Probabilistic Causality, Selection Bias, and the Logic of the Democratic Peace

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Rosato (2003) claims to have discredited democratic peace theories. However, the methodological approach adopted by the study cannot reliably generate the conclusions espoused by the author. Rosato seems to misunderstand the probabilistic nature of most arguments about democratic peace and ignores issues that an appropriate research design should account for. Further, the study's use of case studies and data sets without attention to selection-bias produces examples that actually support theories it seeks to undermine. These problems place in doubt the article's findings.

Rosato (2003) purports to demonstrate that the enormous literature on the democratic peace rests on dubious microfoundations. Reduced to its most basic, the claim is that none of the causal mechanisms advanced by the proponents of numerous different theories of the liberal peace hold up to empirical scrutiny. This is certainly an important finding if true. Unfortunately, the method employed in reaching these conclusions makes it impossible for us to know whether the author is right.

Despite the title of the article, the author does not engage the logic of the theories. Rather, he seeks to evaluate the empirical plausibility of the mechanisms they specify. We identify several problems with this methodology, each of which places in doubt the validity of the author's claims. Indeed, the study serves to catalogue research design flaws that are not uncommon in international relations research.

First, Rosato (2003) ignores fundamental issues of hypothesis testing and inference from historical data. We detail two possible interpretations of theoretical statements and show that the author's methodology does not allow him to draw the conclusions he does from either one. Second, the author ignores selection bias problems affecting observed behavior. This leads him to advance cases that actually support democratic peace theories instead of contradicting them.

We do not catalog all such errors, due to space constraints. Instead, we use the signaling theory (what Rosato refers to as "the information mechanism," 587) to illustrate most of our concerns.

THE LOGIC OF INFERENCE: CAUSALITY AND EMPIRICAL TESTING

The most important errors in Rosato's article stem from inappropriate methodological choices and research design. The basic setup of the study is a reduction of democratic peace theories to logical statements of implication of the form $D \rightarrow S \rightarrow P$, where D stands for "state is democratic," S is a consequence implied by democracy (e.g., "state externalizes norms" or "state can signal better"), and P is the consequence of S (e.g., "states signaling or externalizing norms tend to resolve crises peacefully").[1]

Rosato (2003) seems to treat these statements as sufficient conditions. That is, $D \rightarrow S$ means that democracy is all that is needed to achieve better signaling. The idea is to demonstrate that $\neg[D \rightarrow S]$, or that democracy does not imply the causal mechanism proposed by the theory. For example, Rosato (589) asserts that there are "several examples of liberal states violating liberal norms in their conduct of foreign policy and therefore the claim that liberal states generally externalize their internal norms of conflict resolution is open to question." In sentential logic, the argument boils down to $\neg[D \rightarrow S] = [D \wedge \neg S]$. Rosato reasons that if he demonstrates that $[D \wedge \neg S]$ is true, then he can reject the claim that $[D \rightarrow S]$, which in turn negates the link between D and P. In other words, if he finds cases where a democracy (D) failed to externalize norms ($\neg S$), then he can infer that the causal connection postulated by the particular theory is empirically invalid and that the theory is thereby discredited.[2]

The problem with this reasoning is that democratic peace theories, as social scientific claims, do not typically offer hypotheses in the form of sufficient conditions. Instead, these theories make probabilistic claims for two reasons we explain in the following sections. We argue that Rosato's (2003) critique does not succeed irrespective of the source of the resulting empirical nondeterminism.

EVALUATING THEORIES

Theoretical models express claims about *tendencies* that are contributions of one or several causal factors

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We thank Hein Goemans, and Robert Northcott for useful discussions.

[1] $D \rightarrow P$ means "D implies P" (i.e., D is a sufficient condition for P and P is a necessary condition for D; $\neg D$ means "not D"; and $D \wedge S$ means "D and S."

[2] Rosato (2003) does not appear to challenge the $S \rightarrow P$ component, at least in the cases we examine.

that would prevail and produce the anticipated effect *all other things being equal* (Hausman 1992, Mill 1967 [1836]). Take, for example, the signaling theory in Schultz (1998). The formal model demonstrates that public endorsement by the opposition tends to contribute positively (and, conversely, the absence of endorsement contributes negatively) to the credibility of the government's threat. The theory does *not* claim that (1) the opposition's actions will always (or even most of the time) lead to credible threats, or that (2) when a government's threats are credible, that this can be credited to the opposition. Liberal governments will make credible threats in the face of domestic dissent, even as they are bound to bluff occasionally, even when benefiting from domestic political consensus.

Because any theoretical model requires assumptions to produce its deductions, a careful theorist will be especially cautious in making predictions in cases where these assumptions may not hold; a judgment that is further complicated by the fact that we do not possess complete models and hence do not know the full set of assumptions that might be operating. The model expresses a tendency that should prevail in certain circumstances, but this tendency can also be overwhelmed by other, countervailing, ones. Anyone who seeks to assess a theory must make a reasoned judgment about where the theory applies. This requires that we identify a sample where the theory's assumptions are approximately satisfied. This would let the theory express a tendency claim about the real world rather than the neat stylized one of the model. Were one then to demonstrate that hypotheses from the theory do not obtain, one would have a serious challenge to the theory.

Rosato does not do this. Instead, he seeks to undermine democratic peace theory by selecting examples where the assumptions of theories are not satisfied, or where other factors held sway. For example, Rosato (2003, 589) challenges signaling theory in the following manner:

> The available evidence suggests that democracies cannot clearly reveal their levels of resolve in a crisis. There are two reasons for this. First, democratic processes and institutions often reveal so much information that it is difficult for opposing states to interpret it.[3] Second, open domestic political competition does not ensure that states will reveal their private information.

The first sentence is demonstrably false. At least on occasion, democracies do appear to have been able to signal through open political contestation (see Schultz 1998). In addition, the two reasons Rosato gives for the alleged failure of democracies to signal are simply illustrations of countervailing tendencies. As such, Rosato's (2003) critique amounts to the rather unambitious point that the theory applies in some cases more clearly than in others.

PROBABILISTIC THEORIES

In drawing his conclusions, Rosato seems to treat theories as deterministic, whereas they are almost invariably couched in probabilistic terms. Theories in social science usually say things like "the probability of war is lower when informative signals can be sent" (Schultz 2001, 7), or "in any equilibrium of any game with the above format, the probability of war is an increasing function of the expected benefits from war of the informed player" (Banks 1990, 600).

Why couch theories in probabilistic terms? The probabilities in models can come from two sources. One of them is internal to models in the sense that a model may itself specify a probability distribution over outcomes arising from strategic factors. For example, it may be optimal to play a mixed strategy and bluff on occasion. Although we can specify the probability of bluffing, we cannot predict with certainty whether a player would bluff or not in any given realization of the game even if we hold everything else constant.

Another source of indeterminacy is external. Suppose the model itself makes a deterministic prediction. We still should not expect this prediction to hold once we "export" it to the empirical world. We simply cannot be sure how other factors, unforeseen by the theory, will play themselves out in individual cases. Because we do not have the complete specification of all contributing variables to social processes, we generally treat these unknowns as "noise." In testing, we seek to control for major disturbing factors (through case selection, multivariate statistical analysis, or experiment) and hope that the predicted tendency is robust enough to reveal itself regardless of other confounding influences.

Rosato (2003, 599) states that "the purported informational properties of democratic institutions are unlikely to improve the prospects for peace." The probabilistic claim that democracies do not lead to more credible signaling, and hence peace, is an assertion about statistical tendencies, not about behavior in individual cases, where outcomes can only occur or not occur. Though Rosato provides no carefully reasoned explication of the claim, let us assume that he is correct and that democracies do not strongly correlate with credible revelation of information. Suppose we found that out of five hundred interstate crises involving at least one democracy, only in 10% of the cases were democracies able to signal credibly, and in the remaining 90%, the tendency was supplanted by other causes. Is this democratic tendency then useless? The assertion that democracy does not explain anything would miss the point: after all, we may have a perfectly good explanation for 50 crises, and in the remaining cases, we may have a partial one. Focusing on the 90% of cases where the tendency was not decisive would mislead us to ignore the 10% where it was. Rejecting the theory on these grounds is unwarranted.

[3] The everyday use of the word "information" confuses the distinction between data (facts about defense spending, public statements, etc.) and private knowledge (e.g., one's reservation level). Rosato's (2003) claim appears to be that democracies make so much data available, that one would have difficulty inferring the privately known values from them. That is, he is saying that democracies do not reveal information, in the sense the concept is used in signaling games. We thank a reviewer for pointing this out.

Rosato's (2003) methodology, which fails for deterministic theories, is on even shakier ground for probabilistic claims. Under what conditions can we conclude that a tendency identified by a model is sufficiently causally relevant to explain outcomes in an appropriate sample of cases? Causality in these theories is not in the form of implications, but rather of probabilities. We say that D causes P if $\Pr(P \mid S \wedge T) > \Pr(P \mid \neg S \wedge T)$ for every test situation T.[4] An appropriate test situation is one in which all other independent causally relevant factors are held fixed (Cartwright 1979). This condition was proposed to avoid Simpson's Paradox, where depending on how a population is partitioned a cause may actually decrease the probability of its effect.[5] We can interpret this as a requirement that the sample used for testing be chosen so as to respect the model's applicability. A researcher collects a sample of cases in which the model more or less applies and then measures the probability of its prediction coming true. Rosato's research design does not follow this widely accepted methodology for testing probabilistic hypotheses.

Because Rosato (2003) does not fully engage some of the theories he criticizes, the critique sometimes uses cases that actually support the theory he wants to discredit. Take, for example, the 1967 crisis between Egypt and Israel preceding the Six Days War. Citing Finel and Lord (1999), Rosato states that "Nasser was 'overwhelmed by the "noise" of Israeli domestic politics' and 'had enough information to see whatever he wanted and confirm existing misperceptions about Israeli intentions.'" This is said to illustrate how democracies cannot signal credibly.

Let us look at the tendencies the signaling theory expresses: democracies tend to signal credibly, and democratic signaling tends to decrease the probability of war. The hypothesis is that we are disproportionately unlikely to see democracies engaged in wars in cases where they are successful in signaling. Therefore, crises where for some reason the signaling tendency is overwhelmed by other factors are more likely to end in war. The theory leads us to expect that crises that involve democracies and that end in war are precisely the ones where democracies failed to reveal information through signaling. Rosato's (2003) example refers to just such a crisis and thus lends support to the theory.

[4] $\Pr(P \mid S \wedge T)$ reads "probability of event P conditional on events S and T occurring jointly."

[5] Suppose that democracies signal more credibly but also tend to be weak militarily. If credible signaling is a cause of peace, but military weakness is an even greater cause of war (by inviting attack), then democracies may appear more likely to end up at war than nondemocracies. If S represents credible signaling and M represents military weakness, $\Pr(P \mid S) > \Pr(P \mid \neg S)$. However, if we condition on whether the military is weak, the inequality is reversed: $\Pr(P \mid S \wedge M) < \Pr(P \mid \neg S \wedge M)$ and $\Pr(P \mid S \wedge \neg M) > \Pr(P \mid \neg S \wedge \neg M)$. These reversals constitute Simpson's Paradox (Hitchcock 2002). The requirement that only independent causal factors are held fixed is also necessary. Suppose that some cause M of P is itself caused by S. If S causes P exclusively through M, then holding M fixed would screen off S from P, something we clearly want to avoid.

SELECTION BIAS

One must be careful in using cases presumably produced by the data-generating process that the models are trying to explain. Selection bias in conflict datasets has been a well-known problem for some time, and researchers are typically at pains to ensure that they account for its misleading effects. In particular, one must infer the consequences of a theory for observable behavior or else risk reaching incorrect conclusions.

Take, for example, the theory that democratic leaders are more readily punished if they lose a war, and hence that they are more reluctant to engage in wars, making democracies less likely to escalate crises to the highest level of violence. Rosato (2003, 594) uses Goemans (2000) data of the fates of leaders after war "to determine whether leaders' decisions for war are affected by their domestic accountability, that is, if there is something about the domestic structure of states that affects their chances of being punished."

According to the theory, leaders take into account the chances of being punished if they lose, and the fear of punishment affects their conflict decisions. Therefore, cases where war actually occurs already tend to contain leaders who have discounted the probability of punishment. Suppose that democratic leaders who lose a war are more likely to be punished than autocratic ones (we are not saying that this is true; we are just conducting a thought experiment). It follows that democratic leaders would tend to get involved only in wars they believe they can win; hence, democracies would tend to win the wars they fight (this is what we observe empirically). What happens in the few cases where democratic leaders lose? As Rosato (2003) himself finds, these leaders tend to get removed from office disproportionately.

Rosato (2003, 594) concludes that "this evidence is not strong. This is because there are only four cases of democratic losers in the entire dataset, making it impossible to draw any firm conclusions about the likelihood that losing democrats will be removed." But this conclusion is clearly wrong, for, according to the logic of the argument, the evidence is overwhelmingly in support of the self-selection hypothesis: few democracies lose, and in those cases that democracies do lose, leaders get removed at very high rates. We would conclude that (1) democratic leaders are, in fact, more likely to be removed if they lose, and therefore (2) they would only fight when the chances of losing are sufficiently small, and so (3) we should observe very few cases where democratic leaders lose wars. Similar arguments apply to costly wars: after all, few leaders would deliberately begin wars that they expect to be costly and long.

CONCLUSION

The method Rosato (2003) uses to discredit democratic peace theories is inappropriate in most social science contexts. Because Rosato's article is a manifestation of a widespread misconception in our discipline, we

believe it is worth drawing attention to the problems inherent in such approaches.

Despite the title of his article, Rosato does not engage the logic of the theories he wants to discredit. We are willing to believe that many explanations for the democratic peace offer internally inconsistent or *ad hoc* arguments. For many of these theories, it is an open question under what assumptions their claims hold. However, using historical examples to challenge logic is misleading; we know neither that the logic of the theory is correct nor that the implications of the theory are wrong. We suspect, for example, that any reasonably competent student of history can interpret a given case in various ways to support contradictory hypotheses.

Without a proper evaluation of the logic of competing theories, one might (charitably) assume equal deductive consistency for all. We would then hope to see a demonstration that some theories are less useful empirically than others. Instead, Rosato (2003) offers yet another theory: American preponderance, principally through NATO, is said to explain the democratic peace. But this theory needs a proper empirical evaluation missing from the article.[6]

We believe that progress in social science is best achieved through an interactive simultaneous advance on two fronts: the construction of internally consistent theories and the careful comparative empirical evaluation of competing models. If Rosato's (2003) critique of democratic peace theory fails to strike its target, it stands to do substantial damage by legitimizing a fundamentally incorrect method of evaluating social science theories. Although scholars with normative aversion to the democratic peace or the scientific method may conclude that their views have been vindicated, we hope to have demonstrated that such a conclusion cannot depend on Rosato's study.

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[6] Rosato's (2003) hypothesis is not supported by a large-N analysis: Adding joint NATO membership in a dyad as a dummy variable to standard statistical models of the democratic peace does not alter the effects of democracy, and is itself statistically insignificant (Gartzke 2004). The hypothesis is easily refuted even by Rosato's own approach to testing: The peace observation holds for non-NATO dyads (Austria-Switzerland) and fails for NATO partners (Greece-Turkey).