Research Proposal: Arms Races and the Guns-Butter Tradeoff

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The Puzzle

How do states limit the severity of arms races? The security dilemma – the means by which one state makes itself more secure makes others less secure – is given pride of place in international relations theory. From its basic premise, a vast literature has grown around the causes and consequences of arms races and how they can lead to war. The logic is quite intuitive and appealing: when states arm, even for defensive purposes, other states are threatened because those arms could be used offensively; this leads other states to arm and a spiral of repeated arming and insecurity follows, potentially leading to war. (e.g. Downs et al., 1985; Jervis, 1978; Powell, 1993)

Not only is this dynamic argued to be a cause of war, even if war is avoided the process of arming and re-arming is inefficient. All states are spending more than they were before the arms race, but they are no more secure relatively speaking. Indeed, if states in the arms race could agree to stop arming and instead reduce spending equally on all sides, then relative arms levels would remain unchanged and each state would spend less on its military. The inability of states to do so has puzzled scholars and produced lengthy debates over the general "costs of anarchy" (Fearon, 2018) – or simply how much states can cooperate over arms levels when there is no world government to enforce disputes.

Related Literature

Two primary mechanisms have long been hypothesized to contain and limit the severity of arms races: the offense-defense balance and the distinguishability of offensive and defensive intentions. The offense-defense balance refers to whether military technology favors offense or defense. Intentions are as they sound – states that can signal clearly defensive intentions are seen as less likely to incur reciprocal arming by potential competitors.

However, both mechanisms have come under strong criticisms. As Biddle (2001) and Glaser and Kaufmann (1998) have demonstrated, the offense-defense balance is an extremely unclear concept in practice, and most defensive weapons can be easily converted into useful offensive purposes. Moreover, intentions might be defensive at one moment, but they can easily change. (Copeland, 2000) Uncertainty about *future* intentions means that it may be rational to arm in return, even if intentions are defensive at the present. Strategic environments can shift, as can domestic political preferences.[1] Similarly, Braumoeller (2008) finds little evidence of arms spirals actually precipitating the outbreak of militarized disputes.

Looking at the data

This all then leads to a puzzling empirical finding. The logic of arms racing is fairly appealing, and there certainly are anecdotal cases of tensions around military capabilities which could be used for offensive purposes. But a quick look at cases where arms competition is *most likely* demonstrates that arms races vary substantially in severity. In figure 1 we see the cases that have driven much of the arms-race literature: European

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[1] There are definitely no examples of this in current events.

powers around WWI and the US and USSR during the Cold War. Each country's military spending maps tightly to others.

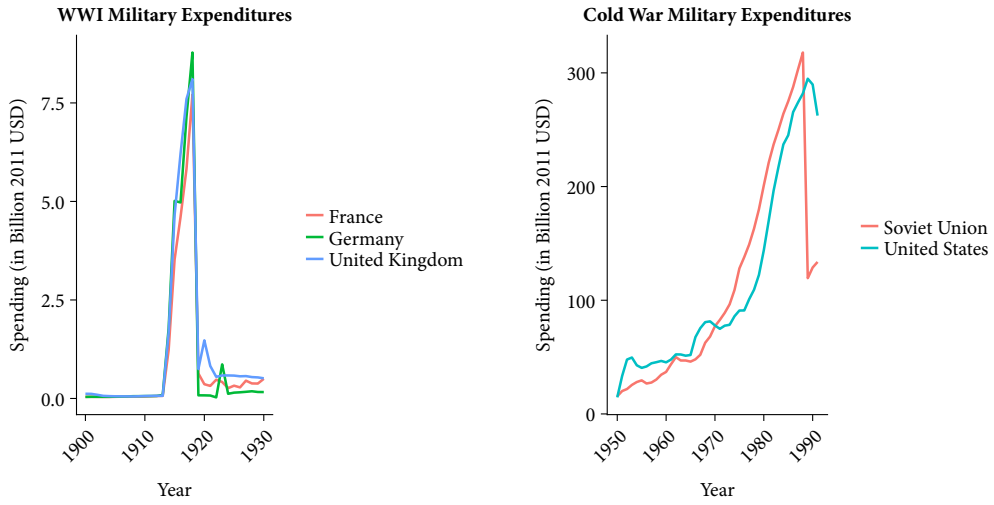

Figure 1: Arms Races

But when we look at military spending across two enduring rivalries (chosen at random) in figure 2 – where there is *good reason* to compete over military spending – we see that in both cases one state lags behind the other. Indeed, these are the cases where we should expect arms races, but the correlation between expenditures within each dyad is quite weak. When we look at the data in this way a clear culprit presents itself: one state cannot afford to keep up with the other. India's economic capacity is far greater than Pakistan's. Saudi Arabia can afford a larger military than Iran due to oil exports. Surprisingly, as obvious as it seems, I haven't seen this point made – that in most scenarios states actually have unintentionally mitigated the security dilemma because one state cannot keep up financially. I suspect this is due to the qualitative nature of the literature – nobody has compiled the data and given it a broad look.

The frontier of this research comes from Fearon (2018), who argues that cooperation and conflict over military spending can be best understood by the "war constraint" – states can cooperate over military spending, but only to a certain level at which there are incentives to 'break out' and arm rapidly for military advantage. The article is intriguing and presents a parsimonious synthesis of various arguments, but it – alongside the broader literature – falls short in two key ways which an agent-based modeling approach is well-suited for. First, as just discussed, Fearon does not take into account how many resources states have available to spend on their military. And this is not without consequence. Due to the guns-butter tradeoff, money spent on the military is not spent on domestic needs. Second, like most, it is a two-state model. Insofar as I know, there have been no studies of military spending in an n-player world – which is the kind of world we live in.

Model

At the moment I want to see how often arms races emerge in a simulated 'worst-case' world, where intentions and the offense/defense balance are left completely ambiguous. In this scenario, most models predict substantial military spending. But I want to program in a guns-butter trade-off, where military spending draws from an agent's finite pool of resources. And each agent will have only so many resources available to spend on the military at one point in time.

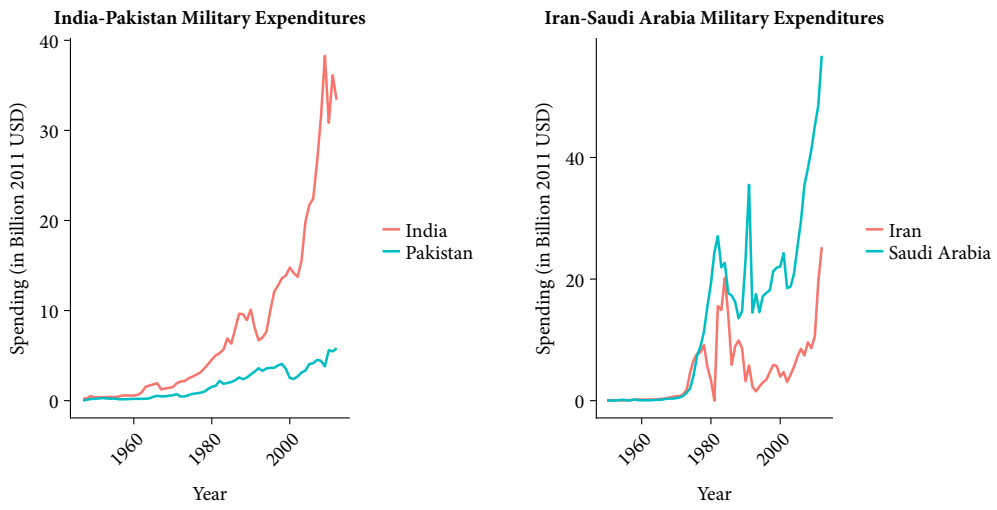

Figure 2: Rival Military Spending

In each round agents will assess their threat environment – how many agents can project force upon them and to what degree – and they will arm accordingly. But states will only arm based on their available resources, which will decrease as states arm. The nice thing about this model is that it produces the security dilemma naturally. Agents will arm in response to other agent arms, producing more arming in return. Yet, agents will only be able to arm if they can afford it.

There are still a few things that I need to sort out conceptually though. First, how does economic growth work? And states should experience some occasional economic downturns. Also, should I program in some sort of domestic demand for spending and let that vary? I'm tempted, at least for one model, to not, because I like the idea of building a worst-case world and seeing how sensitive it is to varying economic conditions. Also, am I missing something more broadly?

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