

THE IMPORTANCE OF ARMS INDUSTRIES

Introduction: the policy issues

Arms producers and arms industries are controversial: they are often criticized and condemned. But such criticisms need to be addressed and carefully considered. Arms firms and whole arms industries cannot be dismissed and proscribed without more detailed and careful analysis and evaluation of their apparent “wrongdoings”.

This chapter sets the scene and outlines the policy issues to be explored in the book. Are arms industries important: if so, why, and which other industries are viewed as important? Do they provide “good value for money”, or are they inefficient, corrupt and immoral; should they be condemned as “merchants of death”; and do they exploit their market power at the expense of taxpayers? What can and should governments do about them: should privately owned arms firms be subject to tighter government regulation or should they be taken into state ownership, and will state ownership solve the “problem”? These and other questions will be addressed in this book, at the end of which the reader will be able to reach a more informed judgement about the economic aspects of the arms industry. In this chapter, the arguments surrounding the arms industry will be presented and assessed. A legal approach would ask what is the case for the prosecution and what are the arguments for the defence? A starting point requires an explanation of why economists disagree about arms industries and other policy issues, followed by a definition of the arms industry.

Why economists disagree

The typical view of economists is that where there are ten economists there will be ten views and only one will be correct, but no one knows who will be correct!

Economists have good reason to disagree.¹ Their disagreements might focus on differences of view about the relevance of a specific theory (e.g., Keynesians versus monetarists), on whether theories should be accepted or rejected on the basis of their explanatory power and predictive accuracy, or on the realism of their assumptions. Disagreements continue over the accuracy and reliability of evidence and on the appropriateness of particular policy solutions in relation to each economist's value judgements and their views about the best solutions. Here, a distinction arises between positive and normative economics. Positive economics is concerned with *what is* whereas normative economics is about *what ought to be*.

Economists disagree about arms industries for all these reasons. They will disagree about the best economic model for explaining and understanding the behaviour of arms producers, industries and markets. For example, cost overruns and delays on major arms projects are viewed either as the result of firms tackling high-technology problems and uncertainty or as private monopolies exploiting taxpayers. There will also be disagreements about the facts to be explained and the reliability, relevance and acceptability of the evidence. Finally, they will disagree about the best policy solutions, with some preferring market-type solutions (e.g., privatization, or more competition) and others opting for state-type solutions such as state-owned and not-for-profit enterprises. Even definitions of the industry are a source of controversy.

What's in a name? Matters of definition

Arms firms and industries are known by various names. They have been called arms, weapons, military, defence or security industries. Differences of definition often reflect whether the analyst is a peace or defence economist: peace economists prefer the term arms industry whereas defence economists prefer the description defence industry. Care is needed in distinguishing

between arms industries and the military, comprising a nation's armed forces in the form of armies, navies and air forces. Armed forces buy arms as inputs into their "production" of defence outputs in the form of peace, protection and security.

Arms industries supply weapons to armed forces both nationally and internationally via exports. They are involved in the design and development (research and development, or R & D), production, servicing and modification of military equipment. They are also involved in training military personnel as well as the management and maintenance of military facilities (e.g., docks, airfields and ranges) together with the disposal of equipment, some of which might involve substantial environmental and "clean-up" costs. For example, disposing of nuclear weapons is costly and time intensive (the process can take up to 50 years). In the case of nuclear-powered submarines, the options include docking at a military shipyard, dumping at sea and temporary safe storage prior to permanent disposal. Russia dumps its nuclear waste at sea (the Kara Sea, north of Siberia); the US uses a nuclear waste repository at Hanford in Washington state; and the UK stores its redundant submarines at Devonport and Rosyth prior to storing its nuclear waste at Capenhurst, Cheshire. Similar disposal and clean-up costs arise for nuclear research and production plants and for storage sites for nuclear weapons.

There are, however, various definitions of arms industries. A narrow definition focuses on *lethal* equipment, comprising lethal air, land and sea equipment. Examples include combat aircraft and helicopters, missiles, tanks and artillery, submarines, aircraft carriers, warships and space systems.² Lethal equipment also embraces conventional and nuclear equipment, as well as major projects and small arms (e.g., rifles, ammunition). Indeed, a distinction can be made between the relatively controlled trade in major conventional weapons and the relatively uncontrolled trade in small arms and light weapons. A further dimension embraces the defence electronics industry, which provides the navigation, guidance and communications systems for modern weapons. The emergence of cyber warfare and the companies involved in such activities adds to the challenges of defining arms industries.³

There is a broader definition of arms industries that includes all firms supplying goods and services to national defence departments or ministries. Such a definition embraces non-lethal goods and services such as the supply

of accommodation, the construction of military bases, the supply of fuel, food and financial services and the supply of motor vehicles, computers and IT systems. The increasing emphasis on the outsourcing of military activities to private contractors has expanded arms markets, allowing new firms to enter markets for activities that were traditionally undertaken “in-house” by the armed forces. Examples include catering, cleaning, transport, training and air tanker operations (e.g., in the UK, RAF air tankers are provided by a private contractor).

There is a further sub-group of weapons: namely, arms firms involved in the supply of weapons of mass destruction (WMD), comprising nuclear, biological and chemical weapons. Biological and chemical weapons are subject to international conventions that outlaw their development, production and stockpiling; but not all nations are signatories to these international conventions and those that are signatories might not abide by the rules. There are also similar international conventions on certain conventional weapons and cluster munitions.

Arms producers are subject to national and international laws that affect their ability to trade, so arms sales that violate such laws form illegal trades. Most large conventional equipment is readily identifiable and is supplied by a small number of large firms, meaning that trade in such equipment is easily regulated and policed by national governments. For example, export sales of aircraft carriers and combat aircraft are difficult to hide and conceal; but export sales of small arms and light weapons (e.g., rifles, ammunition, machine guns, some missiles) are much more easily hidden and can be traded illegally. There are a large number of small firms supplying small arms and this makes their policing more difficult and costly. There is also a demand for illegal arms, with demand coming from non-state groups such as terrorists, rebel groups (freedom fighters) and criminal gangs (e.g., the Mafia). Such demands, often for small arms, can be satisfied by illegal trading, by theft or by acquisition in conflict. Given a demand for illegal trading, arms dealers will emerge to satisfy such demands by bringing together willing sellers and willing buyers. For the purposes of this chapter it is sufficient to recognize that some arms producers supplying small arms and light weapons might be involved in illegal trading (some producers might not be aware of their role in illegal trading: see Chapter 2). Nor are national governments the only buyers of arms; other buyers include private groups and individuals.

New technology affects how we define arms producers and arms industries. For example, manned aircraft only emerged after 1903, leading eventually to today's major aerospace industry, supplying combat aircraft, helicopters, missiles and space systems (including rocket propulsion and moon landings). Aerospace is a completely new industry that did not exist in 1900, and it has resulted in air forces as a new branch of the armed forces. Entry into space has added space to the traditional dimensions of warfare, which now include space weapons and assets (e.g., military satellites). Other examples of technical advance that led to new arms firms include radar, electronics, tanks, nuclear-powered submarines, drones and unmanned air vehicles. More recently, cyber has emerged as a new market, reflecting new threats to national security. Cyber involves markets for software and surveillance technologies that meet an objective that otherwise requires espionage or the use of force. Cyber is an interesting example where the product is not directly lethal but where security is included in one of the definitions of arms industries.

Arms producers and industries are not static: they are changing continuously to meet new threats and new technologies. Some arms firms respond to change by adopting new technologies or by acquiring other firms with relevant technologies and existing markets. Firms that adjust to change successfully will survive; those that fail to adjust will exit the arms industry. For example, BAE Systems has sold many of its civil holdings and acquired a cyber business (BAE 2015). Firms that have exited the aerospace industry include famous aircraft firms (e.g., de Havilland, Hawker, Supermarine and Vickers (all UK); North American and Curtiss–Wright (both US)) and such firms as Swan Hunter (UK) have exited the shipbuilding industry, while other arms firms have exited the industry and entered new civil markets.

Defining and classifying arms producers needs to allow for their defence-dependence (see Table 2.1). Some arms firms supply dual-use products: for example, track can be used for tanks or tractors; steel can be used for warships and bridges; and jet engines are used on both military and civil aircraft. Also, some producers of arms have a high dependence on their arms sales, with such sales accounting for 80 per cent or more of total sales. Questions then arise as to whether firms supplying dual-use products and those with a low defence-dependence are part of the arms industry? One answer is that they qualify as part of the arms industry if they supply their

products to a national or foreign defence department or to a national or foreign arms producer.⁴ In this case products include goods and services, both lethal and non-lethal, where the supply-side comprises R & D, production, repair, maintenance, modifications and upgrading of equipment. Disposal of arms, especially of WMD, can also be added to the definition of arms industries.

The arms trade is big business and the size of the business varies with war and peace and with international tension (e.g., arms races). The business increases during war, conflict and periods of international tension (e.g., threats, including terrorist threats), all of which lead to increased defence spending. Similarly, business and spending declines with peace and disarmament (e.g., at the end of the First World War, the Second World War and the Cold War), with declining business leading to job losses, plant closures and exits from arms industries. But change is not instantaneous and costless: it takes time and involves adjustment costs (e.g., unemployment, and under-employment of labour and capital resources: see Chapter 9). A further clarification is needed between total defence spending and arms spending. Defence budgets are allocated to acquiring military personnel, arms and other equipment, as well as military facilities (e.g., military bases including airfields, barracks and dockyards). As a result, arms spending forms only part of a nation's total defence budget (e.g., equipment spending might vary from 10 per cent to 30 per cent of a nation's defence budget, where the remaining items of expenditure include personnel, infrastructure and other components).

Arms or defence equipment provides an input into the production of final or overall defence output. The armed forces combine arms with personnel, military facilities (capital such as military bases and communications systems) and other equipment and services to produce overall defence output. However, there is no recognized method of valuing defence output. Traditionally, in many economies, the convention was to assume that inputs equalled outputs (a convention that applied throughout the public sector); but this provided no single valuation of overall defence output. Instead, defence output has been variously described as the provision of peace, protection, deterrence, insurance against future threats and, ultimately, security, but with no single monetary valuation on these outputs. In some economies, defence output is expressed as defence capabilities: for example,

the capability to deploy, say, 5,000 combat troops and supporting air and sea forces to the Middle East indefinitely. While this is an improvement over the convention that inputs equal outputs, it lacks a money value for these capabilities: hence, it is not possible to determine whether overall defence spending is a worthwhile investment.

Arms industries are different from the final output of overall defence. For arms, there are market prices comprising input costs and profit margins that reflect the government's and other buyer's willingness to pay. But there are no money valuations that can be placed on the final output of overall defence to provide a single indicator of its value or benefit. In contrast, many civilian goods and services, such as motor cars, televisions and mobile phones, are traded in private competitive markets with large numbers of buyers and sellers determining market prices, showing society's valuation of these products. Defence, however, differs in several key ways from private competitive markets and this explains the challenge in measuring and valuing overall defence output. Nevertheless, all is not lost and economics offers some policy guidelines in this area. The costs of defence and of specific capabilities can be identified and policy-makers can then ask whether defence provides at least a comparable level of benefits. For example, if overall defence spending costs £N billion, does it provide overall benefits of a similar value? The same question can be asked for specific force capabilities, such as nuclear strategic forces, an aircraft carrier capability and a specific combat aircraft capability (e.g., the capability provided by an F-35 combat aircraft).

Different definitions of arms producers and industries affect the size of the industry. A narrow definition based on lethal equipment only would result in a smaller industry than one based on a wider definition that included all sales to national and foreign governments and to national and foreign arms producers. Critics of arms industries need to be clearer about their definitions. Whichever definition is used, the importance of the industry needs to be assessed.

The importance of the industry

Economists assess the economic importance of an industry in terms of its contribution to national output (GDP) compared with the contribution if

the resources were used in alternative industries. For example, what is the contribution to GDP of arms industries compared with such alternatives as agriculture, banks and financial services, chemicals, construction, creative industries, electronics, motor vehicles and pharmaceuticals? All industries and services contribute to national output so the key question is which industries maximize national output. In competitive market economies, competition resolves this issue by allocating society's scarce resources between alternative uses so as to maximize national output: hence, an industry in a competitive economy will produce a greater output than its alternatives in other sectors. But real-world economies are not perfectly competitive and private markets often fail to work properly. They might "fail" to work properly because of imperfections such as monopoly power and entry barriers as well as beneficial and harmful externalities (harmful externalities include traffic congestion, noise and pollution: see Tisdell & Hartley (2008)).

Assessing the economic importance of arms industries immediately encounters two major data deficiencies. First, official government statistics on national output do not identify arms industries as a separate and identifiable industrial grouping in any census of production statistics (see Chapter 2).⁵ Second, there are no money valuations for the *defence final output* of the arms industry: instead, there are only money values for the *input* costs of arms purchases. Nonetheless, the contribution of arms industries to peace, protection and security for a nation's citizens cannot be ignored: these aspects of defence output have some positive money valuation and society has to reach a judgement on whether the value of these benefits exceeds the cost of supplying arms. One approach is to consider the "Hitler question": namely, what would the UK have been willing to pay to protect itself from invasion by Hitler in 1940? In this context, the UK arms industry supplied the aircraft, tanks and warships that eventually contributed to the defeat of Hitler in 1945 (e.g., Hurricanes, Spitfires, Lancaster, Halifax and Mosquito aircraft). The modern equivalent of the Hitler question would be the possible threats from Russia and IS as well as the general uncertainty about future threats facing all nations. The future is unknown and unknowable, hence the need for some minimum national defence capability to meet such threats. Here, it has to be recognized that defence is not like a water tap that can be turned on and off whenever required. Costs and time are needed to create and train a modern fighting

force and these costs can be regarded as an insurance premium to meet unforeseen and unforeseeable contingencies.

In circumstances where there are no money valuations of defence output, assessing the economic importance of arms industries requires alternative measures of importance. These include its economic contribution in terms of employment (jobs) and technology and its contribution to the balance of payments through exports and import-savings (domestic purchases of arms avoids paying for imported arms). But a list of these economic benefits has to be approached critically. First, these benefits need to be compared with the economic benefits that derive from other industries, such as motor vehicles, pharmaceuticals and electronics. This is an empirical question requiring evidence on the economic benefits of alternative industries. Second, in making an economic case for state intervention in arms industries, the economic benefits have to be justified in terms of market failure. Are there failures in labour (jobs), technology (spillovers) and foreign exchange markets (balance of payments)? Next, it is necessary to identify the causes of market failure before identifying appropriate solutions. Typically, a variety of alternative policy solutions are available and it does not follow that arms and arms industries represent the least-cost solution. For example, jobs can be created by construction projects (e.g., building houses, bridges and roads) and more jobs will be created where wage rates are lower than in the arms industry.

Arms, defence and public goods

Arms and arms industries have a further distinctive feature resulting from the public goods nature of defence that represents another source of market failure. Arms and arms industries contribute to defence output. Defence and peace are often presented as classic examples of public goods. These are goods where one person's consumption of defence (or peace) does not affect other people's consumption of defence (non-rivalry), and where once provided, no individual can exclude others from the consumption of defence (non-excludability). For example, the air defence of Moscow is provided to all its citizens: one Moscow citizen's consumption of air defence is not at the expense of any other Moscow citizen, and no Moscow citizen can be excluded from its air defence.

The public goods nature of defence means that left to themselves, private markets will fail to provide the socially desirable amount of defence for a society. As a result, some form of state intervention is needed to correct such market failure and improve the operation of private markets. Once defence is provided, its benefits extend to everyone in society and individuals cannot be excluded from the good by charging a price (cf. the purchase of motor cars). This means that if direct prices cannot be charged, some other method is needed to finance the supply of defence. However, alternative methods of financing defence raise two further problems. First, the “free-rider problem”, where a citizen obtains the benefits of defence without contributing to its costs. An example is free riding in NATO, with European member states apparently free riding on US defence spending. Citizens have incentives to conceal their true willingness to pay for defence if its costs will be borne by others in society. Second, if it is difficult to identify each individual citizen’s valuation of defence, how does a society or government determine the appropriate or “ideal” size of its defence budget? In democracies, voting systems often have major limitations in allowing voters to express their true preferences for different levels of defence and arms spending (Hartley 2011a: Chapter 4). For example, a general election does not identify each voter’s specific preferences for, say, income tax versus social welfare versus education versus foreign policy issues. As a result, elected politicians have discretion in interpreting voter preferences, subject to their desire for re-election. Alternatively, voter preferences on specific issues can be determined more accurately through referendums, but even here, the accuracy and reliability of voter preferences can be affected by the question posed by a referendum and by decisions made by majority voting (compared with alternative voting and decision-making rules). Society needs some mechanism for determining the importance of the arms industries. A legal model or approach to this question would focus on the case for the prosecution and that for the defence.

The legal model: the case for the prosecution

The case against arms industries is varied and extensive, which makes it challenging to distinguish myths, emotion and special pleading from

economic and critical analysis and empirical evidence. The task of the economist is to critically evaluate the economic logic of arguments about the arms industry. One could also judge this industry from other perspectives or through different disciplines. For example, educational and medical groups, theologians, religious groups, Quakers, some scientists and peace scientists and other interest groups condemn the industry on ethical and moral grounds (e.g., Campaign Against the Arms Trade (CAAT)). In 2015 Pope Francis condemned arms manufacturers for being “drenched in innocent blood”, saying that the arms trade contributed to deaths, injuries and the violation of human rights. Clearly, there are issues of economics versus ethics. Some critics view the arms industry and the military as the “wicked problem” responsible for all the world’s ills. The scientific basis of this claim is not addressed. In contrast, this chapter and the book more generally evaluate the arms industry from an *economics* perspective.

Critics claim that arms producers and industries are inefficient monopolies charging high prices and earning monopoly profits at the expense of taxpayers. Furthermore, it is asserted that they supply arms that are not needed, that are characterized by cost overruns, delays in delivery and poor operational performance, and that in some cases have to be cancelled at great cost to the taxpayer and a loss of defence capability for the armed forces. The indictment continues with arms industries accused of starting and promoting wars and conflict and being guilty of bribery and corruption in achieving arms sales, especially arms export sales. These allegations need to be subject to explanation and critical appraisal: a task for which economists are well qualified.⁶

A starting point is ownership and profitability and the need to distinguish between the behaviour of privately owned arms producers and that of state-owned ones. Economic theory establishes a presumption that compared with competitive markets, private monopolies result in higher prices, lower output and abnormal or supernormal profits, leading to a socially undesirable outcome (a misallocation of resources: see Tisdell & Hartley (2008)). In contrast, state-owned monopoly arms producers might act “benevolently” in the “public interest”, charging competitive prices and earning only normal profits or zero economic profit.⁷ On this basis, critics of arms industries need to distinguish between ownership and profitability, taking care about the definition of profits. State-owned monopoly arms producers might not

act benevolently and might be required to act commercially, operating as profit-maximizers, in which case their behaviour will be similar to a private monopoly producer. Also, state-owned enterprises might not be least-cost producers since they are not subject to capital market pressures and, instead, might be subject to “soft budget” constraints (with government-provided funds). Profitability is also confusing since arms producer’s reported profits, which are the focus of criticism and condemnation, are typically accounting definitions of profits and not economic definitions of profits.

Critics also claim that arms producers provide arms that are not needed and that are characterized by cost overruns, delays and “gold plating”. The assertion that arms industries provide arms that are not needed has to be related to established economic models of defence spending. These suggest that military expenditure, and hence the need for arms, is determined by various factors such as the relative prices of arms and civil goods, a nation’s total output (GDP and growth rates), the threats it faces, its membership of military alliances (e.g., NATO), whether it is involved in wars and conflicts, and other variables (e.g., political composition of its government; strategic variables such as the end of the Cold War (Hartley 2011a: Chapter 5)). On this basis, arms are needed to respond to threats, wars and conflict. Weapons are costly and are unlikely to be bought if not needed.

The further claims about costs, delays and gold plating need to be assessed against a standard for comparison. Is a “perfect world” assumed, where there are no cost overruns, no delays and all weapons perform as originally specified? Or, is a real world of uncertainty assumed, where the results of work on high-technology weapons always departs from original plans and where mistakes are made? With uncertainty, no one can accurately predict the future, and today’s initial contract estimates for advanced technology weapons will usually be wrong. Arms producers operating at, or beyond, the known frontiers of technology cannot be certain about the unknown and unknowable future. As a result, defence departments have to formulate and award contracts that recognize uncertainty and aim to minimize its costs (see Chapter 7). Threats, technology and governments can change, leading to project cancellations that are often high-profile and widely publicized events. Such cancellations made by governments are not necessarily conclusive evidence of arms producer inefficiency and failure: they might reflect inefficiency and incompetence by the government, or project cancellations

might be perfectly sensible and rational government decisions when new technology renders a project obsolescent. Next, evidence is needed on cost escalation and overruns to enable international comparisons of contractual performance. For example, are some nations able to obtain similar types of advanced arms with lower cost overruns, fewer delays and less gold plating? Which are these successful nations and how are such results achieved? Moreover, are other industries and projects also subject to cost overruns, delays, gold plating and project cancellations? Possible examples include major construction projects (e.g., roads, bridges, tunnels) and new developments in motor vehicles, pharmaceuticals or oil exploration. However, private firms rarely publish information on cost overruns, delays or cancellation for their new product developments.

A final set of claims relates to arms producers starting and promoting wars and supporting their activities through bribery and corruption. More specifically, arms exports are alleged to promote regional arms races and contribute to international tension, to waste national resources, to impede economic development and to support oppressive regimes. However, economic models of arms races predict a variety of outcomes. Arms races arise from interdependence between nations' defence spending, reflecting an action–reaction process in which one nation increases its military spending in response to an increase in a potential rival's military spending (e.g., nuclear weapons). Examples of arms races include that during the Cold War between the US and the former Soviet Union, and regional arms races such as those in the Middle East, in India and Pakistan and in North Korea and South Korea. Interestingly, economic models of arms races show that they may contribute to peace through deterrence and that disarmament may be destabilizing, leading to outbreaks of war (Sandler & Hartley 1995: Chapter 4).

Nor is it clear how arms producers start wars. Admittedly, they benefit from the increased defence spending during wars, but if they are so powerful then how do critics explain disarmament and peace, which do not benefit arms producers? Similar condemnation of an industry could be applied to, say, pharmaceutical companies, which might be accused of promoting epidemics, disease and illness, with some products being lethal! Other industries facing similar criticisms and condemnation include motor vehicles, civil nuclear power generation, deep-sea fishing and oil exploration.

Arms producers are also criticized for bribery and corruption, especially in relation to arms exports. Allegations have included arms exports from French, German, British and American arms producers to countries such as Indonesia, Saudi Arabia, South Africa, Tanzania and Venezuela (e.g., BAE Systems in 2010: see Hartley 2012b). Elsewhere, claims have been made of illegal behaviour in relation to arms firms securing domestic contracts (e.g., Boeing in relation to bidding for the US air tanker contract). Problems arise because many of these sales are surrounded in secrecy. Nonetheless, where arms firms are found to be acting illegally, they and their staff should be subject to legal action comprising fines, sanctions and imprisonment.

Bribery and corruption are not confined to arms producers. Other firms outside arms industries have been involved in similar practices, although data are not available to determine whether arms producers are more likely than those in other industries to be involved in bribery and corruption. Examples of other industries involved in corruption include construction, pharmaceuticals (drug companies), gas and oil industries, gas turbines and illegal groups (e.g., Mafia), as well as various sporting activities (e.g., athletics). Corruption distorts markets and leads to unfair competition, and it flourishes where markets function poorly. Defence and security markets represent corruption risks since they involve large contracts that are often shrouded in secrecy and awarded in non-competitive markets. But in principle *all* public sector markets that contract out activities to outside contractors offer opportunities for bribery and corruption as a means of obtaining business.⁸

One further group of arms producers is the focus of special criticism: namely, private military and security companies. Some of these are involved in peaceful activities; others are involved in conflict situations. They provide combat support, including training and intelligence provision, consultancy, security and post-conflict reconstruction. Their security role includes protection tasks such as the guarding of individuals, installations, facilities, pipelines and convoys. Examples include the Constellis Group in the US (previously Academi, formerly Blackwater), Aegis Defence Services and G4S in the UK, the Unity Resources group in Australia, and RSB in Russia. Analysis is complicated by the fact that these companies often change their names! Some of their activities require personnel equipped with small arms, and in a conflict situation (e.g., Iraq) there might be no obvious difference between regular soldiers and private support workers

in protecting convoys or installations. Critics demand that private military and security companies should be subject to government regulation forbidding their involvement in direct combat and combat support (Mathieu & Dearden 2006). This raises more general questions about the extent to which military activities can, and should, be allocated to private companies (see Chapter 8).

A further sub-group of private military companies embraces mercenaries and private armies involved in direct combat. Mercenaries are defined as individuals and groups fighting for personal gain rather than national interests (such as in African conflicts like that in the Congo). Criticism focuses on their definition, accountability and legality in lethal combat operations, where the pursuit of personal gain can prolong conflicts and lead to “undesirable” external effects (e.g., civilian casualties). There are international and national laws on mercenaries. The UN Convention on mercenaries has not been signed by all nations, including nations with large military forces (e.g., France, China, India, Russia, the UK and the US). Also, some nations have national laws forbidding their citizens from fighting in foreign wars not involving their nation state (the French Foreign Legion and the British Army’s Gurkhas are not classed as mercenaries).

Any study of arms industries cannot ignore the ethical and moral aspects of arms and some types of warfare. Arms industries involve potential clashes between economics, ethics and morality. For example, an economically efficient arms policy might be regarded as unethical and immoral; but, in principle, the contrary might be possible, where economic efficiency might be ethical and moral (there are other combinations for this matrix of economics, ethics and morality, further adding to the controversy surrounding this industry). It could be the case that arms exports were part of an efficient arms policy that might also be viewed as unethical and immoral. Alternatively, ethical and moral policies might create inefficiencies in arms industries. Furthermore, some arms and some forms of warfare might be totally unacceptable, so they are subject to international bans. Examples include chemical and biological weapons, but international bans do not guarantee that all nations will observe the prohibitions. Technical progress might also lead to new weapons that could also be subject to an international ban. For example, the future development of completely autonomous weapons (without human intervention) might be viewed as unethical and immoral.

In summary, the case against arms producers is that they have serious impacts on human rights, security and economic development. Further, it is claimed that the procurement or export of arms might exacerbate conflict, promote aggression or raise tension, support oppressive regimes, undermine democracy and threaten social welfare spending (CAAT 2016a). Not all these claims and assertions have a firm scientific, theoretical and empirical base. Where economics and ethics are in conflict, economists can identify the economic consequences of ethical arms policies, thereby contributing to a more informed debate. Next, the case in favour of arms producers is presented.

The legal model: the case for the defence

Arms industries are justified in terms of their military and economic benefits. They contribute to national security in the form of peace, protection and the security of a nation's citizens, their assets and their national way of life (e.g., freedoms of speech, mobility and culture). These are "goods" that citizens value and for which they are willing to pay. A domestic arms industry contributes to national defence output by providing independence, security of supply and resupply, especially in a conflict. It also provides equipment designed specifically for the nation's armed forces. For example, a domestic arms industry provides arms in a national emergency (e.g., the UK in 1939, with the Hitler question, or in 2017, with threats from IS (Islamic State) and Russia). Arms industries also provide equipment that is needed for international peacekeeping operations, disaster and humanitarian relief missions (e.g., UN operations).

Although such arguments appear impressive, they are not immune from criticism. While citizens value peace and security, their willingness to pay is usually limited (except in national emergencies such as that in the UK in 1939), and the "public goods" and free-rider aspects of defence mean that it is complex to identify a society's true valuation of and willingness to pay for national defence (and international peace and security). Nonetheless, the contribution of a national arms producer to both national and international peace and security has some positive valuation that needs to be incorporated into any economic evaluation of arms producers. However, maintaining

a national arms industry to provide independence, security of supply and tailor-made weapons is never cheap and can be costly. Also, specifically designed nationally procured weapons are associated with cost overruns, delays and poor operational performance (see Chapters 7 and 10).

An alternative would be to import arms from foreign producers where their governments have funded all the costs and risks of development and the importing nation pays some contribution to foreign development costs. Compared with nationally procured weapons, imported arms might be cheaper and less risky: their development risks would have been solved with funding from a foreign government. However, a foreign government might cancel the development of a major weapons system, thereby depriving overseas buyers of a required weapon.⁹ There are various forms of importing that will reduce some of their risks, especially in relation to independence and security of supply. For example, the importing nation might be willing to manufacture the foreign equipment under licence by creating a domestic final assembly line (e.g., F-16s, F-35s). A foreign buyer might also specify national requirements for equipment, including electronics and engines. For example, in 1966, the UK purchase of US Phantom aircraft required that UK Rolls-Royce engines as well as British avionics be fitted into the aircraft. Similarly, the 1995 UK decision to buy US Apache attack helicopters required local assembly at Yeovil, Somerset, with Rolls-Royce engines and UK electronics. Admittedly, licensed production and design modifications are not costless but they might be cheaper than the national development and small-scale production of domestically produced weapons. This becomes an empirical question requiring evidence on the total development costs and the unit production costs of independence compared with direct imports and licensed production with or without modifications. An alternative policy solution to independence and security of supply might be provided by membership of a military alliance (e.g., NATO).

National arms producers provide additional economic benefits in the form of employment, technology and spillovers, and a contribution to the balance of payments. Some of these arguments were assessed above in examining the importance of the industry. The employment benefits of arms industries are claimed to include the total numbers of jobs, their skill and wage levels and their location. Supporters of arms industries point to “large” numbers of jobs dependent on major weapons programmes (e.g., F-35s and the UK

Trident replacement) and the fact that many of these jobs are highly skilled and highly paid, and therefore improve living standards. Some of these jobs, especially in the supply chain, might be located in remote areas where there are few alternative job opportunities. The problem with arguments about employment benefits is that all economic activity generates and supports jobs. The jobs argument is inevitably deployed to justify any new activity, such as fracking or mining and quarrying in scenic and environmentally protected areas. The question then becomes one of evidence on magnitudes. Which activities support the greatest number of jobs per unit of expenditure and what are their wage levels (more jobs will be created at lower wage levels)? Arms producers also provide substantial numbers of highly paid jobs (e.g., compared with large numbers of low-paid jobs in fast food outlets). But other industries also provide high-skilled and highly paid jobs, including chemicals, electronics, financial services and pharmaceuticals.

Market failure in labour markets also has to be considered. Often, labour markets work well as clearing mechanisms, although some local failures are reflected in relatively high regional unemployment rates. Even where labour markets fail to work properly, it does not follow that arms projects are the only or least-cost solution to maintaining employment. Other policies such as training and retraining, information, mobility allowances, vocational guidance and assistance with job search also contribute to assisting labour to find other jobs elsewhere in the economy.

Some critics of arms industries assert that the industry is in long-term decline and that it receives massive state financial subsidies that could be better used to support renewable energy industries (e.g., offshore wind and marine energy). Their claim is that renewable energy would provide more jobs than arms industries, it would provide alternative employment for arms industry workers, the jobs would be high skilled and there would be thousands of supply chain jobs that could be located anywhere in the country. It is also claimed that investment in renewable energy would place nations such as the UK in a leading position in technologies that will be in high demand, with major export potential (CAAT 2016b). However, just as critics of arms industries make their case against the industry, their arguments about alternative resource uses also need to be critically assessed and evaluated. Proposals to reallocate resources from arms industries to renewable energy take a simple view of resource reallocation that is, in reality, costly,

complex and takes time. Privately owned and profit-seeking firms and markets are central to resource allocation. It cannot be assumed that arms producers that have a competitive advantage in arms markets will automatically reallocate their business to renewable energy markets: these are new emerging and risky markets and arms producers and their workforces might prefer other industries. Uncertainty is a further factor in resource choices. While renewable energy currently has superficial attractions, in a world of uncertainty today's winners might be tomorrow's losers; it is also the case that firms other than arms producers might be better able to exploit new energy markets (see Chapter 9).

Arms industries provide further economic benefits in the form of technology and spin-offs. There are some attractive examples of spin-offs from arms industries, including radar, jet engines, the Internet, composite materials, space communications, drones and helicopter rotor blades (e.g., applied to wind farms). But attractive though these examples are, they do not provide any indication of the *market value* of spin-offs: how worthwhile are they? Also, some technologies might be defence specific: only of value in the arms industry (e.g., stealth technology). Other industries might also provide valuable spin-offs. There is a more fundamental issue, relating to whether R & D markets fail to work properly, therefore requiring state intervention to improve their operation. In relation to technology spin-offs, R & D markets might fail to work properly if it is too costly to establish property rights in valuable ideas and knowledge. Again, however, it does not follow that arms projects are the most effective or least-cost method of correcting failures in R & D markets.

Defence industries provide further economic benefits through arms exports, which contribute to the balance of payments, provide jobs and maintain industrial capacity. For example, it is argued that export sales contribute to retaining defence industrial capacity, and without such sales national governments would have to bear the costs of retaining capacity. Assessing the retention-of-capacity argument assumes that such capacity is needed in the future and fails to recognize that there might be alternative solutions, such as importing or "mothballing" capacity, each of which involves different costs.

There is a further contribution to the balance of payments in the form of import-savings. Buying arms from a national industry "saves" on the foreign

currency required for alternative imports. But estimating the magnitude of such savings requires that domestic purchases be valued on the basis of the least-cost alternative, where imports might be considerably cheaper than a domestic buy (assuming that imports are close substitutes for a domestic weapon). And both the arms export and import-saving contributions to the balance of payments have to be related to major market failures in foreign currency markets. Typically, such markets work very well and are unlikely to be characterized by market failure.

One study of the economic costs and benefits of a 50 per cent reduction in UK defence exports estimated that the economic costs were relatively small and mostly one-off. It concluded that the balance of arguments about defence exports should largely revolve around non-economic considerations. The study had its limitations: it was not a comprehensive cost–benefit analysis of UK defence exports and it applied a specific economic model with time lags and used the standard economic assumption that everything else in the economy remains unchanged (Chalmers *et al.* 2002).

There is a more fundamental concern about the economic benefits of arms industries. The focus on jobs, spillovers and exports diverts attention from the real aims of defence policy: to provide peace, protection and security to a nation's citizens. Arms purchases that contribute to national defence are not designed to protect a nation's jobs, technology and exports.

Conclusion

This chapter has reviewed the economic aspects of arguments for and against the arms industry. It has shown that the issues are complex, with varying interpretations. At the most basic, there are problems in defining an arms industry and assessing its economic importance. Next, many of the arguments about the industry lack reliable and reputable data to reach a conclusion. As always, there are no answers except to questions, and no views except from a viewpoint. Economists have the task of identifying and critically assessing the economic questions about arms industries.

Arms industries are not costless. Some of their costs are reflected in government defence budgets. Also, where there is conflict, there are further costs reflected in the deaths and destruction caused by war. Evidence of

military deaths are readily available in British cathedral and church graveyards, where there are memorials to military personnel killed in colonial wars, the two Great Wars and conflicts since 1945 (the price of empire?). For the Soviet Union, the total number of deaths in the Second World War has been estimated at over 20 million military and civilian personnel. But success in conflict has its benefits. For example, the Allied defeat of Nazi Germany in the Second World War resulted in the end of slavery, the restoration of freedom, liberty and peace for the citizens of occupied Western Europe. But none of this confirms that arms industries are solely responsible for wars, their costs and consequences. A whole range of factors account for war and peace. Our next task is to review the facts about the arms industry.

Notes

1. Churchill is reputed to have said that if you put two economists in a room, you get two opinions, unless one of them is Lord Keynes, in which case you will get three opinions, since Keynes will say: on the one hand and on the other. The author is similarly guilty of frequent use of "on the one hand ... and on the other". This book comes with the usual health warnings about economists.
2. The UN Outer Space Treaty (1967) prohibits weapons of mass destruction in space but it does not prohibit conventional weapons being placed in space.
3. Cyber warfare is Internet-based conflict. It involves attacks on computers and information networks (e.g., computer viruses), and armed forces are highly dependent on information systems (e.g., for knowledge and communications).
4. An example would be BAE Systems supplying Typhoons to the Saudi Arabian government and Martin Baker (UK) supplying ejector seats to Boeing for its F-18E/F Super Hornets for sale to the US Navy or for export to other nations. Care is needed to avoid double counting.
5. The UK census of production only identifies two defence-specific industries, namely, the manufacture of weapons and ammunition (Standard Industrial Classification (SIC) 25.4) and the manufacture of fighting vehicles (SIC 30.4). Other major arms sectors such as aerospace and shipbuilding are only identified for their total output, comprising both military and civil output: the defence sales of these industries are not shown separately.
6. Critics refer to the role and performance of economists in the Brexit debate, which showed the limitations of their qualifications in that debate.
7. Economists distinguish between normal and abnormal or supernormal profits. Normal profits are those that are sufficient to persuade firms to remain in the industry and represents the opportunity cost of capital. Abnormal or supernormal profits are profits that are greater than normal and are associated with temporary shortages or monopoly power. Supernormal profits are economic

or pure profits that are earnings in excess of all opportunity costs of capital. Accounting profits differ from economic profits: accounting definitions of costs exclude the opportunity cost of capital and a risk premium. To economists, the opportunity cost of capital is a cost, whereas accountants include it as part of profits (Lipsey & Chrystal 1995: 187–8).

8. Transparency International publishes a Corruption Perception Index. In 2015 it showed that 68 per cent of the world's nations had a serious corruption problem. Also, from a total of 168 countries in 2015, Denmark ranked top of the index (low corruption), with Germany and the UK ranked at tenth and the USA ranked at sixteenth. At the other end of the ranking were Afghanistan (ranked at 166) and North Korea and Somalia (each ranked at 167, indicating high levels of corruption). Further opportunities for corruption arise from transactions between private firms (i.e. firm to firm transactions), where corruption and bribery are even more difficult to identify (TI 2015).
9. An example occurred in 2017 when there were reports that President Donald Trump threatened to cancel the US F-35B aircraft, which would leave the UK without an aircraft for its new aircraft carriers. In such an eventuality, the UK could continue to fund development costs for the F-35.