

# Bargaining power and U.S. military aid in the post-cold war era

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## Abstract

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*This study examines the effect of bargaining power on the allocation of U.S. military assistance. Conceptualising U.S. military assistance as an aid-for-policy deal, it applies a two-tiered stochastic frontier model to a data sample of the post-Cold War era. It shows that the bargaining effect accounts for a huge variation in U.S. military aid distribution. The volume of U.S. military assistance in equilibrium is lower than the baseline volume by 4% at the mean and by 6% at the median. The donor U.S. extracts a slightly larger portion of the transaction surplus at these central points. However, the game of surplus division is not always about equally strong hagglers as it may first appear. In fact, the quartile values show substantial variance in bargaining performance and, hence, an outcome of surplus division across transactions. The bargaining effect is highly significant in the allocation of U.S. military assistance in the post-Cold War era. The donor U.S. enjoys a bargaining advantage at the mean and median, but rich variations are noticeable.*

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## Keywords:

United States, bargaining, military aid, Post-Cold War, Stochastic Frontier

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## Introduction

In the past two decades, the growing empirical literature on the determinants of U.S. economic assistance has considerably improved our understanding of the issue ([Lai, 2003](#); [Gibler, 2008](#); [Demirel-Pegg and Moskowitz, 2009](#); [Boutton and Carter, 2014](#); [Wang, 2016](#)). This research achievement nevertheless highlights how little has been done on the U.S. military assistance front. There have been few, if any, empirical studies that have presented systematic evidence bearing directly on the determination of U.S. military aid since the landmark piece by [Poe and Meernik \(1995\)](#). As a result, our knowledge of the issue based on systematic empirical research is limited to the mid-1990s.

This academic status quo is unsatisfactory for at least three reasons. First, existing studies have shown that U.S. military assistance has controversial social-political consequences in aid-recipient countries ([Cingranelli and Pasquarello, 1985](#); [Khilji and Zampelli, 1994](#); [Bapat, 2011](#); [Sandholtz, 2016](#); [Boutton, 2019](#)). A well-built literature on U.S. military aid can improve our ability to predict the chance and severity of these consequences.

Second, foreign military and economic aid offer different types of resource transfer. The transfer of defence-related resources such as military equipment and technology has immediate consequences for the security of both donor and recipient. Due to fungibility, economic assistance may also have security implications. However, the connection is much less imminent and necessary. Hence, research on economic assistance cannot fully substitute for research on military assistance, though the former sometimes provides valuable insights into the latter.

Finally, post-Cold War history has provided a rich sample of U.S. foreign aid that many believe to be systematically different from the previous age. As a result, the Cold War experience of military assistance might still be engaging for historical reasons but is much less so in terms of practical relevance. Take the September 11, 2001 terrorist attacks, for instance. This epoch-making event has profoundly changed U.S. foreign and security policy, of which military assistance is an important part. Since the Cold War era never witnessed similar events on U.S. soil, updated studies on the allocation of U.S. military assistance are needed to meet the intellectual demand in both academic and policy-making circles.

The first objective of this research is to improve our understanding of the determination of U.S. military aid in the post-Cold War era. In many respects, this study responds to the call of [Poe and Meernik \(1995\)](#). For instance, the authors urged that future research on the post-Cold War determinants of U.S. military assistance should use a comprehensive data sample to transcend the limitations of the small-N analysis and that both socio-economic and political-strategic factors should be considered as explanatory variables. Thanks to theoretical and methodological advancements in the past 20 years, these once-novel suggestions have become more standard in empirical studies of U.S. foreign aid. This research follows these suggestions.

The second and more important objective of this study is to investigate the effect of bargaining power on the allocation of U.S. military aid. My emphasis on the bargaining effect is a fundamental deviation from the existing empirical literature regarding how to conceptualise the distribution of U.S. military assistance. In particular, I argue for the conceptual model of aid-for-policy transaction ([Bueno de Mesquita and Smith, 2007, 2009](#)) as a competitive alternative to the prevailing model of unilateral decision-making ([Cingranelli and Pasquarello, 1985](#)). Thus, the current research is not an exercise of the prevailing research paradigm on a more recent temporal domain. Instead, it is a reflection on what is the more appropriate way to model the determination of U.S. foreign assistance.

The rest of this paper is organised as follows. The second section brings the issue of bargaining power to light by arguing that U.S. foreign assistance is the outcome of aid-for-policy deals struck with aid-recipient countries. It then develops an empirical framework of a two-tiered stochastic frontier that enables us to investigate the bargaining effect. The third section introduces the data set in use and variable operations. The fourth part discusses the results. The fifth section is the conclusion.

## **Bargaining Power and U.S. Military Aid**

### **U.S. Foreign Assistance as the Outcome of Aid-for-Policy Deals**

Cingranelli and Pasquarello (1985) offered a general conceptual model of U.S. foreign assistance. According to them, the allocation of U.S. foreign aid could be conceptualised as the result of a unilateral decision-making process in two stages. In the first stage of gatekeeping, the U.S. identifies the nations qualified to receive its assistance. In the second stage of distribution, the U.S. decides how much each qualified country will receive. Since its first appearance, this conceptual model has gained its popularity in the empirical literature to explore various possible determinants of U.S. foreign aid, and considerable efforts have been made to tackle the selection effect in the gatekeeping stage. Poe and Meernik (1995) exemplify the application of this conceptual model in studying U.S. military assistance. By applying the Heckman selection method, the authors argued that they could address the selection effect better and contributed to the literature at the time.

It is interesting to note that empirical studies on U.S. foreign aid often start with the Cingranelli-Pasquarello model without asking whether it provides an appropriate conceptualisation of the issue. The single most significant feature of the Cingranelli-Pasquarello model is that it describes U.S. foreign aid as the outcome of unilateral giving behaviour and thus assumes away any possible influence of aid-recipient countries over the issue. Although such a unilateral decision-making paradigm is quite common and helpful in modelling charitable behaviour, it is largely at odds with empirical observations that point to U.S. foreign aid as the outcome of transactions with aid-recipient countries rather than unilateral behaviour of giving (Rai, 1980; Conteh-Morgan, 1990; Raffer and Singer, 1996; Wang, 1999; Neumayer, 2003; Dreher, Nunnenkamp and Thiele, 2008; Fleck and Kilby, 2010).

Bueno de Mesquita and Smith (2007, 2009) are probably best at making the point. By grouping the various self-interest motivations into the rubric of seeking policy concessions from foreign nations, they conceptualised foreign assistance as the result of aid-for-policy deals. Their logic is straightforward. Foreign assistance as a means of resource transfer from the donor to the recipient incurs immediate costs to the former and benefits to the latter. As long as donors care about their interests, they should be rewarded in some way that is highly valued at home. Compared with donor countries, aid-recipient countries are relatively poor regarding material resources but rich regarding policy discretion. Aid-recipient countries value additional resources more than the policy concessions they make, while donor countries value the policy concessions of foreign countries more than the resources they transfer. As a result, aid-for-policy transactions naturally stand out as a focal point where governments in both donor and recipient countries can advance their interests. It is worth noting that when the resource being transferred is defence-related, the self-interest motivation of the donor might have an even more prominent role to play because the transfer has imminent security implications.

Conceptualising U.S. military aid as the outcome of aid-for-policy transactions immediately highlights the issue of bargaining power. It is useful to recall that in any successful

transaction, the buyer's reservation price must be higher than that of the seller. In other words, the consumer must value the object in transaction more than the provider. The gap between the two reservation prices then provides the range of a transaction surplus over which the trading parties can haggle. For the commodity or service in transaction, the seller bargains for a higher price while the buyer bargains for a lower price (Osborne and Rubinstein, 1990). These general rules should be applicable if U.S. military aid is the result of aid-for-policy deals. In the aid-for-policy scenario, the U.S. offers military assistance in exchange for a package of its favoured policy adjustments made by the aid-recipient government, which is not unlike a buyer on the economic market paying the seller for its desirable commodities or services. Specifically, aid-recipient countries, on the sale side, try to push up the volume of U.S. military aid for the policy concessions they offer to make, while the U.S., on the buy side, tries to push it down.

## A New Empirical Framework

The current research adopts the following two-tiered stochastic frontier analysis (Polachek and Yoon, 1987; Gaynor and Polachek, 1994; Kumbhakar and Lovell, 2000) to gauge the effect of bargaining on U.S. military aid. A discussion on the validity of applying two-tiered stochastic frontier analysis (SFA) models to the bargaining effect on bilateral assistance can be found in Wang (2016, 2018).

$$USMAID = \mu(x) + w - u + v \quad (1)$$

where  $\mu(x) = x\delta$  indicates how aid-recipient countries' characteristics affect the baseline U.S. military assistance,  $w$  represents the effort of the aid-recipient government to push up the amount of U.S. military aid,  $u$  represents the effort of the U.S. to push it down, and  $v$  is a normal noise.

By assuming that  $w \sim i.i.d.Exp(\sigma_w, \sigma_w^2)$ ,  $u \sim i.i.d.Exp(\sigma_u, \sigma_u^2)$ ,  $v \sim i.i.d.N(0, \sigma_v^2)$ , and the error components are independently distributed from  $x$ , Kumbhakar and Parmeter (2009) derived the joint density function of the  $i$ -th residual  $\varepsilon_i$  as

$$f(\varepsilon_i) = \frac{Exp(a_i)}{\sigma_u + \sigma_w} \Phi(c_i) + \frac{Exp(b_i)}{\sigma_u + \sigma_w} \Phi(h_i) \quad (2)$$

where  $a_i = \frac{\varepsilon_i}{\sigma_u} + \frac{\sigma_v^2}{2\sigma_u^2}$ ,  $c_i = -\frac{\varepsilon_i}{\sigma_v} - \frac{\sigma_v}{\sigma_u}$ ,  $b_i = \frac{\sigma_v^2}{2\sigma_w^2} - \frac{\varepsilon_i}{\sigma_w}$ ,  $h_i = \frac{\varepsilon_i}{\sigma_v} - \frac{\sigma_v}{\sigma_w}$ , and  $\Phi$  is the cumulative

distributing function of standard normal distribution. The estimates for  $\{\delta, \sigma_w, \sigma_u, \sigma_v\}$  can be obtained by applying a maximum likelihood estimation (MLE) to the following log-likelihood function

$$\ln L(x; \delta, \sigma_w, \sigma_u, \sigma_v) = -n \ln(\sigma_u + \sigma_w) + \sum_{i=1}^n \ln[e^{a_i} \Phi(c_i) + e^{b_i} \Phi(h_i)] \quad (3)$$

where  $n$  is the number of observations of a data sample.

The bargaining impact of the donor U.S., that of aid-recipient countries, and the net surplus can be measured accordingly as

$$E(1 - e^{-u} | \varepsilon_i) = 1 - \frac{\lambda}{1 + \lambda} \frac{[\Phi(h_i) + Exp(a_i - b_i) Exp(\sigma_v^2 / 2 - \sigma_v c_i) \Phi(c_i - \sigma_v)]}{\Phi(h_i) + Exp(a_i - b_i) \Phi(c_i)} \quad (4)$$

$$E(1 - e^{-w} | \varepsilon_i) = 1 - \frac{\lambda}{1 + \lambda} \frac{[\Phi(c_i) + Exp(b_i - a_i) Exp(\sigma_v^2 / 2 - \sigma_v h_i) \Phi(c_i - \sigma_v)]}{Exp(b_i - a_i) [\Phi(h_i) + Exp(a_i - b_i) \Phi(c_i)]} \quad (5)$$

$$NS = E(1 - e^{-w_i} | \varepsilon_i) - E(1 - e^{-w_i} | \varepsilon_i) = E(e^{-w_i} - e^{-w_i} | \varepsilon_i) \quad (6)$$

where  $\lambda = 1/\sigma_u + 1/\sigma_w$ . All these measures reflect the bargaining effect as a percentage change from the baseline military assistance (Kumbhakar and Parmeter, 2009).

## The Baseline Level of U.S. Military Assistance

In the previous section, the baseline volume of U.S. military assistance is assumed to be a linear function of a vector of recipient characteristics. This section specifies those recipient characteristics by reviewing previous research on the determinants of U.S. foreign assistance. Two critical points deserve our attention here. First, although existing studies tend to suggest similar determinants of U.S. foreign assistance, their conclusions often conflict with one another due to differences in time horizon, variable operation, and estimation technique. As a result, general agreement on the effect of any single determinant is more likely to be an exception rather than the norm. Second, the existing literature on the determination of U.S. foreign assistance focuses almost exclusively on economic aid. Although certain determinants might influence both economic and military aid, their impact on the two types of assistance could be considerably different. Given this, the following review suggests the recipient attributes relevant to the allocation of U.S. military assistance. In other words, a variable is included as long as there is reason to believe it could affect the allocation of U.S. military assistance, even if the exact effect is far from conclusive.

Following Poe and Meernik (1995), I divide the traditional determinants of U.S. military assistance into a socioeconomic group and a political-strategic group. The socioeconomic attributes of recipient countries include national income, income per capita, population, imports from the U.S., and the inflow of U.S. economic aid. Many studies of U.S. economic assistance have suggested that small and poor economies face more serious financial constraints than their larger and wealthier counterparts and thus have more robust demand for additional resources (Meernik, Krueger and Poe, 1998; Gibler, 2008; Demirel-Pegg and Moskowitz, 2009; Gibler and Miller, 2012). When military assistance is considered, the same logic may also apply. Unlike large and wealthy economies, small and poor economies have extremely limited resources to meet their security needs. Hence, they have a strong desire to offer policy concessions in exchange for military assistance.

Population is another often-included determinant of U.S. foreign assistance (Neumayer, 2003; Bueno de Mesquita and Smith, 2007; Demirel-Pegg and Moskowitz, 2009). A couple of studies have suggested that U.S. economic assistance is biased in favour of populous economies, which contradicts what we have learned from the comparative aid literature showing systematic bias against them. The security implications of population can further complicate the issue of military assistance. According to Dunne and Perlo-Freeman (2003), a larger population by itself provides a certain level of security because populous countries might rely on a large military force as a substitute for prohibitive weapon systems with cutting-edge technology. If that is the case, countries with a large population have considerably less demand for foreign military assistance and lack the incentive to make policy concessions in exchange.

Next, imports from the U.S. are included because it has long been argued that precious foreign markets constitute a major strategic interest that U.S. policymakers need to serve. Some empirical studies have also shown systematic evidence that the U.S. provides more economic (Neumayer, 2003; Bueno de Mesquita and Smith, 2007; Fleck and Kilby, 2010) and military assistance (Poe and Meernik, 1995) to its major export markets.

Lastly, I include the inflow of U.S. economic assistance in this category because studies have shown a strong positive connection between the two types of aid ([Hook, 1995](#); [Neumayer, 2003](#)).

The political-strategic group includes voting consistency with the U.S. in the United Nations General Assembly (UNGA), U.S. military presence, the level of democracy, violation of citizens' personal integrity, geographical location and the war on terrorism. First, some studies have identified votes in the UNGA as a major form of policy concession that developing countries make in exchange for U.S. economic assistance ([Rai, 1980](#); [Wang, 1999](#); [Dreher, Nunnenkamp and Thiele, 2008](#)). Thus, an aid-recipient country's voting consistency with the U.S. in the UNGA is included to cover for this possibility.

Second, some studies have examined the relationship between U.S. military presence and the volume of U.S. economic aid ([Meernik \*et al.\*, 1998](#); [Apodaca and Stohl, 1999](#)). Little evidence has been found in support of a significant connection between the two. Given the solid logical tie between U.S. military presence and military aid, however, I still include a variable of U.S. military presence to account for a potential nexus.

Third, extensive empirical literature has investigated the relationship between respect for human rights by the governments of aid-recipient countries and inflows of U.S. foreign aid. The scholarship could be further divided into two strands of research. The first focuses on the respect for political rights or the level of democracy ([Meernik \*et al.\*, 1998](#); [Demirel-Pegg and Moskowitz, 2009](#); [Fleck and Kilby, 2010](#); [Gibler and Miller, 2012](#)), while the second focuses on the abuse of citizens' personal integrity ([Poe, 1991](#); [Lai, 2003](#); [Neumayer, 2003](#); [Gibler, 2008](#); [Fariss, 2010](#)). This study takes both political rights and personal integrity abuse into account.

Next, studies on U.S. foreign aid have long noticed the strategic significance of aid-recipient countries due to their geographical location. Although previous studies paid particular attention to American countries ([Poe and Meernik, 1995](#); [Apodaca and Stohl, 1999](#)), it should be noted that countries in other regions could also be of unique value to U.S. foreign policy ([Balla and Reinhardt, 2008](#)). Thus, the current study takes geographical location into account when predicting the baseline volume of U.S. military aid.

Finally, the terrorist attacks of Sept. 11, 2001 have increased academic interest in exploring how the war on terrorism has reshaped U.S. foreign and security policies. Regarding foreign assistance, recent studies show that the post-9/11 era has been characterised by an expansion of U.S. foreign assistance in order to contain the ongoing terrorist threat to U.S. security ([Fleck and Kilby, 2010](#); [Boutton and Carter, 2013](#)). Given the epoch-making nature of the Sept. 11 attacks and their evident impact on U.S. foreign and security interests, this research addresses those concerns as well.

## Data and Variables

To examine the effect of bargaining power on post-Cold War U.S. military assistance, I constructed a data sample for the period 1992–2011. Table 1 provides the descriptive statistics. Data on U.S. military assistance is collected from U.S. Overseas Loans and Grants, which is popularly known as the Greenbook ([USAID, 2012](#)). The volume is converted to 2005 U.S. dollars.

Table 1. Descriptive Statistics.

Variable	Mean	S.D.	Minimum	Maximum
Ln(military_aid)	14.378	2.339	7.734	22.316

Ln(economic_aid)	16.853	2.213	5.809	22.129
Ln(population)	16.250	1.439	12.985	21.019
Ln(GDP)	23.732	1.829	19.844	29.179
Ln(GDP_PC)	7.482	1.277	4.816	10.760
Ln(import)	19.748	2.185	13.502	26.065
U.N. Voting	0.329	0.144	0	0.941
Personal Integrity Abuse	2.708	1.055	1	5
Democracy	3.793	5.754	-10	10
Ln(Manpower)	2.767	1.781	0	11.474
Terror	0.554	0.497	0	1
Rg1: Africa	0.333	0.471	0	1
Rg2: America	0.232	0.422	0	1
Rg3: Asia	0.241	0.428	0	1
Rg4: Europe	0.182	0.386	0	1
Rg5: Pacific	0.011	0.105	0	1

The proposed socioeconomic determinants of U.S. military assistance are collected and operated as follows. The national income and income per capita of aid-recipient countries are measured by GDP and GDP per capita, respectively. The data comes from the World Development Indicators (WDI) of the World Bank (2012) and converted to 2005 U.S. dollars. The population of aid-recipient countries is also from the WDI. Next, I use imports from the U.S. in 2005 dollars to gauge the significance of the recipient as a foreign market. The data is adopted from the Direction of Trade Statistics of the International Monetary Fund (IMF, 2012). Finally, U.S. economic assistance is also included in the socioeconomic group to predict the baseline level of military assistance. The data is again from the Greenbook and in 2005 U.S. dollars. To control for the impact of extreme values, all of the variables mentioned above are log-transformed.

The proposed political-strategic determinants of U.S. military assistance are operated as follows. First, voting consistency with the U.S. in the UNGA is provided by Strezhnev and Voeten (2013). Specifically, the variable of `agree3un` is used. It ranges from 0 to 1, with a higher value indicating a higher level of voting consistency. Second, U.S. military presence is measured by the number of U.S. military personnel stationed in the aid-recipient country. The data comes from Active Duty Military Personal Strengths by Regional Area and by Country, which is produced by the Defense Manpower Data Center (U.S. Department of Defense, 2012). In order to account for the effect of extreme values, this variable is also log-transformed. When no U.S. military personnel are stationed in a country, a value of one is used to deal with the problem of log zero. Third, the standard 21-point polity score (Marshall, Gurr and Jaggers, 2012) is employed to measure the level of democracy or the political-right dimension of human rights in aid-recipient countries. Fourth, the abuse of personal integrity is coded according to the Political Terror Scale (PTS) by Wood and Gibney (2010). Following Mayer and Zignago (2011), aid recipients are categorised into one of five continental groups. These are Africa, America, Asia, Europe, and the Pacific. The African group serves as the benchmark for comparison and is omitted in empirical estimation. Finally, a single dummy variable is used to control for the impact of the U.S. war on terrorism. A value of one is given to this variable for all observations after 2001. Otherwise, the variable is coded as zero.



## Empirical Findings

### Benchmark Results

To examine the effect of bargaining power on U.S. military assistance in the post-Cold War era, I first take a benchmark analysis that involves two different specifications. The first includes only the recipient characteristics proposed to influence the baseline volume of U.S. military aid. This specification is estimated with ordinary least square (Model 1a) and maximum likelihood (Model 1b), respectively. The second specification takes into account the bargaining effect by operating the two-tiered SFA developed in Section 2.2. In particular, two variants of the two-tiered SFA are applied. The first (Model 2a) operates hypothesis testing based on regular standard error, while the second (Model 2b) operates it based on robust standard error. Table 2 contains the results.

**Table 2. Regression Results (Benchmark).**

	<b>Model 1a OLS (S.E.)</b>	<b>Model 1b MLE(S.E.)</b>	<b>Model 2a TTSFA(S.E.)</b>	<b>Model2b TTSFA(R.S.E.)</b>
Ln(economic_aid)	0.52***(0.03)	0.51***(0.03)	0.51***(0.03)	0.51***(0.04)
Ln(population)	-20.44***(2.55)	-21.71***(2.38)	-21.62***(2.52)	-21.62***(3.16)
Ln(GDP)	20.08***(2.54)	21.38***(2.38)	21.30***(2.52)	21.30***(3.16)
Ln(GDP_PC)	-19.72***(2.55)	-20.93***(2.39)	-20.82***(2.53)	-20.82***(3.18)
Ln(import)	0.23***(0.05)	0.24***(0.05)	0.24***(0.05)	0.24***(0.05)
U.N. Voting	1.04**(0.49)	1.75***(0.45)	1.82***(0.48)	1.82***(0.64)
Personal Integrity Abuse	0.18***(0.05)	0.11**(0.05)	0.08*(0.05)	0.08*(0.05)
Democracy	-0.01(0.01)	-0.01(0.01)	-0.001(0.01)	-0.001(0.01)
Ln(Manpower)	0.17***(0.03)	0.21***(0.03)	0.21***(0.03)	0.21***(0.04)
Terror	0.21*(0.11)	0.34***(0.10)	0.32***(0.10)	0.32**(0.13)
Rg2: America	-0.09(0.17)	-0.22(0.15)	-0.28*(0.16)	-0.28(0.19)
Rg3: Asia	0.91***(0.13)	0.97***(0.11)	1.05***(0.11)	1.05***(0.13)
Rg4: Europe	0.94***(0.20)	0.80***(0.18)	0.82***(0.18)	0.82***(0.22)
Rg5: Pacific	0.13(0.43)	0.35(0.36)	0.38(0.34)	0.38(0.32)
$\sigma_v$			0.49***(0.14)	0.49***(0.15)
$\sigma_u$			1.29***(0.22)	1.29***(0.25)
$\sigma_w$			1.19***(0.35)	1.19***(0.35)
LR Test			32.98***	
Observations	1789	1789	1789	1789

\* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$

The two model specifications reach the same conclusion regarding how the proposed attributes of an aid-recipient country influence the baseline volume of U.S. military aid. As for the socioeconomic attributes, GDP, imports from the U.S., and the inflow of U.S. economic assistance have a positive effect on baseline military aid, while GDP per capita and population have had a negative effect during the post-Cold War era. It is interesting to note that the result for the population-aid nexus is consistent with what we have learned from the comparative literature of aid and the Dunne and Perlo-Freeman (2003) argument that population itself can provide a certain level of security.



Interesting results also appear concerning the political-strategic attributes. First, higher voting consistency with the U.S. in the UNGA and a larger contingent of U.S. military personnel help a recipient gain more military aid. Second, the results also suggest that U.S. military aid is indiscriminate regarding a recipient's level of democracy (respect for citizens' political rights) but biased in favour of those that regularly abuse the personal integrity of their citizens. Finally, the U.S. provides more military assistance in the war on terrorism, and countries in Asia and Europe received more U.S. military aid.

The main objective of this research, however, is to evaluate the impact of bargaining power on the distribution of U.S. military assistance. According to the estimates of Models 2a and 2b, both  $\sigma_u$  and  $\sigma_w$  are statistically significant at the 0.01 level. Since Model 1b is nested in Model 2a, we can use a likelihood ratio (LR) test to evaluate whether a more complicated specification is preferable. The chi-squared value of 32.98 is highly significant and thus supports the inclusion of additional parameters modeling the bargaining effect.

To illustrate the overall contribution of the bargaining effect to the variation in U.S. military assistance, I operate a variance-decomposition analysis based on the two-tiered SFA specification. Table 3 presents the results. According to this analysis, the overall unexplained variation in U.S. military assistance is 3.32. Of this unexplained part, 93% can be explained by the bargaining effect. Within the bargaining-related variation, 46% can be further attributed to the bargaining effort of aid-recipient countries to push up the amount of aid. In comparison, the other 54% can be attributed to the bargaining effort of the donor U.S. to push it down. The figures suggest a significant bargaining effect on the distribution of post-Cold War U.S. military assistance.

**Table 3: Decomposition (Benchmark).**

$\sigma_v^2 + \sigma_u^2 + \sigma_w^2$	3.32
$(\sigma_u^- + \sigma_w^-) / (\sigma_v^- + \sigma_u^- + \sigma_w^-)$	0.93
$\sigma_u^+ / (\sigma_u^+ + \sigma_w^+)$	0.54
$\sigma_w^2 / (\sigma_u^2 + \sigma_w^2)$	0.46

To complete the discussion, I provide the mean and quartile values of the bargaining effect of the donor U.S., that of its military aid recipients and the net surplus in Table 4. They are calculated based on the point predictors introduced in Equations (4) through (6), respectively. The results indicate that on average, the bargaining effort of the donor U.S. decreases the volume of military assistance by 56.07%. In comparison, the bargaining effort of aid-recipient countries increases it by 54.47%. In equilibrium, the volume of U.S. military assistance is lower than the baseline volume by 1.60% at the mean and by 2.73% at the median. Obviously, the donor U.S. extracts a slightly larger portion of the transaction surplus at these central points.

**Table 4. Distribution of Bargaining Power (Benchmark).**

	Mean	Q1 (%)	Median (%)	Q3 (%)	Q3-Q1 (%)
Donor U.S. $\hat{E}(1 - e^{-u}   \varepsilon)$	56.07	38.80	47.56	69.32	30.52
Recipients $\hat{E}(1 - e^{-w}   \varepsilon)$	54.47	38.60	44.84	66.68	28.08

Net Surplus $\hat{E}(e^{-u} - e^{-w}   \varepsilon)$	-1.60	-30.72	-2.73	27.88	58.60
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However, the game of surplus division is not always about equally strong hagglers as it may first appear. In fact, the quartile values show substantial variance in bargaining performance and, hence, the final outcome of surplus division across transactions. As reported in the last row of Table 4, the net surplus at the first quartile point is -30.72%. This means that for a quarter of the aid-for-policy transactions in our data sample, the policy concessions made by aid-recipient countries were traded for at least 30.72% less than their baseline price. At the same time, the net surplus at the third quartile point is 27.88%, meaning that for another quarter of transactions, policy concessions were traded for at least 27.88% more than their baseline price. The inter-quartile variance (the difference between the first and third quartile values) is 58.60%, demonstrating the massive influence of bargaining power over the allocation of U.S. military assistance.

### An Extended Model

The two-tiered SFA analysis in Section 4.1 assumes bargaining efficiency to be homogeneous among aid recipients. A more realistic scenario, however, would allow it to be heterogeneous across different recipients. Previous studies in the two-tiered SFA literature have addressed this issue by allowing seller and buyer attributes to influence the means of  $w$  and  $u$ , respectively (Groot and Maassen van den Brink, 2007; Murphy and Strobl, 2008; Kumbhakar and Parmeter, 2009; Tomini, Groot and Pavlova, 2012). Using the same approach, I now allow aid-recipient attributes to influence the mean of  $w$ . In particular,  $\sigma_w$  is now assumed to be a linear function of all the recipient characteristics studied in the benchmark analysis except the regional dummies.

Table 5 An Extended Model.

	Model2b TTSFA	Model 3 Extended $\mu(x)$	Model 3 Extended $\sigma_w$
Ln(economic_aid)	0.51***(0.04)	0.41***(0.04)	0.01(0.03)
Ln(population)	-21.60***(3.16)	-24.10***(2.37)	1.82(2.72)
Ln(GDP)	21.30***(3.16)	23.88***(2.37)	-1.85(2.72)
Ln(GDP_PC)	-20.80***(3.18)	-23.56***(2.38)	1.87(2.72)
Ln(import)	0.24***(0.05)	0.17***(0.05)	0.10**(0.05)
U.N. Voting	1.82***(0.64)	0.66(0.7)	0.68(0.43)
Personal Integrity Abuse	0.08*(0.05)	-0.15**(0.06)	0.23***(0.05)
Democracy	-0.001(0.01)	0.04***(0.01)	-0.06***(0.01)
Ln(Manpower)	0.21***(0.04)	0.06(0.04)	0.13***(0.03)
Terror	0.32**(0.13)	0.15(0.14)	0.15(0.12)

Rg2: America	-0.28(0.19)	0.04(0.16)	
Rg3: Asia	1.05***(0.13)	1.16***(0.11)	
Rg4: Europe	0.82***(0.22)	1.35***(0.21)	
Rg5: Pacific	0.38(0.32)	0.24(0.29)	
$\sigma_v$	0.49***(0.15)	0.65***(0.26)	
$\sigma_u$	1.29***(0.25)	1.18***(0.41)	
$\sigma_w$	1.19***(0.35)		
Observations	1789	1789	1789

\* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$

Results based on this extended model are provided in Table 5. For the sake of comparison, findings based on Model 2b are duplicated here. Several interesting patterns are identified and worth discussing in detail. As far as socioeconomic attributes are concerned, only imports from the U.S. are shown to have a significant effect on the bargaining capability of an aid-recipient country. Specifically, importing more from the U.S. not only promotes the baseline level of military assistance but also grants the importer bargaining advantage in surplus division. The other socioeconomic attributes show no significant effect on the bargaining capability of an aid-recipient country, and their influence over the baseline military aid is similar to those identified in the benchmark analysis. The results demonstrate that U.S. economic aid inflows, population, GDP, and GDP per capita of an aid-recipient country affect U.S. military assistance only by determining the baseline aid.

With regard to the political-strategic attributes of an aid recipient, the accommodation of heterogeneity in bargaining efficiency provides a complicated picture of the channels through which such characteristics influence U.S. military assistance in equilibrium. All political-strategic attributes, except the voting consistency with the U.S. in the UNGA and the war on terrorism, show a significant impact on an aid recipient's bargaining capability. Specifically, personal integrity abuse and U.S. military presence increase bargaining capability. However, a higher level of democracy (or higher respect for citizens' political rights) decreases it.

Allowing bargaining efficiency to vary across aid recipients also has considerable consequences for determining the baseline level of military assistance. Once the cross-recipient difference in bargaining efficiency is assumed, U.S. military presence and the war on terrorism lose their significance. At the same time, democracy gains importance in determining the baseline level of U.S. military aid. Violation of personal integrity is still a significant determinant of baseline aid but switches its coefficient sign from positive to negative.

From such changes, essential lessons can be drawn concerning how the political-strategic attributes of an aid-recipient country influence the U.S. military assistance it receives through two different channels. In particular, recipient attributes can affect either the portion of the transaction surplus grabbed by aid-recipient countries or the value of for-

eign policy concessions made to the U.S. as reflected in the baseline level of assistance. According to the extended model, countries that regularly abuse the personal integrity of their citizens provide less valuable policy concessions, which is reflected in the lower baseline level of aid. However, this disadvantage is largely compensated by their strong capability in negotiating deals with the U.S. On the other hand, more democratic states provide more valuable foreign policy concessions and earn more military assistance as reflected in the baseline volume. The advantage, however, can be negated by their considerable bargaining inefficiency. Finally, unlike what we learned from the benchmark results, the war on terrorism has no impact on military assistance through either mechanism once difference in bargaining capability is considered.

**Table 6. Decomposition (Extended).**

$\sigma_v^2 + \sigma_u^2 + \sigma_w^2$	3.08
$(\sigma_u^2 + \sigma_w^2) / (\sigma_v^2 + \sigma_u^2 + \sigma_w^2)$	0.86
$\sigma_u^2 / (\sigma_u^2 + \sigma_w^2)$	0.52
$\sigma_w^2 / (\sigma_u^2 + \sigma_w^2)$	0.48

Does the accommodation of heterogeneity in bargaining efficiency affect our evaluation of the overall contribution of the bargaining effect to the variation in U.S. military assistance? To answer this, I operate a variance decomposition analysis for the extended model and report the results in Table 6. The overall unexplained variation in U.S. military assistance is now 3.08. Of this unexplained variation, 86% can still be attributed to the bargaining effect. Within the bargaining-related variation, 48% can be further attributed to the bargaining effort of the recipient countries to push up the amount of U.S. military aid, while the other 52% can be attributed to the bargaining effort of the donor U.S. to push it down. Compared with the benchmark results, the overall explanatory ability of the bargaining effect has decreased from 93% to 86% after taking cross-recipient heterogeneity in bargaining efficiency into account. The relative impacts of recipient and donor bargaining efforts in the extended model are close to those reported in the benchmark analysis.

Next, I inspect the mean and quartile values of the bargaining effect of the donor U.S., that of its military aid recipients and the net surplus based on the extended model. The results presented in Table 7 show that on average, the bargaining effort of the donor U.S. decreases the amount of military aid by 53.84%, while the bargaining efforts of recipient countries increase it by 49.46%. As a result, U.S. military assistance in equilibrium is 4.38% lower than the baseline level at the mean and 5.99% lower at the median. The quartile values again show colossal variation in bargaining performance on both the donor and recipient sides as well as in the net surplus. The net surplus at the first quartile point shows that for a quarter of the aid-for-policy transactions, policy concessions are traded for at least 32.25% less than their baseline price. At the same time, the net surplus at the third quartile point shows that for another quarter of transactions, policy concessions are traded for at least 20.91% more than their baseline price. The inter-quartile range of 53.16% illustrates the massive impact of bargaining power and its substantial variation across transactions.

**Table 7. Distribution of Bargaining Power (Extended)**

	Mean	Q1 (%)	Median (%)	Q3 (%)	Q3-Q1 (%)
Donor U.S. $\hat{E}(1 - e^{-u}   \varepsilon)$	53.84	40.02	46.98	65.25	25.23

Recipients $\hat{E}(1 - e^{-w}   \varepsilon)$	49.46	33.74	42.01	59.35	25.61
Net Surplus $\hat{E}(e^{-u} - e^{-w}   \varepsilon)$	-4.38	-32.25	-5.99	20.91	53.16

A quick comparison with the results from our benchmark analysis (Table 4) immediately reveals three noticeable differences. First, ignoring cross-recipient heterogeneity in bargaining efficiency is likely to overstate the overall impact of bargaining power on U.S. military assistance, a point that holds at both the mean and different quartile points. Second, the bargaining advantage of the donor U.S. in the surplus division is underestimated in the benchmark analysis. Third, assuming the same bargaining efficiency across recipients exaggerates the variance in bargaining performance, which is best reflected by the interquartile ranges.

Despite these differences, it is critical to note that the extended model unequivocally reconfirmed two general themes established in our benchmark analysis. First, the U.S. enjoys a modicum of bargaining advantage at both the mean and the median. In other words, it can grab a larger portion of the transaction surplus at those central points. Second, policy concessions are not always traded under their baseline price. Though many aid recipients ended up with highly unfavourable deals with the U.S., many others managed to strike highly favourable ones.

**Table 8. Top Ten Successful Bargainers (1992-2011).**

Rank	Country	Average Net Surplus
1	Liberia	58.67
2	Tunisia	56.39
3	Israel	53.33
4	Colombia	53.08
5	Egypt	52.76
6	Morocco	50.32
7	Jordan	50.01
8	Iraq	48.22
9	Bahrain	43.41
10	Pakistan	39.58

Some curious readers might then be interested in knowing more about the bargaining performance of individual aid recipients. Before moving to the final section, Table 8 shows the 10 most successful ones in terms of average bargaining performance (out of 133 aid-recipient countries). All of these countries are long-term beneficiaries of U.S. military assistance. It is also interesting to note that countries from the Middle East and North Africa dominate the list.

## Conclusion

Conceptualising U.S. military assistance as the outcome of aid-for-policy transactions immediately brings to light the effect of bargaining power on the allocation of U.S. military aid. This study provides a two-tiered SFA that is able to examine the impact of bargaining power on U.S. military aid. By looking at the distribution of U.S. military

assistance during the post-Cold War era, I find that the bargaining effect accounts for a considerable variation in U.S. military assistance. Empirical results also show that aid-recipient countries vary substantially in bargaining efficiency, although the donor U.S., both on average and at the median, enjoys a modicum of bargaining advantage. In addition, critical behavioural patterns concerning how different attributes of an aid-recipient country influence the amount of U.S. military assistance it receives have been identified and discussed.

As one of the first to address the nexus between bargaining power and U.S. military assistance, this study also leaves questions for future academic inquiry. I believe one of them is incredibly demanding and promising. That is to develop new theories that account for the variation in bargaining efficiency across aid-recipient countries.

The well-developed theoretical literature on why and how certain socioeconomic or political-strategic attributes affect the bargaining capability of aid-recipient countries would tremendously benefit our understanding of the bargaining-aid nexus in a couple of important ways. First, it would help explain some empirical patterns identified in the current research which lack a clear theoretical account. For instance, why do countries that regularly abuse the personal integrity of their citizens have more bargaining capability while democratic regimes are pretty inefficient in negotiating favourable deals of military assistance with the U.S.? In particular, what is the exact institutional or informational mechanism that gives rise to these differences?

Second, the current research was forced to put traditional determinants of U.S. foreign aid in both equations of  $\mu(x)$  and  $\sigma_w$  due to the shortage of theories on bargaining efficiency. Such a practice did provide fruitful results. However, other determinants of bargaining efficiency might have been omitted, for they do not obviously affect the baseline level of U.S. military assistance. Well-built theories on the determination of bargaining efficiency would propose new attributes of aid-recipient countries that affect the amount of U.S. military assistance only through the bargaining mechanism.

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The data presented in this study are available in supplementary material.

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