THE CAUSES AND CONSEQUENCES
OF ARMS RACES

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Key Words arms races, arms control, structural realism, spiral model,
bureaucratic politics

Abstract This chapter reviews the literature on causes of arms races, their con-
sequences, and when a state should build up arms and engage in an arms race if
necessary. The literature tends to equate external causes with threats; the chapter ar-
gues for a broader understanding that includes all causes of rational arming behavior.
Internal causes of arms races are then understood to be factors within the state that
lead it to adopt suboptimal policies. Although the causes and consequences of arms
races are usually dealt with separately, in fact they are closely connected. When a state
engages in an arms race because this is its best option, the state is acting rationally,
the causes of the arms race are external, and the arms race has no consequences of
its own. In contrast, when a state arms because domestic interests have distorted its
policy, the arms race produces negative consequences. Research on the consequences
of arms races has been hindered by the lack of a fully developed theory of when a state
should race; progress on defensive realism is helping to fill this gap.

INTRODUCTION

Arms races have generated a great deal of interest for a variety of reasons. They are
widely believed to have significant consequences for states’ security, but agreement
stops there. In the debate over their consequences, one side holds that arms races
increase the probability of war by undermining military stability and straining
political relations. The opposing view holds that engaging in an arms race is often
a state’s best option for avoiding war when faced with an aggressive adversary.
Debate over the causes of arms races is just as divided. One school believes that
arms races are primarily rational responses to external threats and opportunities,
whereas arms race skeptics believe that arms buildups are usually the product of a
mixture of internal, domestic interests, including those of the scientists involved
in research and development (R&D), the major producers of weapons systems,
and the military services that will operate them. The policy implications of these
contending views are equally contradictory; critics see arms control as a way to
reduce the probability of war and rein in domestic interests that are distorting the state’s security policy, and proponents argue that military competition is most likely to protect the state’s international interests and preserve peace.

Arms buildups and arms races also play a prominent role in international relations (IR) theory. Building up arms is one of a state’s three basic options for acquiring the military capabilities it requires to achieve its international goals; the other two are gaining allies and cooperating with its adversary to reduce threats. In broad terms, choosing between more competitive and more cooperative combinations of these options is among the most basic decisions a state must make, and it is often the most important.

The literature that focuses on arms races is large and diverse. Scholars working on various aspects of arms race questions have analyzed case studies, worked with large-n data sets, and developed many types of formal models. Beyond the literature that focuses specifically on arms races, more general work on IR theory—including structural realism, the security dilemma, defensive realism, and neoclassical realism—addresses the question of when a state should pursue cooperative policies and when it should pursue more competitive ones. This more general work contributes significantly to answering the question of when a state should engage in an arms race.

The following sections of this chapter review the literature on the causes of arms races, on the consequences of arms races, and on when a state should build up arms and race if necessary. ¹ The literature divides causes into internal and external causes, and it usually deals with the causes and consequences of arms races as separate topics. This chapter argues that in fact the causes and consequences are closely connected. When a state decides to engage in an arms race because this is its best available option for achieving its international goals, given the constraints imposed by the international system, the state is acting rationally, the causes of the arms race are external, and the race has no consequences of its own. In contrast, when a state builds up arms because domestic interests have distorted its policy, the state is acting suboptimally, the causes of the arms race are internal, and the race itself produces negative consequences. Assessing the consequences of arms races therefore requires a fully developed theory of when a state should build up arms and race if necessary, to which states’ actual arming behavior can be compared. The lack of such a theory has hindered research on the consequences of arms races; progress on defensive realism is helping to fill this gap.

¹Whether to build up arms is a decision that a state makes on its own, whereas an arms race results from the interactive decisions of two (or more) states. Therefore, although it is common to refer to a state deciding to engage in a race, it is more precise to say that a state decides whether to build up arms than to say that a state decides to engage in an arms race. The two are closely linked, however; the decision on whether to build up arms will usually require a state to evaluate whether doing so will increase the probability that its adversary will respond with a buildup of its own. States often expect that a buildup will provoke a reaction, and therefore the decision to build up arms is essentially a decision to engage in an arms race.
CAUSES OF ARMS RACES

Many authors have characterized the literature on causes of arms races in terms of external versus internal causes, or equivalent categories (Buzan 1987, Russett 1983, Evangelista 1988, Hammond 1993:59–66, Buzan & Herring 1998; Gleditsch 1990 provides a somewhat different division; also on why states race, see Gray 1971, 1974). Although these categories are useful, the literature has tended to interpret external causes too narrowly, equating “external” with reacting to threats and action-reaction phenomena. Internal causes of arms races are of interest primarily because they help to explain why states have chosen suboptimal policies—building up arms when cooperative policies such as arms control or unilateral restraint would have had better prospects of achieving their goals. It is most useful to envision external causes in contrast to internal ones and, therefore, more broadly to include all factors that would lead a rational state to engage in an arms race.2

External Causes: Models of Rational Behavior

The prevailing view in the arms race literature is that external causes explain arms races in which states are reacting to the threat posed by an adversary’s arms buildup. Buzan & Herring (1998:83), for example, argue, “The basic proposition of the action-reaction model is that states strengthen their armaments because of the threats the states perceive from other states. The theory implicit in the model explains the arms dynamic as driven primarily by factors external to the state.”3

This action-reaction process can lead to an endless arms race in which each reaction is met by still another reaction.

Action-reaction logic gained prominence in the 1960s as an explanation of the US–Soviet nuclear arms race. Secretary of Defense McNamara argued, “Whatever their intentions or our intentions, actions—or even realistically potential actions—on either side relating to the buildup of nuclear forces necessarily trigger reactions on the other side. It is precisely this action-reaction phenomena that fuels the arms race” (McNamara 1967; see also Freedman 1981). A fuller version of this argument (Rathjens 1969) stressed that uncertainty about Soviet capabilities tended to fuel overreactions, since the United States tended to plan its forces against “greater-than-expected threats,” and that the long lead-time required to develop new weapons systems resulted in further overreaction because the United States

2 In fact, it might be better simply to rename the categories, replacing “external causes” with “causes of rational arming behavior” and replacing “internal causes” with “causes of suboptimal arming behavior.” These new labels are more accurate, since some causes of rational arming behavior, such as states’ goals, are not external to the state. However, to maintain a close correspondence to the arms race literature, this essay continues to use the labels that are currently used in the literature.

3 However, unlike most of the literature, their chapter on the action-reaction model includes a discussion of factors that goes beyond pure security motives.
had to develop reactions well before Soviet actions actually occurred. As a result, although the basic logic of action-reaction is straightforward, identifying the phenomenon in practice could be more difficult, since the timing and magnitude of reactions might not directly match actions (Allison 1974). Rathjens (1969) argued that the United States overreacted to uncertainty at the time of the “missile gap” by deploying a massive intercontinental ballistic missile (ICBM) force, which fueled Soviet deployments of both ICBMs and defenses against ballistic missiles, which led to US deployment of multiple independently targeted reentry vehicles (MIRV missiles), which was likely to lead to Soviet deployment of mobile missiles.

Although action-reaction, threat-based explanations are certainly important, there is another potentially equally important source of rational arms race behavior. A state might build up arms and race because it wants to expand for reasons other than security, that is, because it is greedy, not because it is threatened. The arming behavior of these states might look as though each is reacting to the other, but the driving force behind this competition is not the security that lies at the core of the action-reaction explanation. The greedy state wants to acquire the military capability necessary to compel its adversary to make concessions or to win a war if its demands cannot be achieved peacefully, whereas the other state reacts to preserve its security in the face of an increased threat. The greedy state will keep building up arms, even if its security-seeking adversary stops.

The consequences of conflating external explanations with security-driven, action-reaction explanations are apparent in descriptions of the Anglo-German naval race. This race is frequently identified as a prominent example of an action-reaction race (Buzan 1987, Hammond 1993), but the German naval buildup can also be interpreted as part of Germany’s effort to shift the military balance in the hope of gaining colonial and continental goals (Kennedy 1980). The German decision was not fueled by a British naval buildup. More importantly, a British decision not to respond to the German challenge would not have convinced Germany to cancel its naval program, and the prospects for arms control were poor. Thus, although the British and German buildups were coupled, action-reaction logic—at least when it is understood as reaction to a growing threat—does not capture the true cause of this race. (In addition, many explanations of the German naval buildup emphasize internal, domestic factors; see e.g. Lamborn 1991, Snyder 1991.)

Envisioning external causes broadly to include the full range of factors that influence rational arming behavior is valuable for a number of reasons. First, and most basic, as explained above, since external causes are paired with internal causes to span the full range of explanations for arms races, and since internal causes are of interest primarily for explaining suboptimal behavior, external causes should explain the full range of rational state arming behavior. Second, identifying external causes with the sources of rational behavior emphasizes that in order to understand these causes we need a theory of when (that is, under what conditions) a state should build up arms and when it should pursue more cooperative policies instead. As discussed above, a state’s decision should depend on its own goals and its beliefs about its adversary’s goals. It could also depend on a variety of other
factors, including the state’s power, the nature of military technology, the quality of information that each state has about the other’s military programs, the speed with which the state can launch a buildup of its own, etc. Therefore, all of these factors could be sources of rational arms racing and provide a much richer explanation of why an arms race occurs than identifying more generally the adversary’s buildup. Research that focuses on when a state should engage in an arms race is reviewed in a later section.

Third, and more specific, the inclusion of diverse motives and goals within the category of external causes enables us to better link causes of arms races with a key division in the IR theory literature and the policy recommendations that follow. Interactions between security seekers are described by the security dilemma, the spiral model, and structural realist theories. In contrast, the decisions of greedy states lie in the domain of neoclassical realism, which sees greedy states as the driving force behind competition and war, and in the deterrence model, which focuses on the subset of greedy states that are also secure (Jervis 1976). The most important disagreement during the Cold War over how the United States could best cope with the risks of its arms race with the Soviet Union hinged on beliefs about Soviet motivations. Individuals who saw the Soviet Union motivated primarily by insecurity applied the spiral model and called for cooperative policies—arms control and unilateral restraint—whereas those who believed that the Soviet Union was not threatened by the United States and was motivated entirely by greed applied the deterrence model and called for the most competitive policies. Both of these views, as well as mixed views in the middle, are based on theories of rational international behavior and belong in the category of theories of external sources of arms races.

Before leaving external causes, it is necessary to at least mention Richardson arms race models, since they have generated a huge and influential literature. Richardson (1960) developed a descriptive model of interactive arming, in which changes in a state’s military expenditures are influenced by three factors: the military expenditures of the adversary, the economic burden of previous purchases of military forces, and the extent of the state’s “grievance” against the adversary. His model is a pair of linked differential equations, with constant coefficients for each of the three factors. In this model, the states do not have an explicit objective, and the model does not include strategic behavior. Rather, the parameters in the model, for example, the intensity of the state’s reaction to the adversary’s expenditure, determine the course of the arms race. For certain values, the arms race reaches a stable equilibrium; for others, armaments continue to grow at increasing rates. A tremendous amount of effort has gone into developing different versions of the Richardson model and much of the mathematics is quite complex.

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An important proponent of these arguments is Schweller (1994, 1998); his basic criticism of balance-of-threat theory—that it sees all alliances as reactions to threats—parallels the point here about viewing all arms races as reactions to threats. See Rose (1998) for a recent review.
Extensive reviews have been published by Busch (1970), Russett (1983), Isard (1988), and Etcheson (1989). Empirical tests of the models have produced mixed results, and most found little evidence that the United States and the Soviet Union were involved in an arms race. However, Ward (1984) built a model that included stocks of deployed weapons, as well as defense expenditures, and found that the United States and the Soviet Union did react to the relative balance of deployed forces. Given the expectation that states will act strategically and that states that are reacting to each other will nevertheless sometimes be out of sync due to uncertainty about the other’s buildup and the complexity of developing and fielding large modern weapons systems, it is hard to know what to make of these results.

**Internal Causes: Models of Suboptimal Behavior**

Explanations that focus on internal causes of arms races locate the causes within the activities and operations of states. Whereas explanations that focus on external causes imagine the state as a unitary actor, these explanations focus on how the structure of the state—its political processes, institutions, and interest groups—contributes to arms races. Analysts of arms races have identified a large number of internal causes. Buzan & Herring (1998; see also Buzan 1987) provide a good overview of this literature, which includes the potential impact on a state’s arming decisions of the institutionalization of military R&D, the institutionalization of military production, electoral politics, bureaucratic politics, and the military-industrial complex.

Explanations that focus on internal causes of state behavior go beyond external/rational explanations only if they explain deviations from rational behavior (on this general point, see Fearon 1998). If states act rationally, then there is little reason to focus on their internal workings to explain their international behavior.\(^5\) External/rational models therefore usually assume that states are unitary actors, even though they obviously are not. Simply finding organizations and actors with interests that diverge from the state’s national interests is insufficient to support an internal explanation; it is necessary to demonstrate that those interests led the state to adopt suboptimal behavior. Although many studies of states’ arms-acquisitions decisions are sensitive to this requirement, there is nevertheless some inclination to see activity within the state suggesting support for internal explanations.\(^6\)

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\(^5\) This somewhat overstates the case, since if external/rational models leave a state’s options indeterminate, internal-sources models could be useful for understanding how states choose among the range of rational options.

\(^6\) This discussion glosses over some of the complexities that arise once the state is no longer viewed as a unitary actor. It then becomes possible both that the national interest is not well defined and that the preferred means for pursuing a given interest cannot be determined by assessing the positions of actors who hold divergent preferences. Under these conditions, assessing suboptimal behavior can be problematic (see Downs & Rocke 1995, Bueno de Mesquita 2000).
The available space does not allow in-depth discussion of each of the internal-causes arguments, but a quick look at what they have in common suggests some important points. Most of these arguments hold that when a state organizes itself to meet its military requirements, it creates structures and institutions that have interests of their own and that have the political power to pursue these interests. (The exception is the argument positing electoral politics as a source of arms races.) Suboptimality arising from these sources is therefore not easily eliminated because the state needs these institutions to pursue its international goals. For example, the nature of modern military technology requires states to support an extensive R&D establishment. That establishment also sees its own interests advanced by promoting technological change and can therefore becomes a driving force in an arms race (Brooks 1975; Shapley 1978a,b; Buzan 1987; Evangelista 1988). The close connection between civilian and military technology can also generate a technological imperative. An example of this phenomenon is the increased accuracy of ballistic missiles, which can be explained as largely the result of incremental improvements in a large number of technologies, many of which were not accomplished with improved missile accuracy as a primary goal (but see also Mackenzie 1990).

The case of military production is similar. Producers of weapons systems obviously have an interest in a continuing arms buildup. One way to insure demand is to design more technologically advanced weapons and then convince the military that these weapons systems are best matched to their needs. According to Kaldor (1981), because standards for assessing effectiveness are highly subjective and weapons systems are rarely tested, and because weapons producers make improved systems available, states end up producing increasingly sophisticated, complex, and expensive systems that do not increase military effectiveness, at least not to a degree commensurate with increases in costs. In addition, a state in an ongoing military competition may have to help preserve its military-industrial base to insure its ability to build next-generation weapons systems or large numbers of sophisticated weapons quickly. For example, Kurth (1971) argues that there exists a “follow-on imperative” because “the Defense Department would find it risky and even reckless to allow one of only six or seven [aerospace] production lines to wither and die for lack of a large production contract.” Again, the result can be an arms buildup and a continuation of an arms race when it is unnecessary.

Bureaucratic-politics arguments, which were developed partly in reaction to rational-actor, action-reaction arguments, hold that because of the complexity and duration of the weapons-development process, the military services are the key players in shaping the weapons systems that a state buys. This is important because the services’ preferences are likely to diverge somewhat from the state’s interests. According to Allison & Morris (1975:125), who challenge the action-reaction interpretation of the US ICBM program, anti-ballistic missile decisions, and MIRV deployment, “Service organizational health is seen to depend on maintaining the autonomy of the organization and preserving what its members view to be the ‘essence’ of the organization, sustaining morale, maintaining or expanding roles.
and missions, and keeping or increasing budgets. The result could be that states deploy types and numbers of weapons systems that fuel unnecessary competition, or that they simply buy the wrong weapons. For example, Steinbruner & Carter (1975) argue that the Trident submarine was larger and faster than it needed to be, which left it at best no more effective than a smaller, slower, and less expensive version. The authors attribute this outcome largely to a battle for control within the US Navy.

In the years since these bureaucratic-politics arguments were developed in the 1970s, a number of studies of US weapons acquisition have found support for the impact of organizational interests, but others have found little impact. Brown’s (1992) study of US strategic bomber programs finds support for both external/strategic and organizational arguments but no support for technological or economic arguments (see also Farrell 1997). In contrast, Rhodes (1994) finds that the composition of US naval forces was not influenced by bureaucratic politics. He argues that this is a critical case for the bureaucratic-politics model because issues of force structure are of central importance to the Navy’s essence and to the distribution of resource within the Navy, yet these issues rarely attract the high-level political attention required to counter organizational interests.

More recent theoretical work has extended organizational arguments to questions of military doctrine, finding that military organizations tend to prefer offensive doctrines (Posen 1984, Snyder 1984, Van Evera 1984; but see Kier 1997). Although not usually considered part of the arms race literature, these arguments should be included because they identify additional ways in which military organizations could lead states into unnecessary arms competition.

Once we envision internal causes as sources of suboptimality, we should also add misperceptions—both individual and national-level—to the already long list of internal causes of arms races. Although psychological explanations are well established in the IR literature, they are not usually noted as part of the arms race literature. Jervis’s description of the spiral model, which can be used to explain arms races (as well as competition more generally), has a rational foundation, but common cognitive errors can both generate and accelerate suboptimal competition (Jervis 1976; see also Jervis et al 1985). For example, if leaders tend to understand their own arms buildups as demanded by their external situations, while interpreting the adversary’s buildup as reflecting its goals, they will overlook the possibility that the adversary is also striving for security and react with a buildup when the more appropriate course might be to propose an arms control agreement. Similarly, militaries are often inclined to inflate the threat posed by adversaries (Van Evera 1984); a state that adopts this view of its international environment will be inclined to build up arms when it should not.

The relative importance of the various internal causes, and the relative importance of internal causes versus external, are likely to vary across countries. Most of the domestic-structure arguments focus on the United States and should not be

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7See also Halperin (1974); for early criticism of these arguments, see Art (1973) and Krasner (1972); for more recent assessments, see Welch (1992) and Bendor & Hammond (1992).
expected to apply equally well to all other states (Buzan & Herring 1998:114–18). For example, most states do not have large military R&D establishments, and many do not produce sophisticated weapons systems. Consequently, these states will be less influenced by R&D and weapons-production establishments than are major powers that are on the cutting edge of military technology.

Evangelista’s (1988) study of military innovation found significant differences in the importance and timing of internal and external causes in the United States and the Soviet Union. He found that “the openness and decentralization of U.S. society encourage technological innovations in weaponry, whereas the [former] Soviet Union inhibits innovation with its obsessive secrecy and centralization.” As a result, internal causes played a larger and earlier role in the United States, with scientists seeking support for technical innovations from the military. External causes entered the process later, playing an important role in establishing support once the weapons system began to face bureaucratic barriers and to require approval by Congress and the executive branch. In contrast, in the Soviet Union, innovation resulted when civilian and military leaders identified external threats and then endorsed efforts to respond.

Although there is not a full consensus, the literature on internal causes suggests that they often influence states’ arms acquisition decisions. Most authors find that both internal and external causes play a role in states’ decisions to build up arms, although there is substantial disagreement over the relative importance of these causes. However, whether internal causes regularly play a decisive role in states’ decisions to engage in an arms race is less clear. It is one thing to show that various internal causes influence the specific design or production of a weapons system—for example, the size of a submarine or the timing of the deployment of a new aircraft—and quite another to show that the key decisions, the forks in the road, that may be decisive in defining an arms race are the product of internal sources. The case of MIRV, which was a fork in the road, is sufficiently complex that, although organizational interests certainly mattered, strategic rationales also played a powerful role in the outcome (Greenwood 1975). Many assessments of the impact of internal causes can be sharpened by first asking what arms buildup, if any, the state should have engaged in, given its goals and the conditions it faced. Establishing this rational baseline requires a theory for when a state should build up arms. Divergences from this baseline can then be attributed to internal causes.

**CONSEQUENCES OF ARMS RACES—DO THEY INCREASE THE PROBABILITY OF WAR?**

Much of the interest in arms races is generated by the belief that they are dangerous, specifically, that they increase the probability of war. The consequences of arms races have been studied from a number of angles, including developing

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8There are exceptions, however; for example, Senghaas (1990) argues that domestic causes are overwhelmingly dominant.
propositions inductively by looking at multiple cases, studying the correlation between arms races and war using large data sets, and building formal models of the impact of arms buildups on states’ decisions about whether to initiate war.9 Downs (1991) provides a good assessment of the literature on the consequences of arms races, and of the literature on when a state should engage in an arms race, which is the focus of the following section.

Inductive Hypotheses Based on Multiple Case Studies

Two important articles (Huntington 1958, Kennedy 1983) offer hypotheses and insights based on a detailed knowledge of a number of arms races. These articles do not systematically present and explore cases but instead use examples from the cases to develop and support their insights.

Huntington’s 1958 article remains one of the most influential and widely read works on arms races. Based on his analysis of 13 arms races, Huntington identifies two sets of relationships between arms races and war. First, he argues that there is an inverse relationship between the length of an arms race and the probability that it will end in war. This is because a danger point (sometimes two) occurs at the beginning of every race. Once a state initiates a challenge by launching a buildup, the challenged state must decide if it can acquire allies and/or deploy armaments that are sufficient to restore the previous military balance. If the challenged state finds that it cannot, then it may conclude that launching a preventive war is its best option. As examples, Huntington identifies Tirpitz’s concern that Britain might attack before Germany’s naval buildup was sufficiently far along to deter attack, and interest within the United States in preventive war to stop the Soviet Union from acquiring nuclear weapons. Alternatively, if the challenged state fails to respond for some reason other than a lack of capability, it may then decide to respond once it finds itself in a dangerously weakened position. Recognizing this danger, the initial challenger may launch a preventive war to preserve the military advantages it achieved by launching its buildup. These arguments lead to Huntington’s conclusion regarding duration—if war does not occur at either of these danger points, a sustained race is likely to result, and “the regularity of the increases in itself becomes an accepted and anticipated stabilizing factor in the relations between the two countries” (Huntington 1958:63). The preventive-war logic that Huntington uses to link arms races with war finds support in a large body of work on shifts in the distribution of power and preventive war (Levy 1987, Van Evera 1999:ch. 4). Less developed, and more controversial, is Huntington’s claim that the reactive arms buildups become accepted and enable political relations to improve. At this level of generality, it seems as likely that a sustained arms race will damage political relations, much as the spiral model describes (Jervis 1976).

9Space limits prohibit discussion of this latter line of work. Important examples include Intriligator & Brito (1984) and Morrow (1989); Downs (1991:86–90) assesses this type of research.
Second, Huntington argues that quantitative arms races tend to lead to war and that qualitative races do not. In quantitative races, one side is likely to achieve definitive superiority; it is a marathon in which one or both states are likely to become exhausted, or in which the state that is falling behind will opt for war. In contrast, qualitative races start over with each major innovation, thereby always giving the state that is behind in the race a chance to catch up. Huntington notes that qualitative races generate anxiety about technological breakthroughs, but he argues that in fact this fear is misplaced because states tend to achieve major innovations nearly simultaneously. Huntington contends that quantitative races are more dangerous because they impose ever-increasing demands on the countries’ resources. Generating popular support for these burdens requires governments to create an increasingly hostile picture of the enemy. “Prolonged sufficiently, a quantitative race must necessarily reach a point where opinion in one country or the other will demand that it end, if not by negotiation, then by war” (Huntington 1958:76). In contrast, qualitative races require the continuous redeployment of resources but not continuous increases.

These arguments about qualitative versus quantitative races are problematic; there is little reason to expect that they will hold in general. It is not clear why the costs of a quantitative race have to increase with time, or why the costs of a qualitative race do not, or why a lead in a quantitative race is more likely to result in preventive war. It also seems unlikely as a general rule that quantitative races are likely to run longer than qualitative ones. Under certain conditions, quantitative races may simply damp out. For example, if two states are interested only in security and if defending is easier than attacking, then parity may be acceptable to both countries. Once both countries have built up to a level at which their forces are adequate to defend and deter, increases in force size could stop. Under these conditions, qualitative improvements could then have the effect of restarting this race and making it more expensive. For example, if qualitative improvements in US and Soviet nuclear forces had stopped with early-generation ballistic missiles, it seems likely that the Cold War nuclear race would have been less intense and less costly. Further, when defense has the advantage, a shift toward offense advantage could make attacking more attractive, reducing both states’ security and making war more likely than if the qualitative race had not occurred. I turn to these arguments in a more general framework below.

Kennedy (1983) draws on knowledge of many arms races to conclude that arms races are the product of political differences. “[U]ltimately, this argument is saying that arms increases—and arms races—are the reflection of complex political/ideological/racial/economic/territorial differences, rather than phenomena which exist, as it were of themselves, uncaused causes” (1983:174). In the same spirit, the key reason that arms limitations have often failed is “because an agreement over reducing the number and size of weapons alone, without agreement over the non-military causes of the rivalry, has seemed to one side or the other—usually to the challenging expanding power—to be pointless” (1983:174).
These conclusions bear upon two key issues. First, Kennedy is arguing that arms races have no independent effect on the probability of war, but instead, like war, reflect deep causes. In effect, he claims that arms races are driven by external/rational causes, not internal causes. Although he does not develop this at any length, it is an important argument that can strongly influence how we envision the consequences of arms races.

Second, within the family of rational causes, Kennedy appears to contend that what I have termed greedy states—i.e. states that want to change the status quo for reasons other than security—are the driving force behind arms races. The quotation above gives this impression, and two of his examples support this position. Kennedy points out that Prussia rejected efforts to halt its arms race with France in 1869–1870 because this would have compromised Bismarck’s plan to revise the European order. He also notes that France’s position at the 1898 Hague Conference was influenced by its desire to keep open the possibility of regaining Alsace-Lorraine.

However, in the end, Kennedy’s position on the basic question of what drives arms races is not so clear. Toward the end of his essay, he argues that an arms race will “all too easily contribute to the upward spiral of fears and hatreds and suspicions which were themselves the cause of the original armaments increases” (1983:175). But arguing that fears and suspicions were original causes of the arms race is quite a different argument. Although it too is within the rational-causes family, this argument focuses on the security dilemma, not the desire to revise the status quo for nonsecurity reasons. Moreover, although Kennedy’s examples are clear in that they illustrate that arms competition reflected states’ interests, they are ambiguous as to whether greed or security (or both) was key. For example, he argues that at the 1898 Hague Conference, Germany and Russia disagreed over proposals for limiting arms, each preferring the proposals that played to its own strengths. Yet, since states can desire improved military capabilities to pursue either greedy or security-driven goals, the example as presented is unclear on this issue. Interesting as Kennedy’s analysis is, it leaves unresolved the nature of the fundamental disagreements that drove these arms races and, as a result, whether the states might have had available policies that were preferable to engaging in an arms race.

In addition to these articles, a final study that deserves mention here is Hammond’s (1993), which provides useful background and descriptions of most of the arms races that are commonly identified in the literature, some of which Hammond argues do not really qualify as arms races. Hammond characterizes each race along a number of dimensions, including its mode (that is, whether its source is external or internal), medium (land, sea, or air), goals, type (qualitative or quantitative), and intensity. His clearest conclusion, which is consistent with the other multiple-case studies, is that arms races sometimes end in war but often do not. Hammond argues that arms racing should be viewed as a sometimes appropriate means for a state to achieve its goals, but he sheds little light on the
conditions under which this is the case and therefore on whether states’ decisions to engage in arms races were well matched to the opportunities and challenges they faced.

Overall, these studies leave no doubt that arms races are a complex phenomenon and that it is impossible to predict whether a race is likely to end in war without addressing the states’ relative military positions at the beginning of the race, the nature of military technology involved, states’ relative abilities to compete, and (perhaps most important) the states’ goals. However, valuable as these studies are, they would benefit from being placed in a more general theoretical framework, both to sharpen some of their propositions and to clarify the generality of others.

Large-n Studies

Much of the empirical work on whether arms races lead to war has analyzed large data sets built on data from the Correlates of War project (see Sample 1997 and Siverson & Diehl 1989 for reviews). Wallace (1979) launched this line of research with a study of whether serious disputes between nations engaged in an arms race have a significantly greater probability of resulting in war than those between states engaged in more normal military competition. Wallace chose to focus on states that were involved in serious disputes to insure that their arms buildups were directed at each other and not coincidental. He analyzed 99 militarized international disputes and found a strong statistical association between arms races and the escalation of crises to war. Wallace cautioned that “it is conceivable that the result is a spurious effect of ongoing hostility and tension between the powers” but concludes nevertheless that it is difficult to argue that “arms races play no role in the process of leading to the outset of war.”

Wallace’s article generated a number of significant criticisms. Weede (1980) argued that Wallace’s analysis failed to separate out whether wars were resulting from the arms race or instead from one state’s failure to arm fast enough to keep up its side of the race. Wallace (1980, 1982) responded to this criticism by exploring whether the “status quo” power declined relative to the “revisionist” power. Although his analysis produced mixed results of the association between the revisionist power winning the race and disputes escalating to war, any relationship that did exist was less strong than that between arms races and war, and Wallace concluded that his original conclusion remained strong.

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10Wallace’s terminology of “revisionist” and “status quo” states does not map directly into greedy and security-seeking states, and therefore his terminology is not converted here. His terms categorize states by their actions, whereas the other terms categorize states by their motivations. In Wallace’s analysis, one state is the revisionist and the other is the status quo power; in contrast, this is not necessarily the case when states are categorized by motives—for example, both states could be security seekers, even though they are involved in conflict.
Two other basic criticisms have been leveled at Wallace’s work. First, a number of scholars (Weede 1980, Altfeld 1983, Diehl 1983) focused on the nature of the cases, arguing that many of them were not independent but instead closely linked to one of the two world wars. As a result, some of the supposed arms races did not reflect countries reacting to each other, and some of the escalations to war probably reflected the impact of alliances on the spread of war and not the impact of the arms race. Second, critics raised doubts about Wallace’s measure of when an arms race exists. Altfeld (1983) argued that the threshold was set too low; changing this, however, did not alter Wallace’s basic conclusion. Diehl (1983) criticized the construction of Wallace’s arms race index, which multiplied the two countries’ arms growth rates together, thereby creating the possibility that an intense buildup by only one country could lead to an index that qualified as an arms race. Diehl developed a different arms race index and revised the data set to reduce some of the problems noted above. He then found, contrary to Wallace, that there is little association between arms races and the escalation of militarized disputes to war.

New contributions to this debate have further complicated the picture. Horn (1987) has developed another measure of when two countries are in an arms race, which suggests that arms races are less common than the other studies indicate. His work finds that arms races that occur over shorter periods (6 years) do not significantly correlate with war, but that for arms races over longer periods (12 years) there is a significant relationship, although it is not as strong as the one found by Wallace. Most recently, Sample (1996, 1997, 1998) has determined that the disputes that do not escalate tend to be either Cold War cases involving nuclear weapons, or early disputes in enduring rivalries. She finds that “with the exception of the Cold War, virtually every case in which two countries are both arming at abnormally high levels was at war within five years” (1997:16) and therefore concludes that arms races are more closely associated with the escalation of disputes than the ongoing debate has suggested.

Given the complexity of the issues in studying the correlation between militarized disputes and war, chances are that continuing refinements and advances in this line of study will be possible. Two important issues that have not played a central role so far deserve mention. First, by focusing on the escalation of disputes, this body of work does not address the possibility that arms races could generate disputes, or alternatively deter disputes and in turn war (on a related issue, see Diehl & Kingston 1987). Second, the use of total spending to measure arms racing may sometimes be misleading, especially in a qualitative race, because innovations in military forces may not result in increases in spending, even though they pose a significant challenge to states’ abilities to perform their military missions.

However, the bigger question is what can be learned from this line of study, not what is required to improve it. Much of this work is introduced as an effort to resolve a debate between the preparedness model (if you seek peace, prepare for war) and the arms race model, or the armaments-tension dilemma (Singer 1958), or the spiral model (Jervis 1976), all of which hold that if you prepare for war, an arms race is likely to result, which will increase the probability of war. The
debate is important because, among other reasons, the two model types are said to prescribe quite different policies; the preparedness model calls for arms buildups and the spiral model for unilateral restraint and arms control. However, a closer look at these models shows that these studies cannot resolve this debate.

A much fuller statement of the preparedness model is found in the deterrence model (which should not be confused with deterrence theory more generally), which assumes that the defending state’s adversary is a greedy state that will not be made insecure by the defender’s arms buildup. A fuller statement of the arms race model is found in the spiral model, which has two important variants: (a) the rational spiral model, which assumes that all states are interested only in security but that they face a security dilemma that can lead them into conflict; and (b) the misperceptions spiral model, which adds individual and/or state-level misperceptions to the rational spiral model (Jervis 1976, 1978; Glaser 1992, 1997).

The deterrence and spiral models disagree about the nature of the adversary, not primarily about the nature of interaction in the international system. One model could apply in one situation, the other in another situation, and a mixture of the models would apply in situations in which the adversary was an insecure and greedy state. Consequently, an effort to figure out which model is correct is misguided. Yet, this is the stated aim of the large-\(n\) studies discussed above, and their implicit assumption that all arms races are essentially the same is consistent with this objective. However, basic IR theories suggest that the implications of arming, and in turn the consequences of arms racing, depend on states’ goals and therefore that analyses need to distinguish different types of arms races along this dimension.

A possible rejoinder to this criticism is that these large-\(n\) studies are helpful in assessing the distribution of types of states over time, since war would correlate with spiral model conditions, and disputes that did not escalate would correlate with deterrence model conditions. This information could be useful, even though it would not provide good guidance for how to deal with any specific future arms race. However, these studies do not provide it. They might seem to, since the preparedness model and deterrence model call for arming to achieve peace, whereas the arms race model and spiral model are said to view arming as a cause of war. However, for three reasons, this is not the case. First, contrary to some descriptions, the dangers created by the security dilemma, and the negative spiral that it can fuel, are not always best handled by arms control and cooperation. Under certain conditions, competition is the state’s best option, even though it may not prevent war. Second, arming in a preparedness/deterrence model situation does not guarantee peace. This would be the case, for example, if the adversary would not be deterred by even highly effective military capabilities. Arming may still be the defender’s best bet, and the fact that such a competition ends in war does not necessarily discredit the policy. Nor does it necessarily suggest that the adversary was the type identified by the spiral model and not by the deterrence model. Consequently, even assuming that states choose their best options, the fact that some arms races end in war does not tell us which type of adversary they faced.
Third, some arms races may end in war because states chose the right type of policy but made mistakes in implementing it. For example, if a state fails to arm soon enough, and thereby allows its adversary to acquire a militarily significant lead in the arms race, the race may end in war, when better arms racing behavior might have ended in peace. In a preparedness/deterrence model situation, the problem is that the state raced poorly, not that it should have cooperated instead of racing.

In sum, these analyses of large data sets can tell us neither which model provides better guidance nor what the distribution of types of states has been across time. The problem is not with large-n studies per se, as compared to case studies, but instead with the weak connection between IR theory and the design of these studies.

WHEN SHOULD A STATE ENGAGE IN AN ARMS RACE?

Deciding when a state should engage in an arms race requires a rational theory of behavior. In this type of theory, the outcome of a state’s behavior is best thought of as resulting from the conditions it faces and not from the behavior itself. More specifically, building up arms and racing if necessary are one type of behavior (or strategy) available to a state. When conditions facing the state make arms racing its best option, we should attribute outcomes, whether peace or war, to the conditions and not to the race. Therefore, although this section reviews work that is usually viewed as addressing the consequences of arms races, I treat it separately here.

There is not yet a fully developed theory of when a state should build up arms and risk generating an arms race, instead of choosing other options, including most obviously cooperation—in the form of arms control or unilateral restraint—and alliance. At a minimum, such a theory should address how a state’s decision depends on (a) its own goals and its assessment of its potential adversary’s goals, (b) the probability that its adversary can and will respond to a buildup, (c) the impact of a mutual buildup on the state’s ability to perform the military missions required to deter, defend and attack, and (d) the impact of an arms race on the states’ relationship—specifically, whether an arms race would generate strained relations and political fears. In addition, such a theory should include a dynamic dimension, which considers how changes over time in states’ abilities to compete should influence their current arming behavior.

Defensive Realism

Structural realism, especially defensive realism, provides a start on such a theory (Waltz 1979 remains the classic statement of structural realism; on defensive realism see Snyder 1991, Glaser 1994/95, Van Evera 1999). Defensive realism focuses on states that are motivated only by security, and it assumes states’ knowledge of others’ motives is based only on the information communicated by their international policies. The security dilemma plays a central role, explaining how states that have fundamentally compatible goals can still end up in competition...
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(Jervis 1978). The key variables that influence whether a state can achieve a high level of security, and whether it will have to rely on competitive policies to achieve it, are power and the variables that determine the nature and magnitude of the security dilemma—the offense-defense balance and offense-defense differentiation.

The arguments about the relationship between security-dilemma variables and arms races are the more thoroughly developed. When defense has the advantage, a state can deploy forces that will increase its security more than they decrease the adversary’s security. An arms buildup may be necessary to achieve forces that are large enough for deterrence and defense, but the state’s security will increase with successive action and reaction cycles, and arms races should peter out (for related analysis, see Hoag 1961). Beyond a certain point, the state should stop its buildup, not only because it will be wasting resources but because, as discussed below, continuing to arm risks signaling malign motives and thereby damaging political relations with its adversary. A lack of arms races is likely to be associated with peace because defense advantage can make both cooperative military policies and peace a state’s best options.

The situation is different when offense has the advantage, since states with equal size forces cannot achieve high levels of security. When a state adds forces, its adversary needs to make a larger addition to restore its ability to defend; this dynamic promises to fuel an intense arms race. However, racing may nevertheless be the state’s best option because failing to do so risks falling behind its adversary and becoming even more vulnerable to attack. Arms races are likely to be associated with war because offense advantage can make both an arms race and war a state’s best option, and because differences in force size, which are likely to be generated by an arms race, create larger incentives for war (Van Evera 1999). 11 Whether a state should enter into an arms control agreement that freezes forces at parity depends on how the risks of falling behind in a race compare to the risks posed by the adversary’s ability to cheat on the agreement, which in turn depends on the nature of unilateral and cooperative means of verification.

The implications of a qualitative arms race depend on its impact on the balance. For example, a qualitative change that shifts the balance toward defense will reduce the intensity of the arms race and the probability of war, whereas a change that shifts the balance toward offense will have the opposite effect. Timing, however, will be important—even an innovation that shifts the balance toward defense could provide the state that acquires it first with military capabilities that could be used for offense and possibly incentives for preventive war.

When offense and defense are differentiated, a state has the option of deploying forces that are useful only for protecting its territory. This deployment does not

11 However, the impacts of offense advantage may be more diverse than the argument stated here acknowledges. For example, Fearon (1995) argues that offense-advantage may increase the variance of war outcomes by making both total victory and total defeat more likely. This could increase the willingness of states to make concessions, thereby reducing the probability of war.
reduce its adversary’s ability to defend itself and therefore should not provoke a strong reaction. Differentiation also makes possible arms control agreements that ban offense, thereby increasing both states’ ability to defend. When offense has the advantage, a state may have to pursue arms control, instead of a unilateral policy of deploying defense, because the adversary’s deployment of offensive forces could leave the state unable to afford an effective defensive policy. Much of the literature of classic arms control theory, although it preceded offense-defense theory, emphasizes the value of limiting systems that favor offense (Schelling & Halperin 1961).

In addition to addressing military capabilities, defensive realism also addresses how arming behavior can influence the political relationship between states. The key is that a state’s decision can communicate information about its goals, which may increase or decrease the other’s insecurity. For example, a state that chooses to build offensive forces when defense has the advantage will signal that it is a greedy state, because under these conditions a state interested only in security would build defensive forces (Glaser 1994/95; on signaling more generally see Jervis 1970). Signaling arguments can also explain how spirals of hostility can develop without misperceptions. For example, when states are uncertain about the size or type of forces required to maintain a given level of security, a security-seeking state that builds larger forces or offensive forces risks convincing others that it is greedy, since all greedy states will choose these force deployments but only some security seekers will (Glaser 1997; Kydd 1997a, which is discussed below, studies another type of rational spiral). As a result, under these conditions of uncertainty, a state has incentives to moderate its arming behavior. The result can be a tradeoff between arming in the hope of improving its military capabilities, and restraint designed to communicate its benign intentions, which increases the adversary’s security and in turn its own security.

Within structural-realist analyses of when a state should engage in an arms race, further research is needed on how states should proceed when structural tradeoffs are indeterminate, on how to measure the offense-defense balance (Glaser & Kaufmann 1998), on developing a dynamic theory that includes power and offense-defense variables that change over time (Kim & Morrow 1992, Powell 1999:ch. 4 explore the implications of shifts in the distribution of power), and on how states should choose between arming and gaining allies (Morrow 1993, Sorokin 1994).

Other Levels of Analysis
A full theory of when a state should build up arms and risk an arms race must go beyond the assumptions imposed by structural realism. One obvious extension is to bring greedy states into the theory. The expectation is that greedy states will be more interested in building up arms and more willing to risk an arms race than security-seeking states are under a range of conditions. For example, when offense and defense are distinguishable, greedy states are more likely to opt for
offense, because offense is necessary for expansion, even though their adversary’s acquisition of offensive forces will reduce their own security. We also expect greedy states to make the tradeoff between acquiring military capabilities and signaling benign intent quite differently, since preserving the adversary’s security is less essential to their goals. Development of these arguments would fall into the neoclassical family of theories, which to date has focused on alliance choices and not arming behavior (Schweller 1994, 1998).

A further expansion of the theory would relax structural realism’s assumption that a state does not gather useful information about the adversary’s motives and intentions by studying the adversary’s political system, leadership, and domestic politics. On the one hand, this type of information might help reduce spirals between security seekers. Kydd (1997b), for example, argues that the policy process in modern democracies is sufficiently transparent that, if a democracy is a security seeker, other states will be able to figure this out. This knowledge should have the effect of moderating competition that would be generated by purely structural interactions and reduce, if not eliminate, the need for security-seeking states to engage in arms races. Further, by showing that a state is interested only in security, state-level information about motives reduces the dangers of competitive policies, allowing a security-seeking state to compete vigorously against greedy states without worrying about the need to moderate its policy so as not to generate self-defeating insecurity. This is part of the logic that underlies the deterrence model’s claim that an arms buildup will, at worst, result in wasted resources. Research on how states assess others’ motives and how much reliable information is available at the unit level (D Edelstein, dissertation in progress) is necessary to support this line of argument on when states should arms race.

Formal Models

Formal modelers have addressed many aspects of the question of when states should engage in arms races. This literature is large, so I have chosen a few pieces that connect especially well with the nonformal theories described above. Downs (1990), Isard (1988:ch. 2) and Intriligator & Brito (1990) offer helpful reviews and assessments of this body of work.

Downs et al (1985) explore the types of $2 \times 2$ games that can generate arms races and the relative effectiveness of three different strategies—unilateral restraint, tacit bargaining, and formal arms control negotiations—for generating cooperation. They explain that when states have perfect information, the two key types of games that can generate an arms race are Prisoners’ Dilemma and Deadlock—a situation in which a state prefers mutual defection, i.e. an arms race, to mutual cooperation, i.e. both states stop building up arms. Although analysts have usually turned to Prisoners’ Dilemma to explain arms races, Downs et al (1985) argue that Deadlock provides a simple explanation for arms races and may therefore be more prevalent than generally assumed. In support of this possibility, they explain that
Deadlock does not require that states have greedy/expansionist objectives, that is, states need not have fundamental conflicts of interest. The payoff orderings in the \(2 \times 2\) games reflect preferences over means, such as arming versus not arming—not preferences over ends, for example, altering the territorial status quo versus maintaining it. Thus, consistent with structural realism, states that are interested only in security could have Deadlock preferences over arming. For example, a state that has superior technology might prefer a mutual buildup to mutual restraint because this would increase its security.

The second key argument of Downs et al (1985) is that if states have imperfect information, more types of games can lead to arms races. Most important, Stag Hunt—in which states prefer mutual cooperation to unilateral defection—does not lead to an arms race when there is perfect information, but if a state believes incorrectly that its adversary is acquiring a weapons system, then it too will decide to acquire the weapon and the arms race is on. Third, they show that even small amounts of poor information can undermine tacit bargaining strategies that would otherwise be effective in curbing competition (Tit-for-Tat is the prime example). Finally, their article shows that the success of various strategies for curbing an arms race depends on the game that states are in and the quality of information they have. In sum, in broad terms, Downs et al (1985) provide another useful perspective for understanding that whether states should race and the types of policies that may be successful in slowing a race depend on a variety of factors, including states’ goals, the nature of military technology, the balance of forces at the beginning of the race, and, as Downs et al emphasize, the quality of information.

Powell (1993, 1999: ch. 2) explores the factors that influence the intensity of arms buildups and whether they will lead to war. He focuses on the tradeoff that a state must make between allocating its resources to domestic ends and to military means (the guns-versus-butter tradeoff).\(^{12}\) In each period of the game, a state makes this choice and then decides whether to attack the other state. If a state attacks, the probability of victory is assumed to be a function of the relative amounts of the states’ military spending. Winning the war enables the state to devote all of its resources to domestic ends in all future periods. The model assumes complete information, so uncertainty about the other’s motives, which plays a central role in the security dilemma, is not present, and signaling one’s type is not an issue. Two of the key parameters in the model are the offense-defense balance and the extent of the states’ willingness to accept risks—which can viewed as a measure of their aggressiveness. Powell finds that states increase their military allocations, which means that arms competition becomes more intense, as the offense-defense balance shifts toward offense and as either state becomes more aggressive. A shift

\(^{12}\)Some interesting models of the guns-versus-butter tradeoff are not discussed here. Brito & Intriligator (1985) explore how asymmetric information and the opportunity to negotiate a redistribution of resources affect the probability of war. Oren (1998) explores how a state’s arming behavior is affected by the interaction between the adversary’s capabilities and the state’s assessment of the adversary’s intentions, which is determined exogenously.
toward offense advantage does not necessarily make war more likely, although a large enough shift will lead to war. These findings are essentially consistent with those of defensive realism and arguments that address greedy states. However, by focusing on the tradeoff between consumption and military spending, Powell develops arguments that are precluded by defensive realism’s simplifying assumption that states can be envisioned as security seekers. In Powell’s model, states value security because it is necessary to ensure future consumption. Increasing military spending, although it increases security, decreases the value of the status quo because the state has less left to consume. Consequently, offense-advantage can increase the probability of war by reducing the value of the status quo because the state must spend more on military forces, in addition to increasing the probability that the attacker will prevail, which is the effect emphasized by defensive realism.

Focusing on how arming can influence political relations, Kydd (1997a) develops a formal model of how arming decisions can provoke fear and provide reassurance. He starts with a puzzle. If a state builds arms to increase its own security, why can it conclude when an adversary matches its buildup that this indicates aggressive/greedy motives? Kydd shows that although psychological biases are often invoked to explain this puzzle, in fact concluding that the adversary is greedy can be rational behavior. Both states in his model are uncertain about the value that the other places on winning a war, and each is also uncertain about how the other state views its motives. A state’s belief about how its motives are perceived by an adversary influences how the state interprets the adversary’s arms buildup. For example, if state A believes that B perceives it as likely to be a security seeker, then A will rationally interpret B’s arms buildup to indicate that B is more likely to be a greedy state. The basis for A’s conclusion is that if state A is interested only in security, then it is not a threat to its adversary B, so if B is building up arms, it must be because B is greedy. Kydd shows that, under a wide range of conditions, a rational adversary will find the state’s buildup to be provocative, and also that there are conditions under which states can use restraint to reassure adversaries. [See Downs & Rocke (1990:ch. 4) for another model of the potential of unilateral restraint to slow an arms race when states are uncertain of each other’s preferences.] Kydd’s analysis adds to our understanding of the spiral model—the strategic interactions are sufficiently complex and subtle that they are difficult to fully appreciate without a formal model.

CONCLUSION

A theme of this essay is that the causes and consequences of arms races are more closely linked than the literature recognizes and takes advantage of. In addition, we have seen from a variety of angles that understanding when a state should build arms and risk provoking an arms race is essential to evaluating both the causes and
consequences of arms races. This section summarizes the relationships between these three questions and identifies implications for future research.\(^{13}\)

From the perspective of the causes of arms races, internal and external sources are potentially complementary, and often the difficult question is how much they each explain. However, when we change perspective and ask whether arms races have undesirable consequences, the internal and external factors provide opposite answers. If a state is influenced only by external factors, and it decides to build up arms and race, then the state’s behavior is rational; the arms race is its best option, given its goals and the constraints and opportunities it faces. Whatever the outcome of the arms race, the race itself should not be assigned responsibility, since it is essentially only a reflection of exogenous variables. In contrast, when internal factors explain a state’s decision to build up arms, the state has available policies that are preferable to arming, and the arms race itself can be understood to be undesirable, increasing the probability and/or the costs of war or at least wasting resources. In other words, arms races only have negative consequences when internal factors cause a state’s decision to race.

To assess whether a state’s behavior is rational, and therefore to assess whether internal factors are distorting its policy, we often need a theory that explains when a state should race. Certain arms procurement decisions may have sufficiently little impact on a state’s overall strategy that they can be assessed in narrow military-technical terms. For example, a case mentioned above—the size and speed of Trident submarines—is probably this type of decision. However, other decisions about whether to acquire new types of weapons systems or to increase force size must be assessed in the context of a state’s overall military strategy and therefore must be evaluated in the context of the state’s goals, resources, and geopolitical setting. This analysis requires a theory that is built on basic structural variables and that can address choices of military doctrine, force requirements, and cooperative versus competitive arming policies. This type of theory is also required to assess the consequences of an arms race when a state does engage in suboptimal behavior.

The first step, therefore, toward a better understanding of the causes and consequences of arms races is to have a better theory of when states should build up arms and risk an arms race—one that is general enough to capture the essential features of arms races and that is developed enough to be used to assess historical cases. Defensive realism is progressing in this direction. Its integration of offense-defense variables and power enables a more nuanced assessment of states’ military options than is possible with power alone, and its identification of the signals sent by states’ arming decisions enables assessment of the role of military policy in influencing states’ relations. However, defensive realism still requires fuller development, and an adequate theory of when a state should engage in an arms race must be more general than defensive realism, expanded to deal with a

\(^{13}\)The manuscript “When Do Arms Races Make War Unnecessarily Likely?” (C Glaser, unpublished) represents an initial effort in this direction.
wider variety of states and with the impact of information that is available at the unit level. Applied to specific arms races, such a theory can be used to determine whether states should have engaged in the race, and, if they should not have, to assess the consequences.

ACKNOWLEDGMENT

For valuable comments on an earlier draft of this chapter, I wish to thank George Downs.

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