

Yet another look at vote buying in the UN General Assembly

Fang-Yi Chiou* Simon Hug[†]
Bjørn Høyland[‡]

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Abstract

From the very early writings assessing how Ronald Reagan's policy of asking the state department to report on UNGA votes to ensure punishment and rewards for aid recipients, strategic interactions have been considered as important. A clean way to assess these interactions has, however, eschewed scholars so far. In this paper we propose a statistical strategic model that allows for taking into account correlated errors while assuring equilibrium behavior. Replicating Carter & Stone's (2015) analysis we find that some of their key findings are likely due to a misspecification of the model. Preliminary results suggest that democracies are not necessarily more susceptible to punishments by the US, and the role of the ideological orientation of the recipient government appears also as more complex.

* IPSAS, Academia Sinica, Taipei; email: fangyichiou@gmail.com

[†] Département de science politique et relations internationales, Faculté des sciences de la société ; Université de Genève; 40 Bd du Pont d'Arve; 1211 Genève 4; Switzerland; phone +41 22 379 83 78; email: simon.hug@unige.ch

[‡] Department of Political Science, University of Oslo, Postbox 1097, Blindern, 0317 Oslo Norway ; phone +4722858598 ; email: bjorn.hoyland@stv.uio.no

1 Introduction

The relationship between voting at the United Nations General Assembly (UNGA) and development aid has been a topic of recurring interest among economists and political scientists alike. Some early work attempted to assess whether particular decisions, like the admission of Communist China to the United Nations (UN, see Bernstein & Alpert 1971, Alpert & Bernstein 1974), were affected by disbursement of development aid. Later, Ronald Reagan’s decision to require the US State Department to report on whether US policies were supported by aid recipients in the 1980s led to a further flurry of studies on possible links between foreign aid and UNGA voting (e.g., Kegley & Hook 1991).¹

These early studies as well as more recent work on US bilateral aid come to quite conflicting results. In part this has to do with the fact that relationships between voting in the UNGA and decisions on development aid might be linked through different mechanisms. Thus, Kegley & Hook (1991) nicely discuss how aid might be used as punishment, respectively reward, but also as inducement (see in a similar vein Alker 1964). These two viewpoints are clearly visible in two recent publications, with Carter & Stone (2015) emphasizing punishments and rewards, while Woo & Chung (2018) stress the importance of inducements.

Despite considerable progress in the literature we argue that the full consequences of these various mechanisms linking UNGA voting and development aid have not yet been fully acknowledged in empirical work. More specifically, we suggest that the strategic logic inherent in all purported mechanisms needs to be fully taken into account, while acknowledging that the various mechanisms induce complications that simple models (often specified in reduced forms) have a difficult time to capture, and thus are likely to lead us astray.

To address these issues we propose a statistical strategic model that relies on one mechanism linking voting and development aid proposed by Carter & Stone (2015), but allows for correlations in the errors terms which are likely to be induced by other mechanisms. Replicating Carter & Stone’s (2015) analysis we find that allowing for such correlated errors changes considerably the insights from the empirical analysis.

In the next section we briefly review the literature on UNGA voting and development aid (leaving aside other influences of the later, like voting in the UNSC, etc.). In section three we present our model while drawing on Carter & Stone’s (2015) simple statistical backward induction estimation and extending first Leemann’s (2014) approach to dealing with correlated errors in a statistical strategic model. We demonstrate that this approach

¹Woo & Chung (2018, 1002) report on another bill discussed in Congress in 2011 aiming at reserving aid to recipients supporting the US in UNGA votes.

can only reflect equilibrium behavior if the strategic interaction is, at the empirical level, a one-shot game. As this is clearly not the case in Carter & Stone's (2015) study (nor in the applications discussed by Leemann 2014) we propose, drawing on Chiou, Hug & Høyland (2017), an estimator that allows for correlated errors but at the same time also ensures equilibrium behavior. Section four presents our empirical results before we conclude in section five.

2 Literature

Voting in the United Nations General Assembly (UNGA) has been studied in various perspectives over time. Early work attempted to explore whether specific coalitions were detectable in the voting behavior of UNGA members (e.g., Ball 1951, Hovet 1960, Lijphart 1963, Alker 1964, Alker & Russett 1965, Voeten 2000) and under what conditions specific groups voted together (e.g., Meyers 1966, Hurwitz 1975, Foot 1979, Iida 1988, Johansson-Nogues 2004, Young & Rees 2005, Luif & Radeva 2007, Hoesli, van Kampen, Meijerink & Tennis 2010). Only at a later stage did authors explore whether there were links between voting in the UNGA and aid allocations. Probably the earliest work interested in these links assessed whether votes on the admission of Communist China to the UNGA in the 1960s were somehow related to aid received from the United States or the Soviet-Union (see Bernstein & Alpert 1971, Alpert & Bernstein 1974).² Rai (1980) similarly focused on aid allocation by these two super-powers and tried, by looking at correlations with voting decisions, to establish whether these states used aid as inducement, or as punishment and reward (for an even earlier contribution, see Rai 1972). Studying this link between aid allocation decisions and votes in the UNGA become even more topical with Ronald Reagan's proposal (and adopted by Congress, see Kegley & Hook 1991) in the 1980s to require the US State Department to report on an annual basis whether or not US policies were supported by aid recipients, especially in votes deemed important by the US (see Thacker 1999, Wang 1999). This led to a further flurry of studies on possible links between foreign aid by the US and UNGA voting (e.g., Kegley & Hook 1991).

While these early studies came to quite conflicting results, many subsequent studies on aid allocation decisions systematically controlled for whether a recipient voted often with the aid donor at the UNGA in their analyses (e.g., Alesina & Dollar 2000, Alesina & Weder 2002, Berthélemy & Tichit 2004, Berthélemy 2006, Fleck & Kilby 2006, Kuziemko & Werker 2006, Dreher, Thiele & Nunnenkamp 2008, Dreher, Sturm & Vreeland 2009*a*,

²It is useful to note that Alker (1964) in his study of the conflict dimensions in UNGA voting regressed factor scores, obtained from these votes, on US and Soviet aid and for some of these dimensions, e.g., the one related to the admission of Communist China to the UN, finds effects of US aid.

Kilby 2009, McKeown 2009, Werker, Ahmed & Cohen 2009, Dreher & Gassebner 2012, Milner & Tingley 2013, Dreher, Lang, Rosendorff & Vreeland 2019).³ From a control variable votes at the UNGA became, harking back to earlier work, a substantive variable in studies considering aid as the price to pay to buy votes.⁴

The most recent studies attempt to get a better handle of the exact mechanisms that lead to correlations between foreign aid and voting in the UNGA as observed by studies as early as those by Bernstein & Alpert (1971), Rai (1972, 1980), Alpert & Bernstein (1974), and Kegley & Hook (1991). Thus, Carter & Stone (2015), while relying on the punishment and reward mechanism as discussed by Rai (1980), argue that by the very nature of this mechanism, there is a sequence of action implied, which also needs to be addressed empirically. Thus, relying on Signorino's (1999) work on statistical strategic models (extending work on the quantal response equilibrium for simultaneous move games proposed by McKelvey & Palfrey 1995, 1996) and using Bas, Signorino & Walker's (2008) statistical backward induction approach, they propose to estimate a model with a recipient first deciding whether to vote with the US and then, as a function of this vote, the US deciding whether to reward or punish the recipient.⁵ Employing this estimator the authors offer several novel substantive insights. Thus, their results suggest that democracies are more critical towards the stances defended by the US, but due to the mechanisms of punishment and reward fall more often in line with the US when voting. For the recipients' side Carter & Stone (2015) find that poor countries are more likely to resist US pressure, while important trade relations decrease this willingness to vote against this important donor.⁶

As discussed above, already earlier studies considered that US aid could also be used as inducement to aid recipients to vote like the US (see for instance Rai 1972, 1980). In a recent study Woo & Chung (2018) propose a detailed empirical analysis of this alternative mechanism for how US foreign aid could be related to voting at the UNGA, while relying on an error correction model (for a detailed discussion of these models, see De Boef &

³Gartzke (1998) provided pioneering work on affinity measures in the UNGA, while a series of scholars proposed critiques and extensions (see Signorino & Ritter 1999, Häge 2011, Häge & Hug 2016, Bailey, Strezhnev & Voeten 2017).

⁴Other outcome variables were equally considered like participation in IMF programs, etc. while also considering votes in the UN Security Council (UNSC, see Dreher, Sturm & Vreeland 2009*b*). More specific and detailed studies are provided by Smith (2006), Dreher, Thiele & Nunnenkamp (2008), Potrafke (2009), Boockmann & Dreher (2011), Hillman & Potrafke (2011), Sturm & Dreher (2012) and Dreher & Jensen (2013), amongst others.

⁵As every year a UNGA member votes multiple times the authors restrict their analysis to votes considered to be important by the US State Department (see Thacker 1999, Wang 1999) and address the inflation of observations (and other issues) by boot-strapping the standard errors. Given the grouped nature of the UNGA votes considered, the way these boot-straps are implemented is far from innocuous.

⁶As Carter & Stone (2015) also convincingly argue, their findings make it questionable to use the voting record of UNGA members as pure preference measures as done by Gartzke (1998) and many other scholars discussed above. It is interesting to note that already early studies, for instance by Hovet (1960) alerted scholars that due to the non-binding nature of resolutions votes could easily be traded.

Keele 2008).⁷ More specifically, relying on the literature on lobbying in the US Congress, the authors suggest that countries having voted less with and/or having moved away from the position of the US should, during the post-cold war period, obtain more aid. During the cold war period, due to the competition among the two blocs, the authors hypothesize that no inducement through foreign aid should be perceptible. Woo & Chung's (2018) empirical results suggest that countries whose affinity index with the US, based on UNGA voting, decreases are likely to obtain more aid during the post-cold war period. Similarly, mostly countries with low affinity scores in the previous year are likely to see increases in the aid allocations by the US.

3 A model

As discussed above, from the very early literature on the link between aid allocations and voting in the UNGA, scholars concurred that aid donors and recipients find themselves a strategic interaction. Much of the empirical work, while acknowledging this character of the interaction, fails, however, to explicitly model this theoretically and in some sense relied on a reduced form of an often only implied model in structural form of the interaction. This, obviously renders the evaluation of the various mechanisms that might link aid allocation and UNGA voting quite tentative. Thus, overcoming these challenges requires on the one hand a clear specification of the theoretic model of the strategic interaction between donor and aid recipient and an empirical model that allows an appropriate test of the theoretically implied relationships. In what follows we present these two steps while taking Carter & Stone's (2015) approach as scaffold.

3.1 A game-theoretic model

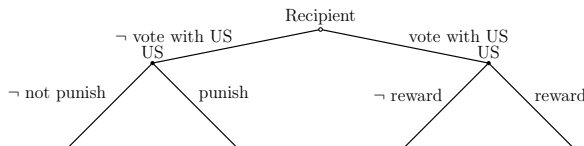
Carter & Stone (2015) approach relies on a simple game-theoretic model that focuses specifically and exclusively on a mechanism of reward and punishment in linking UNGA voting and aid disbursement (Figure 1). This innovative endeavour comes, however, also with some drawbacks. As Woo & Chung (2018, 1006, emphasis in the original) note “the main strategic game . . . restricts the United States' choices to punish or not to punish when an aid recipient country disagrees with the US, thus *a priori* excluding the possibility of the US rewarding aid proactively in order to ‘buy votes’ of a disagreeing country with foreign aid.”⁸ More specifically, by emphasizing and considering only one mechanism in

⁷It is useful to note that this empirical model is obviously a reduced form of the theoretical argument the authors propose, especially if it is acknowledged that punishment and reward may happen as well. Even considering, with the help of events in the Middle East, an instrumental variable approach is unlikely to address all the concerns one might have with this solution.

⁸This assumption underlying Carter & Stone's (2015) theoretic model conflicts also with the empirical data. While their replication data does not allow to assess whether in their dataset there are observations of votes

studying the link between UNGA voting and aid allocation their approach opens itself up to possible problems, which may have far-reaching consequences. More specifically, and considering their sequential game reproduced in Figure 1, Carter & Stone (2015) argue that the interdependence of the actions of the recipients (at the first node) and the US (the two second nodes) only comes about by the former anticipating the actions of the latter based on the covariates the authors employ in their empirical model. Consequently, controlling for the covariates the actions at all three decision nodes are assumed to be independent of each other. This assumption, namely that the error terms associated with the utility calculations at each decision node are independently (and identically) distributed, allows them to use statistical backward induction as championed by Bas, Signorino & Walker (2008).⁹

Figure 1: Reward and punishment game for UNGA voting



This assumption, however, is problematic in this context for two interrelated reasons. First, as numerous previous studies have shown, inducement and punishment and reward linked to UN voting are interdependent (Wittkopf 1973, Kegley & Hook 1991). If that is the case, and one assumes a sequential move game, errors committed by the two actors almost by definition become correlated.¹⁰ Second, even in the absence of another mechanism, as the empirical data reflects repeated interactions between the US and recipients, it is very unlikely that over time (and across recipients), after controlling for observable covariates, nothing else links voting and aid allocation decisions.

In our view, there are two ways out of this conundrum in the study of vote buying. One consists of assuming a simultaneous move game that involves the US and aid recipients choosing simultaneously their actions, but in a repeated fashion. This would acknowledge that the sequence of action leading to an interdependence of aid and UNGA voting is hard to pin down. The empirical approach proposed by Chiou & Yang (2008) and Chiou, Hug

against the interests of the US that are followed by increasing aid disbursements (i.e., rewards), in our recreated and extended dataset, such observations are (relatively) quite frequent (see appendix).

⁹Strictly speaking this assumption also underlies Signorino's (1999) approach to statistical strategic models of a sequential type as implemented in Kenkel & Signorino's (2014) *R*-package.

¹⁰Given the stickiness of both UNGA voting and aid allocations, simply lagging the independent variables, as is done by Carter & Stone (2015), is unlikely to address this issue in a clean way. In addition, and not at all addressed in the present paper, one might expect, after controlling for covariates that there is still heterogeneity in the actions in the various dyads formed by the US and recipient countries (for a proposal to address this, see Lu 2019, Lu & König 2019).

& Høyland (2017), drawing on precursor work by Camerer, Nunnari & Palfrey (2011), and Goeree, Holt & Palfrey (2016) allows for estimating such a model (for a related application, see Chiou, Hug & Høyland 2018). Another, which we pursue here, is to consider, as Carter & Stone (2015) do, a sequential move game but allowing for correlated errors. Allowing for such correlated errors acknowledges that some unobservables (or omitted covariates) might influence the actions at all three decisions nodes and that the presence of the inducement mechanism is likely to result in such correlated errors. As the literature on statistical strategic models shows, however, allowing for correlated errors in sequential move games is not innocuous (for a detailed and systematic discussion, see Leemann 2014). A first proposal appears in Signorino (2002), whose implementation, in Leemann's (2014, 381) words, is "fairly complex."¹¹

Leemann (2014) proposes also a statistical strategic model for sequential move games with correlated errors, which assumes, however, that actors taking actions at earlier decision nodes are unaware of these correlated errors. More specifically, the estimator models, for example for the game depicted in Figure 1, the action probabilities for the decision nodes of the US as coming from a multivariate normal distribution the correlation coefficients of which are also estimated. For the recipient's action probability, however, which are influenced by the anticipated actions of the US, the probabilities associated with these latter actions are determined only on the basis of univariate normal distributions by considering the utility differences between each of the two outcomes, and thus ignoring the empirically determined correlations.

In a strict sense, and especially provided that the statistical strategic model is applied to repeated interactions (as is almost always the case) the induced action probabilities are only in equilibrium if the correlation of the error terms are zero. If they are different from zero, informing player 1, in this case the recipient, that its actions are correlated beyond what is due to possible common covariates and the modeled strategic interdependence will lead the aid recipient to want to adjust its behavior. So while Leemann's (2014) estimator allows for correlated errors and thus addresses also issues of possible selection bias (see the discussion of this point in Wucherpfennig 2013, Cederman, Hug & Wucherpfennig 2018 (under contract, forthcoming)), it fails to induce equilibrium behavior especially in cases where the strategic interactions are repeated.

Consequently, while Signorino's (2002) estimator attempts to ensure equilibrium behavior by relying on a grid search in the parameter space, its optimal performance is hardly

¹¹Signorino's (2002) estimator relies on a computationally intensive grid search in the parameter space, which, according to Leemann (2014), might explain that it is barely used in applications. To foreshadow our discussion below, Leemann's (2014) solution, which in our view suffers from other shortcomings, has also not really caught on in applications (we are only aware of the application proposed by Wucherpfennig 2013).

assured. We propose another approach to ensuring equilibrium behavior in sequential move games with correlated errors by addressing the problem of best responses head-on by drawing on precursor work by Chiou & Yang (2008), Camerer, Nunnari & Palfrey (2011), Goeree, Holt & Palfrey (2016) and Chiou, Hug & Høyland (2017), who developed estimators for simultaneous move games. The basic idea of these estimators is to maximize a likelihood function which comprises the estimation of coefficients for covariates affecting the utilities of particular outcomes but then, in an additional step, to ensure in a system of non-linear equations, that the induced action probabilities are in equilibrium (for a related approach relying on a spatial regression model for a public goods game, see Steinwand 2011). While Chiou, Hug & Høyland (2017) extend and assess their estimator for a larger set of actors than the typical two-actor game (see also Chiou & Yang 2008), we propose here to adopt the same setup of relying on a system of non-linear equations to ensure equilibrium behavior embedded in a likelihood function for data produced in a sequential interaction. This allows us to estimate the effect of covariates on the utilities of the various outcomes of a sequential game while at the same time ensuring that the induced probabilities of taking each action at all decision nodes are mutual best responses despite the correlated errors. Thus, we use a similar specification as Leemann (2014), assume, however, that all three action probabilities follow a multivariate normal distribution and ensure in each iteration of the likelihood calculation that the action probabilities are mutual best responses.

3.2 The statistical model

The statistical strategic model that we propose relies on the same game-theoretic model proposed by Carter & Stone (2015). As Figure 1 shows, we are mostly interested in three probabilities namely $p_{US}(punish|\neg vote\ with\ US)$, $p_{US}(reward|vote\ with\ US)$ and $p_{recipient}(vote\ with\ US)$. These first two probabilities are specified in the following way:

$$\begin{aligned} p_{US}(punish|\neg vote\ with\ US) &= p(U_{US}(punish) - U_{US}(\neg punish) > \epsilon_1) \\ p_{US}(reward|vote\ with\ US) &= p(U_{US}(reward) - U_{US}(\neg reward) > \epsilon_2) \end{aligned} \quad (1)$$

The recipient's action probabilities are specified in the following way:

$$\begin{aligned} p_{recipient}(vote\ with\ US) &= p(p_{US}(reward|vote\ with\ US) \times U_R(reward) \\ &\quad + (1 - p_{US}(reward|vote\ with\ US)) \times U_R(\neg reward) \\ &\quad - p_{US}(punish|vote\ with\ US) \times U_R(punish) \end{aligned}$$

$$+(1 - p_{US}(\text{punish}|\text{vote with } US)) \times U_R(-\text{punish}) > \epsilon_3) \quad (2)$$

As Carter & Stone's (2015) specification models the utility differences in each outcome pair with the same set of covariates it follows that:¹²

$$\begin{aligned} p_{US}(\text{punish}|\neg\text{vote with } US) &= f(X\beta_{US_1}) \\ p_{US}(\text{reward}|\text{vote with } US) &= f(X\beta_{US_2}) \\ p_{\text{recipient}}(\text{vote with } US) &= f(p_{US}(\text{punish}|\neg\text{vote with } US) \times X\beta_{\text{recipient}_1}, \\ &\quad p_{US}(\text{reward}|\text{vote with } US) \times X\beta_{US_1}) \end{aligned} \quad (3)$$

This setup, corresponding to Bas, Signorino & Walker's (2008) statistical backward induction relies on the fact that the error terms associated with the probabilities specified in equations 1 and 2 are uncorrelated. As Signorino (2002) and Leemann (2014) discuss, this is unlikely to hold. Leemann's (2014) FIML estimation assumes that the error terms are correlated, but that the recipient at the first decision node determines his action probabilities, assuming that the error terms for the probabilities specified in equation 3 each follow univariate standard normal distributions. As discussed above, especially in repeated interactions, this fails to guarantee equilibrium behavior. Our model specifies, given the three probabilities that determine the outcome of the game, a trivariate normal distribution, as follows

$$\begin{bmatrix} p_{\text{recipient}}(\text{vote with } US) \\ p_{US}(\text{punish}|\neg\text{vote with } US) \\ p_{US}(\text{reward}|\text{vote with } US) \end{bmatrix} = N \left(\begin{matrix} f(p_{US}(\text{punish}|\neg\text{vote with } US) \times X \\ \beta_{\text{recipient}_1}, p_{US}(\text{reward}|\text{vote with } US) \times X\beta_{US_1}, \\ f(X\beta_{US_1}) \\ f(X\beta_{US_2}) \end{matrix}, \rho \right) \quad (4)$$

with

$$\rho = \begin{bmatrix} 1 & \rho_{1,2} & \rho_{1,3} \\ \rho_{1,2} & 1 & \rho_{2,3} \\ \rho_{1,3} & \rho_{2,2} & 1 \end{bmatrix} \quad (5)$$

This setup specifies action probabilities and how they relate to covariates, which can be used to calculate the likelihood of each outcome. On the basis of this a likelihood function can be determined and by maximizing it, the coefficients can be estimated in a FIML framework.

¹²We omit the complication that Carter & Stone (2015) assign a constant to one of the utilities appearing in equation 1.

The main complication with this setup comes from the fact that in equation 4 some probabilities appear both on the right- and left-hand side of the equal sign. Drawing on Goeree, Holt & Palfrey’s (2016) suggestion (expanded on in Chiou & Yang 2008, Chiou, Hug & Høyland 2017) we embed a system of non-linear equations in our likelihood function ensuring that the three sets of probabilities are mutual best responses.¹³

4 Results

In what follows we explore our proposed solution by replicating Carter & Stone’s (2015) study. Thus, we use the exact same data (i.e. covering the period from 1988 to 2000 and relying on their operationalizations and empirical specifications). The goal is to assess whether allowing for correlated errors in the sequential move game depicted in Figure 1 leads us to change our substantive insights. This implies extending Leemann’s (2014) estimator to a game-tree with three decision nodes as depicted in Figure 1 (for similar implementations, see Wucherpfennig 2013, Cederman, Hug & Wucherpfennig 2018 (under contract, forthcoming)). As we consider Leemann’s (2014) approach relying on the assumption that the first mover can only anticipate the actions of the second mover based on the expected utilities of the latter (without taking into account the correlated nature of the errors) this is problematic we draw on elements of Chiou, Hug & Høyland’s (2017) estimator to propose a statistical strategic model with correlated errors that ensures equilibrium behavior.

To illustrate the importance of the model specification for inferences we first recall Carter & Stone’s (2015) estimation results in Table 1.¹⁴ We then report in Table 2 the results obtained based on our model.¹⁵

Comparing the results reported in these two tables suggests one important first conclu-

¹³In practical terms we employ Baumann & Klymak’s (2019) “Fixed Points” *R*-package to ensure that the action probabilities specified in equation 4 are fixed points of the best response correspondences.

¹⁴It is important to note here that the standard errors reported in the two tables, while both boot-strapped, differ. While Carter & Stone (2015) employ a simple boot-strap procedure that relies on clustering by year of observation, we use a different strategy for the following reasons. As Bas, Signorino & Walker (2008) nicely discuss, using their estimation procedure yields incorrect standard errors as the estimation of the earlier movers choices rely on estimates of the choices of latter movers. These latter estimates, necessarily, come with uncertainty. One way to deal with this is to explicitly factor this uncertainty into the estimation, while another (short-cut) solution is to employ boot-strapped standard errors. Applied to a dataset like the one used by Carter & Stone (2015) raises a series of additional complications. As the dataset is a time-series cross-section it is likely that observations display some sort of spatial and/or temporal interdependence. In addition, however, as each every important vote at the UNGA generates as many observations as there are recipients, the number of observations is artificially inflated (as all independent variables do not vary across important votes of a particular year). As Carter & Stone (2015) use in their boot-strapping clusters by year, none of these additional sources for biased standard errors is accounted for. As we believe that the inflation of observations (by a factor of more than ten) is the most serious issue we boot strap our standard errors over important votes by year. Thus for each boot strap we randomly select for each year one vote and estimate our model and then based on the variation in our estimates calculate the standard errors of our coefficients.

¹⁵In the appendix we report the results from a series of other models, among them a FIML estimation of Carter & Stone’s (2015) model using Kenkel & Signorino’s (2014) *R*-package and an adaptation of Leemann’s (2014) approach.

Table 1: Carter and Stone’s (2015, 16) results

	$U_R(Punish)$	$U_R(\neg Reward)$	$U_R(Reward)$	$U_{US}(Punish)$	$U_{US}(Reward)$
(Intercept)	62.63 (8.42)	-5.79 (0.69)		-1.91 (0.40)	-2.85 (0.21)
polity_b	-3.50 (0.35)		-0.63 (0.50)	0.05 (0.01)	0.10 (0.02)
allies	0.04 (3.69)		-9.91 (1.51)	-0.10 (0.13)	-0.07 (0.35)
rgdp	8.31 (1.12)		-0.34 (0.14)	-0.09 (0.16)	0.02 (0.03)
trade	3.05 (1.13)		1.73 (0.55)	-0.05 (0.02)	-0.08 (0.06)
execL	1.08 (3.88)		2.65 (2.47)	-0.07 (0.11)	-0.54 (0.21)
execR	38.46 (5.88)		10.40 (4.19)	-0.71 (0.15)	-0.43 (0.29)
novote1	-1.50 (0.46)		-0.56 (0.51)	-0.08 (0.03)	0.02 (0.01)
Log-likelihood	(Not reported)				
N	14337				

Note: Boot-strapped (clustered by year) standard errors in parentheses

sion. The estimates obtained from our estimator are attached with much more uncertainty than those reported by Carter & Stone (2015). In our view this has mostly to do with the fact that we explicitly address the grouped nature of the independent variables (and thus the inflation of observations). Thus, as this is in part used as bench-mark by Carter & Stone (2015) almost none of the coefficients estimated in our model are statistically significant. Regarding the main insights from Carter & Stone’s (2015) study as discussed above, almost none remain.¹⁶

Thus, while Carter & Stone (2015) suggest that democracies are overall more critical with regard to the stances of the US, but change their votes under the effect of punishment and reward, we fail to find such effects. Contrary to the original results we find that non-democracies are much more sensitive to the punishment and rewards handed out by the US.¹⁷ Similarly with respect to the insight that poor countries and those with important trade relations with the United States are more likely to vote against their donor we find quite different results. Especially for the trade variables we find for both of the recipients’ utilities opposite signs, suggesting that the relationship is inversed. With regard to the

¹⁶It bears noting that we do not yet provide information on the substantive effects of particular variables on the choice probabilities of the two actors. Given the large uncertainty attached to our estimates, our tentative conclusions that follow will, however, hardly be affected.

¹⁷Both coefficients for the Polity-indicator on the two utilities for the recipient are positive, and the one for the utility of punishment is even statistically significant.

Table 2: Full Information Maximum Likelihood with correlated errors new estimator (bootstrapped errors (50))

	$U_R(Punish)$	$U_R(\neg Reward)$	$U_R(Reward)$	$U_{US}(Punish)$	$U_{US}(Reward)$
(Intercept)	-1.419 (0.552)	-1.533 (0.211)		-23.327 (38.371)	0.421 (3.027)
polity_b	0.025 (0.011)		0.031 (0.019)	2.926 (5.503)	1.627 (3.148)
allies	0.049 (0.113)		0.023 (0.163)	-19.551 (28.825)	-9.462 (16.245)
rgdp	-0.016 (0.020)		-0.005 (0.024)	-7.106 (11.307)	-1.767 (4.558)
trad	-0.007 (0.045)		-0.014 (0.067)	6.946 (17.397)	-1.450 (7.867)
execL	-0.017 (0.110)		-0.056 (0.145)	4.455 (21.727)	2.414 (15.472)
execR	-0.134 (0.133)		-0.121 (0.173)	-4.312 (33.120)	1.217 (17.337)
novote1	-0.018 (0.060)		0.028 (0.026)	7.296 (8.133)	0.848 (3.602)
$\rho_{1,3}$			0.008 (0.451)		
$\rho_{2,3}$			0.085 (0.413)		
$\rho_{2,3}$			0.034 (0.529)		
Log-likelihood			- 845.7997		
N			3822		

Note: Boot-strapped (clustered by year-vote) standard errors in parentheses

coefficients for the GDP our results are more mixed.

Substantively interesting are also the coefficients obtained for the utilities of the United States, even though their are subject to considerable uncertainty. Thus it appears that the US is more likely to punish and reward democracies, recipients that are not allies and are poor as well as with leftist governments (compared to centrist ones). Governments on the right are less frequently punished and more often rewarded than centrist governments. Finally important trading partners of the US are more likely to be punished but less likely to be rewarded by additional aid.

5 Conclusion

The link between voting at the UNGA by aid recipients and aid allocations by the US has preoccupied in one way or another the scholarly literature for quite some time. Implicit in much of this work is that the US might be engaged, with aid allocations, in some sort of vote buying. As any scholar sufficiently versed in films on narco-dealers knows, a sale may proceed in two different ways. Either the money is handed over in advance and one hopes for good merchandise or one insists on inspecting the merchandise before handing over the money(provided no fatal interaction occurs before).

The same two sequence of actions have also been proposed as mechanisms that are behind vote buying, namely aid delivery as inducement for vote alignments with the US, or aid as punishment and reward for votes at the UNGA. In the abundant literature on US bilateral aid one finds empirical evidence for both mechanisms, most recently in the studies by Carter & Stone (2015) and Woo & Chung (2018). The empirical approaches used in these two studies are, however, only likely to allow for unbiased inferences if only one of the two mechanisms is empirically relevant (while the other can be ignored). We believe that this is hardly the case.

Based on this we suggest that in the empirical approach by Carter & Stone (2015) the omission of the inducement mechanism is likely to lead correlated errors in the equations determining the choices of the actors, for which there are, as we discussed, also other reasons. Thus we propose a statistical strategic model that allows for correlated errors, while relying on the same sequential game as the one proposed by Carter & Stone (2015). Evaluating this model suggests that ignoring the possibility of correlated errors affects our substantive inferences. Thus, contrary to Carter & Stone (2015) we find only few statistically significant effects for the chosen covariates on the utilities modeled in the strategic game. In addition, setting aside for the moment the considerable uncertainty in our estimates, even some of the substantive conclusion are affected. Most notably, we find, contrary to Carter

& Stone (2015) that non-democracies are the recipients most sensitive to the punishment and reward strategy of the United States.

Needless to say, our findings are not the final word in the vote-buying literature. We hope, however, that our still quite tentative argument and suggestions will alert scholars in this literature to important conundrums. Regarding our proposed estimator, we still need to evaluate its statistical properties (as we have done for a similar estimator for simultaneous move games Chiou, Hug & Høyland 2017) and determine the conditions under which it is preferable. With respect to the theoretical approach it is also worth considering either a simultaneous move game or a more evolved sequential move game which considers both an inducement, as well as a punishment and reward mechanism. Once all these things have been addressed we might be ready for a final look at vote buying in the UN General Assembly.

Appendix

In a first step we replicate Carter & Stone’s (2015) estimations by relying on Kenkel & Signorino’s (2014) *R*-package to carry out a full information maximum likelihood (FIML) estimation instead of relying on Bas, Signorino & Walker’s (2008) statistical backward induction.¹⁸ Table 3 reports the results based on a logit specification as is implicit in Carter & Stone’s (2015) analysis.

Table 3: Replication with games-package and logit specification and boot-strapped errors

	$U_R(Punish)$	$U_R(\neg Reward)$	$U_R(Reward)$	$U_{US}(Punish)$	$U_{US}(Reward)$
(Intercept)	192.64 (25.17)	-371.70 (16.85)		-1.85 (0.27)	-2.27 (0.17)
polity_b	7.39 (5.06)		3.41 (2.92)	0.03 (0.01)	0.04 (0.01)
allies	-38.37 (17.16)		3.00 (14.88)	0.04 (0.09)	-0.05 (0.09)
rgdp	8.06 (3.04)		-7.13 (0.72)	-0.01 (0.02)	0.03 (0.01)
trad	-16.77 (6.50)		12.27 (3.40)	-0.04 (0.04)	-0.13 (0.03)
execL	-40.55 (19.03)		-2.79 (3.81)	-0.15 (0.06)	-0.26 (0.10)
execR	-90.52 (76.11)		-6.64 (33.98)	-0.27 (0.24)	-0.47 (0.33)
novote1	35.10 (40.19)		-12.72 (7.79)	-0.04 (0.02)	0.05 (0.02)
Log-likelihood			-6918.48		
<i>N</i>			14337		

As for the specification with correlated errors we need to rely on a probit specification (see Leemann 2014) we replicated the analysis reported in Table 3 based on a probit link. Table 4 reports the results.

¹⁸As the FIML estimation failed to produce a positive-definite Hessian we had to resort to boot-strapping to obtain standard errors. We suspect that this issue comes about by the fact that at each decision node the exact same set of covariates is used to model the differences in the utilities associated with the two actions. This implies that the model is only identified through the functional form implied by the model, which is quite constraining. Needless to say that replicating the analysis based on Carter & Stone’s (2015) replication we find the exact same results.

Table 4: Replication with games-package and probit specification and boot-strapped errors

	$U_R(Punish)$	$U_R(\neg Reward)$	$U_R(Reward)$	$U_{US}(Punish)$	$U_{US}(Reward)$
(Intercept)	192.638 (24.805)	-371.696 (21.464)		-1.854 (0.142)	-2.266 (0.065)
polity_b	7.393 (2.032)		3.414 (0.814)	0.033 (0.006)	0.044 (0.008)
allies	-38.373 (26.301)		2.998 (6.510)	0.036 (0.070)	-0.048 (0.108)
rgdp	8.062 (1.777)		-7.127 (0.905)	-0.011 (0.011)	0.033 (0.009)
trad	-16.773 (4.885)		12.272 (4.213)	-0.036 (0.035)	-0.128 (0.035)
execL	-40.551 (11.964)		-2.791 (6.253)	-0.151 (0.034)	-0.256 (0.043)
execR	-90.516 (27.359)		-6.643 (13.698)	-0.267 (0.091)	-0.468 (0.107)
novote1	35.103 (6.925)		-12.723 (2.575)	-0.042 (0.011)	0.052 (0.010)
Log-likelihood			-6918.478		
N			14337		

Data

As we also intend on extending the time period covered in our empirical work, we recreated and extended Carter & Stone's (2015) dataset. For the UNGA-voting data we relied on Bailey, Strezhnev & Voeten's (2017) dataset and extracted all votes on important topics as defined by the United States Department of State. We used as source for some economic indicators (GDP) Graham & Tucker's (2019) data (see also Graham & Bougher 2018). From the same source we also extracted the revised polity score (Marshall, Gurr, Davenport & Jagers 2002) and Cheibub, Gandhi & Vreeland's (2010) democracy variable, as well as the ideological leaning of the government as coded by the World Banks Political Institutions Database (Cruz, Keefer & Scartascini 2016). Updated versions of Leeds, Ritter, Mitchell & Long's (2002) data was used to assess with which recipients the United States was allied. For the bilateral trade with the United States we relied on Barbieri, Keshk & Pollins's (2009) updated trade dataset.

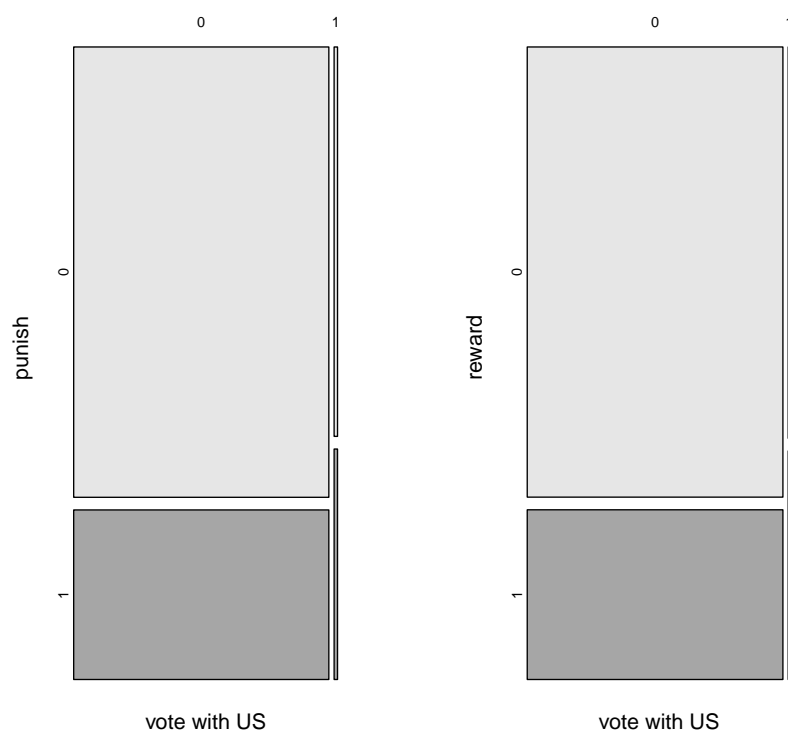
Following the indications in Carter & Stone's (2015) article and the supplementary material we recreated the new dataset, covering the time period 1984-2014 (thus covering almost twice as many years), and generated the same punishment and reward variables. The results of the underlying regression model are reported in table 5.

Table 5: Explaining US aid allocations (1964-2014)

	<i>Dependent variable:</i>
	Aid disbursements
commitment_amount_usd_constant_sum	0.00000*** (0.000)
Aid disbursements t-1	0.338*** (0.012)
<i>Aid recipient country fixed effects omitted</i>	
Observations	3,465
R ²	0.811
Adjusted R ²	0.803
Residual Std. Error	183.332 (df = 3317)
F Statistic	96.848*** (df = 147; 3317)
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01

The results reported in table 5 were used to calculate predictions, and those country-years in which the predictions were outside of the 95 % confidence intervals were coded as punishment, respectively rewards by the US. When considering the relationship with the UNGA-voting the relationships depicted in Figure 2 emerges. This shows that, as Woo & Chung (2018) suspect, rewards (respectively punishments) also occur when recipients vote against (respectively with) the US.¹⁹

Figure 2: Reward and punishment for UNGA voting (1984-2014)



¹⁹This also occurs during the time-period covered by Carter & Stone (2015) in our dataset. As these authors only provide the dataset used for the final empirical estimations, these cases have been eliminated.

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