implementation indicates that a verification group has been established; the verification of the mission's capacity to offer verification is not yet fully established, although the mission has been formally established; and the country is providing a level of verification comparable with its mandate, respectively (Joshi, Quinn, and Regan 2015b). I operationalized verification initiation using the said variable; it takes the value 1 if the implementation of a verification mechanism has reached at least the first level and 0 otherwise. A total of 229 observations were coded as 1 while 94 observations were coded as 0.⁹ As a robustness check, in Table B2, I also used the *verification initiation 2* variable. It takes the value 1 if the verification mission has been formally established and has reached the intermediate level of implementation. I used the initiation of the verification mechanism rather than the levels of implementation of a verification mechanism as the main independent variable. This is because once a verification group has been established, the base of information channel is also established, enabling information sharing for reciprocal implementation, even if the level of verification does not meet all of the mandated requirements. Verification mechanisms have been initiated for 24 comprehensive peace agreements. A full list of their names and verification missions are presented in Table B1.

One might be concerned about the implementation of other provisions such as the DDR provisions, which come with verification provisions. As I will discuss later, I used fixed effects to account for other provisions that could have influenced the provision allocation of a verification mechanism. I did not control for the implementation of other provisions in this case because such an implementation would be using post-treatment variables. First, a verification mechanism is established; then, other provisions are implemented. Those that seem relevant to military spending, such as DDR implementation, would especially be initiated after the verification mechanism is established. This is because the reason that combatants ask for the establishment of a verification mechanism is to monitor the implementation, and as mentioned in the theoretical section, at the verification site, combatants are counted and an inventory of weapons is taken (Mattes and Savun 2010), indicating that DDR implementation is post-treatment.

I controlled for several variables that were likely to influence both the implementation of verification and military expenditure. First, I controlled for *In Active rebels*, which is the log transformed number of active rebel groups in a country in a given year. I calculated the number of active rebel groups using the UCDP Armed Conflict Dyadic Dataset (Harbom, Melander, and Wallensteen 2008; Pettersson and Öberg 2020). Many civil wars experience multiple rebel groups (Walter 2018). It is not rare that when a peace agreement is signed, other active rebel groups continue operating (Maekawa 2021). These groups become outside spoilers that sabotage the implementation of peace accords (Stedman 1997), delaying the initiation of the verification mechanism. Outside spoilers can be threats to the government that exist even after the negotiated settlement. Such internal threats could lead to an increase in the government's military spending (Collier and Hoeffler 2007). Thus, I controlled for this variable.

Second, I controlled for *Democracy*, which takes the value 1 if the Polity 2 score from the Polity V Dataset (Marshall and Gurr 2018) is greater than five and 0 otherwise. Democratic governments might be more likely to cooperate with international organizations, facilitating the establishment of a verification mechanism. Alternatively, the demands for third-party verification may be high in non-democratic governments. Non-democratic countries lack the experience of democratic politics, while political reforms are often incorporated in peace agreements, such as electoral reforms or power-sharing arrangements (Hartzell and Hoddie 2003). Thus, the mistrust by rebel groups toward a non-democratic government regarding peace accord implementation may be higher. Given the high demand, non-democratic countries may be more encouraged to implement the verification of a peace agreement. Regarding the effect of regime type on military expenditure, extant research shows that democracy is associated with less military spending (Dunne and Perlo-Freeman 2003; Fordham and Walker 2005; Goldsmith 2003; Rosh 1988; Yildirim and Sezgin 2005).

Third, I controlled for *In GDP p.c.* and *In Population* from the dataset by Gleditsch (2002). GDP per capita has been used as a proxy for state capacity (Fearon and Laitin 2003). States with higher capacity may facilitate the implementation of peace accords, as weak states may be too weak to function in a normative sense (DeRouen et al. 2010). Such a low state capacity could delay the verification mechanism as well as other provisions of the agreement because of a potential delay in the necessary facility for verification. Meanwhile, a higher GDP per capita is positively associated with military spending because greater resources per capita enable the state to meet the population's basic social welfare needs while leaving a large portion of income for defense spending (Goldsmith 2003). Moreover, past studies have shown that the population size has a negative effect on military spending (Collier and Hoeffler 2007; Dunne and Perlo-Freeman 2003; Dunne, Perlo-Freeman, and Ron 2008).

Fourth, I controlled for two external factors, *Neighbor milex* and *Contiguity number*. The external security environment affects countries' military spending (Dunne and Ron 2007; Nordhaus, Oneal, and Russett 2012; Rosh 1988). Rosh (1988) argues that a subsystemic external environment, the so-called security web, influences the determinants of military spending, and argues that geographical proximity is the most important factor in determining the threat in Third World countries. Neighbors' military expenditures are positively associated with military expenditures (Collier and Hoeffler 2007; Phillips 2014). Therefore, I controlled for the average percentage of military spending of GDP of contiguous countries and the number of contiguous countries. I used the Correlates of War (COW) Direct Contiguity Data, 1816-2016, Version 3.2 to identify contiguous countries (Stinnett et al. 2002).

Finally, in post-conflict societies, as time passes, the government may decrease military spending. Moreover, as the peace agreement implementation rate gradually goes up (Joshi, Lee, and Mac Ginty 2017), as time passes, verification mechanisms may be less likely to be initiated due to the decreased demand for verifying the implementation. Therefore, I controlled for the *Year count* variable. To avoid issues of reverse causality, I used a one-year lag for all variables except for the year count variable.

To check multicollinearity problems, I checked the variance inflation factor (VIF) score. No variables scored above 3, implying that there were no multicollinearity problems.¹⁰

Results and Discussion

Because the dependent variable is a continuous variable, I used ordinary least squares regression. In choosing models between fixed effects and random effects, I conducted the Hausman test. As the p-value is significant (<0.01), I used a fixed effects model. By using peace-agreement-specific fixed effects, I accounted for time invariant factors that could have influenced the results, such as the terms of the peace agreement, including demobilization arrangements, as well as time invariant conflict characteristics that could have influenced the deployment of the verification of the mechanism. Model (1) only includes the main independent variable and year count. Model (2) includes all control variables. Model (3) includes a lagged dependent variable because as the incrementalist argument suggests, past military spending may influence the current military spending.¹¹ Model (4) includes dummies for year, but the coefficients for year are not reported in Table 1.

In all models in Table 1, where the initiation of verification implementation is used as the main explanatory variable, *Verification initiation* is negative and statistically significant. This result indicates that once a verification mechanism is initiated, military expenditure decreases. When an initiated verification mechanism exists, military expenditure decreases by 1.923 with a 95% confidence interval of $[-2.930, -0.915]$ (Table 1 Model 2).¹² The main results did not change when using the *verification initiation 2* variable, which captures the formal establishment of the verification mechanism (see Table C1), except for a model where the lag of dependent variable was included (Table C1, Model 3). In this model, the *verification initiation 2* variable was only statistically significant at $p < 0.1$. However, considering that the population variable loses statistical significance in this model, it might be the case that including the lagged dependent variable produced biased estimates.

The main results also did not change when the population variable was replaced with the military personnel variable (Table C2).¹³ Peace agreements might lead to downsizing of the armed forces. As the size of military personnel was highly correlated with population, I only included this variable after

Table 1. Fixed effect regressions of military expenditures for countries with a comprehensive peace agreement, 1992–2011.

	Military expenditure			
	Model (1)	Model (2)	Model (3)	Model (4)
Verification initiation t_{-1}	–2.498*** (0.554)	–1.923*** (0.514)	–1.354*** (0.504)	–2.147*** (0.537)
Active rebels t_{-1} (ln)		0.121 (0.190)	–0.014 (0.195)	0.191 (0.195)
Democracy t_{-1}		–1.243*** (0.244)	–0.846*** (0.265)	–1.267*** (0.258)
GDP p.c. t_{-1} (ln)		0.340 (0.456)	0.198 (0.456)	–0.234 (0.496)
Population t_{-1} (ln)		4.281*** (1.230)	1.840 (1.301)	3.421*** (1.275)
Neighbor milex t_{-1}		0.607 (6.755)	0.899 (7.285)	2.974 (7.040)
Contiguity number t_{-1}		0.074 (0.532)	0.107 (0.506)	–0.370 (0.568)
Military expenditure t_{-1}			0.318*** (0.069)	
Year count	–0.089*** (0.018)	–0.175*** (0.040)	–0.094** (0.043)	–0.119** (0.054)
Observations	259	237	226	237
Peace agreement fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	No	No	No	Yes
R ²	0.184	0.331	0.414	0.405
Adjusted R ²	0.060	0.198	0.291	0.211

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$.

removing the population variable (Table C2).¹⁴ Next, I used the log transformed dependent variable in Table C3. In Table F, the main independent variable was significant at $p < 0.05$ in the parsimonious model (Model 1 in Table F) and in the year-fixed effect model (Model 4 in Table F).¹⁵ Further, the main results did not change when I inputted 0 values to missing values of democracy variable (Table C4).

I found robust empirical evidence that the regime type matters in explaining a government's military spending after the negotiated settlement. In Models 2, 3, and 4 in Table 1, *Democracy* is negative and statistically significant at $p < 0.01$. This is consistent with the findings of previous studies that democracy is negatively associated with military expenditures (Dunne and Perlo-Freeman 2003; Fordham and Walker 2005; Goldsmith 2003; Rosh 1988; Yildirim and Sezgin 2005). The relationship between democracy and military expenditures does not change even after the negotiated settlement.

Regarding other domestic factors, *In Active rebels* and *In GDP p.c.* are not statistically significant in all models (Table 1); only *In Population* is positive and statistically significant in Models 2 and 4 (Table 1). This finding contradicts past studies that have found a negative relationship between population and military spending (Collier and Hoeffler 2007; Dunne and Perlo-Freeman 2003; Dunne, Perlo-Freeman, and Ron 2008). However, the significant relationship between population and military expenditures disappears once the lagged military expenditure variable is controlled for in Model 3 (Table 1). One possible explanation for the positive relationship between population and military spending is that a population increase after a negotiated settlement implies an increase in returned refugees. During civil wars, people flee to other countries as refugees, but once a peace agreement is signed many refugees return to their country. In many cases, the population increases because the return of refugees is included as a mandate. The return of refugees can be perceived as an internal threat to the government, as the ethnic composition changes and the risk of another conflict increases (Schwartz 2019).

Regarding international factors, neither *Neighbor miles* nor *Contiguity number* are statistically significant in all models (Table 1). This may be because in post-conflict situations, particularly after a negotiated settlement where rebel groups exist without being defeated, internal security threats are the primary concern. However, to conclude that internal security threats matter more in deciding military spending, further investigations are required as other international factors such as an arms race (Dunne and Ron 2007; Richardson 1960), alliance (Oneal and Whatley 1996), change in hostility (Dunne, Perlo-Freeman, and Ron 2008), and globalization (Solarin 2018) are not included in the models, given that the main interest is the effect of verification mechanisms on military expenditure.

Robustness Checks

I conducted a series of robustness checks before drawing the main conclusions. First, a potential bias comes from the possibility that it is not the verification mechanism but other missions deployed simultaneously that influenced the levels of military spending. As listed in the Appendix, many verification mechanisms are deployed under the UN missions, which comes with the deployment of peacekeeping operations, although verification missions do not necessarily accompany peacekeeping operations. In my sample for analysis, both verification missions and UN peacekeeping operations were deployed simultaneously in 88 observations. Table B2 shows the list of overlap between verification missions and UN peacekeeping operations for countries in the sample. It may be the case that it is such peacekeeping operations that reduced military spending after a settlement was negotiated rather than the verification mechanisms. Peacekeeping serves as deterrence, increasing the costs of aggression (Fortna 2008). Indeed, deterrence through peacekeeping reduces ongoing local conflicts (Ruggeri, Dorussen, and Gizelis 2017). Fjelde, Hultman, and Nilsson (2019) argue that as peacekeepers are able to move into rebel-held areas, rebels become sensitive to both the political and military costs of targeting civilians. Thus, deployment of peacekeeping could reduce violence by rebels, suppressing internal threats, and this could result in less military spending by the government. Moreover, UN peacekeeping operations observe verification of peace agreements,

supplementing the role of verification mechanisms. Therefore, I re-estimated Models 2, 3, and 4 with a peacekeeping operation variable.¹⁶ I included the log transformed number of peacekeeping personnel from the data on the UN peacekeeping personnel commitments (Kathman 2013). The results are reported in Table 2.

The coefficients for verification initiation increase and remain negative and statistically significant at $p < 0.01$. Interestingly, the results in Table 2 suggest that an increase in the size of the UN peacekeeping operations leads to higher military spending. This may be due to selection effects. Peacekeeping operations tend to be deployed to hard cases (Fortna 2008; Gilligan and Sergenti 2008; Sambanis and Doyle 2007). What happens to verification missions in harder cases where a large number of UN peacekeeping personnel are deployed? To further unpack the relationship between peacekeeping operations and verification mechanisms, I included the interaction between verification mechanisms and peacekeeping operations in Model (4) (Table 2). Although the joint significant test was not significant for the interactive model ($p > 0.1$), Model 4 has the slightly greater Adjusted R^2 than Model 1 (Table 2). Plotting the result of interaction itself shows an interesting interpretation. Figure 5 shows how the marginal effect of verification mechanisms changes depending on different values of the log of the number of UN peacekeeping personnel.¹⁷ The verification mechanism has a greater negative effect on military spending as the number of UN peacekeeping operations

Table 2. Fixed effect regressions of military expenditures for countries with a comprehensive peace agreement, 1992–2011 (with the peacekeeping operations variable).

	Military expenditure			
	Model (1)	Model (2)	Model (3)	Model (4)
Verification initiation t_{-1}	−1.860*** (0.498)	−1.383*** (0.496)	−2.166*** (0.522)	−0.165 (1.516)
PKO personnel t_{-1} (ln)	0.091*** (0.024)	0.067*** (0.024)	0.085*** (0.025)	0.329 (0.202)
Verification initiation t_{-1} * PKO personnel t_{-1} (ln)				−0.245 (0.207)
Active rebels t_{-1} (ln)	0.170 (0.185)	0.036 (0.193)	0.218 (0.190)	0.154 (0.185)
Democracy t_{-1}	−1.132*** (0.238)	−0.822*** (0.261)	−1.098*** (0.256)	−1.111*** (0.239)
GDP p.c. t_{-1} (ln)	0.387 (0.445)	0.257 (0.453)	−0.117 (0.484)	0.397 (0.444)
Population t_{-1} (ln)	4.343*** (1.192)	2.262* (1.292)	3.608*** (1.240)	4.101*** (1.208)
Neighbor milex t_{-1}	−1.887 (6.581)	−1.935 (7.242)	0.335 (6.885)	−1.472 (6.583)
Contiguity number t_{-1}	−0.056 (0.516)	−0.001 (0.500)	−0.365 (0.552)	−0.072 (0.516)
Military expenditure t_{-1}		0.278*** (0.070)		
Year count	−0.151*** (0.039)	−0.087** (0.043)	−0.098** (0.047)	−0.148*** (0.039)
Observations	236	225	236	236
Peace agreement fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	No	No	Yes	No
R^2	0.378	0.438	0.441	0.383
Adjusted R^2	0.251	0.316	0.258	0.252

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$.

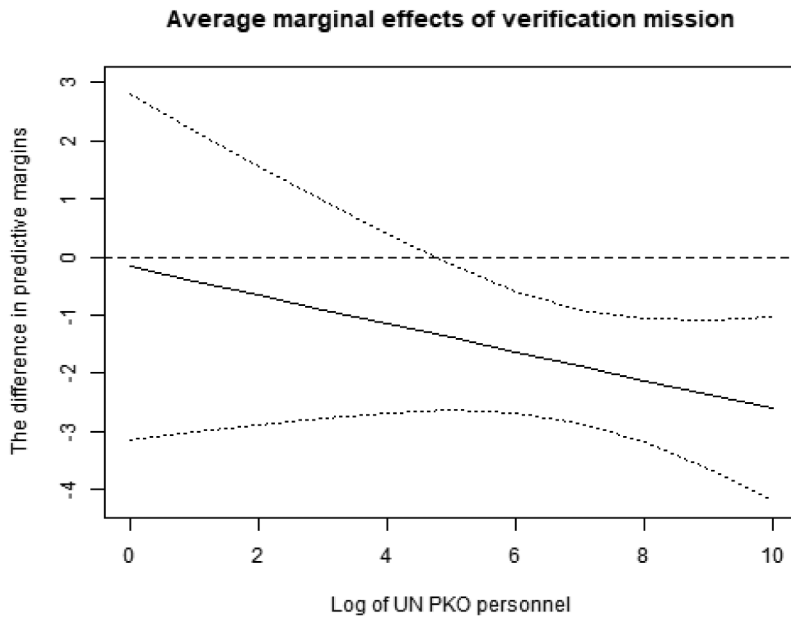


Figure 5. Marginal effect of verification mission for different values of log of United Nations peacekeeping personnel.

personnel increases. This is an interesting finding, considering the places where large numbers of personnel go. As the number of troops committed to peacekeeping increases, the missions have a greater capacity to reduce violence (Kathman 2013). Therefore, a large number of personnel would be deployed to harder cases. Peacekeepers are also deployed to rebel-held areas (Fjelde, Hultman, and Nilsson 2019). In these harder cases, the verification mechanism is more effective in reducing the military spending. When the verification mission is combined with the large UN personnel presence, through the enhanced levels of patrolling, monitoring, and reporting, the increased cost of violence by rebels might be able to decrease internal threats. Moreover, considering that a larger peacekeeping personnel presence increases the levels of peace agreement implementation (Maekawa, Ari, and Gizelis 2019), under such situations, verification mechanisms would share the information on the progress of implementation, leading to further reciprocal implementation with less mistrust. This may lead to a reduction in military spending.

Second, a potential bias in making inferences of the relationship between verification mechanisms and military expenditure stems from a non-random deployment of these verification mechanisms. Background factors of the verification mechanism rather than the mechanism itself may predict the outcome (Mattes and Savun 2010). Since I used fixed effects, time-invariant background factors were taken into account in the analysis. However, to check the robustness to a different model specification where I did not use fixed effects, I first used matching techniques to control for the background factors. Matching allows pairing cases of a treatment (deployment of verification mission) and a control (no deployment of verification mission) where the values of other covariates are similar. I used covariates that were causally related prior to the treatment in the matching procedures such as *log of conflict duration*,¹⁸ *log of cumulative battle related deaths*,¹⁹ and *democracy*²⁰ at the year of signing the peace agreement. A verification mechanism may be established in a case where mistrust among conflict parties is high. Security dilemmas are caused by mistrust, which derails the implementation of an agreement (Kydd 2000, 2006). Given the high risk of derailed implementation, conflict parties may consent to the verification of peace accords. Thus, I used conflict duration and the cumulative number of battle-related deaths as measurements of mistrust. In addition, because non-democratic countries lack experience of democratic politics

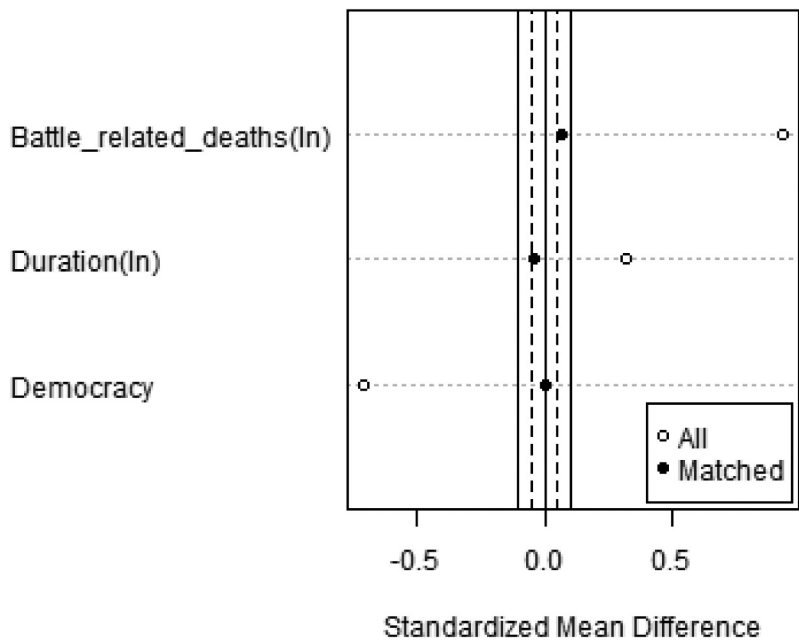


Figure 6. Standardized mean differences in the matched versus unmatched samples.

regardless of promises of political reforms (Hartzell and Hoddie 2003), mistrust of rebel groups toward the government in terms of peace accord implementation may be high in non-democratic countries. Thus, I also used democracy as one of the covariates.

A coarsened exact matching (CEM) approach reduces imbalance; thus, CEM was performed using the MatchIt package (Ho et al. 2011) in R. Continuous variables were matched with one-third intervals. After the matching, 120 observations remained. Forty-nine observations without the initiation of a verification mechanism were matched with 71 observations with the initiation of a verification mechanism. Figure 6 shows the standardized mean difference for all samples and matched samples. The bias decreased after matching.²¹ Table 3 shows the results obtained from models estimated using a matched dataset. Table 3 presents the regression results, which include weights, with cluster-robust standard errors. Table 3 shows that the negative and statistically significant effect of verification initiation on military expenditure remains. Table C5 shows the results of estimating a model with panel-corrected standard errors where I included covariates used for matching, a dummy variable capturing whether the conflict started before 1989,²² other control variables, and year count variable. The main results are robust. The results from the matching analysis suggest that the effect of verification initiation is not driven by selection bias. Verification mechanisms reduce military spending after the negotiated settlement.

Table 3. Regression of military expenditures for countries with a comprehensive peace agreement, 1992–2011 (after matching).

	Military expenditure
Verification initiation $t-1$	−1.731**(0.750)
Constant	3.824*** (0.626)
Observations	120
Adjusted R ²	0.165

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$.
Standard errors are clustered on peace agreement ID.

Conclusions

This paper extends the research on military expenditures in post-conflict societies by outlining how third-party verification mechanisms of peace accords contribute to reductions in military spending. After a negotiated settlement, as government and rebel groups must cohabit without being defeated, internal security threats persist continuously. In such an environment, I argue that implementing a third-party verification mechanism of peace accords helps reduce military spending in post-conflict societies because the verification mechanism facilitates the peace accord implementation by enabling reciprocal implementation and by increasing the cost of noncompliance through active information flow. Implementation of peace agreements reduces threats posed by both former and outside rebel groups. This makes the government decrease the military expenditure allocated to appease internal security threats. Thus, a third-party verification mechanism decreases military expenditures after a negotiated settlement. Using a sample of post-conflict countries that signed comprehensive peace agreements between 1992 and 2011, the empirical analysis results support the hypothesis. When a verification mechanism is initiated, military expenditures decrease after a negotiated settlement. The finding is robust for a series of robustness checks.

The findings have important implications for academic research and policy. They suggest that verification mechanisms in peace agreements contribute to peace by facilitating peace accord implementation, which results in reduced military expenditures. In a situation where strategic dilemmas persist in the post-civil war period, by introducing a verification mechanism that encourages reciprocal implementation and increases the cost of noncompliance, policymakers can achieve objectives of security reform. The finding also suggests the key role of third parties in post-conflict societies beyond enforcement. The finding that third parties contribute to reducing military expenditures after the negotiated settlement implies that third parties indirectly contribute to the increase in welfare spending. This ultimately results in reducing inequality and grievances, leading to conflict prevention. By introducing third-party verification mechanisms of peace accords after a negotiated settlement, post-conflict economic development may be attainable.

Interestingly, a negotiated settlement without a verification mechanism initiation is worse than a government victory in terms of the reduction of military spending after conflict termination (Table D1). This raises an important policy implication that without an international involvement, a natural reduction of military spending after a negotiated settlement, where a government and a rebel group must cohabit, is difficult to achieve. However, such continuously posed threats in post-conflict societies can be managed by involving third parties.

This paper suggests several trajectories for future research on military expenditures. For instance, it would be important to investigate the relationship between other types of third-party involvement and military expenditures. The literature on military spending has overlooked the role of third parties in military spending reduction. If other mechanisms of interventions that lead to reduction in military spending are also identified, it would be helpful for policymakers who attempt to reform the security sector in the post-conflict society. Although this research included peacekeeping personnel variable in a model, it did not address selection bias as mentioned because this was not the main variable of interest. Future work could address this point and investigate the relationship between other interventions, including peacekeeping and military spending. Alternatively, future work could explore third-party involvement and military expenditures at the international level. Verification mechanisms at an international level could change the arms race, influencing military spending. Finally, and most importantly, future work could explore the relationship between the temporal involvement of third parties and a juncture of long-term reduction in military spending. As the sample in this study is limited to ten years after the negotiated settlement, the effect of third parties on long-term post-conflict military expenditures remains unexplored. Additional research could further our understanding of the relationship between third parties, negotiated settlements, military expenditures, and economic development.

Notes

1. The unit of analysis is conflict episode. Information on conflict episodes and their terminations were taken from UCDP Conflict Termination Dataset version 2-2015 (Kreutz 2010).
2. The unit of analysis is conflict episode. Information on conflict episodes and their terminations were taken from UCDP Conflict Termination Dataset version 2-2015 (Kreutz 2010).
3. Refworld's 'Freedom in the World 2009 – Cote d'Ivoire,' accessed on 31 March 2021. Available at: <https://www.refworld.org/docid/4a6452c11e.html>.
4. Mozambique – ONUMOZ Background; accessed on 2 September 2021. <https://peacekeeping.un.org/sites/default/files/past/onumozFT.htm>.
5. Mozambique – ONUMOZ Background; accessed on 2 September 2021. <https://peacekeeping.un.org/sites/default/files/past/onumozFT.htm>.
6. United Nations Security Council. 'Report of the Secretary-General on the United Nations Operation in Mozambique.' S/1994/89.
7. Although there were originally 34 peace agreement cases, 2 cases were dropped as information on Polity2, which I use as a control variable, was not available for Bosnia and Lebanon.
8. In PAM_ID, some peace agreements exited the sample before the 10th year of implementation, including the Ouagadougou Political Agreement signed on 4 March 2007 in the Ivory Coast; Abidjan Peace Agreement, on 30 November 1996 in Sierra Leone; and Sudan Comprehensive Peace Agreement, on 9 January 2005 in Sudan.
9. These observations are before those where other missing variables are removed.
10. As I will mention later, I include year dummies for one model and an interaction between the main independent variable and UN personnel variable. VIF scores for year dummies and an interaction term were higher than 3.
11. I include a lagged dependent variable only in one model because including a lagged dependent variable could produce biased estimates (Keele and Kelly 2006). Indeed, many studies do not include a lagged dependent variable (Albalade, Bel, and Elias 2012; Collier and Hoeffler 2007; Phillips 2014).
12. In calculating the marginal effect, mean (median) values were used for continuous (dummy) variables.
13. The information on military personnel was taken from Correlates of War National Material Capabilities (v6.0) Dataset (Singer 1987; Singer, Bremer, and Stuckey 1972).
14. As the main results in Table 1 had greater Adjusted R² score, I present a model with population as the main result in Table 1.
15. As the main results in Table 1 had greater Adjusted R² score, I present a model without log transformation as the main result in Table 1.
16. I assign the same model numbers as in Table 1.
17. The values of the other continuous variables are held at their mean values, while median values were plugged in for dichotomous variables.
18. I calculate the number of years each conflict lasted using the information on conflict start date listed in the PAM_ID (Joshi, Quinn, and Regan 2015a).
19. The cumulative number of battle-related deaths was calculated using the UCDP Battle-Related Deaths Dataset (Pettersson and Öberg 2020). Because this dataset only covers information since 1989, for conflicts that started before 1989, cumulative deaths were calculated since 1989.
20. This variable takes the value 1 if the Polity 2 score from the Polity V Dataset (Marshall and Robert Gurr 2018) is greater than five and 0 otherwise.
21. Using the threshold for mean difference to 0.1, all covariates were balanced.
22. As mentioned earlier, because information on battle-related deaths was only available since 1989, I controlled for this variable in the model.

Acknowledgement

I would like to thank Joakim Kreutz, Theodora-Ismene Gizelis, and participants at the ISA 2022 Annual Convention for their helpful comments and suggestions on this project. I also greatly thank the editor and anonymous reviewers for excellent suggestions and comments.

Disclosure Statement

No potential conflict of interest was reported by the author(s).

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Appendices

Appendix A. Descriptive Statistics

Table A1. Descriptive Statistics.

Variable	Minimum	Maximum	Mean	SD
Military expenditure	0.3	9.3	2.287	1.705
Verification initiation $t-1$	0	1	0.709	0.455
Active rebels $t-1$ (ln)	0	1.946	0.259	0.443
Democracy $t-1$	0	1	0.507	0.501
GDP p.c. $t-1$ (ln)	5.459	10.402	7.435	1.025
Population $t-1$ (ln)	6.440	13.884	9.363	1.646
Neighbor milex $t-1$	0.004	0.151	0.251	0.022
Contiguity number $t-1$	2	12	5.516	2.789
Military personnel $t-1$ (ln)	0.693	7.172	3.466	1.440
Year count	0	10	5.390	2.869

Appendix B. List of Implemented Verification Mechanism**Table B1.** List of Implemented Verification Mechanism.

Country	Date	Peace agreement	Verification mechanism
Guatemala	29 December 1996	Accord for a Firm and Lasting Peace	United Mission for the Verification of Human Rights and of Compliance with the Commitments of the Comprehensive Agreement on Human Rights in Guatemala (MINUGUA)
Liberia	18 August 2003	Accra Peace Agreement	Implementation Monitoring Committee
Sierra Leone	7 July 1999	Lomé Peace Agreement	United Nations Observer Mission in Sierra Leone (UNOSMIL), United Nations Mission in Sierra Leone (UNAMSIL)
Republic of Congo	29 December 1999	Agreement on Ending Hostilities in the Republic of Congo	Monitoring Commission
Burundi	2 November 2003	Arusha Peace and Reconciliation Agreement	Implementation Monitoring Committee
Rwanda	4 August 1993	Arusha Accord	Neutral Military Observer Group, United Nations Assistance Mission for Rwanda (UNAMIR)
El Salvador		Chapultepec Peace Agreement, 16 January 1992	United Nations Observer Mission in El Salvador (ONUSAL)
Angola	15 November 1994	Lusaka Protocol	Joint Commission
Angola	4 April 2002	Luena Memorandum of Understanding	United Nations Mission in Angola (UNMA), Joint Military Commission
Mozambique	4 October 1992	General Peace Agreement for Mozambique	United Nations Operation in Mozambique (ONUMOZ), Supervisory and Monitoring Commission
South Africa	17 November 1993	Interim Constitution Accord	United Nations Observer Mission in South Africa (UNOMSA), Goldstone Commission
Sudan	9 January 2005	Sudan Comprehensive Peace Agreement	United Nation Mission in Sudan (UNMIS), Ceasefire Joint Monitoring Committee (CJMC)
Tajikistan	27 June 1997	General Agreement on the Establishment of Peace and National Accord in Tajikistan	United Nations Missions of Observers in Tajikistan (UNMOT)
Bangladesh	2 December 1997	Chittagong Hill Tracts Peace Accord (CHT)	Implementation Committee
Nepal	21 November 2006	Comprehensive Peace Agreement	Joint Monitoring Coordination Committee, Joint Monitoring Teams, United Nations Missions in Nepal (UNMIN)
United Kingdom	10 April 1998	Northern Ireland Good Friday Agreement	Independent International Commission on Decommissioning, Independent International Monitoring Commission
Cambodia	23 October 1991	Framework for a Comprehensive Political Settlement of the Cambodia Conflict	United Nations Advance Mission in Cambodia (UNAMIC), United Nations Transitional Authority in Cambodia (UNTAC)
Indonesia	15 August 2005	MoU between the Government of the Republic of Indonesia and the Free Aceh Movement	European Union Monitoring Mission in Aceh
East Timor	5 May 1999	Agreement between the Republic of Indonesia and the Portuguese Republic on East Timor	United Nations Mission in East Timor (UNAMET)
Papua New Guinea	30 August 2001	Bougainville Peace Agreement	United Nations Political Office in Bougainville (UNPOB), United Nations Observer Mission in Bougainville (UNOMB)
Macedonia	13 August 2001	Ohrid Agreement	NATO Mission
Croatia	12 November 1995	Erdut Agreement	Joint Implementation Committee, United Nations Transitional Administration for Eastern Slavonia, Baranja and Western Sirmium (UNTAES)
Bosnia	21 November 1995	General Framework Agreement for Peace in Bosnia and Herzegovina	High Representative
Guinea-Bissau	1 November 1998	Abuja Peace Agreement	United Nations Peacebuilding Support Office in Guinea-Bissau (UNOGBIS)

Information on peace agreements as well as verification mechanism was taken from Peace Accord Matrix Implementation Dataset (Joshi, Quinn, and Regan 2015).

Table B2. List of overlap between implemented verification mechanism and UN peacekeeping operations.

Country	Year
Croatia	1996-1998
Bosnia	1996-2002
Liberia	2003-2012
Sierra Leone	1999-2008
Burundi	2004-2012
Rwanda	1993-1996
Angola	1995-1998
Mozambique	1993-1994
Sudan	2005-2011
Tajikistan	1997-2000
Nepal	2007-2010
Cambodia	1992-1993
East Timor	1999-2008
Guatemala	1997, 1999-2002
El Salvador	1992-1995

Appendix C. Robustness Checks

Table C1. Fixed effect country-year regressions of military expenditures for countries with comprehensive peace agreement, 1989-2015 (using *verification initiation 2* variable).

	Military expenditure			
	Model (1)	Model (2)	Model (3)	Model (4)
Verification initiation 2 $t-1$	-0.806** (0.360)	-0.669** (0.330)	-0.791* (0.415)	-0.796** (0.340)
Active rebels $t-1$ (ln)		0.162 (0.196)	-0.025 (0.200)	0.238 (0.201)
Democracy $t-1$		-1.302*** (0.250)	-0.843*** (0.268)	-1.378*** (0.263)
GDP p.c. $t-1$ (ln)		0.353 (0.468)	0.192 (0.461)	-0.152 (0.510)
Population $t-1$ (ln)		4.872*** (1.247)	1.843 (1.314)	4.138*** (1.294)
Neighbor milex $t-1$		0.369 (6.923)	0.969 (7.362)	2.701 (7.240)
Contiguity number $t-1$		0.123 (0.544)	0.125 (0.511)	-0.369 (0.584)
Military expenditure $t-1$			0.340*** (0.068)	
Year count	-0.089*** (0.019)	-0.187*** (0.041)	-0.093** (0.044)	-0.133** (0.055)
Observations	259	237	226	237
Peace agreement fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	No	No	No	Yes
R ²	0.130	0.298	0.403	0.371
Adjusted R ²	-0.003	0.159	0.278	0.166

***p < 0.01; **p < 0.05; *p < 0.10.

Table C2. Fixed effect country-year regressions of military expenditures for countries with comprehensive peace agreement, 1989-2015 (using *military personnel* variable).

	Military expenditure		
	Model (1)	Model (2)	Model (3)
Verification initiation t_{-1}	-2.191*** (0.523)	-1.375*** (0.506)	-2.383*** (0.540)
Active rebels t_{-1} (ln)	0.109 (0.196)	-0.030 (0.196)	0.182 (0.199)
Democracy t_{-1}	-1.321*** (0.260)	-0.829*** (0.270)	-1.343*** (0.275)
GDP p.c. t_{-1} (ln)	0.050 (0.464)	0.041 (0.448)	-0.576 (0.491)
Military personnel t_{-1} (ln)	-0.086 (0.143)	-0.050 (0.142)	-0.063 (0.158)
Neighbor milex t_{-1}	1.097 (6.970)	1.081 (7.350)	3.444 (7.186)
Contiguity number t_{-1}	-0.288 (0.536)	-0.010 (0.502)	-0.715 (0.564)
Military expenditure t_{-1}		0.357*** (0.063)	
Year count	-0.063*** (0.024)	-0.044* (0.024)	-0.027 (0.042)
Observations	237	226	237
Peace agreement fixed effect	Yes	Yes	Yes
Year fixed effect	No	No	Yes
R ²	0.291	0.408	0.382
Adjusted R ²	0.151	0.284	0.180

***p < 0.01; **p < 0.05; *p < 0.10.

Table C3. Fixed effect country-year regressions of military expenditures for countries with comprehensive peace agreement, 1989-2015 (using *log transformed dependent variable* variable).

	Military expenditure (ln)			
	Model (1)	Model (2)	Model (3)	Model (4)
Verification initiation t_{-1}	-0.523** (0.207)	-0.345* (0.206)	-0.285 (0.197)	-0.441** (0.218)
Active rebels t_{-1} (ln)		0.054 (0.076)	0.045 (0.078)	0.061 (0.079)
Democracy t_{-1}		-0.336*** (0.098)	-0.336*** (0.100)	-0.345*** (0.105)
GDP p.c. t_{-1} (ln)		0.501*** (0.182)	0.482** (0.184)	0.346* (0.202)
Population t_{-1} (ln)		1.725*** (0.492)	1.225** (1.511)	1.416*** (0.518)
Neighbor milex t_{-1}		1.550 (2.700)	2.080 (2.920)	0.742 (2.860)
Contiguity number t_{-1}		-0.103 (0.212)	-0.092 (0.203)	-0.252 (0.231)
Military expenditure t_{-1}			0.188*** (0.070)	
Year count	-0.032*** (0.007)	-0.084*** (0.016)	-0.067*** (0.017)	-0.062*** (0.022)
Observations	259	237	226	237
Peace agreement fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	No	No	No	Yes
R ²	0.126	0.249	0.320	0.309
Adjusted R ²	-0.007	0.100	0.177	0.084

***p < 0.01; **p < 0.05; *p < 0.10.

Table C4. Fixed effect country-year regressions of military expenditures for countries with comprehensive peace agreement, 1989-2015 (inputting 0 values for democracy variable where the values are missing).

	Military expenditure		
	Model (1)	Model (2)	Model (3)
Verification initiation t_{-1}	-1.913*** (0.544)	-1.423*** (0.527)	-1.978*** (0.565)
Active rebels t_{-1} (ln)	0.095 (0.197)	-0.093 (0.201)	0.171 (0.206)
Democracy t_{-1}	-1.206*** (0.258)	-0.896*** (0.275)	-1.320*** (0.272)
GDP p.c. t_{-1} (ln)	0.620 (0.446)	0.697 (0.448)	0.278 (0.505)
Population t_{-1} (ln)	4.468*** (1.294)	2.293* (1.351)	3.870*** (1.339)
Neighbor milex t_{-1}	6.501 (6.917)	0.069 (7.344)	6.187 (7.342)
Contiguity number t_{-1}	0.118 (0.562)	0.069 (0.531)	-0.376 (0.600)
Military expenditure t_{-1}		0.284*** (0.067)	
Year count	-0.200*** (0.041)	-0.128*** (0.044)	-0.220*** (0.059)
Observations	249	237	249
Peace agreement fixed effect	Yes	Yes	Yes
Year fixed effect	No	No	Yes
R ²	0.318	0.393	0.399
Adjusted R ²	0.186	0.266	0.203

***p < 0.01; **p < 0.05; *p < 0.10.

Table C5. Regression with Panel Corrected Standard Error (after matching).

	Military expenditure	Military expenditure (ln)
Verification initiation t_{-1}	-0.618** (0.298)	-0.396*** (0.101)
Duration pre-deployment (ln)	-0.300*** (0.107)	-0.454*** (0.049)
Democracy pre-deployment	-0.781*** (0.229)	-0.016 (0.064)
Battle related deaths pre-deployment (ln)	0.372*** (0.064)	0.281*** (0.023)
Started before 1989	-0.040 (0.263)	0.307*** (0.111)
Active rebels t_{-1} (ln)	1.565*** (0.159)	0.553** (0.218)
GDP p.c. t_{-1} (ln)	0.565*** (0.159)	0.263*** (0.043)
Population t_{-1} (ln)	-0.849*** (0.257)	-0.230** (0.097)
Neighbor milex t_{-1}	13.167 (8.491)	9.492*** (3.580)
Contiguity number t_{-1}	0.380*** (0.083)	0.149*** (0.025)
Year count	-0.094*** (0.024)	-0.030*** (0.009)
Constant	2.133 (2.657)	-1.260 (0.912)
Observations	120	120
R ²	0.686	0.746

***p < 0.01; **p < 0.05; *p < 0.10.

Appendix D. Estimate Models Using All Types of Conflict Termination Outcomes

To investigate whether a negotiated settlement without verification initiation is worse than other conflict termination outcomes in terms of the reduction in military spending in post-conflict society, I conducted an extension analysis where I used all types of conflict termination outcomes for the sample of analysis. The sample of analysis was constructed in the following way: first, from UCDP Conflict Termination Dataset version 2-2015 (Kreutz 2010), observations for the year when the conflict was terminated were extracted. Then, each row was expanded for 10 years. Thus, the sample covers 10 years after the conflict termination. The unit of analysis is conflict termination episode – year. Variables used in Table 1 in the main text are used for the analysis. As variables that do not appear in Table 1 in the main text, I use conflict termination outcome (peace agreement, rebel victory, government victory) dummy variables. As verification initiation was merged at country level information and the unit of analysis is conflict termination episode – year, not all observations where verification initiation takes the value 1 is coded as peace agreement = 1. Thus, I included interaction between verification initiation and peace agreement. In addition to control variables mentioned in the main text, I controlled for intensity level and log of conflict duration. Intensity level is measured at the time when conflict was terminated, taken from UCDP Conflict Termination Dataset version 2-2015 (Kreutz 2010). Conflict duration was calculated using start year in the UCDP Conflict Termination Dataset version 2-2015 (Kreutz 2010). As conflict termination outcomes are time-invariant dummy variables, I used panel corrected standard errors rather than fixed effects.

Table D1. Regression with Panel Corrected Standard Error for Military Expenditure (All Conflict Termination Outcomes), 1990-2012.

	Military expenditure
Military expenditure _{t-1}	0.872*** (0.064)
Verification initiation _{t-1}	0.003 (0.002)
Peace agreement	0.001 (0.001)
Verification initiation _{t-1} * Peace agreement	−0.006** (0.003)
Rebel victory	−0.003 (0.002)
Government victory	−0.002*** (0.001)
Active rebels _{t-1} (ln)	0.001 (0.001)
Democracy _{t-1}	0.000 (0.001)
Intensity level	−0.001 (0.001)
Conflict duration (ln)	−0.000 (0.000)
GDP p.c. _{t-1} (ln)	−0.000 (0.000)
Population _{t-1} (ln)	−0.001** (0.000)
Neighbor miles _{t-1} (ln)	−0.000 (0.026)
Contiguity number _{t-1}	0.000*** (0.000)
Year count	−0.000 (0.000)
Constant	0.0011*** (0.004)
Observations	1553
R ²	0.795

***p < 0.01; **p < 0.05; *p < 0.10.