

DEFENSE IN A GLOBALIZED WORLD: AN INTRODUCTION

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Contents

Abstract	608
Keywords	608
1. Introduction	609
2. Defense economics: Then and now	611
3. Our decision on what to include in Volume 2	615
4. Organization of the book	615
5. Concluding remarks	620
References	620

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Abstract

Since the end of the Cold War, the world remains a dangerous place with new threats: regional conflicts, transnational terrorist networks, rogue states, and weapons of mass destruction (i.e., chemical, biological, radiological, and nuclear). The second volume of the *Handbook of Defense Economics* addresses defense needs, practices, threats, agents, and policies in the modern era of globalization. This new era involves novel technologies, new business practices, and enhanced cross-border flows. Such ever-growing flows mean that military armaments and armies are less equipped to keep out unwanted intruders.

This introductory chapter sets the stage for this volume in three ways. First, the chapter identifies how threats have changed since the Cold War. For example, the end of the superpower arms race has brought forth new issues, such as the quelling of local conflicts, the role of economic sanctions, and the challenge of asymmetric warfare. There are also new concerns about military manpower and the role of reservists and civilian contractors during a time when most countries have downsized their forces. Second, the chapter indicates the choice of topics and how these topics differ from those in Volume 1. In particular, we selected chapters on topics not covered in Volume 1 (e.g., civil wars, peacekeeping, trade and peace, and economic sanctions); chapters on past topics where there has been significant advances in knowledge (e.g., conflict, terrorism, arms races, and military manpower); and chapters on topics that reflects the influence of globalization and new threats (e.g., terrorism, trade and peace, and arms industries). Third, the chapter provides a brief overview of each chapter in the volume.

Keywords

Armed Forces, arms trade, arms races, collective action, conflict, defense industries, globalization, new technology, peacekeeping, procurement, terrorism

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1. Introduction

In the early 1990s, many people wondered why we decided to edit the first volume of the *Handbook of Defense Economics* in light of the end of the Cold War, significant progress in reducing nuclear arsenals, the fall in arms sales, and the promise of a more peaceful world. Back then, interest focused on the so-called peace dividend as money from the defense sector was being redirected to the civilian sector, including social programs. In the 1980s, defense spending as a percent of gross domestic product (GDP) was 4.5%; by 2000, it had fallen to 2.5% [NATO (2000)]. The nature of the security threat has indeed changed since the Cold War, but the world remains a dangerous place with myriad security concerns. During the decade since the publication of the first volume, the terrorist attacks on 11 September 2001 (henceforth, 9/11), the rise of rogue states, and the prevalence of intra-state wars have underscored security issues despite the end of the nuclear confrontation between the superpowers and the demise of the former Soviet Union and the Warsaw Pact.

The second volume of the *Handbook of Defense Economics* addresses defense needs, practices, threats, and policies in the modern era of globalization. New technology in the form of the information revolution has contributed to creating a global economy and a revolution in military affairs (e.g., electronic warfare and unmanned air vehicles). Defense contractors have become international companies and are increasingly using global supply chains. Globalization emphasizes the enhanced cross-border flows of all kinds (e.g., capital and labor flows, ideas, and goods) including the spillovers of benefits and costs associated with public goods and transnational externalities (i.e., uncompensated interdependencies affecting two or more nations). Such ever-growing flows mean that military armaments and armies are less able to keep out unwanted intruders. Borders are porous to sleeper cells, pollutants, diseases, political upheavals, conflicts, computer viruses, and insidious pests. These enhanced cross-border transmissions bring with them new defense and security needs and implications. Even increased trade and financial flows imply novel security challenges and defenses. Globalization also underscores the importance of a new set of institutions (e.g., the European Union, other regional pacts, global governance networks, transnational defense contractors, and multilateral agencies) and agents (e.g., nongovernmental organizations and terrorist networks) that influence ever-increasing transfrontier flows. Globalization blurs the distinction between domestic and transnational security concerns. Thus, a civil war in a remote African country may cut off the supply of strategic resources (e.g., titanium), foster the start of a pandemic, or impact neighboring countries' economies [Murdoch and Sandler (2002, 2004)].

Globalization not only spreads security concerns but also provides nations with a greater rationale to act collectively. The difficulty arises because nations are not inclined to sacrifice their autonomy over security matters for the collective good. Thus, globalization presents a host of collective security challenges – e.g., preempting a common terrorist threat, curbing nuclear proliferation and the spread of chemical and biological weapons among rogue nations, forgoing profitable arms trade, upholding an arms

boycott, contributing to peacekeeping operations, and reducing civil wars in developing countries – that are extremely difficult to address. Although today's security exigencies may not threaten apocalyptic consequences, as did the superpower confrontation during the Cold War, these challenges are nevertheless a security concern that can be as costly as nuclear confrontation to eliminate. Since the end of the Cold War, the world clearly remains a dangerous place. World order needs guarding and in the absence of a guardian, disorder is likely. There is a view that currently and for the foreseeable future, the United States is the only possible guardian and the guardian will look to its national interest while possibly seeking to serve the "general good" [Gray (2004)]. The longer-term challenge is whether the United Nations can develop into an effective organization for maintaining and enforcing world peace [McNamara (1992)]. Given its past record, it is doubtful that the United Nations will fulfill this role.

The events of 9/11 demonstrate that today's threats can assume novel and ghastly forms. If weapons of mass destruction (WMDs) were to get into terrorists' hands, then 9/11 may seem tame compared with the carnage and economic consequences of a WMD terrorist attack. In the United States, the Department of Homeland Security's (DHS) budget is now over \$40 billion, which does not include about the same amount spent on terrorist-related intelligence [Enders and Sandler (2006)]. Proactive measures taken by the US military and its allies in Afghanistan and Iraq account for many billions more (conflict and peacekeeping operations are costly) [Sandler and Hartley (2003)]. Security measures by US states, cities, and local jurisdictions and similar measures in other countries cost still more billions of dollars. Billions are also spent in lost time waiting at airports to clear security and there are further costs through losses of liberty and freedom. Terrorism leads to spending that can continue to escalate without ever guaranteeing that a terrorist attack will not occur. Terrorists can attack anywhere in the target-rich environment of liberal democracies; yet, a country cannot afford to equally secure every potential target. As a consequence, softer targets must exist that will draw the attack, with terrorists always seeking new and novel methods of attacks (terrorist policy resembles the squeezing of a balloon). Addressing nuclear proliferation also poses costly collective action problems, where even a single nonparticipant can spoil the cumulative efforts of the cooperating nations. Each of today's security challenges confronts governments with costly and difficult-to-achieve countermeasures and even more challenges in developing effective collective action responses.

The purpose of this volume is to analyze the security challenges in this new age of globalization, where conflicts involve novel tactics, new technologies, asymmetric warfare (among mismatched adversaries), new agents, different venues, and frightening weapons. Some of these threats are less discriminate than traditional warfare and put civilians in harm's way. In addition, this volume addresses changes in the defense sector that involves arms trade, arms races, arms industries, and military manpower concerns. With today's leaner military, procurement practices are changing as reflected by the increased concentration in some defense industries. The Iraq War and its aftermath illustrates some essential lessons in today's strategic environment. First, modern-day, high-technology weapons can only substitute to a limited extent for military manpower.

Second, casualties may be far greater after “victory” owing to an insurgency requiring substantial peacekeeping operations. By accepting defeat quickly, a losing side can maintain more of its military assets to carry on the insurgency. Third, the most expensive military assets can still be defeated by inexpensive improvised munitions or countermeasure (e.g., a Stinger missile shot at an Apache helicopter), thus underscoring *Hirshleifer’s* (1991) paradox of power. The latter refers to a strategic advantage that the weak has over the strong. Fourth, the United States needs to reassess the adequacy of its military manpower if it intends to confront “rogue nations” and proliferation threats (e.g., with the need to develop expeditionary forces capable of worldwide operations). Fifth, private contractors have an increasing role to play in future conflicts and in the peace-time military (i.e., military outsourcing).

2. Defense economics: Then and now

Defense economics applies the tools of economics to the study of defense and defense-related issues including defense policies and industries, conflict, arms races, disarmament, conversion, peacekeeping, insurgencies, civil wars, and terrorism. When applying these tools, defense economists must tailor economic methods, both theoretical and empirical, to defense issues and policies, while taking account of institutional aspects that characterize the defense section. In, say, the defense industries, the development and manufacture of new weapons possess factors, not characteristic of many other industries. For example, a government may be a monopsony that may be unsure about a weapon’s intended combat role with a contractor required to commit costly and defense-specific resources to the program; and where both parties will have to agree on a suitable contract providing efficiency incentives, an acceptable profit, and guarantees about paying a contractor’s costs. A study of the procurement practices in the United States must include the relevant participants – the Congress, the defense contractors, the military, and the constituency of weapon-building districts – and how they vie for strategic advantage. As such, game theory has an increasing role in the study of defense economics. Game theory also plays a role in the study of conflict, insurgencies, peacekeeping, economic sanctions, arms races, and arms trade.

In addition to institutional details, defense economics must account for the nature of the agents. If, for example, terrorists or insurgents are weak compared with their government adversaries, then the implications of this relative weakness must be addressed. This can show up with the high soldier to rebel ratios (sometimes higher than 100 to 1) that characterize insurgencies, where the government is still unable to put down the rebellion (e.g., Columbia and Peru). Key agents include networked terrorist groups, third-party interveners into civil wars, private contractors, insurgents, reservists, arms runners, and Diaspora supporters. Agents may display novel tastes and possess information unknown to their counterparts. Nevertheless, they are modeled as maximizing an objective subject to one or more constraint that may be influenced by the choices of others. That is, government efforts to harden potential terrorist targets change the

price of various terrorist modes of attacks – i.e., the relative price of skyjackings and kidnappings leading terrorists to substitute cheaper for costlier methods of attacks (e.g., kidnapping, assassinations, or bombings replacing skyjackings).

During the decade or so between the publication of Volumes 1 and 2 of the *Handbook*, the definition of defense economics has not altered. Rather, there has been a changing mix of agents that now include failed states, rogue nations, transnational terrorist networks, rapid deployment forces, and alliance-backed peacekeepers. Technological change has presented new threats (e.g., the ability of terrorists to coordinate operation by the Internet) and challenges (e.g., the need for governments to monitor Internet traffic). On the military side, precision-guided munitions have changed war fighting and pilotless drones harbor the increasing substitution of capital for manpower. With these new agents, there is a change in the nature of threats. The fear of a nuclear holocaust fought between the superpowers of the Cold War has given way to threat of a rogue nation resorting to nuclear blackmail. Other worries involve WMDs (i.e., chemical, biological, radiological, or nuclear weapons) falling into the hands of terrorists or insurgents, who may plant them in a major city. A common scenario is a radiological device or dirty bomb that consists of radiological material dispersed by a conventional bomb. Such a device could cause billions of dollars of losses if exploded at a major harbor, such as Los Angeles. The rise of intra-state wars from the late 1980s on has increased the risk to neighboring countries from either an expanding conflict or negative economic consequences. In most cases, an inflow of refugees from the conflict-torn country creates hardships to recipient countries. Cost may also stem from the spillover of border skirmishes that can destroy infrastructure and create the need for border patrols and fortification [Collier et al. (2003)].

During the last decade, the nature of conflict has also changed drastically. Contrary to the democratic peace doctrine, the United States invaded two sovereign states: Afghanistan in October 2001 and Iraq in March 2003. In the former case, the invasion was to punish and dismantle al-Qaida for its role in 9/11 and global terrorism; in the latter case, the invasion was to disarm Saddam Hussein and his alleged WMDs. Both interventions were costly for the United States, its allies, Afghanistan, and Iraq. Moreover, costs were incurred not only during the conflict, but also during the subsequent peacekeeping missions. Estimates suggest that the US military expense for these conflicts exceeded \$400 billion to 2006 (i.e., not including costs to the US civilian economy). Since the mid 1990s, there is a heightened prevalence of asymmetric warfare between adversaries of vastly different abilities. Asymmetric warfare makes obsolete some of the weapons of the Cold War, including the B-2 bomber and M-1 tanks. There is also a growing concern over civil wars, insurrections, transnational terrorism, and rogue nations. Nations must reconfigure their defenses to counter these new contingencies. This reconfiguration involves not only weapons, but also manpower and its necessary training.

Another change concerns new institutional relationships that include a much expanded NATO with Russia as a partner and some Eastern Europe and former Warsaw Pact nations as allies (e.g., East Germany, Hungary, and Poland). Given NATO's una-

nimity voting rule, military response to crises is anticipated to be slower in the future as deals must be struck to get holdout allies to agree to an action. This raises questions about the “optimal” size of NATO, which requires an assessment of the benefits and costs of expanded memberships for both existing and new members. The future of NATO has also to be assessed against the development of the European Union’s Security and Defense Policy, including its efforts to create a Single European Market for defense equipment. Further changes have affected the defense industry, which has experienced a growing importance of the electronics industry and increased concentration among large defense contractors [Hartley and Sandler (2003)]. The emergence of national monopolies means the loss of domestic competition in procurement and the possible need to treat defense contractors as regulated firms. Some contractors are transnational with plants on both sides of the Atlantic; such development makes government control more difficult as the contractor maintains autonomy over some component plants. Fewer contractors make competition over competing new designs for innovative weapon systems and platforms more difficult, thereby giving governments less leverage and this loss of leverage is reinforced through the increasing trend to global chains. Yet another change involves the emergence of loosely linked terrorist networks, which makes it more problematic for government efforts to infiltrate a terrorist group. More important, hierarchically organized governments may be ill-suited to battle nonhierarchically organized terrorist organizations. For military manpower, the reliance on reservists for combat roles has not only hurt recruitment but also raised issues of the heavy use of reservists in extended duty in combat zones. Similar problems arise with military outsourcing and the increasing substitution of civilian contractors for military personnel to undertake activities traditionally provided by “in-house” units (e.g., catering, training, and transport). Changed threats and new technology create the need for new weapons, altered force structures, and novel procurement practices, which presents a challenge to the Armed Forces, often reluctant to change owing to vested interests (i.e., each service seeks to maintain its monopoly property rights over land, sea, and air domains).

The post-Cold War era has brought forth new issues [Chapters 21 (M.C. McGuire) and 22 (M. Garfinkel and S. Skaperdas)]. The end of the superpower confrontation and their use of surrogates for localized conflict have implications for the conversion of both the Armed Forces and defense industries [see Chapters 33 (K. Hartley) and 34 (M. Brzoska)]. With fewer surrogate-directed conflicts, the arms trade assumed a smaller importance. In the post-Cold War era, the spread of democracy has its implications not only for trade but also for world peace [Chapters 31 (S.W. Polachek and C. Seiglie) and 35 (C.H. Anderton and J.R. Carter)]. Enhanced trade flows foster links among countries that limit the gains from conflict. The increase in intra-state conflict, which really began in the latter 1980s, and the need for peacekeeping have put stress on UN peacekeeping capacity [Chapter 24 (B. Solomon)]. This has resulted in a greater role for regional alliances, especially NATO and the developing peacekeeping roles of the EU. Peacekeeping raises issues of burden sharing and allocative efficiency since such efforts have strong public good components. Similar burden-sharing issues arise with economic sanctions, which are a means by which the international community

can change a nation's behavior [e.g., Iraq or Iran; see [Chapter 27](#) (W.H. Kaempfer and A.D. Lowenberg)].

There are also new concerns about military manpower and the role of reservists and civilian contractors [[Chapter 32](#) (B.J. Asch, J.R. Hosek, and J.T. Warner)]. The latter constitutes the growing interest in military outsourcing. Given the prolonged Iraq War and its bloody aftermath, there is a possible return to the draft in the United States. Following the Cold War, arms races have assumed a more localized form between regional adversaries – e.g., India and Pakistan nuclear arms race [[Chapters 28](#) (J.P. Dunne and R.P. Smith) and [29](#) (M.C. Garcia-Alonso and P. Levine)], which is particularly worrying given their longstanding hatred. With the rise of intra-state conflicts, small arms and light weapons assume an enhanced importance [[Chapter 30](#) (J. Brauer)]. Such weapons often dominate local conflicts and are difficult to police internationally [also see [Chapter 23](#) (P. Collier and A. Hoeffler)]. Another concern is over the proliferation of WMDs to nonstate actors, particularly terrorists. Terrorists pose a few concerns: (1) the escalating cost of homeland security; (2) the failing efforts to coordinate governments' counterterrorism; (3) growing carnage in terrorist attacks [[Chapters 25](#) (T. Sandler and D.G. Arce) and [26](#) (W. Enders)]; and (4) the effectiveness of traditional military forces against terrorism (i.e., asymmetric warfare).

The post-Cold War period has made nations acutely aware of the guns-versus-butter tradeoff. Enhanced military budgets must come at the expense of social welfare spending as many governments are trying to downsize in terms of the share of GDP devoted to government. With limited budgets and rising military input costs (e.g., the unit costs of new fighter jets), difficult choices must be made by defense policymakers. Examples of such choices include a re-assessment of a nation's military commitments (e.g., the costs of a world role); a search for "efficiency improvements" (e.g., competitive procurement policy and contractorization); role specialization and substitutions between forces (e.g., air power replacing some land forces; cruise missiles replacing bomber aircraft); reservists and civilians replacing regular personnel; and imported equipment replacing arms bought from a national defense industrial base. The move to all-volunteer armies has also increased the cost of defense. New security challenges have required new weapon systems that are expensive to develop, especially in light of smaller production runs [see [Chapter 33](#) (K. Hartley)]. Today's threats require the Armed Forces to assume new roles, which in turn give rise to transformation costs: it requires both time and costs to change the traditional roles of the Armed Forces, especially in peacetime. Typically, the drivers for change for the Armed Forces are wars and new threats (including defeat in battle), new technology, budget cuts, and (occasionally) an innovative Secretary of Defense (e.g., McNamara). But the Armed Forces lack the incentive and market structures that are the feature of private industry, where consumers are continually demanding new products and lower-cost suppliers emerge to satisfy such demands. However, the Armed Forces differ from private markets in their lack of competition, the absence of a profit motive, and the absence of a capital market. For industries, capital markets act as a policing mechanism through takeovers and the threat of bankruptcy.

3. Our decision on what to include in Volume 2

Three considerations drove our decisions on Volume 2's coverage. First, we wanted to include topics that were not covered in Volume 1. Thus, this volume contains chapters on civil wars, peacekeeping, economic sanctions, and the econometrics of arms races. New topics also involve trade, peace, and democracy, the study of conversion, and a survey of peace economics. Second, we allowed for chapters on past topics where there had been a significant advancement of knowledge since Volume 1. There are, thus, chapters on conflict, terrorism, arms races, arms trade, military manpower, and arms industries. Each of these areas witnessed an explosion of literature over the last decade. Third, we commissioned chapters that reflect the influence of globalization and the changing threats (e.g., terrorism, civil wars, and weapon proliferation). In some cases, a topic is included because it fulfilled two or more of these criteria (e.g., terrorism).

In terms of the first two criteria, the increased incidence of civil wars and other forms of conflict have resulted in myriad contributions in economics and political science [see, e.g., [Chapter 23](#) (P. Collier and A. Hoeffler)]. The World Bank and other institutions funded some of this research. Not surprising, 9/11 greatly expanded both theoretical and empirical analyses of terrorism; hence, we included chapters that review and evaluate recent theoretical [[Chapter 25](#) (T. Sandler and D.G. Arce)] and empirical analyses [[Chapter 26](#) (W. Enders)]. Advances in the study of arms races have also been empirical and theoretical in nature; thus, [Chapters 28](#) (J.P. Dunne and R.P. Smith) and [29](#) (M.C. Garcia-Alonso and P. Levine) present these two aspects in separate studies. Recent breakthroughs in econometric methods allow for more accurate study of the dynamics of arms races. Important environmental and/or institutional changes are associated with the role of manpower in the Armed Forces and the arms industry. For the former, there is a substitution of capital for manpower [[Chapter 32](#) (B.J. Asch, J.R. Hosek, and J.T. Warner)], while for the latter, there is an unprecedented consolidation of producers [[Chapter 33](#) (K. Hartley)]. In terms of the third criterion, we are not only interested in the changing nature of threats [[Chapter 21](#) (M.C. McGuire)] but also the impact of these threats on military spending.

4. Organization of the book

The remainder of the book consists of fifteen chapters. The next chapter sets the stage for this volume. [Chapter 21](#) (M.C. McGuire) argues that the nature of defense changed drastically since the end of the Cold War. Security challenges are now more diverse and involve terrorism, rogue states, WMDs, localized conflicts, and invisible invaders (e.g., bacteria and viruses). Although McGuire sees the unitary role of the United States in confronting these challenges in the near-term, he envisions a new "multi-polar power configuration" for the future. McGuire lays out the meaning and role of defense economics in understanding the new security exigencies. McGuire also shows the influence of globalization in this transformation of defense economics.

The following three chapters address various aspects of conflict. In [Chapter 22](#), Garfinkel and Skaperdas provide an up-to-date review and overview of the economics of conflict, which is a fast growing field of inquiry. These authors indicate how conflict is modeled as a contest between self-interested adversaries who expend resources to augment their likelihood of winning the confrontation. The root of conflict theory is rent-seeking behavior. This conflict research agenda was spearheaded by Jack Hirshleifer and Herschel Grossman. Garfinkel and Skaperdas explore the essential ingredients of the conflict paradigm, which includes the “contest success function” and the “technologies of conflict”. Myriad aspects of conflict – endogenous production, war damage, risk aversion, and discount rates – are investigated. [Chapter 23](#) (P. Collier and A. Hoeffler) analyzes conflict in the form of civil wars that may be motivated by greed, grievance, or both. In the post-Cold War era, inter-state wars gave way to intra-state wars, which are primarily based in developing countries. As such, development efforts are severely hampered in conflict-torn countries and their neighbors owing to collateral damage. Collier and Hoeffler review both econometric and theoretical studies. At the outset, the authors offer a clear definition of civil wars and then turn to available datasets on intra-state conflicts. Severity measures may hinge on either deaths or duration. The authors investigate the causes, consequences, and duration of civil wars. With the increased incidence of civil wars has come the need for greater peacekeeping efforts by the United Nations, NATO, other regional alliances, and the United States. [Chapter 24](#) (B. Solomon) investigates the economics of peacekeeping. In particular, he reviews not only alternative financial arrangements for peacekeeping, but also past burden-sharing behavior. The post-Cold War expansion in peacekeeping meant a greater role for NATO in complex missions in Bosnia and Kosovo where NATO’s vital interests are at stake. Moreover, NATO altered its force structure to respond to peacekeeping demands.

[Chapters 25](#) (T. Sandler and D.G. Arce) and [26](#) (W. Enders) address the economics of terrorism. Sandler and Arce apply game-theoretic methods to the study of terrorism. At the outset, they explain a government’s choice between defensive and proactive policies against a terrorist threat. For transnational terrorism where two or more countries face a common threat, there is a proclivity to spend too much on defensive measures and too little on proactive measures. Defensive action represents a “commons” problem with public costs and private benefits, while a proactive response action represents a public good provision problem with public benefits and private costs. For asymmetric targets where one country attracts the most attacks, the prime-target country will take offensive action that affords a free ride on other target countries. A more optimal mix of defensive and proactive measures characterizes domestic terrorism, insofar as externalities from action are internalized in the host country. This chapter displays the study of counter-terrorism in terms of normal-form (matrix) and extensive-form games. For the latter, Sandler and Arce show the importance of leadership for defensive and proactive scenarios. The extensive-form game is applied to investigate the effectiveness of a pledge never to concede to hostage-taking terrorists. In [Chapter 26](#), Enders provides a fresh review of the application of econometrics to the study of terrorism. Much has been written since 9/11 using a host of different techniques – e.g., time series, panel estimation, and

spectral analysis. Enders begins by introducing the reader to various event-based terrorism data sets, which he uses to display the changing nature of terrorism since the 1990s. In particular, terrorism has become more deadly following the dominance of fundamentalist terrorism. He also displays some differences between the data sets. Next, Enders examines the effectiveness of select past counterterrorism measures – e.g., metal detectors in airports, heightened embassy security, and the Libyan retaliatory raid. In the case of barriers such as metal detectors, he emphasizes the substitution phenomenon, where terrorists respond to policy-engineered changes in the relative prices of modes of attacks by substituting into relatively cheaper attack modes. The last third of the chapter evaluates recent studies on the economic impact of terrorism on the general economy and on specific sectors (e.g., tourism and foreign direct investment).

Chapter 27 (W.H. Kaempfer and A.D. Lowenberg) surveys the literature on the use of economic sanctions, which poses an interesting collective action problem because even a single noncompliant nation can greatly compromise the accomplishment of sanction-imposing nations. Following the Gulf War of 1991, economic sanctions was imposed against Saddam Hussein's regime with mixed results. Iran's recent defiance in pursuing nuclear weapons may bring new economic sanctions against it. As indicated by Kaempfer and Lowenberg, economic sanction represents a means, short of war, by which the international community can coerce an action by some recalcitrant nation. The authors examine not only the redistributive influence of sanctions but also their efficacy. In so doing, they stress game-theoretic strategic aspects and the importance of political institutions. Kaempfer and Lowenberg point to the consensus that smart sanctions – designed to impose selective costs on a specific group – have better success than more broad-based sanctions. **Chapter 27** also reviews the empirical literature on the use of sanctions. In so doing, they highlight a number of issues of estimation associated with gauging the effectiveness of sanctions.

The next two chapters concern arms races. **Chapter 28** (J.P. Dunne and R.P. Smith) investigates econometric issues surrounding military arms races among adversaries. To provide a balanced econometric approach, these authors consider the underlying theory, data, and statistical specifications. As enduring rivalries between pairs of hostile countries or alliances, arms races represent a dynamic interaction that is particularly difficult to investigate from a statistical standpoint. A primary issue concerns the arms race variable: is it military spending, military assets, manpower, or some combination? Another issue involves how much the arms variable must increase each year to constitute a "race". The authors present four alternative econometric paradigms for arms races: time-series estimation of a Richardson action–reaction model; Markov switching estimation of a discrete game-theory model; cross-section estimation model; and panel (time-series, cross-section) estimation model. The time-series Richardson model is tested for India and Pakistan, while the Markov switching estimation is tested for Greece and Turkey. Both of these dyads represent localized arms races that characterize the post-Cold War era of globalization. This chapter adds greatly to the [Brito and Intriligator \(1995\)](#) chapter in Volume 1, which did not investigate econometric issues. The empirical concerns raised by Smith and Dunne also apply to other econometric

exercises – e.g., the impact of defense spending on economic growth. In **Chapter 29**, Garcia-Alonso and Levine present a game-theoretic-based study of arms trade and arms races. The authors note that arms trade has positive and negative consequences. On the positive side, arms exports may add to GDP while bolstering the security of allies; on the negative side, arms exports may decrease security while fueling conflict in unstable regions. Moreover, arms can fall into the hands of enemies. In short, arms exports have positive and negative externalities. The authors display some intertemporal models with a demand and supply side for the arms trade and account for strategic interactions among the agents. According to the authors, the resulting Nash equilibrium will be inefficient owing to coordination failures that neglect externalities. The more likely scenario is too much arms trade that can fuel local arms races, with negative consequences for the world community. Possible regulatory regimes are also discussed to ameliorate a host of collective action problems.

In **Chapter 30**, J. Brauer focuses on arms industries and the arms trade in developing countries. An important insight of this chapter is its recognition of the transnationalization of arms industries and its implications for developing countries. Namely, developing countries contribute components to a wide range of arms even though some other country may, at times be credited with the production of the weapon platform. Brauer notes that some developing countries – e.g., Brazil, China, India, Russia, and South Africa – produce arms on a par with some developed countries – e.g., Australia, Sweden, and Canada. Brauer also points to the failure of nonproliferation as ideas, know-how, and technologies transcend borders in an age of globalization. In the latter portion of the chapter, the market for small arms and light weapons is analyzed. These weapons cause many deaths in civil-war-torn developing countries. Additionally, proliferation issues are addressed in terms of how they pertain to developing countries.

Chapter 31 (S. Polachek and C. Seiglie) represents a new topic for the *Handbook of Defense Economics* that weds ideas from economics and political science. In essence, Polachek and Seiglie investigate whether trade linkages make for less conflict by forging profitable interactions (i.e., gains from trade) that could be destroyed by conflict and disagreements. This chapter builds a theoretical underpinning as to how trade between countries affects conflict and cooperation. Conflict or “trade gone awry” can result from the failure to profit from trading opportunities, nontrading countries competing over a trade opportunity, or the perception of inequitable terms of trade. These authors also review past empirical tests of trade as an impediment to conflict by displaying many issues of estimation, including data availability. A host of empirical models – time-series, cross-section, and panel estimates – are reviewed. In addition, Polachek and Seiglie consider the “democratic peace” literature that views democracies as seldom fighting with other democracies or initiating wars. If this viewpoint is correct, then efforts to promote democracy may result in a more peaceful world.

Much has changed regarding military manpower since J.T. Warner and B.J. Asch contributed to Volume 1 of the *Handbook of Defense Economics*. First, there has been a significant reduction in personnel in the NATO allies – e.g., US military manpower fell from 2.2 million in 1985 to 1.4 million in 2004; Germany’s military manpower fell

from 495,000 to 252,000 over the same period; and France's military manpower fell from 560,000 to 357,000 over the same period [NATO (2005)]. Second, there have been significant deployments of US troops to combat zones in Afghanistan and Iraq. Third, NATO supported complex and lengthy peacekeeping missions in Bosnia and Kosovo. Fourth, more European countries shifted to volunteer forces. Fifth reservists have played an integral role in Iraq. In [Chapter 32](#), B.J. Asch, J.R. Hosek, and J.T. Warner present the new economics of manpower in the light of these and other changes in the post-Cold War era. Among the topics addressed, the authors investigate the ability of the United States to recruit high-quality personnel in the light of longer tours of duty and mounting casualties in Iraq. Manpower enlistment supply is related to advertising, bonuses, educational benefits, and other considerations. [Chapter 32](#) provides a balanced presentation of the supply and demand for manpower in the post-Cold War era. Issues of compensation – i.e., pay, retirement benefits, and entitlement – are discussed. In addition, the authors consider the possible return of the draft.

In [Chapter 33](#), K. Hartley examines the defense industrial base, procurement practices, and industrial policies in light of developments since the end of the Cold War. Mergers have significantly reduced competition and have left just one or two domestic producers for some large defense systems. To take advantage of economies of scale during an era of smaller production runs, some governments (e.g., the United States) encouraged these mergers. There are challenges and costs in maintaining a defense industrial base during peaks and troughs in orders, as well as issues in maintaining competition for domestic procurement. Topics addressed include military outsourcing, the performance of joint ventures, the internal efficiency in the Armed Forces, and the profitability of defense industries. A globalized world with increased international competition has profound implications for procurement practices and the future of defense firms. Hartley indicates how defense industries are adjusting to globalization, new technologies, and new threats.

[Chapter 34](#) (M. Brzoska) analyzes conversion (i.e., the switch of inputs from defense to civilian production) during the post-Cold War era, as the share of GDP devoted to defense plunged in most countries. Brzoska begins with a careful analysis of the meaning of conversion and the many different ways that conversion and its “success” can be measured. Although the author's prime focus is on the general concept of conversion and its measurement during the last decade, he refers to numerous case studies to support his arguments. In places, he presents enlightening comparisons and contrasts in conversion experience between countries in the West and the East. Government policies for fostering conversion are also highlighted and evaluated. Conversion involves reallocation of lands, labor, research capacity, and capital – each of which has its unique issues. The chapter also assesses the impact and implications of conversion for both the Armed Forces and defense industries.

In [Chapter 35](#), C.H. Anderton and J.R. Carter provide a survey of peace economics that identify seminal and current contributions. The authors begin by distinguishing between defense economics and peace economics in terms of topics and orientation. Next, they examine data sources on conflict that have greatly fostered econometric studies of

civil wars, inter-state wars, and nonconventional conflict (e.g., terrorism). These data are used by the authors to show recent trends in conflict. A sizable portion of the chapter is devoted to an analysis of the seminal work of arms rivalry by Richardson (1960), Lanchester (1916), and Intriligator (1975). Many fascinating extensions of these models are displayed. In the latter portion of the chapter, the authors consider models that account for appropriation and exchange – standard economic models focus on exchange and production, and ignore appropriation. Finally, the authors review experiments in peace economics dating back to the 1950s.

5. Concluding remarks

As with Volume 1, it is our intention that Volume 2 of this *Handbook* will serve as a reference source, a teaching tool, and a stimulant for future research. The intended audience includes academics, researchers, and graduate students in economics, political science, and military sciences. The book should also interest defense policymakers in the Armed Forces, national defense ministries, Department of Homeland Security, NATO, the EU, and the United Nations; staff and decision makers in defense industries; and personnel in peace organizations.

The military downsizing set in motion at the end of the Cold War is still playing itself out. Hence, further research is needed on changing manpower needs and the restructuring of the defense industry. Weapon proliferation continues to present a difficult collective action problem that must be addressed. Globalization will further change business practices which will affect defense industries. Although many national defense markets are highly protected, there will continue to be barriers to the creation of an open and global defense market (e.g., EU nations protect their national defense industries through the application of Article 296). In defense procurement, preferential purchasing and tariff protection represent government-created market failures. Finally, asymmetric warfare and the rising threat of terrorism present countries with force restructuring issues that have not been adequately handled. Today's threats require radical change and departures from traditional methods of warfare. Such transformations will be difficult and costly.

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