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Symposium: British arms

David Edgerton on the British military-industrial complex in historical perspective
Keith Hartley on the European and the Britain's defense industrial bases
Nicholas Gilby on corruption in the British arms trade
Anna Stavrianakis on Britain's arms export licensing process
Dan Plesch on Britain's dependency on the United States for WMDs
Chris Langley on the militarization of Britain's universities
Jonathan Michael Feldman on diversification and limits to dual-use theories
Derek Braddon on tracing corporate ownership of British defense firms

Articles

Raphael Bar-El and *Miki Malul* on Middle Eastern regional cooperation projects
Stefan Markowski, *Stephanie Koorey*, *Peter Hall*, and *Jurgen Brauer* on small-arms proliferation in the Asia-Pacific region

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Abstracts

David Edgerton. "The British military-industrial complex in history: the importance of political economy." This article highlights the until quite recently neglected political-economic thinking in matters of defense in twentieth-century Britain. It argues that retrieving such analyses from the interwar years is an excellent although partial way to get at an alternative picture of interwar defense spending and the arms industry. Interestingly, the political-economic approach fell out of favor in the nuclear age, but became central from the 1970s in critical discussion of British militarism. Yet that political-economic view was limited in that in made important assumptions about the civilian origins and nature of modern war. The article challenges these assumptions, noting the military origins and nature of most military technologies, and indeed of many civilian technologies, too.

Keith Hartley. "European defense industrial policy and the United Kingdom's defense industrial base." This article addresses the relationship between European and U.K. defense industrial policy. It considers recent initiatives to create a European Defense Equipment Market and the U.K.'s Defense Industrial Strategy. The European and U.K. defense industries are evaluated and some of the future policy choices are assessed. The future defense firm will be different and there will be conflicts between efforts to open up national defense markets and the desire to maintain national defense industries.

Nicholas Gilby. "Corruption and the arms trade: the U.K. Ministry of Defense and the bribe culture." Using as-yet-unpublished material, the article considers the interaction of the United Kingdom's Ministry of Defense (MoD) with the "bribe culture" that surrounds international arms deals. It finds evidence of two phases. The first, which lasted until 1976, may be characterized as "in-house involvement;" the second, following the United States' Lockheed scandal in 1975-76, as "subcontracted" corruption. In the latter phase, the MoD is seen to have tried to avoid acquiring knowledge of corrupt practices, to have avoided asking awkward questions, and to have left bribes on government-to-government deals to be paid by U.K. companies. In doing this, they are shown to have misled Parliament, and rather than taking any meaningful steps to try and stamp out corruption, to have let corruption continue unimpeded. The U.K. government has actively promoted arms exports for forty years and has always denied being complicit in bribery by arms companies. This article questions such denials and finds them wanting.

Anna Stavrianakis. "Licensed to kill: the United Kingdom's arms export licensing process." The article addresses the U.K. government's arms export licensing process to try to account for the discrepancy between its rhetoric of responsibility and practice of ongoing controversial exports. I describe the government's licensing process and demonstrate how this process fails to prevent exports to states engaged in internal repression, human rights violations, or regional stability. I then set out six reasons for this failure: the vague wording of arms export guidelines; the framing of arms export policy; the limited use (from a control perspective) of a case-by-case approach; the weak role of pro-control departments within government; pre-licensing mechanisms that facilitate exports and a lack of prior parliamentary scrutiny, which means the government's policy can only be examined retrospectively; and the wider context of the relationship between arms companies and the U.K. state. I conclude that the government's export control guidelines do not restrict the arms trade in any meaningful way but, rather, serve predominantly a legitimating function.

Dan Plesch. "A state in denial: Britain's WMD dependency on the United States." Britain is not an independent nuclear power. Its nuclear warheads and delivery systems depend upon American supplied management and technology and have done so since the dawn of the nuclear age. For years these matters were classified and today both governments only supply partial information. Nevertheless, an analysis of the historical records and such government information as is available, particularly from U.S. sources, shows clearly that the U.K. has no independence of procurement and little if any genuine independence of operation. This reality has never been made clear to the public or to many in government and the political and media elites. As a result, the debate in the U.K. and internationally on the future of nuclear weapons is conducted on the false premise that the U.K. is an independent nuclear power.

Chris Langley. "Universities, the military, and the means of destruction in the United Kingdom." High-technology weapons and their support platforms, together with robotic vehicles and satellite-based communications systems, have come to dominate how many nations frame their defense policies and wage war. The resulting technological dependence creates a number of problems for governments, not least the growing military budgets which are required to procure such means of waging war, but also the costly research and development which underpins such devices. Increasingly governments and military corporations have turned to universities to augment the expertise found within industry. This shift to reliance upon the universities impacts not only on the securitization of science and technology but also the role and character of the university in society. Using universities as R&D laboratories creates a culture of secrecy and commercial sensitivity and tends to reduce the available expertise for more positive ways of addressing potential and actual conflict. Moreover, military involvement with teaching and research also limits the skills base available for the nonmilitary sector. These issues call for a wide-ranging and robust examination.

Jonathan Michael Feldman. "Can British defense firms diversify? The Nanoquest case and the limits to dual-use theories." This article investigates the case of

Nanoquest, a small diversification project that was tied to BAE Systems' earlier incarnation as British Aerospace (BAe). I show that British military firms can have success when diversifying into civilian markets, but the process can be sabotaged by managerial interference. I also illustrate the limited utility of dual-use theories in explaining diversification outcomes. Success and failure are also shaped by power relationships rather than simply by technological similarities or limitations. I show why discourses about dual use, the relatedness of military and civilian technologies, networks, learning, and information exchange cannot fully explain how and whether diversification barriers are overcome. One key reason is that the degree of dual-use relationships, or the commonality between military and civilian markets, is based on an historical process of learning and resource acquisition over time. This learning and resource acquisition in turn is mediated by various power structures and struggles within the firm as identified by institutional economists and various management theorists.

Derek Braddon. "Hidden depths: tracing corporate ownership and its implications in the U.K. defence industry." Over the last 15 years, the ownership of U.K. and global defense companies has changed beyond recognition. A series of mergers, takeovers, strategic alliances and joint ventures in the defense industry, within and across geographic borders, has created a number of major defense systems providers, supported by a larger but again increasingly concentrated group of first-tier supply chain companies. The complex ownership matrix that emerges from this process of industrial restructuring is well-known although the implications for the industry and for corporate behavior have been less well explored. Furthermore, behind the scenes, an even more complex, almost invisible ownership revolution is taking place as the nature, origin, and power of global investors shows distinct signs of change. There has been little research into who actually owns the defense industry. The article sets out ask how that ownership is changing, and with what consequences. These issues are examined from the perspective of a sample of U.K. defense companies. The article also seeks to address the fundamental question: does defense company ownership matter?

Raphael Bar-El and **Miki Malul**. "The role of external partners in regional cooperation projects in the Middle East." This article analyzes the extent to which external partners contribute to the internalization of externalities arising from regional cooperation in the Middle East, that is, the degree to which they help increase welfare gains generated by the projects. This is classified by extent, intensity, and sectors of cooperation. Externalities are defined macroeconomically and sociopolitically. The results show that the international community does play a role in the internalization of externalities. In some cases this role is played by the countries themselves; in others, the participation of external partners can be explained by pure economic and business considerations (for projects that are profitable for the private external investor).

Stefanie Koorey, **Stefan Markowski**, **Peter Hall**, and **Jurgen Brauer**. "Channels of small-arms proliferation: policy implications for Asia-Pacific." To develop effective policy to reduce the proliferation of illicit small arms in developing countries, it is necessary to have a good understanding of how these weapons are distributed and how illicit stockpiles are formed. This article captures structural characteristics of small-arms supply-chains and, in particular, stylizes the different mechanisms for funneling small arms to illicit users. The article draws on the experience of countries in South and Southeast Asia and of the Melanesian states of the Pacific. By focusing on the structural complexity of supply chains, the article highlights challenges that multichannel supply chains pose for governments in developing countries that seek to curb the flow of small arms into illicit stocks.

The British military-industrial complex in history: the importance of political economy

David Edgerton

Probably the single most important tradition of enquiry into the British military-industrial complex has been the political-economic one. Political science, strategic studies, and the like have been surprisingly silent on the subject, as have historians, including military historians. Economic historians have dominated the small number of scholars who have paid it any attention. Indeed, rethinking the history of the British military-industrial complex had involved a recovery and a critical engagement with the earlier works of political economists, and a recognition too of the importance of political economic thinking in British strategy.[1] The important tacit assumptions that underlay the political-economic approach need challenging if we are to have an adequate picture of the history of the production of the means of destruction.

Much of what interwar political economists wrote on defense and warlike industries has been forgotten. This article recalls their contributions.

To speak of a British military-industrial complex (MIC), except during and of the very recent past, is to indulge in a major historical impertinence. For, if one took accounts of British arms production that dominated the history books, not only did the complex not exist (except prior to 1914), but could not have done so. The interwar years, it used to be taken for granted, saw the arms industry reduced to practically nothing by disarmament. Rearmament in the 1930s was tardy, and the miracles of war production came from "war socialism" led by the Minister of Labor, Ernest Bevin, brought in from the trade union movement by Winston Churchill in May 1940. After the war, it is generally agreed, there was too much spending on armaments, but there was nothing as dangerous as an MIC – the problem was old-fashioned imperialist attitudes, great power delusions, and subservience to the United States. The effects on the British economy of over-investment in arms were held to be highly negative.

Elsewhere I give an alternative account of the history of the British military-industrial-scientific complex between 1920 and 1970, and of the relevant old and new literatures on this.[2] Here, drawing on this work, I want to sketch out the main points of interest, particular in relation to political-economic thinking. Much of what interwar political economists wrote on defense and warlike industries has been forgotten. Yet political economy was into the 1940s one of the main languages used to discuss matters of defense and international relations in Britain. From the 1970s a left political economy was one of the main critical languages used, although the official discourse had little political economy in it.

Political economy and warlike spending in the interwar years

Political economists noted that interwar British warlike expenditure was high by historical standards. For example, that great Liberal party plan of 1928, *Britain's Industrial Future* (the *Yellow Book*) noted that:

> There is no automatic standard of reasonableness in the connection [arms expenditure]; but we may find comparatively firm ground if we regard our expenditure on defence as an insurance premium incurred to enable us to live our own lives in peace and consider what rate of premium we have paid for this privilege in the past. During the last quarter of the nineteenth century we were in no imminent danger of war ... Our defence expenditure was £25m – a premium of 2 per cent. In 1913 ... the premium had jumped to 3½ percent. Today it is still 3 per cent, though we see no reason for regarding this country as in greater peril than in the last quarter of the nineteenth century.[3]

In 1934, F.W. Hirst, a former editor of *The Economist*, upholding the great traditions of nineteenth century liberalism, wrote that "Despite the unparalleled burdens of growing taxation, the British Government, like other Governments, though participating in a Disarmament Conference, is increasing or maintaining enormous armaments for land, sea and air."[4] Hirst, quoting from the main speech in favor of the Oxford Union's scandalous 1933 resolution (that the house would not fight for King and Country) argued with irony that:

> The War, according to Mr. Lloyd George, was to make England "a land fit for heroes to live in"; but it had produced a mass of unemployment previously unknown. It had also been described as "a war to end war", with the result that "we are now spending forty millions more than in 1913 in preparations for the next war".[5]

Correction for inflation was not an immediate reflex, but it would have got rid of most of the increase Hirst mentioned.

Yet taking prices into account also affected accounts of what happened in the early 1930s, but in an opposite direction. For, while prices inflated during and after the Great War, they deflated in the 1920s and early 1930s. Noting this, H.N. Brailsford, another veteran political economist concerned with war, but one closely linked to the left, observed in 1934 that Britain was spending more in real terms on defense in the early 1930s than it had been in the late 1920s.[6] The interwar critics were certainly right to correct for deflation, just as they should have corrected for the earlier

inflation, thus avoiding needless alarm about supposedly rising defense expenditure.

A political-economic conception of warfare was influential not just in highlighting the raw level of defense expenditure, but the significance of the arms *industry*. There was much more criticism, in this literature, and more generally, of the armaments industry than of Britain's armed forces. Indeed the greatest campaign waged by the interwar peace movement was against the *private* arms industry and the international arms *trade*. The campaign succeeded in establishing a Royal Commission on the Private Manufacture of and Trading in Arms – it sat from 1935 into 1936 – which generated a great deal of evidence on the industry. A leading campaigner, and another political economist, Philip Noel-Baker, followed up his own evidence with a book, *The Private Manufacture of Armaments,* which like most of the evidence, drew much of its material from the pre-war era, focused on the arms *trade* (in the sense of traffic), the degree of monopoly of the arms firms, the links among these firms and the military through directorships, and the international nature of the firms. The campaigners, like their pre-war predecessors called for the nationalization of the arms firms, and the arms trade.

There were definite limits to this activist agenda, particularly with respect to the *British* arms firms. Although a good deal of telling detail can be gleaned on the contemporary British arms industry and arms lobbies, the campaigners did not produce an adequate overall description of the interwar British military-industrial complex on the world stage, or in British politics. Only the Communist Party consistently, although never comprehensively, pointed to the strength and connections of the British arms industry, and to the size of the British arms trade. It started its evidence with the claim that the United Kingdom was "the largest world exporter of armaments" and was therefore "the main pillar of the world arms traffic, the evils of which have been universally condemned."[7] This argument was based on League of Nations data for the years 1928-1932, which covered armaments in the narrow sense, excluding warships and military aircraft.

Sir Maurice Hankey, secretary of the British Cabinet and of the Committee of Imperial Defense, went to great lengths to challenge this conclusion and to play down British strength. By looking at later years, and only at exports outside imperial territories, he showed that in 1934 Britain had 11.1 percent of the trade, well behind France and Czechoslovakia (which had the key arms plants of the former Austro-Hungarian empire). However, by the same criteria, Hankey handily omitted to mention, Britain was the largest exporter in 1929, 1930, and 1931, with shares ranging from 19 percent to 28.1 percent. For the years 1932 and 1933 Britain was below France, but between them they shared almost half the world market.[8]

The communists were right. There is no doubt that Britain was a major arms exporter, whose main competitor was France.[9] If a broader definition of armaments had been adopted the British and French shares would probably have been larger. For the export of warships and aircraft were indeed very important, especially for Britain, and indeed France. In the late 1920s and early 1930s British arms exports in this wider sense were worth around £6m. About £2m of this was military aircraft, engines, and spares.[10] Until the mid-1930s Britain was probably the largest exporter of aircraft of them all. As well as confirming the strength of the arms export trade, modern research suggests that far from being non-existent, the British arms industry employed at the very least 84,000 workers before rearmament in the public and private sectors, with the largest private firm being Vickers, employing around 20,000 workers making armaments from guns to aircraft.[11]

Post-war silence

Critical analysis of the British arms industry, never especially strong, abruptly ended in the late 1930s, and was not to revive until the 1970s. Particularly curious is that the strong peace movement of the late 1950s and early 1960s did not generate an account of the British military-industrial complex. One reason was the virtual disappearance in Britain of the political economic approach to these questions. In academic international relations, political economy, along with "idealism," was left behind. In critical commentary on defense policy the political-economic language became rarer, not least because nuclear weapons in the view of many instituted a new era of warfare in which political economy was irrelevant. Philip Noel-Baker and John Strachey, veterans of the political-economic approach of the 1930s, and both middle-ranking ministers in post-war Labor governments, both wrote books on defense which in the late 1950s and early 1960s, which focused on nuclear weapons.[12] This is not to say that political economy was not used, only that it was marginal, restricted to figures like Barbara Ward of *The Economist*[13] and elements of the far left, notably the Trotskyite International Socialists with their theory of the permanent arms economy. Another example was the New Left argument for positive neutralism, anti-nuclearism, and planned trade with the emerging non-aligned economies. But these were exceptions. The radical opposition to defense policy in the years 1957-1963 was informed above all by "moral imperialism."[14]

In the 1970s and 1980s there was a great revival in socialist political economic writing on Britain, the British state, and on issues of war and peace. The 1970s also saw a resurgence of British marxist writing on military expenditure and capitalism, a literature that went beyond the theory of the permanent arms economy, much published in the *Cambridge Journal of Economics*. As applied to Britain this literature had at its core the observation that Britain spent considerably more on defense as a proportion of GDP than did most continental European countries and the argument that this defense expenditure negatively affected the economy. Particular attention was paid to the supposed costs of high levels of defense R&D. The 1980s also saw the emergence of mostly declinist political economies of twentieth century Britain, which made great play of the weakness of the British state in matters industrial. The key idea was that twentieth century Britain lacked and had lacked a "developmental state." A common argument was the commitment to a strong alliance with the United

States, and high defense spending, especially overseas, contributed to a lack of development at home, and hence to the British economic decline.[15]

The nature of the political-economic account

The account given by British intellectuals of British history and of Britain at war has been a profoundly *civilian* one: civilian forces led to success in war, shaped strategy, deprived the forces of weapons. Of course there are important exceptions, notably in the field of military history, and yet the dominant approach is profoundly civilian. In these civilian accounts, the military are taken out of these stories: they are seen, at best, as old-fashioned and resistant to the necessary modern means of waging war. The political economic approach is particularly prone to seeing in industry, technology, and science – all viewed as profoundly civilian – the main determinants of success in war. Again, one needs to register the existence of exceptions, but also the dominant trend.

Within this framework, only some militarily relevant technologies were called "armaments." As in the discussion of the arms trade in the interwar years, it was not uncommon to exclude aircraft and warships from the definition of armaments. Aeroplanes and ships were seen as essentially a civilian transport technology rather than as a weapon of war, produced by essentially civilian industries. When civilian, modern industry comes into contact with the conservative armed forces the result was seen as being a distorted technology, and a decline in civilian economic vigor. The argument was present in the 1930s, but a particular interesting version was put forward by Mary Kaldor.[16] She saw technical innovation coming from the civil side, specifically competitive private industry, but she put the military themselves in the picture, but only as conservative consumers. The military wanted, she argued, more powerful existing types of weapons, not to shift to new ones. The result was a "baroque arsenal," a phrase which neatly invoked Kaldor's central idea. This was that the over-elaboration of existing technologies of war leads to rapidly diminishing returns, indeed to negative returns. "Baroque" also captures a historical conjuncture which replicates the implicit model of an ancient military and modern technology. Peace time military technology had a grotesque, distorted quality. Moreover, in Kaldor's view, the industry producing baroque weapons acted as a drag on the development of the economy as a whole. In war, according to Kaldor, crisis conditions result in the overthrow of military conservatism and the adoption of radical new technologies and ways of fighting war, of civilian origin. These new forms themselves become baroque in the ensuing peace.

These views need revision at a number of different levels. One particularly common argument of the political economists was that British military R&D crowded out civilian R&D and that this was a major cause of poor British growth post-war. The argument, although influential, does not stack up. Britain had exceptionally high levels of civilian industrial R&D, and, at national level we should not expect high levels of growth to follow from high R&D (or vice versa). In the post-war years the military-industrial-complex was at the heart of a powerful British developmental state. The supply ministries were a great stimulus to British industrial development. Investment in warlike production did positively affect some parts of British manufacturing industry, during and after the Second World War. The concept of war potential lead to the development of many new industries in Britain after the war that would not otherwise have existed. The great state technological programs surely also stimulated R&D in other sectors, helping promote a culture celebrating R&D, looking for technological leapfrogs, and more generally promoting technological and nationalistic considerations over economic ones. From the point of view of advocates of a "developmental state" all this could have been seen in a positive light. Instead, students of industrial and technological policy contrived to ignore these major efforts of the British state.

Contrary to the traditional view, military production has been highly specialized, rather than a mere application of civilian industry. Take the case of warshipbuilding. The key sites were not the shipyards and marine engineering works, but highly specialized makers of armored plates, guns, and mountings. The aircraft industry, so often seen as civilian but applied to defense, was more military than warshipbuilding: it was from the first a national industry maintained for national military purposes. The specialist nature of the industry helps explain an often concealed feature of the arms industry. In the Second World War relatively little civilian industry was turned over to the production of arms, although the implication is usually that this was where arms production came from. The key processes were the building of new specialized capacity, and the extension of the existing armament firms. There were new entrants on the electrical and electronic side, but none of significance in other branches. The war greatly strengthened the existing military-industrial complex, as would be expected, but this is implicitly denied in most existing accounts.

We need, I believe, to recognize the military origins of military technology rather than succumbing to traditions of argumentation which insist by repetition on the essentially civilian nature of technology and science. And indeed, many important civil industries previously taken to be essentially civilian ones applied to war are better described as military technologies applied to peace, aviation being a key example. We should cease to think of aviation and nuclear power, and radio, and much else besides, as civil technologies temporarily given over to war-fighting, but rather see that they are cases of fundamentally military and state technologies which would probably have not existed were it not for the existence of competing nation-states. Far from threatening to supersede the nation-state, as many liberals alleged, these technologies were products of the anarchic world they supposedly threatened. Of course, the civilian and military dimensions are thoroughly intertwined, not least because, as in the British case, the same organization was often asked with promoting both – the official line insisted on the unity of the military and the civilian. The main examples in the British case were the Atomic Energy Authority into the early 1970s,

and the various incarnations of ministries responsible for aviation, which were until 1970 concerned with military and civil aviation: the Air Ministry to 1940; the Ministry of Aircraft Production, 1940-1946; the Ministry of Supply, 1946-1959; the Ministry of Aviation, 1959-1967, and the Ministry of Technology, 1967-1970.

The importance of the public sector

One important but little discussed part of the British military-industrial complex has been in the public sector. Armed forces have long employed civilian workers directly to produce weapons of war. For much of the twentieth century the public sector was the major producer of small arms, as well as an important producer of explosives and propellants, heavy guns, and ships' hulls. Indeed proponents of the nationalization of the arms sector rarely gave enough attention to the existing state industries. At the same time the military had their own major research, development, and testing facilities. The public and private sectors had a complex and often fraught relationship, for they were both in cooperation and competition with each other. Yet some important changes can be outlined. The relative importance of the private sector grew considerably from the end of the nineteenth century, with the state leaving important areas (like gun mountings and aircraft) to it. Yet one must be careful since many new equipments came of the state sector, including aircraft for a period. From the 1930s the importance of the public sector increased in both old and new technologies of war. New devices like radar, jet engines, and explosives like RDX, as well as many new guns were developed and designed in the public sector. During the war, and into the post-war years the importance of the state sector increased, with the development of new and entirely state-sector branches like the military-nuclear industry. Indeed many of the important privatizations of the 1980s were of industries that had never been in the private sector, like Royal Ordnance and parts of the atomic complex. Yet in other cases the story is rather different. The great private armorers of the post-war years were the aircraft and electronic contractors. They remained in private ownership into the 1970s, when through particular crises (Rolls-Royce and Ferranti) they came into public ownership, or were nationalized as part of the nationalization of the aircraft and shipbuilding industries in 1977. The great exception was the electrical contractor GEC, which emerged as the largest private arms firm. Yet the nationalizations of the 1970s were not to last – British Shipbuilders and British Aerospace were among the first enterprises privatized by the Thatcher government. By the end of the Thatcher era, for the first time in history the private sector utterly dominated arms supply.

Conclusion

Understanding the nature of the arms production process and military technologies has been strongly affected by very particular understandings of the place of the military in modernity. We need to understand those assumptions if we are to make sense of one of the most important yet neglected aspects of economic life of the twentieth century.

Notes

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1. Peden (1979, 2007); Strachan, (1985, pp. 447-61); Offer (1989); French (1990); and Edgerton (1991, 2005) are some representative works.

2. Edgerton (1991, 2005).

3. Liberal Industrial Enquiry (1928, p. 428), quoted in Skidelsky (1992, p. 269). Skidelsky argues that it is plausible to attribute the point to Keynes.

4. Hirst (1934, p. 96).

5. Hirst (1934, pp. 97-98).

6. Brailsford (1934, p. 177).

7. Memorandum submitted on behalf of the Communist Party of Great Britain, *Minutes of Evidence*, p. 71.

8. First Memorandum by Sir Maurice Hankey, Appendix E, Table C, *Minutes of Evidence*. Anthony Sampson makes the point that Britain was the largest exporter of arms in the world before 1932, based on this data, noting the omission of empire. He does not, however, point to the fact that these figures exclude warships and aircraft. Sampson (1978, p. 74).

9. Harkavy (1975); Sampson (1978); Krause (1992).

10. Noel-Baker Memorandum, *Minutes of Evidence*, p. 280.

11. Edgerton (2005).

12. Noel-Baker (1960); Strachey (1962).

13. Ward (1951) is an exception. She worked for *The Economist* and later became very well known as a pioneer environmentalist.

14. Taylor (1988, pp. 305-307).

15. Kaldor, *et al*. (1979); Aaronovitch (1981); Smith and Smith (1983), Chalmers (1985); Fine and Harris (1985).

16. Kaldor (1982).

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European defense industrial policy and the United Kingdom's defense industrial base

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The United Kingdom's defense industrial base (UKDIB for short) cannot be viewed in isolation; it needs to be seen in the context of the European Union and its relationships with the United States. Both the EU and the U.S. protect their defense industries using Article 296 of the EU treaty and the Buy America Act (together with other protectionist policies). Compared with the United States, the European Union lacks a single European defense equipment market.[1] In 2004, about 80 percent of EU defense equipment procurement (by value) was exempted from EU public procurement rules on national security grounds.[2]

Until recently, the U.K. defense equipment market was relatively open and subject to competition from foreign firms. This changed in late 2005 with the introduction of the United Kingdom's new Defense Industrial Strategy (DIS), which marked a shift from competition to protection and partnering for key parts of the UKDIB. Such a change occurred when the EU was formulating its defense industrial policy with efforts to create a European Defense Equipment Market (EDEM) and a European Defense Technology and Industrial Base (EDTIB). There are potential conflicts between Europe's aim of creating a more open EU defense market and the United Kingdom's desire to protect parts of its defense industrial base as reflected in its new Defense Industrial Strategy.

This article addresses two issues. First, it outlines developments in European defense industrial policy and addresses one topical element of EDEM policy, namely, the role of offsets in a single market. Second, it considers the role of the UKDIB within European defense industrial policy.

The defense industrial base in the European Union and in the United Kingdom

In 2003, employment in the world's arms industries was almost 7.5 million with the EU accounting for almost 10 percent of the total (see Table 1). Employment declined substantially following the end of the Cold War when the world's arms industries employed over 16 million people in 1990. Between 1990 and 2003, major employment reductions took place in Hungary, the Ukraine, Russia, and Germany. In contrast, employment reduction in the United States was relatively small, which might reflect its world power status, the influence of its military-industrial-political complex, and the defense sector's recovery due to the Afghanistan and Iraq conflicts.[3] Defense industry employment is also concentrated in a few nations with the United States accounting for 36 percent of the 2003 world total compared with 19 percent of the total in 1990. Within the EU, the top three nations of France, the U.K., and Germany accounted for 72 percent of total EU defense industry employment in 2003 (and an 80 percent share in 1990 but based on a smaller EU). Table 1 also shows the major size differences between the United States' defense industrial base (USDIB) and each of the top three EU nations; and the large number of European nations with relatively small defense industries. Such size differences between Europe and the United States and within the EU confirm the costs of national protection in Europe and the potential efficiency gains from a single EU Market for defense equipment.[4]

Since the end of the Cold War, a major re-structuring involving mergers and acquisitions in both the EU and the United States has led to larger defense firms and increased market concentration. European examples include BAE Systems (UK), EADS (Netherlands), Finmeccanica (Italy), Safran (including Snecma: France), and

Table 1: Employment in the EU's arms industries (in thousands)

Regions/groups	*1990*	*2003*		*1990*	*2003*
EU	1,330	724	USA	3,105	2,700
World total	16,241	7,479	China	3,996	2,100
Industrial states	11,291	4,710	Russia	2,516	780
EU nations	*1990*	*2003*		*1990*	*2003*
France	382	240	Greece	15	15
United Kingdom	440	200	Estonia	100	10
Germany	240	80	Finland	10	10
Poland	180	50	The Netherlands	20	10
Italy	80	26	Slovakia	93	7
Bulgaria	100	25	Belgium	25	6
Sweden	30	25	Denmark	7	5
Spain	100	20	Portugal	10	5
Romania	90	18	Austria	5	3
Czech Republic	47	15	Hungary	33	2

***Notes*: Data for EU nations do not include EU members Cyprus, Ireland, Latvia, Lithuania, Luxembourg, Malta, and Slovenia. Apart from Denmark, all EU members are participating member states of the EDA. Nations are ranked by employment numbers in 2003, the last published data from BICC.**
***Sources*: BICC (2002, 2005).**

Thales (France). There has also been the emergence of military service companies reflecting military outsourcing, especially in the United Kingdom and the United States (some U.S. service companies have obtained contracts as a result of the Iraq war, e.g., KBR/Halliburton).[5]

Data on size, value added, and profitability of the top EU and U.K. defense firms is shown in Table 2. Problems arise because the data reflect both military and civil sales and are confined to the aerospace and defense group. Nonetheless, significant differences in the size of firms measured by sales, value added, and employment may be seen. By sales, EADS, BAE, and Thales are the largest European firms. There are also performance differences, reflected in value added and profitability. Within Table 2, Vosper Thorneycroft – a warship builder – has the lowest value added productivity and Dassault Aviation has the highest. Profitability varies from losses by Finmeccanica and BAE Systems to substantial profitability by Dassault, Cobham, and Megitt. Comparisons with the all-U.K. and all-European company averages show that aerospace and defense have higher value added productivity than the industry averages that represent the alternative use value of resources. However, for some companies these performance indicators are likely to reflect the economies of scale and learning from large-scale civil sales (e.g., EADS/Airbus; Rolls-Royce). Moreover, European and U.K. aerospace and defense are relatively less profitable than the industry averages raising questions about their continued presence in what appears to be a relatively less profitable industry.

Table 2: Major European defense companies

Company	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*
European Union					
EADS (Netherlands)	21,823	8,016	110,662	72.4	7.0
Thales (France)	7,069	3,096	55,476	55.8	3.9
Finmeccanica (Italy)	5,173	2,195	46,401	47.3	- 0.8
SAFRAN (France)	4,681	1,962	35,451	55.4	6.2
Dassault (France)	2,377	954	12,043	79.2	13.4
SAAB (Sweden)	1,306	724	12,115	59.7	8.9
United Kingdom					
BAE Systems	9,095	4,290	69,400	61.8	- 0.6
Rolls-Royce	5,939	2,195	35,200	62.4	5.8
Smiths	3,017	1,415	28,509	49.6	10.3
Cobham	983	501	9,863	50.8	13.7
QinetiQ	872	470	10,406	45.2	4.8
Vosper Thorneycroft	602	296	8,360	35.4	8.0
Meggitt	479	279	4,424	63.1	14.2
Ultra-Electronics	320	149	2,678	55.8	11.5
Composites					
All U.K. areospace/defense	1,759	728	13,318	54.7	3.3
All U.K. companies	2,221	695	13,208	52.6	9.7
All EU aerospace/defense	5,300	2,199	36,798	59.8	5.4
All EU companies	6,424	2,217	41,400	53.5	10.1

Columns: (1) sales (£m); (2) value-added (£m); (3) employment (numbers) (4) value-added per employee (£ '000s); (5) profits on sales (%).
Notes: (i) Defense is based on the aerospace and defense group; (ii) companies are ranked by value added; (iii) all company composites for Europe are based on the top-700 European companies, with sales and value added as averages for the 700 companies and includes the top U.K. firms; for U.K. companies, averages are based on the top-800 companies; (iv) DTI does not publish similar data for the United States.
Source: DTI (2006).

EU defense industrial policy

Defense industrial policy involves procurement choices between the extremes of supporting a national defense industrial base or importing foreign arms (with or without offsets) or the intermediate solutions of international collaboration and licensed or co-production. Each option involves varying degrees of work-sharing and technology for the buying nation with corresponding alternative prices.[6]

Economic theory offers two key policy guidelines for EU defense industrial policy, namely, gains from trade and gains from scale and learning economies. Most EU defense markets are protected with preferential purchasing and support for national champions (e.g., Article 296 of the EU Treaty). Free trade among member states would lead to gains from specialization with trade based on comparative advantage. This requires abolition of tariff barriers, subsidies, and preferential purchasing by member states, thus allowing free entry and competition for national defense contracts. Firms from member states would be allowed to bid for defense contracts in each nation-state. In late 2005, EU member states agreed a voluntary Code of Conduct for defense procurement to encourage competition in the EU defense equipment market where traditionally arms contracts were exempt from the normal EU internal market rules.[7]

Additional cost savings are available where arms industries are decreasing cost industries (e.g., aerospace). Greater output reduces unit R&D costs and leads to economies of scale, learning, and scope: such economies are not achieved in small-

scale EU national defense markets but are available in a single arms market embracing all member states of a military alliance. Estimates suggest that competition effects might lead to unit-cost savings of 10 percent to 25 percent with scale and learning economies probably contributing a 15 percent to 25 percent reduction in unit costs.[8]

Policies to introduce an efficient defense industrial policy will, like all policies, involve gainers and losers. Potential gainers include those industries and firms which are privately owned and have already been exposed to competition and competitively-determined fixed price contracts. Possible losers will be state-owned firms which operated in protected markets receiving subsidies and cost-plus contracts. Changes to establish a more efficient industrial policy will involve adjustment costs and will take time. There will be some unemployment and underemployment of resources, reflected in job losses, plant closures, exits from the industry, and local unemployment. Potential losers will oppose change and will lobby for "fair and managed" competition with work allocated on a *juste retour* basis and protection for EU defense industries (e.g., Fortress Europe). With such pressures from producer groups, the ideal of an efficient defense industrial policy might soon be transformed into cartels, collusive tendering, a lack of rivalry, and inefficient EU defense industries.

Within Europe, collaboration has been the most distinctive of its defense industrial policies, especially in aerospace systems (e.g., 3-nation Tornado; 4-nation Eurofighter Typhoon).[9] In theory, ideal or perfect international collaboration leads to savings in development and unit production costs. Actual collaboration involves departures from the ideal case with work-sharing based on political, equity, and bargaining criteria (*juste retour*) rather than efficiency criteria, resulting in inefficiencies in both development and production and longer development times. Collaboration fails to exploit gains from trade; but it does achieve economies of scale and learning although these are not fully realized due to each nation's desire for a final assembly line.

A U.K. study provided evidence on the inefficiencies of collaboration. It estimated that total development costs on collaborative projects were some 140 percent to almost 200 percent higher than comparable national programs, depending on the number of partner nations; but the U.K.'s cost share on collaborative programs was about one-third of total development costs. On production, it was found that collaboration achieved scale and learning economies in the region of half of those on national projects with collaboration causing an average of 11 months delay.[10] Cost overruns and delays on collaborative programs reflect the transaction costs of international contracting, including the management of collaborative programs, the cooperative industrial arrangements, and changed order quantities as well as budget constraints and delayed approvals by national partners.[11] Current European defense industrial policy is focused on creating a single market for defense equipment and a European defense industrial base based on initiatives pursued by both the European Commission and the European Defense Agency (EDA).

A European defense market: market openness and offsets

The European Defense Agency has introduced initiatives to create a single European market for defense equipment. These include an inter-governmental agreement for a voluntary Code of Conduct aimed at opening defense markets of member states and promoting competition, including transparency and accountability procedures. With this new system, EDA will publish procurement opportunities and contract details through an electronic bulletin board. Under the Code of Conduct, member states are committed to purchasing defense equipment from each other on the basis of best value, instead of automatically contracting with a national supplier. The Code covers defense equipment purchases that governments choose to exempt from EU public procurement rules under Article 296 and that do not usually involve any cross-border competition. Member states requiring an exemption from the Code of Conduct must provide an explanation to the agency. However, the Code of Conduct is not legally binding so is unlikely to achieve much impact. There are also concerns that efforts to create a common European defense equipment market will be affected by state support, subsidies, state ownership, security of supply, intra-community trade, export policies, and different military requirements. Furthermore, EDA is assessing the impact of offsets on competition and defense industry restructuring. There is a concern that offsets distort competition, promote inefficiency in defense procurement, affect transparency in procurement, and might impair efforts to establish a European Defense Technology and Industrial Base. Questions arise as to what is known, what is not known, and what it is necessary to know to formulate a sensible policy on offsets in the European defense equipment market.[12]

Estimating offsets

Import data in Table 3 can be used to provide an upper bound estimate of the annual value of offsets for participating member states of the European Defense Agency in 2005. This upper bound estimate of €4.2 billion is based on the limiting assumption that all imports are associated with an offset – an unrealistic assumption but one which provides a starting point for estimating the value of offsets for EDA member states. On the basis of the import data, we expect the annual value of offsets for all members to be less than €4.24 billion in 2005. These data refer to annual values only: typically, offset data are shown for the total value of the offset, which usually involves transactions over a number of years (e.g., see data in the annual SIPRI yearbooks).

The upper bound estimate can be modified further by considering some countries' offsets as a share of total defense equipment foreign trade (exports or imports). For example, for U.S. defense equipment exports to the U.K. over the period 1993-2005, offsets accounted for 84 percent of the total value of such exports. Similarly, for U.S. defense exports to the top-9 EDA member states over this same period, offsets accounted for some 79 percent of the total value of such U.S. exports.[13] On this basis,

Table 3: Procurement, imports, and employment

Country	*(1)*	*(2)*	*(3)*	*(4)*
Austria	184	26	14	3
Belgium	223	0	0	6
Cyprus	48	0	0	0
Czech Republic	213	772	(362)	15
Estonia	20	12	60	10
Finland	539	94	17	10
France	5,618	4	< 1	240
Germany	3,445	265	8	80
Greece	1,400	1,366	98	15
Hungary	106	15	14	2
Ireland	94	5	5	0
Italy	2,119	275	13	26
Latvia	14	9	64	0
Lithuania	37	11	30	0
Luxembourg	24	0	0	0
Malta	9	22	(244)	0
The Netherlands	1,215	158	13	10
Poland	633	118	19	50
Portugal	223	498	(223)	5
Slovakia	95	0	0	7
Slovenia	39	3	8	0
Spain	2,166	345	16	20
Sweden	1,217	128	11	25
U.K.	6,699	115	2	200
Total	26,380	4,241	16	724

Columns: (1) defense equipment procurement (€m, 2005); (2) arms imports (€m, 2005); (3) import share of equipment procurement (%); (4) defense industry employment ('000s; 2003).
Notes: (i) for imports, €'s estimated at exchange rate of €=$1.2155 (June 2005); also, SIPRI data originally in 1990 US$ prices and converted to 2005 prices using USA CPI; (ii) figures are rounded; (iii) figures in brackets show where imports exceed procurement spending suggesting data discrepancies either with import or procurement data; imports are for major conventional weapons only (SIPRI data); (iv) employment data from BICC: the series was discontinued after 2005 so the latest data are for 2003; where BICC did not provide any data, the country entry was recorded as zero (0).

offsets for EDA members might account for between 79 percent and 84 percent of total arms imports, equivalent to between €3.4 to €3.6 billion in 2005.

The import data also show the magnitude of foreign market opportunities among EDA members, namely, a foreign trade value of €4.24 billion in 2005. However, import figures for one year are unlikely to indicate longer-term trends. For the period 2001-2005, the aggregate value of imports of major conventional weapons for EDA members totaled some €21.3 billion (another indicator of the maximum upper bound figure of offsets over the period 2001-2005). Interestingly, the aggregate value figure results in an annual average of imports for the members states of €4.3 billion (similar to the 2005 data).

Estimates were made of rank correlations between defense procurement in 2005 against imports in 2005 and against aggregate imports over the period 2001-2005. In each case, significant and positive coefficients were estimated with a coefficient of r = 0.585 for defense procurement in 2005 against imports in 2005 (significant at the 1 percent level, t = 4.2) and a rank correlation of r = 0.84 for defense procurement in 2005 against aggregate imports over the period 2001-2005 (highly significant, t = 13.7).

The European defense equipment market: market openness

Table 3 also provides estimates of import penetration of defense equipment markets, data which are useful in assessing the openness of participating EDA member states' defense markets and the contribution toward the development of a European defense equipment market. There are substantial variations in market openness ranging from almost 100 percent for Greece to under 1 percent for France. The average market openness is 16 percent. (An alternative estimate is 10 percent for military markets compared with 25 percent for civilian orders.[14]) Typically, the nations with a relatively large defense industrial base (employment of 20,000 or more) were the ones with relatively low degrees of import penetration, suggesting substantial market protection. France, Germany, Italy, Sweden, and the U.K. each had import penetration rates below the EDA member states' average (Poland was above and Spain was at the average). A rank correlation based on the top-7 defense industries found a significant and positive correlation between defense industry employment and the degree of protection (measured by import shares; r = 0.75, significant at the 5 percent level), but when the sample was extended to include other nations, the rank correlation was not significant (r = 0.0061).[15]

United States data on European and United Kingdom offsets

The United States Congress publishes regular reports on offsets in defense trade. These reports provide data on offset percentages and country policies for EU nations based on U.S. defense exports. Table 4 shows the average percentage offsets for the

period 1993 to 2005 while the country percentage reflects the current offset percentage required by each national government. Most countries set a single target percentage offset value; but a few nations vary the percentage depending on the significance of the individual offset to the local economy. Table 4 and other evidence from U.S. Congressional reports provides some generalizations about offsets from the United States.

- For EDA nations, offsets achieved varied substantially from 28 percent for Portugal to 174 percent for Austria. Often, the achieved offset was substantially below the country target percentage. Even nations with a large defense industrial base did not achieve their 100 percent target (i.e., France, U.K.) while countries with a relatively small defense industry often achieved a relatively high percentage offset (i.e., Austria, Greece, the Netherlands).
- Regional offset percentages are greater in Europe compared with all other regions of the world.
- There is some evidence of an upward trend in offset requirements for U.S. defense exports. For the period 1993-1998, the offset percentage totaled 55 percent of the value of U.S. defense exports and the percentage rose to 87 percent over the period 1999-2005. Over the whole period 1993 to 2005, the offset percentage averaged 71 percent with a peak of 125 percent in 2003, falling to 65 percent in 2005.
- Direct defense offsets accounted for about 40 percent of all offsets. Subcontracts accounted for almost 60 percent of the value of all direct offsets, with most of these being aerospace-related.
- Indirect offsets accounted for some 60 percent of all offsets.[16] Typically, purchases, usually aerospace-related, accounted for over 60 percent of the value of indirect offsets. However, the data on indirect offsets are dubious. They are defined as defense goods and services unrelated to the defense export, suggesting that they are indirect defense offsets. However, the text in the U.S. Congressional reports implies that they include indirect civil sales.
- Technology transfer, defined broadly, accounted for some 17 percent of the value of all offsets over the period 1993-2005. During this period, about 42 percent of the value of technology transfer was classified as direct offsets and 56 percent as indirect offset.[17] With direct offsets, for most U.S. prime contractors the technology transferred is not leading edge.[18]
- As regards country distribution, European countries accounted for the majority of offset activity with 65 percent of the value of offsets, but under 50 percent (47 percent) of the value of U.S. defense exports. Over the period 1993-2005, U.S. firms reported entering into 286 offset agreements with European countries to a total value of some $37 billion and an average value of $128.5 million per agreement and an average duration of almost 85 months.[19]
- Over the period 1993-2005 countries with developed, technically advanced economies have demanded higher levels of offset than other nations. However, countries outside Europe are now demanding higher offset percentages. Also, foreign defense purchases are being driven by the competitiveness of the offset package offered by U.S. industry rather than by the quality and price of the defense system acquired.[20]
- Offsets are not free. Estimates show that they increase the price of defense equipment by as much as 15 percent to 30 percent.[21]
- Offsets can lead to U.S. prime contractors discovering innovative, reliable, and cost-effective subcontractors that they would not otherwise have found. On this basis, some offsets are trade-creating.

Table 4: Data on U.S. offsets, 1993-2005

Country groups Europe (EDA)	*Percentage offsets (%)*	*Country percentage (%)*
Austria	174	200
Belgium	80	Case-by-case
Czech Republic	n/a	100
Finland	100	100
France	85	100
Germany	100	up to 100
Greece	113	80 to 300
Hungary	n/a	n/a
Italy	94	min. 70
The Netherlands	119	up to 150
Poland	n/a	100
Portugal	28	100
Spain	89	up to 100
Sweden	104	100
U.K.	84	100

Offset percentages:
- Europe regional total: 99 (EDA median: 99)
- North and South America regional total: 97
- Middle East and Africa regional total: 43
- Asia regional total: 39
- U.S. data, all offsets, 1993-1998: 55
- U.S. data, all offsets, 1999-2005: 87

Notes: n/a = not available; data are rounded; Europe group shows EDA participating member states (pMS) for which data are provided; not all pMS states are reported and some non-pMS states are reported. Europe regional total refers to all European countries reported by the U.S. data.
Source: USDC (2007, Table 2-5, pp. 2-13).

Offsets and the European defense equipment market

Critics regard offsets as a source of inefficiency in defense procurement and a barrier to the creation of a European defense equipment market through their introduction of non-price factors into procurement choices and value for money criteria. Further, they claim that offsets, if badly targeted, can conflict with the aims of creating a European defense

industrial base and that all offsets are difficult to administer and to deliver in practice. Such claims need to be evaluated.

Offsets might lead to the discovery of lower-cost suppliers and allow entry into highly-protected defense markets. Also, the criteria for the most economically advantageous offer in any procurement competition allows consideration of non-price factors. The point about badly targeted offsets and the European defense industrial base suggests that there are correctly targeted offsets that might contribute to creating such a defense industrial base. Finally, claims about administration and delivery of offsets are empirical issues requiring supporting data on transaction costs.

There are various options for an EU policy on offsets. First, there could be a ban on all offsets for defense trade between member states involving EU firms. Such a ban would be strongly opposed by various member states who support offsets and would place EU firms at a competitive disadvantage with U.S. defense firms in European markets. Second, there could be harmonization of offset policies where the harmonization might involve minimum thresholds or a maximum offset percentage (e.g., a cap of 100 percent) or the specification of the weight to be placed on offsets in procurement choices and the introduction of a common external offsets policy (similar to the common external tariff). Third, efforts might be made to identify "desirable" and "undesirable" offsets in relation to their impact on the European defense industrial base. The European Defense Agency could also act to break the offsets trap where nations are competing to maximize offsets (cf., subsidy trap). Or, policy might focus initially on transparency requiring that member states specify their offset requirements in all invitations to tender with a possible further requirement that offsets be non-discriminatory between national and other firms. In fact, current EDA policy on offsets aims "to create the market conditions and the European DTIB structure, in which the practice may no longer be needed – and meanwhile to consider how adverse impact on competition and the DTIB might be mitigated."[22] However, there are more serious issues concerning the creation of a European defense equipment market. Typically, member states rely on the national security exception in Article 296 to make most of their defense purchases on a national basis.[23] Efforts to open up national defense markets of member states continue to offer the greatest opportunities for substantial efficiency improvements. There are also wider issues about the European defense industrial base.

The European technological and defense industrial base

The European Defense Agency has announced a policy on the future European Defense Technological and Industrial Base (EDTIB). This is needed to supply equipment to the EU's armed forces, including world-leading technology equipment and to allow independent operations. A EDTIB is also seen as a valuable economic asset as a major source of jobs, exports, and technological advance. However, the agency recognizes the need for fundamental change in policy toward a EDTIB. A truly European defense technological and industrial base is no longer economically sustainable on a national basis with separate national research and development and procurement programs. For example, Europe has four main battle tank programs compared with one in the United States; twenty-three national programs for armored fighting vehicles; and eleven frigate programs compared with one in the United States.[24]

The EDA view of the EDTIB is one which is "... more integrated, less duplicative and more interdependent – increased specialisation at all levels of the supply chain, must take over from all (or at least too many) trying to do everything. Centres of excellence should emerge from a market-driven process, moderated by policy considerations including the requirement to achieve an appropriate regional distribution."[25] Policy also refers to identifying, preserving, and developing "key" European technologies and industrial capacities as well as ensuring security of supply for all member states in a "truly European DTIB."[26]

Attractive though a European DTIB policy appears, there is a need for much more clarification. Concepts such as "key" technologies and industrial capabilities are vague: what are these capabilities, why are they key, and are they to be retained regardless of costs? Potential conflicts are likely between the aims of an EDEM and an EDTIB: a genuinely competitive and open defense market is unlikely to support an "appropriate regional distribution" of the "key" technologies and industrial capabilities. Nor are there any indications of the optimum size of EDTIB and of its constituent firms. For example, which nations have a comparative advantage in which areas of air, land, and sea systems as well as in R&D, production, and subcontracting? Will the EU market only support one monopoly supplier for some types of defense equipment (e.g., aircraft carriers; nuclear-powered submarines; space systems)? Further potential problems arise between the desire for a EDTIB and national preferences for retaining key defense industrial capabilities (e.g., as in the U.K.'s Defense Industrial Strategy).

The U.S. defense industry which supplies a large single American market might provide a model for an EDTIB. The U.S. Department of Defense submits an Annual Industrial Capabilities Report to Congress.[27] This outlines ideal industry characteristics such as a reliable and cost-effective defense industrial base, including an "adequate" number of competitive suppliers in key and emerging technology areas and opportunities for new entry by innovative suppliers. The reports contain a detailed analysis and assessment of industrial and technological capabilities embracing primes, subcontractors, and critical sole-source suppliers (e.g., missile solid rocket motors). For example, in the aircraft industrial sector, the report questions Boeing's future in the combat and transport aircraft sectors and raises doubts about the future availability of titanium for the aerospace industrial base. It also suggests that suppliers not associated with the F-35 program are at risk.

Increased industrial concentration is highlighted. In ground vehicles, it notes that during the 1990s, the number of prime contractors reduced from eleven to two

(General Dynamics Land Systems and BAE Ground Systems Division). Similarly, in missiles, the number of primes fell from over twelve to six (dominated by Raytheon and Lockheed Martin) and bottlenecks in the supplier base remain. In shipbuilding, there are six major U.S. shipyards shared equally between Northrop Grumman and General Dynamics. Significant excess capacity exists, leading to higher overhead costs. Concern was also expressed that the United States' unique submarine design industrial base could downsize significantly, as happened in the U.K. where the eventual result was large cost overruns and schedule delays.

A similar annual report on European defense industrial capabilities would provide EDA and policymakers with the necessary information for making informed choices on the EDTIB. Significantly, the U.K. recently published a similar comprehensive review of its defense industrial base in the form of the Defense Industrial Strategy which has implications for the development of European defense industrial policy.

The United Kingdom's defense industrial base and its defense industrial strategy

The U.K. Ministry of Defense (MoD) is a major buyer of defense equipment and services, spending some £16 billion on R&D, equipment, and support in 2005.This buying power forms a major component of the demand side of the U.K. defense equipment market and can be used to determine the size, structure, behavior, performance, and ownership of the UKDIB. Exports are a further component of market demand, valued at some £7.1 billion in 2005. U.K. defense industrial policy is based on the 2005 Defense Industrial Strategy (DIS),[28] and the associated Defense Technology Strategy (DTS).[29] The DIS is the most comprehensive statement of U.K. defense industrial policy ever published by a U.K. government. It provides data on the UKDIB; it provides guiding principles for the Strategy; it outlines the problems facing the defense industries; and it identifies the key industrial capabilities which will be retained in the United Kingdom.

The DIS contains data on the UKDIB, and some of the main features are shown in Table 5. The Table shows annual MoD spending and its allocation between R&D, equipment, and support services. Support services accounted for over 50 percent of MoD spending and the DIS forecasts a significant growth of this business. The DIS also confirms the relative openness of the U.K. defense market, where over 30 percent of MoD industrial spending was with foreign-owned companies, collaborative programs, and imports (with imports accounting for about 14 percent of equipment spending in 2005). Labor productivity in the UKDIB is higher than the average for U.K. industry suggesting that the defense industries are more productive than the average alternative use of resources (i.e., the UKDIB makes a net contribution to national output). However, employment in the UKDIB has declined substantially from 740,000 employees in 1980/81 to 550,000 at the end of the Cold War and the 310,000 personnel in 2005. The DIS forecasts further employment reductions and substantial excess capacity in U.K. production facilities. Indeed, the DIS reflects the need for the UKDIB to adjust to a future of major gaps in development and production work, raising questions as to which defense industrial capabilities the United Kingdom wishes to retain, how such capabilities will be retained, and at what cost.

Table 5: The United Kingdom defense industrial base, 2005

Total MoD spending in £ billions	
Support services	9.0
Equipment	4.7
Research and technology	2.3
Total	16.0
Country-ownership allocation of MoD spending (in %)	
U.K.-owned and based companies	68.0
Foreign-owned U.K.-based companies	14.0
Collaborative projects	13.0
Imports	5.0
U.K. defense exports (deliveries) in £ billions	7.1
Productivity (value added per employee in £ '000s)	
U.K. defense industry	55.0
All U.K. industries	48.1
Total employment in U.K. defense industries (in '000s)	310
- including employment on defense exports	65

Major firms paid over £250 million by MoD in 2005/06: BAE Systems, Finmeccanica, General Dynamics, QinetiQ, Babcock, EADS, EDS, Halliburton, Lockheed Martin, Raytheon, Rolls-Royce, Serco, and Thales.

Sources: DIS (2005); DASA (2006).

The DIS specifies that the sectors to be retained in the U.K. include submarines, core workload warship building, small arms ammunition, and cryptography together with support capabilities for manned fixed wing aircraft, helicopters, and armored fighting vehicles. Elsewhere, the United Kingdom retains the right to buy from overseas for large aircraft, trainer aircraft, helicopters, missiles, torpedoes, and some warships. Future business in the defense industry is expected to be dominated by support and upgrading of platforms. It is also recognized that as industrial rationalization continues, sustaining competition for domestic requirements will be

increasingly difficult. Once the current generation of major projects enters service, there is forecast to be substantial excess capacity. For example, the projected end of any new design manned fast jet aircraft threatens the U.K.'s existing design, development, and manufacturing capabilities (e.g., BAE plants at Brough, Woodford, Warton, and Samlesbury).

The DIS plans to retain key parts of the UKDIB by offering protected and guaranteed markets to preferred suppliers through long-term partnering agreements. These agreements will be with domestic monopolies and will replace competition as a means of delivering best long-term value for money (e.g., where competition is not possible or inappropriate). Inevitably, concerns arise about the economic impact of the shift from competition to monopoly and partnering. Standard economic theory predicts that partnering will lead to monopoly behavior reflected in higher prices, inefficiency, monopoly profits, and a poor performance on innovation. There are also potential conflicts between the DIS partnering model based on protected and guaranteed U.K. defense markets and the EU's efforts to create a European defense equipment market based on open and competitive markets. Interestingly, before the DIS, U.K. procurement policy was based on open and competitive markets.

The DIS raises further issues of concern. There will be more emphasis on non-competitive contracts with all their problems (e.g., estimating and agreeing costs, profits, and prices). The role of wider factors in procurement choices represents a further unknown in the DIS (e.g., what are these wider factors; are they based on market failures; do they allow Ministers opportunities for distorting procurement choices?). Also, supporting key U.K. defense industries involves a willingness to pay for such capabilities, but various parts of the DIS refer to the need to avoid paying a U.K. premium. Finally, the dominant position of BAE Systems with its domestic monopolies in air, land, and sea systems needs to addressed. There are concerns about a cosy relationship between the contractor and MoD which might be controlled by treating BAE as a regulated firm or subjecting it to periodic efficiency audits by the U.K. Competition Commission.[30]

Conclusion

European, U.K., and U.S. defense firms are faced with change. Defense firms have a long history of change and uncertainty. New technology has resulted in revolutions in arms and armed forces. Examples include the emergence in the twentieth century of manned aircraft, missiles, and nuclear weapons. Continued technical change and the emergence of new threats (e.g., international terrorism) means that the future defense firm will be different from today's defense firm. Not all existing arms firms will survive and adjust to new technologies. Future aerospace firms will shift from manned combat aircraft to unmanned combat air vehicles, missiles and space systems, and the electronics industry is likely to become more important providing the next generation of new entrants, systems integrators, and prime contractors. New forms of industrial organization will also emerge characterized by buying rather than making, using international supply chains in a global economy leading to more international arms firms.[31]

Costly, defense specific equipment will create further challenges for European and U.K. governments and the defense industrial base. Examples include aircraft carriers, main battle tanks, manned strategic bomber aircraft, and nuclear-powered submarines. Increasingly, these are purchased in small numbers with long gaps in development between new generations of equipment. Where such systems require highly specific human and physical capital (e.g., nuclear-powered submarines),[32] there will be problems and costs in maintaining such assets during gaps in development. The absence of competition for these weapons means that their prime contractors will have to be treated as regulated firms requiring procurement agencies to review their regulatory policies for non-competitive contracts (cf., regulation of natural monopolies). Continued industry re-structuring among both prime contractors and suppliers means that national markets will be dominated by larger firms and domestic monopolies. Competition remains an efficient policing mechanism, but it will require a government's willingness to open up its national defense market to allow foreign firms to bid for arms contracts with possible adverse impacts on the EDTIB and domestic defense industries.

For the EU, there are likely to be conflicts between its efforts to open up national defense markets and the desire to create and maintain an EDTIB and for nations to retain a domestic defense industry (e.g., the U.K.'s DIS). The notion of an EDTIB remains vague (e.g., compare the U.S. model). Even if the defense industrial base can be defined, choices will be needed about its geographical distribution (e.g., the desire for fair shares), the likely monopoly of some costly and highly specialized industrial capabilities (e.g., aircraft carriers; missiles; space systems; nuclear-powered submarines), and the possibility of duopoly-oligopoly in other sectors of the EDTIB (e.g., helicopters; manned combat aircraft; transport aircraft; main battle tanks).

The United Kingdom is already making such choices through its Defense Industrial Strategy, which has identified key capabilities that the U.K. plans to retain through guaranteed markets and partnering agreements with preferred suppliers. The development of an EDTIB might require the U.K. to make further difficult choices through being more selective about which defense industrial capabilities are to be retained in the U.K. For example, can the U.K. (and France) afford to retain a costly submarine industrial base supplying one product to one customer in small numbers? It might be more cost-effective to focus on the U.K. aerospace industry as a successful defense industrial sector. Nor can the U.K.-U.S. relationship be ignored in formulating a European defense industrial policy. The U.K's major defense firms have substantial business investments in the U.S. defense industry (e.g., BAE, Roll-Royce) while American and European defense firms own substantial parts of the UKDIB (e.g., Smiths Aerospace owned by GE; AgustaWestland owned by Finmeccanica). For U.K. firms, the U.S. defense market is a large and relatively profitable market. The creation

of a European defense equipment market would provide a similar large and potentially profitable market for U.K. and European firms.

Notes

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1. DIS (2005, p. 26).

2. That is, using Article 296. See DIS (2005, p. 29).

3. In fact, employment in the U.S. defense industrial base declined by some 35 percent from 1989/90 to 1998, after which it increased.

4. Dunne and Surry (2006).

5. See Sköns and Surry (2005).

6. Hartley (1995).

7. EU (2005).

8. Hartley (2006).

9. The Joint Strike Fighter, or JSF, is an international cooperative program consisting of the United States and eight foreign partners (U.K., Italy, Netherlands, Turkey, Denmark, Norway, Canada, and Australia). The partners have made various financial contributions to the development phase in return for an involvement in the program. However, the aircraft is a U.S. design with Lockheed Martin as prime contractor. Problems have arisen over the work allocated to the foreign partners, especially access to advanced technology (technology transfer).

10. NAO (2001).

11. NAO (2001).

12. Brauer and Dunne (2004).

13. USDC (2007).

14. Kuechle (2006, p. 8).

15. For this larger sample, the limited data set was based on removing outliers (data in brackets in Table 4) and omitting nations with apparently zero defense employment but with imports less than domestic procurement, suggesting that these nations might have had defense industry employment which was not shown by the BICC data. The result was a sample of n = 15 nations.

16. USDC (2007, Table 2-2, pp. 2-5).

17. The balance was unspecified; USDC (2007, pp. 2-7).

18. USDC (2007, Interagency Team, pp. 4-16).

19. USDC (2007, pp. 4-5).

20. USDC (2007, pp. 4-9).

21. USDC (2007, p. vi).

22. EDA (2007, p. 5).

23. EDA (2007, p. 4).

24. Kuechle (2006, p. 26).

25. EDA (2007, p. 2).

26. EDA (2007, p. 3).

27. DoD (2007).

28. DIS (2005).

29. DTS (2006).

30. Hartley (2007).

31. Hartley and Sandler (2003).

32. Ireland (2007).

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Corruption and the arms trade: the United Kingdom's Ministry of Defense and the bribe culture

Nicholas Gilby

Bribery has long been the handmaiden of the arms trade. Richard Jordan Gatling, the inventor of the Gatling gun, wrote in the 1870s that "our best policy will be to keep up the prices of the guns and give liberal commissions."[1] The practice of paying commissions to agents, hidden in the overall price quoted to the customer government, has become a common method by which arms companies have passed bribes to decisionmakers.[2] Although not necessarily illegal, this is corruption, or bribery, as commonly understood by the layman, where promises of payments are made by a company or individual, sometimes via intermediaries, to individuals in a position to influence decisions, with the expectation that this will buy a favorable decision for the company or individual promising the payments.[3]

Arms exports are necessary to enable the U.K. government to achieve its objective of sustaining the country's arms industry.[4] But to export arms, U.K. arms companies seem to need to pay bribes.[5] (The government, which for forty years has actively promoted arms exports,[6] has, however, always denied being complicit in bribery by arms companies.[7]) Using previously unpublished material, this article considers exactly how the U.K. Ministry of Defense (MoD) has interacted with the "bribe culture" that has surrounded international arms deals.[8] It argues that there were two basic phases. The first, in which the MoD directly paid commissions to agents, used a subsidiary of the Crown Agents as a front, facilitated bribery by private companies, and provided intelligence on corruption to U.K. companies. The second phase, after the Lockheed scandal in the United States in 1975-76,[9] saw the MoD trying to avoid acquiring knowledge of bribes and to avoid asking awkward questions. In essence, this left bribes on government-to-government deals to be paid by U.K. companies, and misled Parliament about the truth.

The following sections explore these assertions in some detail.

In-house involvement

Up to the 1970s, there is evidence that the U.K. government actively participated in arms trade corruption in four ways. First, the MoD, when selling surplus MoD weapons or weapons produced by nationalized companies, directly employed agents in the expectation they would indulge in bribery. This was evident prior to the setting up of the Defense Sales Organization, DSO (which became the Defense Export Services Organization, DESO, in 1985), when the Director of Sales at the MoD, Harold Hubert, told the embassy in Tehran in July 1964 that he wanted an agent to secure arms deals in Iran. Hubert complained of "loud protests about the encouragement of graft. My own reaction to this is that I am not keen to educate the Persians in virtuous ways." He asked his agent to sell "through the back door."[10] Hubert admitted to the Foreign Office that in Saudi Arabia, Alamuddin, the agent he wanted to use in Iran, had used the Zahid brothers, whom, Hubert said, "operate by graft." The Zahid brothers, he wrote, "gave me immediate access to the Minister of Defence," Prince Sultan, then and now the Saudi Minister of Defense.[11]

In May 1965 Hubert sold Geoffrey Edwards 10,000 Lee Enfield .303 rifles and 6 million rounds of ammunition.[12] The arms were to be sent to Saudi Arabia. Edwards was the agent in Saudi Arabia of BAE Systems's forerunner, the British Aircraft Corporation (BAC). Edwards, the Foreign Office believed, passed bribes to secure arms deals.[13] Hubert pointed out that "the rifles which we sold to Edwards for £7.15.0d delivered in Jedda were re-sold to the Saudi Government for £15." Clearly showing he believed that bribes had been paid, Hubert wrote "a profit of this sort (on ammunition as well) has no doubt to be shared." The Foreign Office wrote to the embassy in Jedda that "any sweetening of the Saudis is a matter for Edwards and not the Ministry of Defence."[14] The embassy replied that "certain military officers received bribes in consideration of passing the rifles as satisfactory."[15]

When, in early 1967, a U.K. embassy official in Caracas asked Hubert whether the government were prepared, through an agent, to enter into a government-to-government contract involving bribery,[16] Hubert replied "I am completely mystified by just what your problem is ... people who deal with the arms trade, even if they are sitting in a government office, live day by day with this sort of activity, and equally day by day they carry out transactions knowing that at some point bribery is involved. Obviously I and my colleagues in this office do not engage in it, but we believe that various people who are somewhere along the lines of our transactions do. They do not tell us what they are doing and we do not inquire. We are interested in the end result."[17] Leonard Figg of the Foreign and Commonwealth Office's (FCO) Defense Department replied that "we accept the proposition that an agent acting in a government-to-government deal (or of course firm-to-government) should get his commission and the price HMG charge must reflect this cost."[18]

Later that year DSO promised £50,000[19] to an agent "to help with the promotion of the Chieftain Tank sale to Holland because of the influence it was considered he could bring to bear in influential quarters."[20] The Treasury believed the agent was Prince Bernhard,[21] widely believed to be "on the take."[22] In 1975 Bernhard was removed from public duties after it was revealed he had requested $4 million to $6 million in commission from Lockheed on the Dutch purchase of F-104 Starfighter aircraft.[23] Defense Secretary Denis Healey was told in 1969 that "the [Chieftain] deal did not come off and no money was paid" but that another agent[24] had been hired to sell the 30mm Rarden Gun to Holland.[25]

In early 1969, the MoD used Shehadah Twal to sell Royal Ordnance Factory

Overall, there is considerable evidence that prior to the mid-1970s the British government was aware of arms deal corruption, and that it participated in this corruption in various ways. For the period thereafter, an argument can be made that government knowingly "subcontracted" arms-related corruption to other agents.

products in Jordan.[26] According to the Amman Defense Attaché, Twal "was previously hand in glove with [Major General] Sherif Nasser." Hubert's deputy, Edgar Nissen,[27] wrote that "Sherif Nasser is known as 'Mr 15 per cent' so far as Services equipment is concerned. Unless we can keep in with him and offer acceptable terms, it is unlikely that we can hope for any serious business."[28] Nasser was the uncle of King Hussein and Commander-in-Chief of the Jordanian Army. Ray Brown, the Head of DSO, told Defense Secretary Denis Healey that Twal had been hired because of "the need to have individuals at the Department's disposal to ensure that those able to influence where orders may go are appropriately recompensed by the agents."[29] Twal was promised 2.5% "commission" in 1969.[30] On 5 November 1970, DSO sold 16 Centurion tanks to Jordan for £16,500 each. Twal was "incurring considerable expenditure on sales promotion and entertainment"[31] and on 22 June 1971 was paid his commission.[32] The MoD canceled the agreement in June 1972 as Twal had not had further success.[33] This hiring of agents by the MoD was authorized by ministers and very senior officials.[34] Even Defense Secretary Denis Healey was aware of the arrangements regarding Holland, and he and Defense Minister Ian Gilmour knew of the MoD's employment of Alamuddin (Alamuddin was promised 2.5% "commission" on sales) in the Lebanon and Twal in Jordan.[35]

Second, there is evidence that the MoD used Millbank Technical Services (MTS), a wholly owned subsidiary of the Crown Agents for Overseas Governments and Administrations, as a front to pass on bribes. The Crown Agents were financial, professional, and commercial agents for overseas governments and public bodies.[36] Working with DSO, it offered "to defence forces overseas a comprehensive range of technical supply and support services."[37] Crucially, MTS was able and willing to pay "agents commissions."[38]

At the start of the 1970s DSO were heavily involved in an attempt to sell the Saudi Arabian National Guard (SANG) five armoured battle groups[39] for £112 million.[40] SANG Commander Prince Abdullah (now King of Saudi Arabia) pressed for a formal government-to-government deal[41] and the MoD answer was to use MTS. The Head of DSO, Lester Suffield, explained to Defense Secretary Lord Carrington's Private Secretary in 1972 that "because of the usual considerations that apply to any business in Saudi Arabia i.e. the need to pay 'commissions' and because also Prince Abdullah wished to give any purchase the appearance of a Government-to-Government deal, we proposed to Prince Abdullah that a middle course would be to make the U.K. package offer through Millbank Technical Services."[42] Earlier Hubert had explained that "there might be advantages in MTS co-ordinating any British equipment business to provide the quasi-Government oversight as well as passing on the douceurs."[43] MTS employed Abdullah's brother-in-law, Fustuq, as their agent.[44]

Ministers were told "at various times other 'fixers' tried to get in on the act and we did our best to string them along while continuing to deal through the channel Abdullah desired [Fustuq]." With the deal slipping away from the United Kingdom, Hubert advised that MTS should try and do a deal with Khashoggi (who represented the big U.S. arms companies) and "we should go for it and pull out all the stops. If a deal has to be done with Khashoggi it should be done. His own personal demands will probably be high, but that is the way business is done in Saudi Arabia, the King's edict about 25 percenters notwithstanding. Either Khashoggi is offered the cut he wants or we should pull out."[45] Khashoggi had previously been used as an "agent" on arms deals by the MoD,[46] but the United States eventually secured the deal.

Third, there is evidence that bribery by private companies was facilitated by U.K. officials. General Makki Tounisi, the Director of Operations in the Saudi Army, asked Jedda Defense Attaché Colin Fitzpatrick for a substantial bribe (3.5 percent of the contract price) for the sale of Vickers private venture tanks to the Saudi Army. This bribe request was duly passed to Vickers by Fitzpatrick.[47] Colonel Bernard Heath of Vickers told his superiors that Hassan Gabr, chief interpreter to Saudi Defense Minister Prince Sultan, had said "everyone else used agents and that no deal would go through unless Sultan and the Army Officers got a cut."[48]

Last, there is evidence that the DSO consulted "fixers" to glean intelligence for U.K. arms companies. In January 1971 Adnan Khashoggi met DSO in London to advance his proposals for a "systems management organisation" for the Saudi Arabian Air Defense scheme.[49] Khashoggi was also consulted by DSO over the attempts by Vosper Thorneycroft to sell ships in the early 1970s.[50] By the early 1970s senior DSO officials such as Harold Hubert and Reg Anderson were meeting Khashoggi at least monthly to discuss arms sales, and hoped he could generate business as well as intelligence. Hubert observed "to K pressing for or against a particular equipment was not appreciably affected by its military qualities." Hubert said to Khashoggi "naturally we should not interfere with commissions paid to him by firms."[51] Meetings between DSO and Khashoggi took place in February 1972,[52] late March 1972,[53] and in May and November 1972.[54] The relationship continued into the mid-1970s, and in 1974 DSO met with Khashoggi and others to discuss the sale of Rapier.[55]

Overall, there is considerable evidence that over this period the government was aware of corruption in arms deals and participated in various ways. The advent of the Lockheed scandal in 1975-76 changed everything. Until then no questions had to be asked about what activities the agents undertook.[56] But, post-Lockheed, questions might be asked, and new MoD Permanent Secretary Sir Frank Cooper was worried about the answers. An MoD official for many years, Cooper almost certainly knew that, as Chancellor and former Defense Secretary Denis Healey later said in 1977, "there was no doubt that bribery had been going on for years on a large scale in the

Middle East and Africa, and that organisations responsible to Government (including Defence Sales and nationalised industries) had been involved."[57]

Subcontracting corruption

In May 1976, Cooper decided that "in view of the current interest in the subject of special commissions" guidelines were needed.[58] His directive, issued on 9 June 1976, stated that public money was not to be used for illegal or improper purposes, that officials should not engage in or encourage illegal acts, that DSO should avoid employing agents, and if any agent was employed by DSO they should be reputable and not demand an "excessive" fee.[59] This might have seemed a reasonable response, but as agents could still be employed by private or nationalized companies with the knowledge of the MoD, it failed to do more than lead to the subcontracting of corruption.

This became evident in 1977 when Comptroller and Auditor General, Sir Douglas Henley, was investigating the MoD's contract with BAC to provide the Saudi Arabian Air Defense Project (SADAP). In the deal payments were made by the Saudis to BAC via the MoD's accounts. BAC had told the MoD they had to pay 10 percent in "consultants' fees" – over £30 million.[60] The MoD's lawyer made clear Henley's purpose: "the question he is asking is whether we have satisfied ourselves as to the propriety of accepting the payments."[61] MTS had by then commissioned a legal opinion on the question of corruption. Using this opinion, Henley noted that in the SADAP case none of the three criteria MTS's lawyers had seen as necessary to avoid corruption had been met. Rates of commission were much higher than those paid for Iranian or Kuwaiti arms contracts; no information was provided as to the recipients of the consultants' fees; and a separate confidentiality agreement had been requested.[62]

The MoD commissioned its own legal advice from the Treasury Solicitor's Department who replied "MoD are not aware of the identity of the agents nor of the details of their services and that they have no means themselves or knowing whether the payments are excessive for the services rendered." The advice then stated that because of this the MoD could not know whether public money had been used for illegal or improper purposes and thus was in breach of Cooper's June 1976 directive.[63] The legal advice was that "the Department is entitled to obtain full information in relation to the payments. Whether or not this is practicable is, however, a matter for administrative decision."[64] A suggestion that the MoD should ask BAC for further information about its agents and their services prompted Cooper's Private Secretary John Howe[65] to minute "I don't really like the way this is going and what may be unearthed."[66] Howe wrote "we do not have a responsibility for going to some pains to discover what agents are employed by firms or exactly what the arrangements are between firms and agents" and that Cooper felt it was "business which is properly the companies' and not our own."[67]

As a result he merely asked BAC for an assurance that "the third party consultants to whom the fees in question are paid are reputable companies and individuals; and that in your company's opinion you are obtaining an adequate return through the services performed by third party consultants for the fees which you pay. Finally I should be grateful if you would confirm that the position of these consultants in relation to the contract is acceptable to the appropriate Saudi authorities." BAC agreed to provide the assurance provided that the last sentence was qualified by the phrase "to the best of your knowledge and belief."[68] This was a crucial qualification for it absolved BAC of responsibility should it turn out that (officially) the Saudi government were not aware of BAC's agency arrangements (as they almost certainly were not). The assurance was given and Cooper stressed this to Henley, neatly evading the point that SADAP had not been in compliance with his own directive about the use of agents by failing to mention to Henley that the assurances had only very recently been received.[69] Cooper then told Henley the MoD had "not thought it necessary to know the identity of the recipients" as long as BAC gave assurances.[70] His parting shot was that "it is accepted Government practice to avoid over extensive enquiries. We must have regard for the risk of unnecessary interference in industry's business and for placing firms at a disadvantage with their competitors."[71] As a concession Cooper reissued his 1976 directive to DSO. It was amended so that in cases where firms asked for MoD approval for fees or commissions to be included in the final price, the MoD should obtain assurances from the firm that the agents are reputable, providing "an adequate return" for the payments, and "to the best of the firm's knowledge" the position of the agents should be accepted by the customer government.[72]

Cooper's amended guidelines certainly made it easy for the government to turn a blind eye to corruption, by accepting companies' word that nothing was wrong at face value, while private arms sales did not require MoD approval of specific contract terms. Why the MoD wanted to avoid knowledge and further enquiries by Douglas Henley became clear two weeks later in June 1976 when the Head of Defense Sales, Lester Suffield, gained Cooper's approval for "agency fees" of 15 percent on the SADAP II deal and for the same level of "agency fees" on a contract for communications for SANG. The "fees" would be paid by the MoD's subcontractors – BAC and Cable and Wireless, respectively.[73] In the draft of Suffield's minute to Cooper asking for approval, the fees were described as amounting "in practice to the exertion of influence to sway decisions in favour of the client" and that senior Saudis "would certainly not approve the payment of fees, although they undoubtedly expect appropriately discreet arrangements to be made."[74] It appears that some MoD officials did believe that the payments were essentially corrupt.

This episode provides an illuminating insight into the culture change that the Lockheed and British Leyland corruption allegations had wrought in the MoD by the mid-1970s. The MoD tolerated "commissions" on arms deals, and the documents contain many tacit admissions of knowledge, or suspicion, about what the arms

companies were up to. But while running deals like SADAP through the MoD accounts and promoting private arms sales, senior officials tried to avoid knowledge of, and prevent the Exchequer and Audit Department discovering, what lay beneath.[75]

Turning a blind eye

Archival evidence about the government's role in the U.K.'s arms trade is, generally, only available up until 1976. But what little evidence there is after that point does tend to suggest that the government's avoidance of knowledge of bribery in arms sales continued in the 1980s.

In January 1986 the former Group Marketing Director at British Aerospace (BAe) and then Head of Defense Export Services at the MoD, Colin Chandler, met Prince Sultan in Riyadh to conclude the Al Yamamah arms deal (the U.K.'s biggest ever).[76] Chandler's telegram on the negotiations said that the price of each IDS variant Tornado had risen from £16.3 million in May 1984 to £21.5 million, and the price of each Hawk trainer from £4 million to £5.3 million.[77] This represented a price rise on both types of aircraft of 32 percent over a period of 19 months. Inflation in the United Kingdom between May 1984 and January 1986 was around 9.5 percent. No reason was provided in the telegram to London for the dramatic price rise,[78] although Patrick Wright, the Ambassador in Riyadh who was at the meeting with Chandler and Sultan, would probably have been aware of the possibility of corruption. In 1974 when Head of the FCO's Middle East Department, DSO official Ian McDonald had told Wright "the 'fiddle factor' was an element that could not be overlooked"[79] in arms sales to Saudi Arabia.[80] Despite this, the now available U.K. government documents on the negotiations[81] contain no discussion by any officials about the possibility of corruption at all, suggesting the MoD preferred not to know. Indeed, the still suppressed National Audit Office report into Al Yamamah, according to Robert Sheldon, one of its authors, was "not able to follow money outside the department once it is paid to the contractors, so we do not know what was done with it."[82]

Cooper's 1977 guidelines were updated by the Permanent Secretary Sir Christopher France in November 1994.[83] The revised guidelines stressed that "commissions" were the business of the companies only – DESO was forbidden to employ agents. Arms companies were, however, given more flexibility in government-to-government deals. The MoD dropped the requirement for assurances, demanding only that companies were told the MoD believed companies should only employ "reputable companies or individuals" and ensuring the agents provided "an adequate return for ... payments."[84] This directive essentially amounted to the MoD relaxing its standards from the late 1970s.

In March 2001 the Chief Executive of the Serious Fraud Office, Rosalind Wright, wrote to Permanent Secretary at the MoD, Kevin Tebbit, about the allegations of Edward Cunningham, a former employee of Robert Lee International (RLI), a company linked to BAe. *The Guardian* newspaper has alleged RLI was running a "slush fund" for Saudi royals. Wright wrote "I thought it right to draw this to your attention since it is conceivable that Government money has been misused."[85] Later that month Tebbit replied saying he had "no wish to set damaging hares running, but given the sensitive issues raised in your letter, I have conducted a discreet initial exploration of the allegations' implications."[86] In a move reminiscent of Cooper in 1977, Tebbit asked the Chairman of BAE, Sir Richard Evans, about the allegations: "The Chairman told me that this was an old story and reaffirmed BAES' commitment to operation within the law in all countries in which the company was involved."[87] Defense Secretary Geoff Hoon told Labour MP Gavin Strang that "Sir Kevin looked into the issue at the time and was satisfied that the allegations were of no relevance to the MoD and that no contractual impropriety regarding Government employees existed."[88] Around this time the Serious Fraud Office began its investigation into the Al Yamamah "slush fund" allegations which lasted until late 2006, but which was curtailed following lobbying by the Prime Minister and BAE Systems.

More recently, allegations have emerged that for at least 10 years BAE Systems paid £30 million every quarter to a U.S. bank account controlled by Prince Bandar bin Sultan, the son of Saudi Defense Minister Prince Sultan, as part of the Al Yamamah deal.[89] An investigator for the bank told the BBC "there wasn't a distinction between the accounts of the Embassy or official government accounts as we would call them and the accounts of the Royal Family." Prince Bandar has denied the payments were corrupt. The BBC claimed that, like SADAP, the payments were made via the MoD accounts, due to Al Yamamah being a government-to-government deal. Until more documents are available, the truth will be impossible to establish. But it appears inherently unlikely that MoD officials processed quarterly invoices from Prince Bandar as the BBC alleged. It is possible that Al Yamamah was similar to SADAP, with payments being made by the MoD to BAe, who then paid for "support services," with the MoD turning a blind if knowing eye.[90]

Frank Cooper's determination to avoid "unnecessary interference in industry's business" has thus persisted in the MoD to this day. Current policy is that "all decisions on the employment of agents and on their remuneration are matters for the companies" and DESO "is now concerned only with responding to requests ... for assistance in determining whether to employ an agent, or for information about reputable agents."[91]

Misleading Parliament

Throughout the period, Parliament has generally been kept in the dark. In the 1970s, during Henley's investigation into SADAP, an MoD lawyer made clear the MoD's anxiety to avoid parliamentary scrutiny on the issue of corruption. She wrote of Henley that "he is still concerned about the whole subject of agents' commission in its various forms, but in a longer-term context. Like us he cannot overlook the danger of the Public Accounts Committee (PAC) rambling on to the subject but I think this

would be as unwelcome to him as to us."[92] Henley felt that in the light of the British Leyland bribery allegations in the *Daily Mail* the SADAP transactions' "unusual nature and large magnitude are such that Parliament would now expect them to receive very special scrutiny and to be informed of the situation."[93] It was not.

In 1978, FCO official Derek Thomas, struggling to answer a Parliamentary Question asking "how many cases of corruption involving alleged bribery by British companies had come to the notice of the Foreign and Commonwealth Secretary during the last five years and how many such cases were connected with arms contracts," wrote "I find that it is impossible to state categorically that no such cases had come directly to Dr. Owen's notice in his capacity as Foreign and Commonwealth Secretary. This would simply not be true."[94] Thomas arranged for Frank Judd, FCO Minister of State, to merely reply that "the enforcement of legislation and general standards relating to business activities is a matter for the appropriate authorities acting within their own jurisdiction."[95]

At the end of the 1970s Cooper found himself before Parliament trying to defend actions that had been taken under his own guidelines. International Military Services (IMS), the successor to MTS, was found to have deposited just under half a million pounds into a Swiss bank account as "consultancy" on an arms deal. The MoD told the Public Accounts Committee, a powerful Parliamentary committee that scrutinizes government expenditure, that it did not "condone" bribery, a statement that as we have seen was dishonest. It emerged that, following Cooper's own guidelines, the MoD had "undertaken not to require IMS to supply documentation relating to the company's commercial partnerships with third parties," and as a result Cooper conveniently could not be certain whether or not a bribe had been paid.[96]

An article in *The Guardian* in 2003 claimed that "bribery has been at the heart of DESO's mission from the day the unit was launched nearly 40 years ago," and that the "UK secretly connives at such payments."[97] The article was fiercely rebutted by the MoD in a response to a parliamentary inquiry as "totally without foundation" and irresponsible."[98] While Parliament's Quadripartite Committee still accepts the MoD denials,[99] the MoD's defense[100] relies on the revised Cooper's 1976 guidelines, which, as we have argued, were designed to allow them to turn a blind eye. These were largely meaningless, as, two weeks after their promulgation, MoD officials apparently believed that payments made on a government-to-government deal with Saudi Arabia were essentially corrupt. Sadly, Parliament continues to be misled.

Conclusions

If we accept Joe Roeber's plausible contention that the international arms trade is "the most corrupt of all legal international trades,"[101] then the MoD's close involvement with the international arms trade means that it is inevitably complicit in corruption. The evidence presented here suggests, however, that it has been more than complicit and that its insistence on the propriety of its own conduct is questionable. Newly available evidence documents the involvement of the government in corruption before the mid 1970s, and since then it appears to have deliberately chosen a strategy of closing its eyes to the corruption it actually suspects. This is particularly the case in the Al Yamamah arms deal, where MoD has been more closely involved than any other U.K. arms deal. It has acted as government sponsor, committing its own staff to the servicing of the contract, and lobbying for loan guarantees and for a new lucrative contract known as Al Salam.[102] The allegations about corruption in the Al Yamamah deal have been sustained, from multiple credible sources and thoroughly documented. Yet the MoD's response has been to ignore them. When pressed by the Serious Fraud Office (SFO) it merely sought unsubstantiated assurances from BAE Systems. And once the SFO did investigate, it participated in the lobby for the investigation to be stopped, as Defense Secretary Des Browne did in the autumn of 2006.[103]

For the last forty years the MoD has faced a choice – accepting corruption or making a serious attempt to stamp it out. It has chosen the former. The likely costs of this choice are high. A bribe culture "undermines democratic accountability, diverts resources from the public good and into private pockets, and 'redistribut[es] wealth and power to the undeserving.' Corruption can also increase inequality and poverty,"[104] and generate demand for arms that could increase the likelihood of conflict. It also undermines democracy in the United Kingdom, and in the words of former DSO employee Harold Hubert "besmirch[es] the good name of the British Government."[105]

To be able to stamp out corruption, the truth would need to be faced openly and honestly so that effective solutions can be put forward.[106] To this end the government should remove its support for a corrupt trade, the National Audit Office (NAO) report into Al Yamamah (the only NAO report still secret) should be published, the Serious Fraud Office investigation into Al Yamamah should be reinstated, and an independent enquiry into the whole affair should be launched. The U.K. government needs to bring in effective corruption legislation, and, more importantly, enforce it. This may lead to some embarrassment to the government, but the potential benefits are significant.

Notes

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1. Phythian (2000, p. 85).

2. For reasons of brevity I do not intend to substantiate this point in this paper. Those who are skeptical about this assertion can turn to the following for enlightenment (this is not an exhaustive list of the relevant literature but they give a good overview of the

subject): Boulton (1978); Phythian (2000, pp. 84-96); Roeber (2005). In the United Kingdom. there have also been many allegations in recent years concerning bribery by BAE Systems and a company it now owns – Alvis plc – in Saudi Arabia, Indonesia, South Africa, Romania, Tanzania, the Czech Republic, Chile, and Qatar. These allegations have been given extensive coverage, particularly in *The Guardian*. Aside from Saudi Arabia and Indonesia, all the allegations are being investigated by the Serious Fraud Office (SFO). BAE Systems and Alvis have always denied the allegations.

3. Until 2001 the relevant anti-corruption legislation was the Prevention of Corruption Act 1906. Subsection 1(1) of the Act states "if any person corruptly gives or agrees to give or offers any gift or consideration to any agent as an inducement or reward for doing or forbearing to do, or for having after the passing of this Act done or forborne to do, any act in relation to his principal's affairs or business, or for showing or forbearing to show favour or disfavour to any person in relation to his principal's affairs or business ... he shall be guilty of a misdemeanour." It is the view of the U.K. government, as reported by the OECD, that "there is no legal impediment to applying these offences to the bribery of foreign public officials" (see OECD, 2000, p. 3). The U.K. government told the OECD that the Prevention of Corruption Act 1906 also applies where a bribe is made via an intermediary (ibid, p. 5). Further the U.K. government told the OECD that under section 8 of the Accessories and Abettors Act 1861, "any person who aids, abets, counsels, or procures a criminal offence, statutory or at common law, may be prosecuted" (ibid, p. 7). The government has also stated that "section 31, sub-section (1) of the Criminal Justice Act of 1948 provides that where any British subject employed by HMG in the U.K., when in a foreign country and acting in the course of his employment, commits an offence which if committed in England would be punishable on indictment, then that individual shall be guilty of an offence" (Quadripartite Committee, 2007, paragraph 341, p. 136). The OECD noted, however, that "the courts did not have jurisdiction to try a bribery offence unless some part of the corrupt transaction took part in the United Kingdom" (OECD, 2003, p. 5). The OECD noted in 2005 that "despite the longstanding existence of bribery offences in the UK… [there have been no] known convictions of legal persons for domestic or foreign bribery under the common law, the 1889 Act or the 1906 Act. There is also scant evidence of any prosecution of legal persons" (OECD, 2005, pp. 64-65). The difficulties inherent in prosecution are graphically illustrated in the Al Yamamah "slush fund" case where BAE Systems were alleged to have run a "slush fund" for leading Saudi Princes. The SFO investigation was controversially suspended in December 2006. Part of the reason for this was that the then-Attorney General, Lord Goldsmith, took the view that a prosecution was impossible as BAE Systems had asserted the payments had been authorized at the highest level in Saudi Arabia. Under the 1906 Act the person receiving the bribe (the "agent") has to be acting against the interests of his "principal," i.e., organization. Effectively Goldsmith took the view that as in Saudi Arabia the royal family (who were allegedly the beneficiaries of the "slush fund") are the state, BAE Systems' defense would succeed (Adams, *et al*., 2007). Because of the legal complexities, this article does not attempt to define the practices described as legal or illegal, but instead relies on the ordinarily understood definition of corruption, which arguably should guide the government more than mere legal considerations.

4. Ministry of Defense (2005, pp. 46-47).

5. In the words of Joe Roeber, the arms trade is "the most corrupt of all legal international trades." See Roeber (2005, p. 5).

6. For example the government used a dedicated unit of around 500 civil servants, the Defense Export Services Organization (DESO), to push for arms exports (DESO however is due to be closed by the end of 2007). There are a variety of other ways, direct and indirect, that the government uses to support arms exports.

7. Quadripartite Committee (2004, Ev 34) and, more recently, Quadripartite Committee (2006, p. 24).

8. The Freedom of Information Act (2000) has been important in enabling some of the material in this article to reach the public domain. Previous publication of some of the material in the article has resulted in the documents cited being withdrawn from public view. Section 4(6) of the Public Records Act 1958 (which is still in force) states that "public records in the Public Record Office or other place of deposit appointed by the Lord Chancellor under this Act shall be temporarily returned at the request of the person by whom or department or office from which they were transferred." This was the fate of files DEFE 23/149 and PJ 5/40, cited in this article.

9. An investigation by the U.S. Senate Sub-Committee on Multinationals under Senator Frank Church had uncovered massive bribes paid by a major U.S. arms company, Lockheed, to secure contracts.

10. The National Archives (TNA). 5 March 1965. Letter from H.R. Hubert, MoD, to I.R. Courtney, British Embassy, Tehran. FO 371/180660.

11. TNA. 24 March 1965. Letter from H.R. Hubert, MoD, to W. Morris, FO, 24 March 1965, TNA. FO 371/180660.

12. TNA. 12 May 1965. Minute from D.I. Morphet, FO. BS 1192/77, FO 371/179889.

13. TNA. 22 July 1965. Jedda Telegram No.72 to MoD, copied to FO. BS 1192/96, FO 371/179890.

14. TNA. 11 August 1965. Letter from D.I. Morphet, FO, to J.M. Brown, British Embassy, Jedda. BS 1192/96, FO 371/179890.

15. TNA. 25 August 1965. Letter from J.M. Brown, British Embassy, Jedda, to D.I. Morphet, FO. BS 1192/96, FO 371/179890.

16. TNA. 18 January 1967. Letter from D.N. Brinson, British Embassy, Caracas, to L.C.W. Figg, FCO. FCO 46/190.

17. TNA. 2 February 1967. Letter from H.R. Hubert, MoD, to D.N. Brinson, British Embassy, Caracas. FCO 46/190.

18. TNA. 22 February 1967. Letter from L.C.W. Figg, FCO, to D.N. Brinson, British Embassy, Caracas. FCO 46/190.

19. TNA. 5 September 1967. Letter from J. Moreton, MoD, to J. Patterson, HM Treasury. T 225/2918.

20. TNA. 15 October 1969. Minute from R.F. Brown, MoD, to Denis Healey. http://image.guardian.co.uk/sys-files/Guardian/documents/2007/05/28/ch02doc 080910.pdf [accessed 22 September 2007].

21. TNA. 5 September 1967. Letter from J. Moreton, MoD, to J. Patterson, HM Treasury. T 225/2918.

22. Sampson (1977, p. 123).

23. Phythian (2000, p. 87).

24. Colonel Douwes Dekker of Goliath Limited. TNA. 1 September 1976. Draft reply to letter from Sir Douglas Henley, Exchequer and Audit Department to Sir Frank Cooper, MoD. PJ 1/43.

25. TNA. 15 October 1969. Minute from R.F. Brown, MoD, to Denis Healey. http://image.guardian.co.uk/sys-files/Guardian/documents/2007/05/28/ ch02doc080910.pdf [accessed 22 September 2007].

26. Twal worked for The Commercial and Industrial Company in Amman. TNA. 19 February 1969. Letter from T.E. Nissen, MoD, to S.S. Twal. DEFE 68/96.

27. At this time Nissen was Deputy Director of Army Sales in the MoD; Hubert was Director of Army Sales.

28. TNA. 4 August 1969. Minute from T.E. Nissen, MoD, to C. Hewertson, MoD. DEFE 68/96.

29. TNA. 15 October 1969. Minute from R.F. Brown, MoD, to Denis Healey. http://image.guardian.co.uk/sys-files/Guardian/documents/2007/05/28/ch02doc080 910.pdf [accessed 22 September 2007].

30. TNA. 24 November 1969. Agreement between the United Kingdom Ministry of Defence (Directorate of Army Sales) and The Commercial and Industrial Company Limited, Amman, represented by Mr. Shehadah Twal. DEFE 68/96.

31. TNA. 4 December 1970. Minute from T.E. Nissen, MoD, to H.R. Hubert, MoD. DEFE 68/96.

32. TNA. 10 July 1972. Minute from T.E. Nissen, MoD, to H.R. Braden, MoD. DEFE 68/96.

33. TNA. 15 June 1972. Letter from H.R. Braden, MoD, to S.S. Twal. DEFE 68/96.

34. Defense Secretary Denis Healey was told by his Permanent Secretary, Sir James Dunnett, in September 1967 that "instructions have been issued to ensure that any proposals to employ agents on MoD behalf are submitted to at least DUS level and where considered appropriate, to Ministers." DUS level is Deputy Under Secretary level, one grade lower than Permanent Secretary, the grade of the top MoD official. TNA. 21 September 1967. Minute from I.J. Dunnett, MoD, to Denis Healey. DEFE 13/509.

35. TNA. 15 October 1969. Minute from R.F. Brown, MoD, to Denis Healey. http://image.guardian.co.uk/sys-files/Guardian/documents/2007/05/28/ch02doc080 910.pdf [accessed 22 September 2007]. TNA. 21 May 1971. Minute from R.L.L. Facer, MoD, to APS/Minister of State, MoD. DEFE 68/96.

36. MTS was a private company incorporated on 11 December 1967. TNA. March 1975. Interim Report on Millbank Technical Services Limited, Coopers and Lybrand Chartered Accountants, p. 3. CAOG 18/676.

37. TNA. Final Draft MTS Brochure. CAOG 22/27.

38. TNA. March 1975. Interim Report on Millbank Technical Services Limited, Coopers and Lybrand Chartered Accountants, p. 10. CAOG 18/676.

39. TNA. Presentation to His Royal Highness Prince Abdullah Bin Abdul Aziz, Commander, Saudi Arabian National Guard. DEFE 68/239.

40. TNA. 3 March 1972. Minute from H.J.L. Suffield, Head of Defence Sales to Private Secretary, Secretary of State for Defence. FCO 8/1914.

41. TNA. 4 August 1971. Annex C of letter from W. Morris, British Embassy, Jedda to A.D. Parsons, FCO. FCO 8/1753.

42. TNA. 3 March 1972. Minute from H.J.L. Suffield, Head of Defence Sales to Private Secretary, Secretary of State for Defence. FCO 8/1914.

43. TNA. 11 January 1972. Minute from H.R. Hubert, DSO, to H.J.L. Suffield, Head of Defence Sales. FCO 8/1914.

44. TNA. 5 August 1971. Note for the file by R. Anderson, MoD. DEFE 13/797. TNA. 18 February 1972. DSO Telegram to British Embassy, Jedda copied to FCO. FCO 8/1914. Fustuq was hired via his firm METICO, a Beirut firm he appears to have run with a Jean Moghabgab. TNA. 9 February 1972. Letter from W. Morris, British Embassy, Jedda to A.D. Parsons, FCO. FCO 8/1914.

45. TNA. 11 January 1972. Minute from H.R. Hubert, DSO, to H.J.L. Suffield, Head of Defence Sales. FCO 8/1914.

46. TNA. 15 January 1965. Submission "Parliamentary Question." BS 1192/25, FO 371/179888. TNA, 17 January 1966. Letter from A. Miller, MoD, to D. Marston, FO. BS 1192/16, FO 371/185493. TNA. 26 May 1965. Letter from M.S. Weir, FO, to J.M. Brown, British Embassy, Jedda. BS 1192/78, FO 371/179889. TNA. 14 January 1965. Submission "Arms for Saudi National Guard." BS 1192/25, FO 371/179888.

47. Vickers Archive. 21 October 1968. Minute from J.H. Robbie, Vickers. File 871. This material is produced by permission from the Vickers Archive held at the Cambridge University Library.

48. Vickers Archive. 29 September 1969. Visit to Saudi Arabia – 22 to 26 September 1969, Report by Col. B.S. Heath, Vickers. File 871. This material is produced by permission from the Vickers Archive held at the Cambridge University Library.

49. TNA. 8 July 1971. Letter from H.J.L. Suffield, MoD, to W. Morris, British Embassy, Jedda. FCO 8/1753.

50. TNA. 2 May 1971. Letter from W. Morris, British Embassy, Jedda, to H.J.L. Suffield, MoD. FCO 8/1753.

51. TNA. 20 January 1972. Minute from H.R. Hubert, MoD, to AUS(Sales), MoD. FCO 8/1914.

52. TNA. 8 February 1972. Note of a Meeting with Mr. Khashoggi. FCO 8/1912.

53. TNA. 27 March 1972. Saudi Arabia – Note of a Meeting with Mr. Khashoggi. FCO 8/1914.

54. TNA. 8 May 1972. Minute from H.R. Hubert, MoD, to AUS(Sales), MoD. FCO 8/1920. TNA. 1 November 1972. MoD Telegram No. 011615 to British Embassy, Jedda copied to Cairo. FCO 8/1917.

55. TNA. 22 April 1974. Note for the File "Rapier for Saudi Arabia." FCO 8/2344.

56. Guidelines had existed since 1967 under which agents were to be employed by the MoD "to promote exports where it is clear that the market could not be exploited without their help," the agents had to be "persons or firms of repute" and "remunerated on a basis which reflects the services rendered and can be defended as fair and reasonable." These guidelines, although reasonable sounding, were interpreted by MoD officials, as we have seen, as permitting the use of agents and bribery. TNA. 4 May 1967. Letter from C. Hewertson, MoD to J.A. Patterson, HM Treasury. T 225/2918.

57. TNA. 22 May 1977. Note of a Meeting after lunch at Chequers on Sunday. FV 22/117.

58. TNA. 4 May 1976. Minute from J.F. Howe, MoD, to DUS(FB), MoD. DEFE 68/110.

59. TNA. 9 June 1976. Minute from F. Cooper, MoD to HDS. DEFE 68/110.

60. TNA. 12 January 1977. Letter from Sir Douglas Henley, Exchequer and Audit Department to Sir Frank Cooper, MoD. DEFE 68/110.

61. TNA. 24 March 1977. Minute from Mrs. M. Swaffield, MoD, to DUS(FB), MoD. DEFE 23/149.

62. TNA. 12 January 1977. Letter from Sir Douglas Henley, Exchequer and Audit Department to Sir Frank Cooper, MoD. DEFE 68/110.

63. TNA. 21 February 1977. Letter from A.D. Osborne, Treasury Solicitor's Department, to J.E.D. Street, MoD. DEFE 23/149.

64. TNA. 19 April 1977. Minute from A.D. Osborne, Treasury Solicitor's Department to AUS(Sales), MoD. DEFE 23/149.

65. John Howe held a wide variety of positions on both the management and policy sides of the MoD, including a spell in Northern Ireland in the early 1970s; secondment to the FCO as Counselor in the U.K. Delegation to NATO in the early 1980s; founding Head of the Defense Arms Control Unit; a spell as Private Secretary to the Defense Secretary George Younger (in the mid to late-1980s); and Personnel Director. His last post was as Deputy Chief Executive of the Defense Procurement Agency. Since 2000 he has been the Vice Chairman of Thales U.K.

66. TNA. 2 March 1977. Minute from J.E.D. Street, MoD, to PS/PUS, MoD. DEFE 23/149.

67. TNA. 3 March 1977. Minute from J.F. Howe, MoD, to AUS(Sales Admin), MoD. DEFE 23/149.

68. TNA. 13 April 1977. Minute from J.E.D. Street, MoD, to PS/PUS, MoD. DEFE 23/149.

69. TNA. 2 May 1977. Letter from Sir Frank Cooper, MoD to Sir Douglas Henley, Exchequer and Audit Department. DEFE 68/110.

70. TNA. 27 June 1977. Letter from Sir Frank Cooper, MoD, to Sir Douglas Henley, Exchequer and Audit Department. DEFE 68/110.

71. TNA. 10 August 1977. Letter from Sir Frank Cooper, MoD, to Sir Douglas Henley, Exchequer and Audit Department. DEFE 68/110.

72. TNA. 23 August 1977. Directive from Sir Frank Cooper, MoD to Head of Defence Sales, MoD. DEFE 68/110.

73. TNA. 23 June 1976. Minute from H.J.L. Suffield, MoD, to F. Cooper, MoD. DEFE 23/149. TNA. 23 June 1976. Minute from F. Cooper, MoD, to H.J.L. Suffield. DEFE 23/149.

74. TNA. Undated. Draft minute from H.J.L. Suffield, MoD, to F. Cooper, MoD. DEFE 68/319.

75. An interesting perspective on the dilemma of complicit knowledge came in late 1976 in a discussion between Hugh Braden at DSO and Ivor Lucas, the Head of the Middle East Department at the Foreign and Commonwealth Office (FCO). Braden told Lucas that, as far as agents were concerned, DSO "could not insist on being informed at every point; and sometimes they prefer 'not to know'." Lucas's view was that "what it means is that the arms sales business has its shadowy side by which official circles are best left unsullied." TNA. 29 October 1976. Letter from I.T.M. Lucas, FCO, to D.J. McCarthy, British Embassy, Abu Dhabi. FCO 8/2633.

76. Al Yamamah has reportedly been worth around £43 billion over the last twenty years.

77. TNA. 6 January 1986. Riyadh Telegram No. ZMC/ZDK/ZBG/A2P to MoD. PJ 5/40.

78. Evans and Leigh (2006) have noted how the price increases in Chandler's telegram are the same as the amount that was "alleged at the time in Arab publications was exacted in secret commissions paid to Saudi royals and their circle of intermediaries in London and Riyadh, as the price of the deal." An investigation by The Times, written after journalists spoke "to sources linked to Al-Yamamah for much of the past 20 years," claimed the price increase was partly due to a weapons upgrade (although the prices quoted in Chandler's telegram excluded spares, equipment, weapons, and training) but conceded that "money almost certainly was paid to middlemen." See Robertson (2007).

79. TNA. 5 March 1974. Minute from P.A. Raftery, FCO, to J.A. Thomson, FCO. FCO 8/2343.

80. He had also made him aware that at least one middleman on the sale of BAC Lightning aircraft to Saudi Arabia in the late 1960s had complained he had not received "what he considered as owing to him." The middleman had asked if the U.K. government "would consider guaranteeing that BAC would meet their payments to agents." TNA. 8 July 1974. Letter from I.S. McDonald, MoD, to P.R.H. Wright, FCO. FCO 8/2344.

81. See http://www.caat.org.uk/issues/saudi-tna [accessed 22 September 2007].

82. Hirst (2000).

83. This document was uncovered by David Leigh of *The Guardian* newspaper following a Freedom of Information request. It is unclear why in November 1994 the directive needed updating. This would have been no routine matter. The 1976 directive was prompted by the Lockheed revelations, and the 1977 directive by the argument between Cooper and Henley over SADAP. It is likely another contentious issue regarding "agents" arose in 1994 prompting the revision. What this issue was is likely to remain a secret for many years hence.

84. Minute from C. France, MoD to HDES, 9 November 1994, available at http://image.guardian.co.uk/sys-files/Guardian/documents/2007/05/29/ch08doc08.pdf [accessed 22 September 2007].

85. Evans and Leigh (2003a).

86. Evans and Leigh (2003b).

87. Evans and Leigh (2003b).

88. Letter from Geoffrey Hoon to Gavin Strang, MP, 26 January 2004, copy on file at CAAT.

89. Evans and Leigh (2007a).

90. Evans and Leigh (2007b).

91. Letter from MoD to David Leigh, *The Guardian*, 8 August 2006, available at http://image.guardian.co.uk/sys-files/Guardian/documents/2007/05/29/ch08doc08.pdf [accessed 22 September 2007].

92. TNA. 17 January 1977. Minute from Mrs. M. Swaffield, MoD to AUS(Sales Admin), MoD. DEFE 23/149.

93. TNA. 2 June 1977. Letter from Sir Douglas Henley, Exchequer and Audit Department to Sir Frank Cooper, MoD. DEFE 68/110.

94. TNA. 25 January 1978. Letter from D.M.D. Thomas, FCO, to L. Pliatzky, DoT. FV 22/119.

95. *Hansard*, 26 January 1978.

96. Phythian (2000, pp. 91-92).

97. Evans, *et al*. (2003).

98. Quadripartite Committee (2004, Ev 34).

99. Quadripartite Committee (2007, paragraph 341, p. 136).

100. Quadripartite Committee (2004, Ev 34).

101. Roeber (2005, p. 5).

102. Robertson (2007).

103. House of Lords, *Hansard*, 14 December 2006, col. 1712.

104. Hawley (2003, p. 17).

105. TNA. 2 February 1967. Letter from H.R. Hubert, MoD, to D.N. Brinson, British Embassy, Caracas. FCO 46/190.

106. There is a growing amount of literature on the subject – principally researched by the author, Rob Evans, and David Leigh. See for example Gilby (2005), the BBC Newsnight documentary (see http://www.caat.org.uk/issues/saudi-bribery.php) of 16 June 2006 (researched by the author), and the Al Jazeera documentary of February 2007 "Trail of the Dove" (researched by the author). The author has also written a forthcoming book *Arms and Bribes: The Untold History of Britain and the House of Saud*. *The Guardian* have published many documents in a major investigation "The BAE files" at www.guardian.co.uk/baefiles. Much of the material was researched by the author.

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Licensed to kill: the United Kingdom's arms export licensing process

Anna Stavrianakis

The United Kingdom is one of the more significant actors in the international arms trade. Between 2001 and 2005 it was the world's fifth largest supplier of major conventional weapons, behind Russia, the United States, France, and Germany, and the world's fifth largest recipient of arms, behind China, India, Greece, and the United Arab Emirates.[1] The U.K. government supports arms exports because of the economic, strategic, and political benefits they ostensibly bring. It also claims to operate a very strict control regime based on the 2002 Export Control Act and a set of guidelines known as the Consolidated Criteria. Indeed, the government describes itself as being "at the forefront of promoting internationally the need to ensure defence exports are responsible."[2] As the examples later in this article suggest, despite this claim of strict control, it appears that the government continues to licence military equipment to states with a record of engaging in human rights violations, internal conflict, and regional instability. More generally, the scale of U.K. arms exports and the character of its traditional major recipients – NATO allies and Middle Eastern states, in particular Saudi Arabia, as well as states such as India and Indonesia – are such that the U.K. arms trade plays a significant role in maintaining the coercive backbone to the global capitalist system and the disproportionate military capabilities that exist across the globe. This article focuses on the arms export licensing process and asks how it is that, despite the existence of an ostensibly rigorous control process, controversial arms exports continue.

This article proceeds in three parts: an overview of the United Kingdom's arms export licensing process; examples of ongoing controversial exports despite the existence of this process; and an argument as to why they continue.

The article proceeds in three parts: an overview of the arms export licensing process; examples of ongoing controversial exports that continue despite the existence of this process; and an argument as to why these exports continue. I argue that such exports continue because of the vague wording of the guidelines; the framing of arms export policy; the limited use (from a control perspective) of a case-by-case approach; the weak role of pro-control departments within government; pre-licensing mechanisms that facilitate exports and a lack of prior parliamentary scrutiny, which means the government's policy can only be examined retrospectively; and the wider context of the relationship between arms companies and the U.K. state.[3] The overarching argument is that the government's export control guidelines do not restrict the arms trade in any meaningful way but, rather, serve predominantly a legitimating function.

Overview of the arms export licensing process

The Consolidated EU and National Arms Export Licensing Criteria (hereafter, Consolidated Criteria) form the main regulatory mechanism for U.K. arms exports, setting out the government's commitment to be guided in its arms export activity by concerns regarding the state's international commitments, human rights, the internal situation in the recipient country, regional stability, U.K. national security, the recipient state's attitude to terrorism and international law, the risk of diversion, and sustainable development.[4] The licensing process is administered and controlled by the Export Control Organization (ECO), which sits within the Department for Business, Enterprise and Regulatory Reform (BERR, formerly the Department of Trade and Industry, DTI). Companies submit an export licence application to ECO, which circulates the application within BERR and to the Ministry of Defense (MoD), Foreign and Commonwealth Office (FCO) and, where development concerns are an issue, Department for International Development (DfID). Each department gives a recommendation as to whether or not a licence should be granted, having assessed the application against some or all of the Consolidated Criteria. If departments or sub-departments cannot agree on a course of action, the licence application is referred to ministers for a decision. While "Number Ten," the Prime Minister's office, has no formal role in the licensing process, it will get involved where there is ministerial dispute over a decision and, more generally, plays a significant role in promoting arms exports as part of wider foreign relations.

The government is proud of its role as a leading arms exporter and states that "decisions to refuse licences are not taken lightly. Only in those cases where refusal is clearly justified is a final decision taken to refuse."[5] This pro-export stance to the licensing process must be understood against the backdrop of extensive political and financial support for arms exports and arms-producing companies. This support comes in the form of contributions toward research and development costs, insurance cover against the risk of recipient default via the Export Credit Guarantees Department (ECGD, the government department that helps U.K. exporters win business by providing guarantees and insurance), the use of defense attachés, ministers, and the royal family in promoting arms sales abroad, the use of the intelligence services to promote arms exports, and, between 1966 and 2007, the role of the Defense Sales Organization (DSO), later renamed Defense Export Services Organization (DESO), a department of the MoD dedicated to promoting arms exports.[6] This support is justified by reference to the ostensible economic, strategic, and political benefits arms exports bring. However, a recent study has challenged every justification put forward by the government, arguing that they remain, at best, unproven.[7] More specifically,

a 2001 study of the economic costs and benefits of U.K. arms exports, co-written by two MoD economic advisers, concluded that "the economic costs of reducing defence exports are relatively small and largely one-off" and that "the balance of argument about defence exports should depend mainly on non-economic considerations."[8]

Ongoing controversial exports

The government claims that arms exports play a role in "deterring aggression and promoting stability by strengthening collective defence relationships."[9] Notably, a large proportion of U.K. exports go to NATO allies, in particular the United States, and to Middle Eastern states. These transfers are significant in maintaining the stability of the capitalist system as they provide coercive resources to individual states and their military alliances. The U.K.'s arms relationship with Saudi Arabia is central to this: the Al Yamamah deals with Saudi Arabia in the late 1980s are the most lucrative military export deal in British history and made the U.K. the largest arms supplier to Saudi Arabia. More recently, in December 2005, the U.K. government signed a deal with the Saudi government to supply Eurofighter Typhoons. As Mike Turner, BAE Systems Chief Executive, put it: "The objective is to get the Typhoon into Saudi Arabia. We've had £43bn from Al Yamamah over the last 20 years and there could be another £40bn."[10] The U.K.'s arms relationship with Saudi Arabia is marked by extensive financial, political, and intelligence support as well as persistent secrecy and allegations of corruption in the form of bribery and slush funds. In late 2006 the Serious Fraud Office inquiry into these allegations was dropped, allegedly under pressure from then-Prime Minster Tony Blair and the Saudi government.[11]

Aside from core customers such as Saudi Arabia, the claim that the government acts to deter aggression and promote stability is problematic in relation to India and Pakistan. Tony Blair played a leading role in lobbying Indian Prime Minister Atal Behari Vajpayee in October 2002 to buy Hawk jets despite increased tension between India and Pakistan and widespread concern that it could escalate into a nuclear confrontation. In September 2003, BAE Systems secured a £1bn deal to supply the Hawks.[12] While the Hawk is most often described as a training jet, it can also be used as a ground attack aircraft and to train pilots to fly fast jets such as Jaguars, which can be adapted to carry nuclear weapons (and were previously sold to the Indian military by BAE Systems).[13]

Two pertinent examples relating to human rights are Israel and Indonesia. The U.K. government claims that it will not issue an export licence if there is a clear risk that the equipment might be used for internal repression. Yet it has a history of licensing components for combat aircraft, small arms, and ammunition to Israel, whose military has a record of human rights violations in the Occupied Territories. Applying the government's own guidelines on arms exports in 2002 should have resulted in a full embargo on military and security exports to Israel, according to Saferworld, an NGO working for tighter national and international arms control.[14] In July 2002, new guidelines were introduced in relation to transfers of equipment to a third country for incorporation and re-export. The guidelines were announced at the same time as licences were granted for the export of head-up displays to the United States for incorporation into F-16 fighter planes destined for Israel.[15] The licensing of such equipment directly to Israel would have contravened the government's publicly stated arms export control guidelines as the Israeli air force has used F-16s in attacks on the Occupied Territories, but the new guidelines meant the equipment could be exported to the U.S. and, from there, incorporated into equipment for export to Israel. It is widely believed that the new guidelines were introduced in order to facilitate transfers such as this one.[16] Also in 2002 however, 34 percent of all Standard Individual Export Licences (SIEL) applications were refused by government. (SIELs allow shipments of specified items to a specified consignee up to a quantity specified by the licence.) This signaled a rise in refusals: 10 percent of SIEL applications were refused in 2001 and 2 percent in 2000. The Quadripartite Select Committee takes this as evidence that "the licensing policy to Israel may have been tightened up," but without an explanation as to the change, if any, in policy, this remains "neither transparent nor accountable."[17] There is thus considerable ambiguity in the government's policy toward Israel, with developments in arms export policy simultaneously seeming to signal both approval and condemnation of its behavior toward Palestinians.

The government also regularly licences military and dual-use equipment to Indonesia, despite the state security forces' record of repression and human rights violations, particularly in resource-rich regions such as Aceh, East Timor, and West Papua. During the period of martial law in Aceh in 2003-04, for example, the government licensed components for aircraft machine guns, components for combat aircraft, components for tanks, technology for the use of combat aircraft, military helmets, gun silencers, and body armor. This was despite an increase in extra-judicial killings, disappearances, excessive use of force, torture, arbitrary arrest and detention, and sexual violence in this period as well as a clampdown on freedom of movement and communication that made accurate figures even harder to generate. In cases such as Israel and Indonesia, and more generally in relation to its export policy, the U.K. government claims that it abides by its guidelines. However, the lack of transparency around arms export licensing makes it difficult for independent observers to take this claim at face value. The government claims its licensing system is among the most transparent in the world,[18] yet it remains impossible to ascertain what equipment was exported, to whom, and when, or what equipment was refused, to whom and when. The information that is publicly available suggests that arms exports are being licensed to states engaged in internal repression and regional instability.

Pieces of the puzzle

The analysis put forward thus far generates a puzzle: how is it that, despite the U.K.

government's claim to a rigorous licensing process, exports of military equipment to states such as Saudi Arabia, India, Israel, and Indonesia continue? The government claims that all exports have been assessed against the Consolidated Criteria; it thus does not admit that contraventions of the Criteria occur. So one possible answer is that NGOs, campaign groups, journalists, and academics are making a fuss about nothing. Yet the U.K. is one of the world's largest arms exporters, U.K.-supplied military equipment is being used in repression and conflict around the world, and wider policies of military support give sanction to such behavior. This section discusses six key pieces of the arms export licensing puzzle: the wording of the arms export guidelines; the framing of arms export policy; the inadequacy of a case-by-case approach to licensing; the weak role of pro-control actors within government; pre-licensing mechanisms that facilitate exports; and the relationship between arms capital and the state.

Six key elements contribute to the persistent weakness of the British arms export licensing regime: ambiguous wording of arms export guidelines; the framing of arms export policy; the inadequacy of case-by-case licensing; the weak role of pro-arms export control actors; a pre-licensing mechanism that inherently facilitates arms exports; and the relationship between arms capital and the state.

Wording of the arms export guidelines

The Consolidated Criteria set out the guidelines against which licence applications are assessed. For example, a licence will be refused if there is a "clear risk" that equipment "might" be used in internal repression. While this wording is slightly more restrictive than past guidelines, the previous Conservative government also claimed that it scrutinized arms export licence applications on a case-by-case basis and would not licence exports if it thought they were likely to be used in internal repression. However, as early as 1998 the Trade and Industry Committee stated that the Labour Party's policy is "a rather less radical break with past policy than is sometimes represented to be the case,"[19] and the same patterns of behavior and justification are being repeated. There is thus reason to believe that Alan Clark's statement during the Scott Inquiry still applies, namely that the guidelines are "so imprecise and so obviously drafted with the objective of flexibility in either direction – elasticity, shall I say – as to make them fair game."[20]

Any set of guidelines requires interpretation and quantification in order to be operationalized and, in research interviews, civil servants and NGO workers referred to the difficulties involved in this. However, time and again, the interpretations arrived at are conservative to the point of changing any reasonable meaning of words such as "risk," despite the best intentions of pro-control actors. The wording of the guidelines is deliberately vague so as to allow a pro-export policy to continue while permitting government to appear committed to a tight regulation of the trade.

Permission by omission

In addition to the wording of the guidelines, there is also the question of what they do not say. That is, U.K. arms export policy is configured in such a way as to keep exports to some countries outside the bounds of scrutiny. For example, the impact of arms transfers on sustainable development is assessed by DfID, which considers the economic capacity of the proposed recipient, levels of military expenditure, technical capacity and potential diversion of resources, and the legitimate security and defense needs of the recipient state when examining arms export licence applications to the world's poorest states (defined as states eligible for concessional loans from the World Bank's International Development Association).[21] In this process, exports to states such as Saudi Arabia and the United States, for example, are excluded by definitional fiat, despite their enormous levels of military expenditure and the debate that could be had as to whether such levels of spending constitute a legitimate need. U.K. policy is framed in such a way as to exclude some recipients from concern while focusing attention on others (in this case, the world's poorest states, who anyway do not account for a large proportion of the world's arms transfers).

Inadequacy of the government's case-by-case approach

Leading on from the framing of the government's arms export policy is the issue of its case-by-case approach to licensing. The government claims to assess each licence application on a case-by-case basis against the Consolidated Criteria with respect to the conditions in the recipient country. In the words of the Quadripartite Committee in relation to arms exports to Israel, which are applicable to wider policy, it remains unclear how the government assesses whether there is a "clear risk" that proposed exports might be used in internal repression and thus contravene Criterion Two.[22] The inevitable time lag between the licensing of an export and the actual delivery of equipment is problematic because of the possibility of a change in circumstances in the recipient state. In part, the problem is one of implementation: risk assessment that took into account past use of military equipment (whether supplied by the U.K., another foreign government, or domestically produced) and possible future conflict would be a significant improvement on the current process. However, the government already claims that it carries out such risk assessment. Is the problem thus one of incompetence? Given the internal system of auditing (discussed below) and the lack of any admission that the government ever contravenes its guidelines, this is unlikely. Rather, the issue is the orientation of the wider policy toward arms exports: as long as government policy remains pro-export and the onus is to export wherever possible,

the bureaucratic licensing process will remain insufficient for adequate control of exports. The case-by-case approach is a technical tool whose orientation and use depends on the values driving the policy behind it. As the licensing system is currently configured, even if exports are restricted to a particular state at times of tension, it will already be in possession of equipment previously transferred, and will be eligible for more transfers once flashpoints die down.

Weak role of pro-control actors within government

Within government, the main departments concerned to restrict the flow of weapons are DfID and the Human Rights Democracy and Good Governance Group (HRDGG, formerly Human Rights Policy Department, HRPD) within the FCO. DfID plays a lead role on small arms clean-up programs abroad, but in instances such as the Tanzania case, it is sidelined. In 2001 the DTI issued a licence to BAE Systems for the export of a £28m air traffic control system to Tanzania despite the public opposition of Clare Short, who was Secretary of State for International Development at the time, and other DfID officials. DfID's influence is thus at the margins of U.K. arms export policy.

As of 22 March 2007, there were three officers within HRDGG working on human rights concerns in the licensing process, two of whom dedicate approximately 40 percent of their time to this, and one of whom dedicates 15 percent. In 2006, HRDGG was consulted in relation to 631 licences.[23] Given that 7,474 SIELs and 397 Open Individual Export Licences (OIELs, which cover multiple shipments of specified items to specified destinations or consignees) were issued in 2006, and 123 SIEL's and 9 OIEL's were refused, it seems that the proportion of licences HRDGG officials are consulted on is low, raising the question of who decides which licences HRDGG officials get to see and what capacity they have for scrutinizing licence applications.[24] It also appears that, even when they are consulted, the opinion of HRDGG officials carries little weight within the licensing process. While these officials understand themselves as the "guardians" of the human rights criterion in the arms export guidelines, only a small number of refusals called for by them are upheld by ministers. In interviews, officials emphasized that their opinions are put forward during the process, but they have only an advisory role and call for more refusals than are upheld.[25] The result is that in the majority of cases that HRDGG deal with (which is only a small proportion of total licence applications), its advice is not taken up as the FCO position.

More generally, there is an internal system of checks and balances and an auditing process within the FCO that the civil service claims ensures the process is carried out correctly and that departments are accountable, preventing a "loose canon" signing off licences.[26] During periods of tension, such as the Aceh crisis in 2003, every licence for export to sensitive states requires ministerial approval.[27] This means that controversial exports have not slipped through the net or been authorized by a rogue official. They are not an aberration in policy, they are the expression of it.

Form 680 and lack of prior parliamentary scrutiny

The Form 680 process and the lack of prior parliamentary scrutiny serve to facilitate arms exports. The Form 680 process (administered by the Directorate of Export Services Policy, DESP, which sits within DESO as part of the MoD) occurs before the formal licensing process and functions to give MoD clearance to companies for the sale, demonstration, promotion, or export of certain equipment, goods, or information that is classified.[28] It gives companies "an indication of what markets may provide viable export opportunities for their products" and "speeds up the assessment of any eventual Export Licence Application."[29] While F680 approval does not remove the necessity of complying with licensing requirements, it does give industry a good idea of what will be licensed and adds momentum to contracts that makes it harder for them to be refused at the licensing stage. As an industry lobby group argues, it plays a role in "enhancing the potential customer's comfort factor feeling that a licence would be issued by HMG."[30] Thus, in addition to the weaknesses of the licensing process described above, there is a prior process that operates independently and serves to fast-track sales.

In addition to this pre-licensing approval, the parliamentary Quadripartite Committee (made up of representatives from the Defense, International Development, Foreign Affairs, and Trade and Industry Committees) has retrospective rather than prior scrutiny of the government's arms export record and policy. This means it can only comment on arms export licences after they are granted. In addition, when the Committee criticizes the government, such as on the issue of arms exports to Indonesia, the government simply said that it "does not accept" the Committee's conclusion.[31] Even on the rare occasion that details of a controversial sale emerge prior to the granting of licences, such as the £28m air traffic control system to Tanzania in 2001, the Committee was unable to prevent licences being granted. Parliament is thus in a weak position to be able to influence government policy.

Relationship between arms capital and the state

The final piece of the puzzle is the relationship between arms capital and the U.K. state. Arms capital has been integrated into state structures and this relationship sets the overall orientation to arms exports. The parameters of defense industrial and arms export policy are configured to benefit major arms-producing companies, in particular BAE Systems, and means that control measures such as the Consolidated Criteria are vague and do not threaten the interests of industry. Similarly, the proposed legally binding international Arms Trade Treaty, which a coalition of NGOs is pushing for, has been promoted by the U.K. government and U.K.-based industry, which claims that the proposed treaty will not bring new obligations for it.[32]

The integration of arms capitalists into the structures of the U.K. state is the most significant indicator of the close, indeed overlapping, relationship between the state and arms capital. This integration occurs in two main ways, first, via a "revolving door" between the state and military industry, and, second, through high levels of arms company representation on military advisory bodies.[33] The revolving door refers to the traffic of personnel between arms companies and the state, in particular the MoD, and specifically DESO, and vice versa. The most obvious expression of this is that the head of DESO is traditionally drawn from the arms industry and continues to draw pay from the industry during his stint at DESO. The current head, Alan Garwood, in post since 2002, is on secondment from MBDA, which is part-owned by BAE Systems. In addition to the revolving door, arms companies have a significant presence on military advisory bodies such as the National Defense Industries Council (NDIC), Defense Export and Market Access Forum (DEMAF), National Defense and Aerospace Systems Panel (NDASP), and Aerospace Innovation and Growth Team (AeIGT). Through these bodies, industry works in partnership with government to set policy priorities and means that industry has access to elite policymakers, officials, and politicians at the expense of non-corporate actors.

More generally, arms exports are legitimated by claims of national defense. The argument that arms exports are politically, economically, and strategically beneficial carries weight above and beyond its factual content because of the underlying ideological function of the term "defense," and claims regarding state sovereignty serve as a powerful justification for the very idea of an international trade in weaponry. Military activity and the arms trade have an almost sacred quality even among those elements of the state that are not embedded with arms capital. This is not to argue that that the state and capital's interests are identical, or that only policies beneficial to the military and arms industry come into being. Rather, it is to argue that there is a structural bent toward pro-military and pro-industry policies. Given that representatives of arms capital sit, literally, side by side with state officials and often perform state functions themselves, the integration of arms capitalists into the state generates an attitude toward policy, if not the actual specific details of policy, that are functional for arms capital in a way that would not otherwise be. Nevertheless, there is not a complete fusion of interests: there are vigorous and public disputes between fractions of the state and capital, often over domestic procurement issues, and large companies claim to be discriminated against by excessively stringent U.K. export guidelines.

Conclusion

The U.K. government claims to exercise a responsible arms export policy carried out through a strict licensing system. This claim is worth examining in light of ongoing exports to states involved in repression and regions experiencing conflict, and the sheer volume of U.K. exports. I argue that the guidelines against which arms export licence applications are assessed are vague and further weakened by a policy that excludes some states from scrutiny by definitional fiat and a case-by-case approach that isolates exports from wider policies of military support; that the departments most likely to restrict arms exports are institutionally weak; that procedures such as the Form 680 process function to give industry advance clearance for their products; and that Parliament is in a weak position that leaves it unable effectively to control the government or even call it to account. All of these factors must be understood in the wider context of the relationship between arms capital and the state. The integration of arms capital into state structures means that, rather than acting independently of commercial interests to regulate companies' behavior, the state has to a significant extent been captured by the arms industry and acts to a considerable extent in its interests. In light of this, despite the existence of a complex bureaucratic process and despite the best intentions and efforts of officials working in pro-control departments, high levels of arms exports continue, including those to states engaged in internal repression or regional instability. The licensing process is thus better understood as a ritualized activity that functions to create the appearance of control and image of benevolence and restraint.

Notes

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1. Hagelin, *et al*. (2006a, p. 450); Hagelin, *et al*. (2006b, p. 477).

2. Defence Export Services Organisation (n/d).

3. For the purposes of this article, arms companies are those that produce weapon systems or components in one or more sectors (e.g., artillery, missiles, electronics). Companies specializing in military-related communications, information technology, and services are also included under the broad label of "arms companies" because of the growing importance of such products and services to military efforts, and the growing salience of spin-in from civilian to military spheres (Sköns, *et al*. 2004, p. 397). The largest U.K.-based arms companies are BAE Systems (with 93 percent of revenue from defense in 2006), Rolls Royce (29 percent), Qinetiq (76.3 percent), GKN (20.2 percent), VT Group (70 percent), Cobham (61.4 percent), and, up to 2006, Smiths (25 percent). See Defense News (2007). In January 2007 Smiths Group sold its aerospace unit to the U.S.-based company General Electric. As with the wider arms industry, these companies are internationalizing through cross-national mergers and

acquisitions, multinational consortia, joint ventures, codevelopment and coproduction of products, licensed production (in which one company allows another to manufacture its products under licence), and offsets (in which sales involve some domestic sourcing of components, or inward investment to the buying country). These processes of internationalization are such that the biggest U.K.-based arms company, BAE Systems, is a significant actor in the U.S. defense industrial base, and companies such as French-owned Thales are labeled by the U.K. government as part of the U.K. defense industrial base. See O'Connell (2005). Neither arms-producing companies nor the defense industrial base are purely national, yet the government articulates arms exports as in the national interest.

4. MoD, *et al*. (2000).

5. MoD, *et al*. (2004a, p.12).

6. In July 2007 the Prime Minister, Gordon Brown, announced plans to close DESO and transfer support for arms exports or, in his words, "trade promotion for defence exports" to U.K. Trade and Investment. While this means that industry loses its privileged foothold in government, government-to-government deals remain under MoD control, and it remains unclear to what extent this signals a change in government policy toward arms exports.

7. Mayhew (2005).

8. Chalmers, *et al*. (2001, p. 3). More generally, on the economics of U.K. involvement in the arms trade, see Martin (2001); Dunne and Smith (1992). Dunne and Perlo-Freeman (2003) argue that there are no economic arguments against a more responsible arms export policy, in that banning arms sales to highly repressive regimes and countries in conflict would have no detectable impact on the U.K. economy.

9. Defense Export Services Organization (n/d).

10. Quoted in Leigh and MacAskill (2005).

11. Hope (2006); BBC (2006). For a history of corruption in the U.K. arms trade with Saudi Arabia, see Nicholas Gilby's contribution to this issue.

12. Tran (2003).

13. Norton-Taylor (2002).

14. Saferworld (2004, pp. 151-157).

15. Davies (2002).

16. White and Norton-Taylor (2002); Ahmed (2002).

17. Quadripartite Committee (2007, p. 135).

18. Foreign Office minister Baroness Symons, quoted in BBC (2004); Howells (2007).

19. Cited in Cooper (2000, p. 151).

20. Quoted in Norton-Taylor (1995, p. 43). Sir Richard Scott's "Report of the Inquiry into the Export of Defence Equipment and Dual-Use Goods to Iraq and Related Prosecutions" was published in 1996. It was the result of the inquiry started in 1992 in relation to the "arms-to-Iraq" scandal.

21. DfID (2007).

22. Quadripartite Committee (2007, p. 135).

23. McCartney (2007).

24. Data collected from Strategic Export Controls Quarterly Reports, January-March 2006, April-June 2006, July-September 2006, and October-December 2006.

25. Interview with FCO officials, 16 June 2004. One official estimated that 80 percent of licence applications that crossed their desk were submitted to ministers for a decision; another official disagreed that it was this high a proportion but the former was adamant that it was more than half.

26. Interview with a government official, 22 March 2005.

27. Interview with a government official, 7 March 2005.

28. DTI (2006).

29. MoD (2006).

30. Export Group for Aerospace and Defense (n/d).

31. MoD, *et al*. (2004b).

32. Defense Manufacturers Association (2006).

33. For details, see Campaign Against Arms Trade (2005).

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A state in denial: Britain's WMD dependency on the United States

Dan Plesch

This study details the United Kingdom's unique dependence on the United States for supplying and using weapons of mass destruction (WMD), and its importance in modern politics. The Defence Committee of the House of Commons, the lower house of the British parliament reported that "it will also be essential to decide what level of dependence upon the United States the U.K. is willing to accept in any possible Trident successor. We must consider the potential policy implications of any technical dependencies upon the U.S. and the differing concepts of independence adopted by the U.K. and France." It added that "he public debate over the future of the U.K.'s strategic nuclear deterrent should address: the independence of the U.K.'s current system; and the operational and diplomatic impact of any potential dependency on the United States of any future U.K. nuclear deterrent."[1] As the pro-nuclear Member of Parliament Julian Lewis put it, "Britain's ability to continue with nuclear weapons without U.S. support becomes very slim to the point of invisibility."[2]

The Committee highlighted Colin Gray's evidence that "for anyone who wishes to question the true independence of the British nuclear deterrent I would concede that it is ... a hostage to American goodwill ... the dependency is critical and will continue." Interestingly, Colin Gray is doyen of the self-styled realist school of international relations theorists for whom the concept of "goodwill" has no influence on the actions of states. If goodwill is an illusion in affairs of state, to what is the United Kingdom hostage? As Chris Bellamy writes: "the British deterrent is probably the least independent of any ... could this be one reason why Prime Minister Tony Blair has been at such pains to support U.S. foreign and strategic policy over the past eight years?"[3]

This article traces the underlying economic constraints that have driven U.K. policymakers to continuous dependence upon the United States. It argues that the political and media elite, along with a large part of the strategic studies community are in denial over the reduced day-to-day independence of policy in the United Kingdom resulting from this relationship. And the system itself is entirely vulnerable to U.S. policy should Britain ever decide it needs to use its "deterrent." An understanding of the nature of the dependence makes other discussions concerning the need or not for a Trident successor at best irrelevant and, at worst, a collusion in a confidence trick on the electorate.

The article first discusses the history of American support for U.K. weapons of mass destruction and then examines the present state of dependence with respect to the Trident system before concluding that the United Kingdom in fact has no nuclear weapons option other than dependence on the United States.

The weapons in question were fitted to Royal Air Force bombers and ballistic missiles fired from Royal Navy submarines. In addition, and outside the scope of this study, the British Army trained to fire American atomic artillery shells and short-range surface-to-surface missiles from its artillery.

The point of an independent military force is to underpin national sovereignty and the ability to support the power of a nation-state. But in contrast to the other major nuclear powers, the United Kingdom has no independence of procurement and great difficulty even in the short-term in using the system it has procured from the United States.

The point of an independent military force is to underpin national sovereignty and the ability to support the power of a nation-state. In contrast to other states with nuclear weapons and comparable or smaller industrialized economies, the United Kingdom has a very weak independent defense industrial base on which to build. China, France, and Russia build their own weapons and delivery systems using largely or entirely independent industrial capacity created over half a century. India, Pakistan, and Israel have, as far as can be determined given the secrecy surrounding these states' programs, delivery systems of regional range, and small numbers of warheads all using a considerable degree of imported technology.

Were the United Kingdom to withdraw from the nuclear Mutual Defense Agreement with the United States, existing technology and corporate engagement would be withdrawn by the U.S. and U.S. companies. The U.K. would then need to develop the skills, technologies, and production capacity that it has time and again decided it either could not create itself or to which it chose not to devote the needed resources. Even if the political will existed in the British people to create a force comparable to the *force to frappe*, it is far from certain that the United Kingdom has a sufficient skill and technology base to create modern weapons and delivery systems. The creation of an Hiroshima-type atomic bomb to be dropped from aircraft is possibly practical – however, successive governments have determined since the late 1950s that such a system is too vulnerable to preemptive attack and also lacks range and survivability against anti-aircraft weapons. Also, the United Kingdom has no independent long-range ballistic or cruise missile industrial capacity. For these reasons, almost regardless of financial commitment, an independent U.K. nuclear weapons industrial base in the twenty-first century appears to be impractical.

The origins of American support for Britain's nuclear force

British dependence on the United States for nuclear weapons started in the Second

World War. This history shows that it is incorrect to think that the United Kingdom was ever an independent nuclear state like France, Russia, or China.

In 1940, Churchill initiated work on a British atomic bomb, rejecting a suggestion of cooperation from the U.S. President, Franklin Roosevelt, in October 1941.[4] He soon realized that Britain did not have the resources to go it alone and sought to get involved with the United States, but it was not until the 1943 Quebec Agreement that Britain joined the Manhattan project that built the Hiroshima and Nagasaki bombs.

The official historian of Britain's nuclear weapons explains that "Britain had then become only a junior partner in the business, contributing significantly in various ways but present largely on American sufferance."[5] In 1946, the U.S. Congress passed the MacMahan Act to stop nuclear collaboration with any state. British scientists returned home with information on how to build an atom bomb but without detailed knowledge of the industrial production processes.

Despite the MacMahan Act, some nuclear sharing quickly restarted, as the United States needed supplies of British-controlled uranium ore from the Congo.[6] Until 1952, the United States intermittently provided the United Kingdom with nine categories of information mostly on the construction of nuclear reactors for making nuclear explosives.[7] Congressional leaders brought into the negotiations then threatened to withdraw the Marshall Plan aid program to get the Attlee government to give up joint control over the use of nuclear weapons agreed by Churchill and Roosevelt during the war.[8]

In 1947, the British atomic bomb project was restarted by the Labor government. In one account, it was the Foreign Secretary Ernest Bevin's intervention that swung the discussion among ministers.[9] And the need to have a Union Jack on top of the bomb, in Bevin's famous phrase, was driven by the humiliating way that Bevin had just been spoken to by the U.S. Secretary of State, James Byrnes. The program was mentioned in Parliament in 1948, with more detail only provided shortly before the first British atomic test in 1952 under Winston Churchill's premiership.[10] Churchill privately expressed surprise at how much money and work had been done in secret by the Labor government.

One of Churchill's last political acts was to try to reach out to the Soviet leadership after the death of Stalin in order to control the hydrogen bomb. He found he had no influence in Washington and, shortly before retiring, Churchill began the U.K. hydrogen bomb program, while privately expressing greater concern over the future of the world than he had even in 1940.

Despite the great effort to produce the atomic bomb and jet bombers to carry them, the advanced development of next-generation technology, hydrogen bombs, and ballistic missiles, by both the United States and Russia in the 1950s made it politically impossible for the United Kingdom to afford an independent nuclear weapons system.

In 1957, with great difficulty and expense, the United Kingdom exploded its first hydrogen bomb and, shortly thereafter, the United States agreed to provide full support for the British nuclear weapons program. As both Lorna Arnold and Peter Hennessy describe in their studies of the British hydrogen bomb program, the key purpose in the mind of the Prime Minister, Harold Macmillan, was to show the Americans that the British were important enough a nuclear power to help, rather than to have an independent weapon.

In 1958, the U.S.-U.K. Mutual Defense Agreement (MDA) was signed, although very little was known about it in public. It has been renewed periodically ever since, the last time in 2004. The MDA allows the United States to provide the United Kingdom with nuclear weapons designs, nuclear weapons manufacturing, and nuclear reactor technology, designs, and materials.

A secret British government assessment of called "The Dangers of Becoming an American Satellite," only released after 1988, stated:

> The U.K., in its relatively weak position, is already greatly dependent upon United States support. It would be surprising if the United States did not exact a price for the support, and to some extent it does so ... the more we rely upon them, the more we shall be hurt if they withhold it.[11]

Both governments have taken a highly secretive approach to nuclear weapons policies and programs throughout the years, and in the United Kingdom there is no academic center devoted to the study of the most important military relationship for the United Kingdom. Nevertheless, sufficient evidence exists to demonstrate clearly that from the beginning Britain has had a dependent relationship upon the United States and that this relationship has required strategic support for the United States in return for support for a U.K.-flagged nuclear weapon. In all the main aspects of nuclear weapons – explosive materials, warhead design and construction, and missiles – the United Kingdom has no independence.

Nuclear explosive materials

During the Cold War, tons of uranium and plutonium were traded between the two countries, and flatly denied at the time. In 1997, the Clinton administration revealed the extent of this exchange. Ross Hesketh wrote that the 5.4 tons of plutonium sent to the United States amounted to "the entire production of plutonium from all the U.K. civil nuclear power stations, up to April 1969, according to official sources."[12] This trade was helpful to the Americans, but vital to the British nuclear weapons program.

Today, renewed British interest in nuclear energy should be examined closely for any commercial, political, or technical connection to nuclear weapons. How, for example, can the British government be serious about being a nuclear weapons power if it is not going to have a modern nuclear industry?

Table 1: U.S./U.K. Joint Working Groups

Group #	*Title*
6	Radiation Simulation and Kinetic Effects
9	Energetic Materials
22	Nuclear Materials
23	Warhead Electrical Components and Technologies
28	Non-Nuclear Materials
29	Nuclear Counter-Terrorism Technology
30	Facilities
31	Nuclear Weapons Engineering
32	Nuclear Warhead Physics
34	Computational Technology
36	Aircraft, Missile and Space System Hardening
37	Laboratory Plasma Physics
39	Manufacturing Practices
41	Nuclear Warhead Accident Response
42	Nuclear Weapon Code Development
43	Nuclear Weapon Environment and Damage Effects
# unknown	Methodologies for Nuclear Weapon Safety Assurance

Source: House of Commons, *Hansard*, 22 February 2005, column 601.

Nuclear warhead design and construction

The 1958 MDA created the Joint Atomic Information Exchange Group and dozens of Joint Working Groups, or JOWOGs (see Table 1). Documents obtained by the U.S. Natural Resources Defense Council show that the United States supplied the designs of many weapons to the British. The U.K.'s national archives on the JOWOGs, even from 1960, are still sealed. The titles of some documents from that era show that the United Kingdom was briefed on the use of beryllium, plutonium, and uranium and the Americans were presented with the results of British experiments using U.S.-supplied bomb parts. U.S. officials also benefit from the exchanges because of the innovative and skillful approach of their resource-starved British counterparts.

In the early 1960s, public concern over the nuclear arms race focused on the test explosions of nuclear weapons in the atmosphere and the accumulation of radiation in milk. After the 1963 U.K./U.S./U.S.S.R. agreement of the atmospheric test ban, the United Kingdom was only able to carry out test explosions jointly with the United States at the underground test site in Nevada. Then, in 1996, President Clinton's support for a test ban forced John Major's government to follow suit and sign the Comprehensive Test Ban Treaty. The last U.S./U.K. tests at Nevada were code-named Barnwell (1989), Houston (1990), and Bristol (1991).

For many years, the JOWOGs were secret and were only obliquely referred to in the open literature. Thus, two of the main British academic studies on Anglo-American defense relations and nuclear weapons make no more than a passing reference to them.[13] It was only through the work of the Natural Resources Defense Council in Washington, D.C., Greenpeace U.K., and BASIC, that the JOWOGs were first discussed in public. Subsequent activity by MPs such as Frank Cook and Alan Simpson led to the British government providing occasional lists of the JOWOGs to Parliament.[14]

The principal role of the JOWOGs is to assist the British in producing nuclear warheads. Since the mid-1960s, the United Kingdom has deployed four types of nuclear weapon, some with variants. These are the Royal Air Force WE-177, and three types that were produced in succession for Royal Navy Strategic Ballistic Missile Submarines. These three types are Polaris, Chevaline/Polaris, and Trident. Only Trident is in service today.

The RAF and Royal Navy used the WE-177 free-fall bomb with three versions for different military tasks. However, the British only conducted three nuclear tests in the period when the weapon was developed, making a British-only design most unlikely. Quite how the warhead was designed remains a secret. However, an analysis by the Natural Resources Defense Council (NRDC) concludes that the WE-177 was probably based on U.S. designs (the Mark 57 and B61). A declassified U.S. document from 1960 obtained by the NRDC says that the U.K. "plans to produce several versions of the Mark 57."[15]

The United States supplied the design for Polaris (the W-58). In heated exchanges in the House of Commons between the Prime Minister Lord Home and Harold Wilson, Home confusingly said that the Polaris warhead was probably "both" the U.S. design and a British design of the same size.[16] Further evidence that the Polaris warhead was not a British design was that Home saw no need to test it at all, although Harold Wilson did get U.S. permission to conduct one.

In the early 1970s, the United States stopped the key part of the JOWOG cooperation when the Labor government said that it would not have a new nuclear weapon. There was consternation at Aldermaston – a manufacturing facility where the Trident warheads are made – at the loss of access to U.S. bombmakers. U.S. support resumed when, under the premierships of Edward Heath and Harold Wilson, a secret program to put a new warhead on Polaris was begun. This program, known as Chevaline or "Super-Antelope" in Britain, was based on Lockheed's U.S. Antelope project. Technically, its function was to defeat Soviet missile defenses, but politically its function was to keep U.S. nuclear support.[17]

In 1979, Margaret Thatcher's new Defense Secretary, Francis Pym, announced Chevaline in Parliament. This caused much infighting in the Labor Party, whose

members had known nothing of this program, which was in violation of the decisions of the party conference.[18]

The independence of the warheads was a key defense that supporters of the independent deterrent used against the charge that the system was U.S.-dependent. However, documents available in U.S. presidential archives prove that the Nixon, Ford, Reagan, and G.H.W. Bush administrations all authorized the supply of nuclear weapons parts as necessary to the United Kingdom.[19]

Missiles

Forty years ago, Harold Macmillan had to deal with the fact that not only could the government not afford independent bombs, it could not afford independent missiles either. His government first sought a U.S. air-launched missile, Skybolt, and, when this was cancelled, was offered the U.S. Navy's Polaris missile.

The December 1962 Nassau agreement to provide the United Kingdom with Polaris provided the U.K. with missiles, submarine, and reactor technology. President Kennedy offered a similar deal to the French President Charles de Gaulle.[20] In January 1963, De Gaulle made a speech rejecting the U.S. offer of Polaris to France and vetoing British membership of the Common Market on the grounds that the British had now come under U.S. control.

Macmillan's Permanent Secretary, Sir Robert Scott, recorded that the decision has "put us in America's pocket for a decade." The commander of the Royal Air Force nuclear bomber force wrote privately that the deal had been done to sustain the "myth" of an independent force.[21]

The two key agreements on U.S.-support made by Macmillan (the MDA and Polaris) were made because Britain was too weak to act independently. This underlying fact has meant that no government has sought to change the framework of agreements established by Macmillan; rather, they have been anxious to ensure that the United States keeps renewing them.

The Labor government of Harold Wilson came to power in 1964. Its manifesto said that Polaris "will not be independent and it will not be British and it will not deter." Nevertheless, with most of the money committed, the Wilson Cabinet, with the support of Parliament, continued the program, although even in retirement Wilson said: "I never believed that we had a really independent deterrent."[22]

Trident and beyond

U.S. management and technology, including nuclear materials, is involved throughout the Trident weapons system and continues the process begun in the 1940s (see Table 2). According to the National Audit Office report of 1987:

> The U.S. will supply the missiles and associated strategic weapon systems equipment, certain warhead-related components and services, and missile preparation and refurbishment services: the remainder of the programme will be carried out by the U.K.[23]

Table 2: U.K. Trident dependence on the U.S.

Trident component	*Nature of U.S. dependence*
- Warhead design	Based on the U.S. W-76
- Warhead nuclear components	Some imported from U.S.
- Warhead nuclear factory	A copy of the U.S. TA-55 at Los Alamos built by the U.S. Fluor corporation
- Warhead non-nuclear parts	Some imported from U.S.
- Firing system	Designed and built in the U.S.
- D-5 Missiles	"Although specific missiles in the pool of such missiles held at King's Bay, Georgia, will not be identifiably British, the U.K. Government will take title to the missiles it purchases"*
- Missile guidance	Imported from the U.S.
- Submarines	British designed and built with the import of U.S. components and reactor technology
- Aldermaston	Management – 33.3% Lockheed Martin Technology – much U.S.-sourced **
- Maintenance base	Management/ownership – 51% Halliburton ***

Notes:
* DSCR6 (1993, HC 549)
** See, for example, Table 1 and the provisions of the Mutual Defense Agreement.
*** In-service support and refurbishment for Britain's nuclear submarines is provided by the Devonport Management (DML) group, 51 percent owned by Halliburton (see www.devonport.co.uk).

A former British official engaged in the acquisition of Trident explained to the author that the Royal Navy assessment in the 1980s was that the system would remain functional for eighteen months if the United States withdrew support. Since then, U.S. corporations have extended their management of the program, probably reducing this period.[24]

The supply of Trident commanded a political price from the government in London. In his seminal study "Nuclear Weapons: Who's in Charge?" Hugh Miall records comments from two British officials on the state of U.S. influence in the mid-1980s: "Sir Frank Cooper, the Permanent Under Secretary of Defence, said, 'if you ask me whether the Americans have an undue degree of influence over British defence policy I would have to say yes'." And, also according to Miall, Clive Ponting, a former Ministry of Defense official said:

> Client state is putting it a bit strongly but there are very clear signs I think that it's not far short of that ... They clearly do have an undue degree of influence because when the chips are down we side with the Americans because we think the American nuclear and intelligence material is so important to us that we are prepared to pay that price to keep the material flowing.[25]

One area where the price was paid was in support for the U.S. Star Wars program, which was strongly opposed by Foreign Office and Ministry of Defense officials. Initial doubts were expressed by the Foreign Secretary, Geoffrey Howe, only for the Prime Minister to bring the United Kingdom into line with Washington, a pattern familiar in recent years.

The Trident warheads

In June 1991, President George H.W. Bush issued National Security Directive 61, now partly declassified. He ordered that the Department of Energy "shall produce additional nuclear weapons parts as necessary for transfer to the United Kingdom pursuant to the Agreement of Cooperation" for a period up until 1997.

According to a U.K. National Audit Office statement on warhead development and production, "most of the development and production expenditure is incurred in the U.S." These costs included the cost of testing the weapons in Nevada: "[Regarding] special materials ... in 1982 Ministers decided ... that a substantial proportion [of the explosive nuclear material] should be purchased in the U.K. [from British Nuclear Fuels plc]."[26] Therefore, the remaining portion of the nuclear materials in the warheads comes from the United States. Baylis describes how, in the mid-1980s, Britain was "dependent for 'vital materials' for warhead production."[27] The ostensibly British warhead was test-fired at the U.S. underground test-site in Nevada.

The Aldermaston A-90 manufacturing facility, where the Trident warheads are made, "appears to be a direct copy of the Plutonium Processing Facility (TA-55) at Los Alamos."[28]

The United States provided Britain with details of its Trident nuclear warhead design and sells Britain its cone-shaped casing.[29] The U.S. Sandia plant "also designs the arming-fusing-firing mechanisms for all of the United Kingdom's nuclear weapons."[30]

Trident missile and submarine system

The British version of the U.S. Trident system consists of four submarines built at Barrow in Furness, each fitted with sixteen missiles. The submarines can sail to any part of the world's oceans. Powered by nuclear reactors they can stay underwater, undetected, for months at a time.

The submarines must collect the missiles from a U.S. port in Georgia on the Atlantic coast under a lease-purchase arrangement. The extra missiles for Trident's predecessor, Polaris, were British-owned and stored at a base in Scotland, making Britain less dependent on the United States. Denis Healey heaped derision on the arrangement:

> Under the rent-a-rocket agreement we have to swap these Moss Bros missiles every seven or eight years for other missiles in the American stockpile ... [there are] some serious political disadvantages, which can be summed up as a period of prolonged and humiliating dependence on the United States.[31]

The Trident D-5 missiles are occasionally test-fired from the submarines using a U.S. naval facility.

President Bush's support for U.K. WMD

A key objective for the Blair government during 2003 was to ensure the renewal in 2004 of the Mutual Defense Agreement (MDA) with minor amendment that permits the United States to share nuclear weapons technology with Britain. The present Bush administration prides itself on its tough pursuit of U.S. interests. One can logically deduce that the Bush administration would not have renewed the MDA without being certain that the United Kingdom will continue to provide reliable support.

In a formal letter to his officials endorsing the renewal, President Bush said that the United Kingdom is

> making substantial and material contributions to the mutual defense and security. The proposed Amendment will permit cooperation that will further improve our mutual defense posture and support our interests under the North Atlantic Treaty Organization (June 14, 2004).

He explained to Congress that that agreement will continue to

> permit the transfer of nonnuclear parts, source, byproduct, special nuclear materials, and other material and technology for nuclear weapons and military

> reactors ... In the light of our previous close cooperation and the fact that the United Kingdom has committed its nuclear forces to the North Atlantic Treaty Organization, I have concluded that it is in our interest to continue to assist them in maintaining a credible nuclear force.[32]

For George Bush, his decision appears to makes Britain's nuclear force credible. Would he do so free of charge? U.S. support does not, in fact, make the idea of British independence more credible – quite the opposite.

Had the United Kingdom not gone to war with the United States in Iraq, neither President Bush nor the Congress are likely to have agreed that cooperation was close, especially in the climate of "you are either with us or against us" that has prevailed since 11 September 2001.

However, it is reasonable to assume that nuclear weapons technology is supplied with a quid pro quo, although this is not publicly acknowledged.

Firing Trident

This section discusses whether Britain could engage in a nuclear war independently of Washington. Sir Michael Quinlan has conceded that the United Kingdom has no independence of procurement of nuclear weapons but nonetheless argues that this does not matter since the United Kingdom could fire the weapons independently. He also concedes that over time (unspecified) the United States could cause the United Kingdom to cease to be a nuclear power.[33] He further said that the United Kingdom's decision to choose independence of operation meant that "in the last resort, when the chips are down and we are scared, worried to the extreme, we can press the button and launch the missiles whether the Americans say so or not." And he argued that the decision to fire is an independent, sovereign decision: the United States "can neither dictate that the [U.K.'s] force be used if HMG does not so wish, nor [can it] apply any veto-legal or physical-if HMG were to decide upon [its] use."[34]

Dr. John Reid, then the U.K. Defense Secretary, explained that "the United Kingdom's independent nuclear deterrent can be targeted and used without the approval of any other country."[35] However, if one asks "can it be used if the United States disapproves?," we can see from the previous analysis that this is most unlikely. Half a century ago, at Suez, the British had to abandon a military operation under economic pressure from Washington. In any crisis that developed over a period of time where the United States and the United Kingdom were at odds, the United States would have economic, technical, and military means to prevent the United Kingdom using its system, and the longer the period of disagreement lasted the greater is the United States' ability to make the system it supplied inoperable. Although considerable secrecy surrounds this issue, past some public statements from earlier years and more recent off-the record statements undermine the idea that the United Kingdom even operates its nuclear weapons independently.

Even in the days before Polaris, it was obvious that the United States did not regard the United Kingdom as an independent nuclear force. In 1962, Robert McNamara, the U.S. Defense Secretary, spoke out about the "dangerous" contribution of small nuclear powers. This created headlines in Britain and was seen as an attack on the U.K. nuclear force. McNamara and his advisors sought to soothe the British press by explaining that they were only talking about the French, since the British "did not operate independently."[36] Air Vice Marshall Stuart Menaul wrote in 1980 that

> Britain no longer has an independent nuclear deterrent ... strategic considerations as far as Britain is concerned are no longer relevant ... it could only be used after authority for the use of nuclear weapons had been conveyed from the President of the United States to SACEUR [the U.S. general at NATO].[37]

Both governments state that the United Kingdom's weapons are assigned to NATO. What does this mean in practice? According to sources familiar with the process, the United States is aware, through the NATO command structure and the U.S. Strategic Command (STRATCOM), of the location and deployments of Trident submarines. U.S. communications and satellite facilities are normally used for keeping in touch with the submarines and for targeting the missiles.

The command chain from the British Prime Minister to the submarine captains does not involve the Americans. Yet the United Kingdom makes use of U.S. satellites to aim Trident. Former U.K. Trident launch control officers have said that it would be very difficult to fire the missiles without the use of the satellites.[38] John Ainslie has provided details of British reliance on U.S. computer software, satellite-generated targeting information, and related systems that would permit the United States to interfere with a British Trident launch.[39]

Sir Michael Quinlan derided the argument that the United States could prevent the United Kingdom firing Trident in extremis, but in a world at nuclear war it is simply naive to expect that the United States would not use all means necessary to enforce its will. Day-to-day, the United States has a general idea where the U.K. submarines are, since they are assigned to NATO, and it has the physical ability to interrupt U.K. communications by jamming or kinetic action. Over any longer period it becomes even easier for the United Kingdom to be brought under control.

A state of denial

In the 2006 House of Commons debate on the Trident none of the official government, opposition, and Liberal Democrat speakers discussed the importance of the dependence of the United Kingdom on the United States for the supply of nuclear weapons. This is startling since, in an unprecedented investigation, the Defense Select Committee did examine the issue and highlighted it in its report, in the summary of the oral evidence, and in the ordering of the written evidence at its first hearing on the

subject. Moreover, it later returned to the matter.

This article has demonstrated that since the early 1940s economic constraints have driven the United Kingdom to ever greater dependence upon the United States, resulting in reduced rather than increased national independence in direct opposition to the stated purpose of the program.

The United Kingdom does not have, and never has had, fully independent nuclear capability. The United Kingdom does have a nuclear weapons program, but it is and always has been dependent on U.S. technology and supplies. Even between 1946 and 1958, U.S. information acquired during the war was the basis of the program and the United States provided secret support. Successive British governments have decided that the United Kingdom would not make the investment that France did over the years in developing its *force de frappe*. As technology has become more expensive and sophisticated, so the U.K. contribution to U.K.-operated weapons systems has been reduced. For example, when the United States moved from Trident I to Trident II, the United Kingdom decided it could not afford to purchase the missiles outright and store them in the U.K., but opted for their lease-purchase.

It is occasionally argued that the United Kingdom could go it alone as France or China have done. Successive U.K. governments have decided since the 1940s that the country does not have the resources to do this. A break with the United States would likely result in the total withdrawal of U.S. technology, expertise, machine tools, and so forth. The lead time involved in the creation of an independent capability to produce warheads and delivery systems would be many years in the making even were the funds to be found. An independent force is not an option in the short or medium-term, regardless of the funding, since the United Kingdom simply does not have an adequate nuclear defense-industrial base to build-on now. Continuous dependence has meant that in contrast to France, the United Kingdom does not have the ability to produce ballistic or cruise missiles, nuclear submarines, nuclear weapons production facilities, and the full range of nuclear explosive materials and associated electronics.

The present government will not say how much of the spending on U.K. Atomic Weapons Establishment goes to U.S. corporations, and we have to rely on the data given at the time of Trident when the National Audit Office put the figure at 2/3rds of the total United Kingdom expenditure on the Trident warhead. The total lifecycle cost of a Trident replacement up to 2042 has been put at £74 billion. But that the United Kingdom is spending money on activity at a factory located in the U.K. is no signifier of independence.

In general, the British public believes that the country is protected by an independent nuclear deterrent. No government wishes to admit to the weakness that dependence implies.

In return for U.S. support for the U.K. nuclear weapons program, the United Kingdom is compelled to support, broadly, U.S. international policy. Today though, with widespread concern over the long-term direction of U.S. policy it is essential that the public understand the underlying connection between the special nuclear relationship and the special political relationship.

Since the early 1940s, economic constraints have driven the United Kingdom to ever greater dependence upon the United States, resulting in reduced rather than increased national nuclear independence. This is in direct opposition to the stated purpose of the U.K.'s nuclear program.

In an exchange of letters, President Bush and then-Prime Minister Blair confirmed that the United Kingdom will continue to rely on the United States for nuclear weapons up to 2029 and beyond. This course of action will not supply Britain with a weapon it could use if it ever stood alone, as in 1940. The unfortunate reality for the British people is that, unknown to them, they have a nuclear weapon that does not do what it says on the can.

There are a number of lessons to be drawn from this conclusion. First, the British people may wish to continue a dependent relationship with Washington, but they should do so with open eyes and not believe that they can ever have a government that acts with strategic independence so long as Aldermaston is run by Lockheed.

Second, people outside the United Kingdom should be aware that the nuclear special relationship does indeed produce the oft-ridiculed lap-dog status for the United Kingdom.

Third, full-scale nuclear proliferation is not that easy given that even the United Kingdom, until recently the world's fourth largest economy, found the stakes too high to play the game. Other states, China included, have very small forces of limited regional capacity.

Fourth, British supporters of a Trident successor do so on the basis that it is independent. Opponents of the system too often accept this, or at least mix it into a broader range of arguments, whereas, the independence issue is the foundation of the entire project, and by focusing their limited energy on this one issue rather than on a range of topics, their critique has a far greater chance of success.

Fifth, and finally, the extent of the support for nuclear warhead production amounts to an "indirect" transfer of nuclear weapons, a practice that under Article I of the Non-Proliferation Treaty (NPT), the United States and the United Kingdom are legally prohibited from engaging in. Those concerned to enforce international law with respect to nuclear weapons may find that the matter as laid out here provides a case for using Article I of the NPT at least as much as the oft-cited Article VI.

Notes

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1. DSCR8 (2005-6); HC 986 summary and relevant sections; see also HC 835 written evidence.

2. Remarks by Julian Lewis, MP, at the Royal United Services Institute, 6 July 2005.

3. Bellamy (2005).

4. Groom (1974, chapter 1).

5. Gowing (1974, p. 3).

6. Paul (2000).

7. Paul (2000).

8. Groom (1974, p. 31).

9. Hennessy (2002, p. 31).

10. Gowing (1974).

11. FCSC (1958, quoted in Baylis, 1984).

12. *The Times* (29 April 2004).

13. Simpson (1986); Baylis (1997).

14. Alan Simpson, MP (House of Commons, *Hansard*, 15 December 1994, c. 1222).

15. Peden (1991).

16. House of Commons, *Hansard* (12 May 1964, c. 222-223).

17. Spinardi (1997).

18. House of Commons (*Hansard*, 15 February 1989, c 383).

19. Plesch (2006).

20. "On This Day," *BBC News Archive*, 21 December 1962 http://news.bbc.co.uk/onthisday/hi/dates/stories/december/21/newsid_3815000/3815251.stm [accessed 28 September 2007].

21. Cited in Clark (1994, pp. 413, 418).

22. See Hennessy (2002, pp. 70ff).

23. NAO (1987, para. 1.1).

24. A former official speaking on condition of anonymity, 2006.

25. Miall (1987, p. 77).

26. NAO (1987, app. 4, pars 1-4); DSCR3 (1987, p. 22).

27. Baylis (1997, p. 195).

28. Norris (1994, pp. 72 ff).

29. JAIEG (1983).

30. D. Kramer, cited in Peden (1999).

31. See Dumbrell (2000, p. 145).

32. Both quotes from Bush (2004).

33. Quinlan (2006).

34. DSCR8 (2005-06; HC 986 and 835).

35. House of Commons (*Hansard*, 31 October 2005, c. 720W).

36. Clark (1994, pp. 334-337).

37. Menaul (1980, pp. 7, 172).

38. A former official speaking on condition of anonymity. http://www.publications.parliament.uk/pa/cm200607/cmselect/cmdfence/225/22514.htm [accessed September 2007].

39. Ainslie (2005). Also see http://www.basicint.org/nuclear/beyondtrident/cost.pdf [accessed Nov 7 2007].

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Universities, the military, and the means of destruction in the United Kingdom

Chris Langley

The United Kingdom and the United States both allocate significant proportions of their military budgets to procurement of sophisticated technological weapons and support infrastructure as well as maintaining a sustained high-technology research and development (R&D) effort.[1] In the United Kingdom, government spending on military R&D – currently about £2.7 billion – represents around 32 percent of total government R&D allocations.[2] This overshadows the R&D spending of the arms companies, as even the most R&D-intensive military companies like BAE Systems and Rolls Royce spend quite modest sums on R&D (£1.1 billion and £282 million, respectively, in 2005).[3]

In addition, there has been a marked growth in military funding going to universities. An estimate obtained from the Ministry of Defence (MoD) under the Freedom of Information Act indicates that about £22 million of the Ministry's Science and Technology Program funding went to U.K. universities in fiscal year 2005/6. To this must be added support for university R&D for military objectives provided by the former Department for Trade and Industry (DTI) and funding provided by defense and aerospace corporations. These numbers suggest that university-related military R&D is substantial. And when combined with wider changes to make universities increasingly commercialized or entrepreneurial, their growing links with the military have influenced the role of universities in society and appear to be forming a nexus, linking them with arms companies and government departments which maintain military R&D effort.[4] Thus, counter-intuitively, since the end of the Cold War universities have come to play an increasing role in supplying R&D expertise for military purposes, a trend that has attracted little comment or analysis.[5]

This article examines the military R&D nexus in the United Kingdom, considers what maintains it, and how it drives a high-technology weapons-based approach to security. It describes some of the commercializing pressures that universities have faced in the last twenty years and the implications this has for framing security.

Science and military ambitions

Wide-ranging military-related research is relatively new within universities in the United Kingdom. Edgerton argues that U.K. universities were certainly not centers of wartime research and development in the 1930s.[6] And Freeman and Soete describe how the Second World War and the Korean War played an important role in laying the ground for government investment in military R&D, a trend strengthened during the Cold War period. This generated justifications for a huge growth in public spending on R&D and the active involvement of universities in Britain and the United States. It also institutionalized science and technology policy in military affairs.[7]

Counter-intuitively, since the end of the Cold War, British universities have come to play an increasing role in supplying R&D expertise for military purposes, a trend that has attracted little comment or analysis.

Up until the late 1990s U.K. defense research was largely carried out by the Defence Evaluation Research Agency (DERA, which in July 2001 split into the Defence Science and Technology Laboratory, DSTL, and QinetiQ), while much development work was nonetheless placed with industry. In 1994-95 around two percent of gross defense R&D spending was contracted to R&D in universities,[8] and one-third was spent in the Ministry of Defence's (MoD) own research establishments. But since then things have changed considerably, with the research income of many universities including significant sums from the military sector. For instance, Cambridge University in 2005 received 11 percent of its U.K.-origin industrial research funding from the aerospace and military sector, and a further 15 percent of its overseas-origin research funding came from military sources such as Boeing and the U.S. Army and Navy. Imperial College London received funding in 2003 to 2006 from military corporations like General Dynamics, Thales, QinetiQ, and EADS, with General Dynamics providing the largest amount – £3.3 million in the period 2003-06.

A marked increase in collaboration among scientists, engineers, technologists, and the military was to occur during the Second World War.[9] From 1939 to the present day, achieving technological improvements in the means of destruction and the maintenance of military superiority became a predominant theme in the majority of industrialized countries.[10] By developing the atomic bomb, science had demonstrated its role in supporting political power. Others, too, in science, engineering, and technology had shown how valuable they were to achieving military objectives. Their role became embedded within the security matrix,[11] and it remains so today. By providing the scientific and technical expertise as well as the trained personnel, the universities gained a number of advantages which were effectively denied to many other institutions after the Second World War and particularly during the Cold War. U.K. universities are increasingly seen, particularly with the privatization of the former government research defense establishments, as being vital to identifying and facilitating military objectives. This view was given added support in the U.K. Defence Technology Strategy launched in October 2006.

In tandem with the increasing drive for privatization across government the universities, too, have undergone a series of profound changes in the last thirty years. This includes a period of reduced funding for science, engineering, and technology (SET), especially in the 1980s and early 1990s, to produce a highly commercialized

environment for SET. Locating universities, where the majority of fundamental SET research is undertaken, within a business culture with obvious commercial end-points, creates a number of possible tensions. Entrepreneurial academics often feel reluctant to exchange information that might have commercial importance.[12] Security-sensitive areas also throw up concerns about aspects of science such as academic freedom and ease of publishing, movement of staff from one country to another, and the kinds of research biases that have been found in the pharmaceutical industry.[13] Is the provision of research, training, and teaching for military clients conducive to the broader goals of the university?

In the United Kingdom, many departments in the physical sciences have closed or amalgamated in the last twenty years, and those that remain are dominated by significant research funding from many commercial sources, including the military. All these trends not only produce privatized universities but place such institutions in the closed military-industrial complex where decisions are often made without fully transparent and independent expert scrutiny.[14]

Corporate interests are often felt to be best served by secrecy, intellectual property rights monopoly, and the removal of those who appear to be dissidents.[15] The change in status of the former government defense research laboratories to commercial entities also caused a great deal of concern about intellectual property rights.[16] These issues have particular salience given that scarcely any SET department in U.K. universities is now free from some form of corporate presence.

Additionally, the creation of science and technology parks together with university-business partnerships are found throughout Britain and other European countries. Such science parks and innovation centers were the vanguard of attempts to exploit research-intensive companies, to transfer new technology developed within universities to the marketplace, and to forge strong links with publicly funded research centers such as those of the research councils and universities. Such parks have had, in their various incarnations, strong links with the military sector, corporate and government, especially in Silicon Valley in California, where Lockheed Martin – a U.S. military corporation – has been heavily involved in software development.

Segal Quince's major study of one such science park, entitled *The Cambridge Phenomenon*, points out how important was the general growth of national and international advanced electronics and telecommunications companies within and around the city of Cambridge in the U.K., in not only forging strong but often informal links with researchers in the university.[17] Many of the small to medium technology-intensive firms in the park had military companies as their major clients. Cambridge Consultants, Cambridge Interactive Systems, and Spectronics Micro Systems for instance had as major customers government defense organizations such as the Royal Signals and Radar Establishment or U.K. military corporations.

Increasingly, off-the-shelf commercially available computer technology developed from university-commercial incubators such as science parks finds a place in military uses.

The universities and military R&D

Currently there are five main ways in which MoD funding can reach universities to support R&D activities with a broad defense objective.[18] The first is modest direct funding from the MoD, about £220,000 in fiscal year 2005/06. The second is sub-contracting through the two former government defense research establishments, DSTL and the privatized QinetiQ. The DSTL funds research through contracts in around 60 universities in the United Kingdom, including at the universities of Cranfield, Cambridge, Birmingham, Imperial College London, and Oxford. The third is the Joint Grant Scheme between the research councils and the MoD (and the Department for Trade and Industry when research projects cover the biomedical and physical sciences). The fourth is the Defence Technology Centres (DTCs) and the Interdisciplinary Research Centres (two in nanotechnology and one in advanced computation). DTCs at present receive up to £2 million each per year from the MoD with matched funding from other consortia members. Currently DTCs support research in electromagnetic remote sensing for target detection and location, data and information fusion (fundamental to the integrated manner in which battlespace is configured), human-factors integration, which addresses optimum ways in which environments can be designed for human activities in conflict, and lastly autonomous systems engineering, the design of a variety of robotic devices for military operations. Around £90 million has been earmarked for the lifetime of the DTCs from the MoD.

The fifth avenue of funding is through consortia, comprising the MoD, corporations such as BAE Systems and Rolls Royce, and sometimes other government departments. One example is the Defence and Aerospace Research Partnerships (DARPs), which are allied to the Joint Grant Scheme and are part-funded by the MoD, the Engineering and Physical Sciences Research Council (EPSRC), and the former DTI. In 2006, seven DARPs were running across 16 universities and involved research in composites, computation, and aero engineering. Since its inception EPSRC has allocated in excess of £11 million to the scheme. Funds from the former DTI and corporate sponsorship will add significantly to this figure.

Another form of consortium, called Towers of Excellence, is also being developed. These are joint partnerships, launched in 2002, with industry and government, involving researchers in universities and covering areas such as guided missiles, radar and various sensors, electronic warfare, and computation. Detailed up-to-date information is lacking although they are discussed in the 2006 Defence Technology Strategy.

In addition to their involvement in consortia, military corporations such as BAE Systems, support universities through their more direct involvement in both R&D and training. Loughborough University, for example, with core funding from the East Midlands Development Agency, collaborates with BAE Systems in the Systems Engineering Innovation Centre (SEIC). This center has supplied systems engineers to BAE (a thousand between July 2004 and the end of 2005).[19] In the competitive

world in which BAE operates these trained individuals are lost to nonmilitary sectors. BAE Systems also has a collaborative program with EPSRC (called FLAVIIR) to the tune of over £6 million for unmanned airborne vehicles which involves ten U.K. universities including Cranfield, Cambridge, and Imperial College London. Most recently, the Counter Terrorism Science and Technology Centre opened in April 2006. It draws upon academic expertise as well as in-house specialist knowledge from the Ministry of Defence and other government departments. The primary focus of this center is science and technology as tools to safeguard populations against terrorist activities.

In addition, military corporations provide curriculum and staff support in schools and many universities in Britain. Examples include BAE Systems' extensive involvement with various educational programs, including mentoring schemes and their own "university." Boeing Corporation, of the United States, similarly pursues university collaboration, for instance in an advanced manufacturing initiative and a composites program with the University of Sheffield – part of a £45 million program – and a partnership with the universities of Cranfield, Cambridge, and Sheffield in information technology, aeronautics, and manufacturing.

Clearly in many universities the military sector – both public and private – has a major presence in teaching, training, and research. Universities have thus come to play an important function in the provision of high-technology means for the waging of war and form a key approach to framing security.

The driving of military R&D deeper into the university research communities with more projects, dedicated staff, and time and opportunity being devoted to security-oriented objectives will not only limit the resources – people, ideas, and expertise – for other needs but will influence the development of science and technology itself. This securitization of science and technology can compromise the knowledge base available for other goals,[20] which may be related to driving conflict. For instance, the development of sensor technologies, which have important functions in environmental and health monitoring in poorer nations, tends to be dominated by military-led R&D as previously described. Such funding leads to military products, while the nonmilitary uses of sensors, instrumental to improving the health and economic status of communities and making them less prone to conflict, becomes marginalized.

Additionally, an open and disinterested research culture is compromised by commercialization and sensitive security projects. University departments that have been transformed by such involvement and that are small and with their research income dependent on military sources might not feel able to give independent and open advice. Furthermore, the opportunity costs of military R&D activities on areas such as public health, energy efficiency, and climate change amelioration are simply unknown.

Funding military R&D

Revolutions are a commonplace in military circles. Many owe a great deal to input from scientists and engineers, within and outside the universities, and this is particularly true of the so-called Revolution in Military Affairs (RMA).[21] The United Kingdom and the United States military – corporations, government departments, and pressure groups representing the interests of military manufacturers – have supported and pushed this revolution. High technology is seen by these groups as central to modern security, especially for the C4ISTAR complex (Command, Control, Communications, Computers, Intelligence, Surveillance, Target Acquisition, and Reconnaissance Systems).[22] Furthermore, many U.K.-U.S. collaborative military activities develop interoperability, the ability of systems, units, or forces of the two nations to work closely together to ensure meeting military objectives of mutual importance. Such interoperability strengthens the U.K. government's commitment to RMA with its supporting R&D. The International Technology Alliance, for example, is a joint U.K.-U.S. collaboration which seeks areas of mutual interest and concern in the security uses of information and communications technology, a primary focus of RMA.[23]

The RMA has had an indirect effect on military R&D globally.[24] The fixed costs of R&D for the major systems, both platforms and infrastructure (the satellites, strategic air assets as well as the information systems needed for network-centric warfare), continue to grow. Thus there have been powerful drivers for governments, even those of the high-spender category, to look for ways of curbing rising military expenditure and streamlining the procurement process. Such concerns have led to decisions to reform the procurement and research processes to improve efficiency and coordinate those involved in weapons development and acquisition. The first steps were made by George Robertson, U.K. Secretary of Defence in 1997. Successive U.K. governments have decided that such improvements should include the privatization of military research and some aspects of development, and look to the relevant knowledge-base in the U.K. university sector, to augment that from corporate sources.[25]

Prior to 2001, the U.K.'s Defence Evaluation and Research Agency (DERA) and its predecessors the Defence Research Agency (DRA) and the defense research establishments were the major suppliers of research services and military knowhow to the Ministry of Defence.[26] Thus government had direct access to a highly technical, scientific, and relatively impartial expertise base without the need for extensive use of university expertise. But over the past decade the government has increasingly called upon universities to augment the expertise residing in the offspring of DERA, DSTL and QinetiQ.

Both entities have a special place in framing the U.K.'s security stance and are pivotal players in the military-university consortia in the country, supporting the R&D central to the RMA.[27] Such consortia, mentioned earlier, focus on research in sensors,

communication technology, and computational data handling. For instance, the Electromagnetic Remote Sensing Defence Technology Centre, involving the universities of Birmingham, Edinburgh, Glasgow, Heriot-Watt, Imperial College London, Leeds, Cranfield, St Andrews, Sheffield, Strathclyde, Southampton, and University College London, supports research into sensors in the electromagnetic spectrum. Such devices can improve the detection of military targets – people, vehicles, and buildings – at longer range and in a variety of adverse weather conditions.[28] Other Defence Technology Centres that involve universities support research and development of autonomous systems engineering (robotic vehicles and their platforms), and data and information handling.

Universities have become indispensable to modern warfare and in maintaining the scientific liaison implicit in various special relationships with the United States. What does all this mean for the universities, the process of technology transfer, and the U.K. defense strategy?

The launch of the Defence Industrial Strategy (DIS), in December 2005, followed by the Defence Technology Strategy (DTS), in October 2006, suggested a number of changes in Britain's military R&D. One of the key strands in the DTS is to seek, through DSTL, an even closer relationship (in the United Kingdom and further afield) with university expertise in science and technology in order to support military objectives. We have seen already that this will certainly include research in robotic vehicles, satellite systems, and sensor technologies, in addition to newly emerging technologies like nanotechnologies and advanced computational methods. This trend will have the effect of locking-up access to expertise in these areas within universities for nonmilitary uses.

Both DTS and DIS, rather than addressing the broader global security situation and the ways in which the U.K.'s SET community could play a pivotal role, continues the expensive drive for more sophisticated and expensive military weaponry and support platforms. These include the design of complex ships, robotic devices, nuclear submarines, and other expensive means of destruction.[29] Various commentators have pointed out that an international security strategy could focus upon many challenges including climate change and resource depletion and the search for clean and sustainable energy sources.[30] This strategy could harness the expertise residing in U.K. universities in nonoffensive ways.

Conclusions

Universities are very different today than thirty years ago. In Britain, they are now engaged on a sustained and regular basis in a bewildering array of commercial partnerships, including with the military, biotechnology, and electronic sectors. Similar trends (not substantiated in this paper) are to be found in the United States. Such partnerships, especially those with the military, change, often in profound ways, how universities function and how staff regard themselves.

A number of far-reaching changes have occurred within the universities and the military procurement process in the past twenty years in the United Kingdom. The military R&D effort has also undergone many changes that have drawn in the expertise residing in university research communities. This process involves a variety of partnerships with corporate and government entities, which supply funds, research direction, and employment opportunities. Such collaboration raises questions about the role of such universities in teaching, scholarship, and independent thinking, about bias and the availability of university expertise for other, nonmilitary, socially important goals.

The nexus of interacting players, including researchers in the universities, are not only part of the R&D process supportive of the production of weapons and their support systems, but they help shape the security agenda. The expertise found in U.K. universities that is supported by the military sector can effectively lock-up access to nuanced approaches to a variety of global problems, many of which contribute to the drivers of conflict. Military funding thus tends to produce military products and solutions. Additionally, evidence from the last twenty years indicates that technology transfer from military-supported research programs has been disappointing. Bellais and Guichard, in a study of defense innovation and technology transfer, have noted that "current intellectual property laws and practices do not fit technology transfer from the government-funded, secrecy-based defense R&D to the privately-funded, patent-based civilian industry."[31]

The RMA has brought about a heavy reliance upon high-technology solutions to security problems, but does such technological warfare actually provide value for money and does it work? Many have raised serious questions about the overwhelming influence of high technology on how warfare and conflict and the conditions for peace are framed.[32] Has high technology led to the end of a conflict swiftly and effectively? Are there proliferating vulnerabilities in using high technologies in the battlespace? There are many who challenge over-reliance on such means of warfare.[33]

Universities with extensive commercial interests can be compromised in providing access to disinterested views on contentious subjects, a bulwark of openness and democracy. There has in general been little discussion about whether the universities should play increasingly important roles in the R&D central to the modern conception of warfare.

Openness and free exchange of information is potentially problematic in such sensitive environments, as is the questioning of a markedly weapons-based security stance. Despite a number of studies, it is still unclear what the effects are of commercial partnerships on teaching, intellectual property rights, and research within universities. What is clearly needed is a far-ranging and rigorous debate on the future of the U.K. defense strategy, its dependence upon RMA, and its involvement with universities. It is time that our heavy reliance upon expensive weapons systems with the active involvement of universities be examined closely and contested where necessary.

Notes

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1. SIPRI (2006, 2007).

2. DASA (2005); OSI (2005).

3. DTI (2005).

4. Rappert (1999).

5. See Cantor (1990).

6. Edgerton (2006).

7. Freeman (1997).

8. James (1998).

9. See, e.g., Hartcup (2000).

10. Cozzens (1995); Black (2004).

11. Cozzens (1995).

12. Louis (2001).

13. Cozzens (1995).

14. Nature (2001); Brown (2000).

15. See, e.g., Krimsky (2003).

16. Molas-Gallart and Tang (2006).

17. Segal Quince (1985).

18. These are explored in Langley (2005).

19. Cook (2007).

20. For a discussion of the effect of R&D activities on the universities, see Noll (1998).

21. The RMA came to international notice during the First Gulf War, but its birth was due to the realizations of Marshall N V Ogarkov, Soviet general staff member. He proposed in 1982 that long-range precision strike weapons such as cruise missiles, when connected to a military telecommunications network, able to gather and distribute a variety of intelligence in three dimensions from the battlefield, could effectively revolutionize the conduct of war. The resultant discussions in both the U.S.and the then Soviet bloc military produced the RMA. See also Blackmore (2005) and Stone (2004).

22. MoD (2006).

23. A consortium comprising universities and businesses, including Boeing and Honeywell, and is led by IBM. [ITA] 2007.

24. Mallik (2005); SIPRI (2006, 2007); Byman (2002).

25. Molas-Gallart (2001).

26. James (2005).

27. Langley (2005).

28. Langley (2005).

29. Schofield (2006).

30. Dodds (2005); Abbott (2006); Elworthy (2005); Schofield (2006).

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Can British defense firms diversify? The case of Nanoquest and the limits to dual-use theories

Jonathan Michael Feldman

This article investigates the case of Nanoquest, a small diversification project tied to BAE Systems' earlier incarnation as British Aerospace (BAe).[1] It is shown that a military firm can have success when diversifying into civilian markets, but that the process can be sabotaged by managerial interference. In the process, the article illustrates the limited utility of dual-use theories when they are used to explain certain diversification outcomes. Rather than being merely issues of technological similarities or limitations, diversification success and failure are shaped by managerial power relationships. Discourses about the relatedness of military and civilian technologies, networks, learning, and information exchange alone cannot fully explain how and whether diversification barriers are overcome.

The article proceeds to show how the Nanoquest case relates to the wider economic conversion and disarmament debate. The case shows that when market or product similarities exist between military and civilian firms, diversification – even when successful – is not easily accomplished. This finding goes against claims made by some dual-use scholars who argue that similarities between military and civilian products help explain why diversification barriers are often slight.[2] These claims are compared with those of another body of scholarship and theorists who, beginning with institutional economists like Veblen, argued that the political power of managers and capitalists can create barriers to growth and innovation. To a certain extent such arguments were later echoed by certain management theorists.[3]

The article then explores the origins of the Nanoquest company. One key aspect of its development lies in the history of how the firm's resources were organized as part of a wider context defined by different components of a larger family of companies and managerial structures at British Aerospace. Some of these structures, like a special diversification unit in the firm, helped facilitate the company's move into civilian markets.

A third section shows how Nanoquest actually diversified, a process supported in part by organizational innovations like British Aerospace Enterprises, the name of a special unit designed to promote diversification in the firm. This section shows that the ability of defense firm capacities to become related to civilian technology and markets is based on an historical process of learning and reorganization. Relatedness cannot always be defined a priori, as dual-use theories sometimes imply, but often is created. After this process of creation, the diversified firm appears more related to its military origins than it actually was.

The article therefore shows two sides to arguments of relatedness, which are a central part of many dual-use theories. First, learning helps deepen relatedness. Second, higher-level managers decide how much they want potential paths of relatedness to develop. Firms are not like trains on a track, but are more like free-moving, multi-directional kinds of transport vehicles. Given the power that defines choices, learning is mediated by politics. The actual history of Nanoquest bears out many of the arguments made by institutional economists and managerial theorists, in particular that resource development is mired in power struggles within the firm.

The Nanoquest case shows that diversification is neither impossible, nor easy. One key to diversification, successful or not, lies in intra-firm power struggles among managers over resource development and deployment.

Nanoquest and the debate about economic conversion and diversification

Military specialization

In theory, defense firms' development of new civilian products and entry into new civilian markets can make several important contributions. First, it can provide alternative jobs for defense engineers and industrial workers after military contracts or budgets are cut back. Second, it can help diminish political opposition to military cutbacks by giving defense-dependent communities civilian employment alternatives. Third, it can release valuable resources in design and manufacture for the civilian economy.[4]

In the debate over whether defense firms' shift into new markets and products is possible, and what barriers might be encountered, one view is that defense firms are so specialized as to find it impossible to shift into civilian markets, or that they can do so in only a very narrow range of areas. Others point to specialized defense engineers more interested in military performance than low cost. A key barrier is the high overhead operations of military firms, based in part on specialized equipment and on accounting procedures designed to meet military regulations or other requirements. Thus, Britain's Labour Party in a 1995 manifesto proclaimed that "past attempts at conversion – in its crudest form, switching a factory's production line from tanks to tractors – have usually failed, and have little relevance to the modern workplace." The goal should be to diversify a company's "capabilities and expertise, rather than its product base."[5] This notion sees failure tied to some technical deus ex machina.

Yet, military specialization has been overcome in many defense firms by creating lean production platforms, by learning via trial and error methods, or by collaboration with civilian counterparts with expertise in key product or market segments. Defense firms can learn how to overcome barriers and reorganize themselves.[6] In some cases,

organizations can play the role of "dual actors," bridging military and civilian applications.[7] Some have even suggested that conversion is relatively easy, because of similarities between military and civilian technologies or markets.[8]

The Nanoquest case provides a British example of the conditions under which diversification can be successful, albeit into a security-related, but not military, market. Yet, the case also reveals that even when civilian products and markets are closely related to military ones, failure (or constraints on the diversification process) is still possible. The reason is that key barriers to defense firms entering civilian markets are not necessarily based on economic or technical considerations, but also on political ones, that is, the politics of how firms are organized. In the Nanoquest case, success came to depend on the ways British Aerospace created structures to help mitigate (to a certain degree) power structures that blocked diversification. Described here is the extent to which questions of technology and hypothesized barriers to diversification were overcome, but political barriers to innovation were not.

The differences between dual-use frameworks and institutionalist arguments

The idea of dual use has been used to refer to technologies that have "or can have both military and civilian applications."[9] But "even when military and commercial interests are technically compatible, non-technical factors such as standards and security restrictions can get in the way of dual-use."[10] Conflicts between military and civilian objectives extend far beyond export controls and classification requirements to problems associated with managerialism, that is, the extension of defense agency managerial power and military objectives. Civilian divisions within prime defense contractors like BAE Systems (or British Aerospace) have been weaker than their military counterparts because the combination of sizeable, profitable military contracts and defense specialization has oriented top managers in multi-divisional defense firms to favor military markets.[11] Simply put, military managers often win in the competition for money, staffing levels, and quality engineers. This competition echoes a macro competition in which the military economy diverts resources from civilian needs and constrains overall growth.[12]

Conceivably, even the most arcane technologies may have civilian applications because of the skills, experiments, and know-how of innovators working on various projects in the course of developing military technologies. These skills accumulate during multiple projects and careers and cannot be measured simply by examining a single case of technology transfer or a given technological application. The fungible character of innovative resources therefore becomes a central question. Some have argued that military engineers are often indifferent to designs that minimize cost as they are often geared to military performance. Independent of the knowledge that defense engineers gain during their careers, many are socialized into design patterns that have made them ineffective in civilian projects, ceteris paribus.[13] Barriers to defense diversification have been linked to the segregation of military and civilian production.[14] Such segregation helps explain the "great variety of dual-use" relationships. For example, at one point IBM kept "its Federal Systems Division at arm's length from its commercial business." In contrast, at Hughes "the same people make the same solar cells, batteries, attitude control systems, structures, and RF payloads and assemble them in the same facilities into both military and commercial communication satellites."[15]

Technology is not simply embedded in places; it is born of scientific and engineering personnel who can migrate across divisional barriers as part of matrix organizations and floating labor pools.

Technology is not simply embedded in places; it is born of scientific and engineering personnel who can migrate across divisional barriers as part of matrix organizations or floating labor pools. While divisions may be separated for accounting or administrative reasons, key personnel can move from defense to civilian organizations and vice versa.[16] The key question for diversification then becomes how such scientific and engineering staff is trained and managed, and what is the role played by organizational innovations. Some defense companies can learn how to handle differences between military and commercial applications, but even after doing so others can be constrained by managerial interference.[17]

These managerial constraints occur because competition over financial and human resources – key ingredients for developing any new product – is a central part of the innovation process.[18] Higher-level, more powerful managers controlling such resources can limit access to them by weaker, lower-level managers. Some also argue that engineers' ability to innovate can be limited by manager's incompetence, interference, and sabotage.[19] Some dual-use proponents acknowledge that the national defense mission is fundamentally different from the goal of promoting economic competitiveness. The inability to harmonize these goals means that support for one must often be at the expense of the other.[20]

Nanoquest's resources: evolution and organization in the British Aerospace network

Nanoquest Defence Products Ltd. was formed in the United Kingdom in July 1990, with the acquisition of Nanoquest Products Division of Bio-Rad Laboratories of the United States.[21] The firm started off as a strictly military-oriented firm that produced tank and artillery sights, having a strong presence in the military land market. It grew by taking over technologies developed by other military operations in the British Aerospace Enterprises family of companies. Nanoquest assumed responsibility for Reflectone and BAe Simulation's Laser Dome projectors, a product used by the other firms in their Dome Simulators.[22]

In 1987, British Aerospace Enterprises acquired for £17 million a German-based

firm of about 300 persons, called Steinheil Optronik GmbH.[23] Even though that firm eventually closed down in mid-1994, Enterprises used Steinheil to establish Nanoquest as a Steinheil subsidiary. Steinheil supported Nanoquest with financial assistance and by providing production and marketing capacity. Nanoquest – at one point a group of thirty to forty employees – took over technology that had been developed by Steinheil. Steinheil had developed an expertise in infrared technology. One key product, a thermal imaging camera, was an ideal compliment to Nanoquest's existing portfolio. As a significant part of Nanoquest was based on Steinheil technology, it is important to understand why Steinheil transferred its technology to another firm and was eventually closed down. These reasons help partly explain how Nanoquest succeeded and gained managerial support from BAe. One Enterprise manager had wanted Nanoquest to be taken over by Steinheil, but various factors, elaborated below, prevented this from happening.

First, the company faced dramatic cutbacks from the German Ministry of Defense (MoD) and ran out of cash before it could diversify. The cash shortage was not only based on post-Cold war cuts. In addition, Steinheil was late in developing military technologies already taken up by competitors. It had developed night sights to complement its day sights, but by the time they had put a product on the market other German firms had already developed night vision technologies. The cash shortage put a dent in Steinheil's diversification efforts.

Second, Nanoquest's managing director, Paul Johnson, was highly entrepreneurial. He had experience in civilian markets, having worked on commercial optical systems for Xerox copying machines, engraving machines, LCD and fibre optics, including a brand-new product for motorway signing. He worked with sales teams to provide technical support and also had engineering experience and training. Johnson also worked as a manger for military firms, allowing him to understand the requirements of both defense and civilian markets.

Third, Steinheil was even more military-oriented than Nanoquest. They were accustomed to getting orders from the German MoD and had difficulties in diversifying. Steinheil had used Nanoquest as a selling arm for their products, so Nanoquest was encouraged to cultivate marketing skills. Nanoquest originally sold to original equipment manufacturers, not defense ministries, creating a commercial know-how even in their original military market. Nanoquest was established as a small firm with a more commercially-oriented environment. This became important because the military market for Steinheil products was rather competitive.[24]

Nanoquest was able to capitalize on Steinheil technologies using different strategies. The process of technology transfer and innovation was facilitated and sped up as each firm shared the same computer-aided design system and used the same set of suppliers. Sharing suppliers made component testing easier and reduced risk. Nanoquest manufactured its night vision commercial camera to military specifications and became successful by taking Steinheil's technology and placing it in a new, small-firm environment. In January 1998, BAe established an incubator and marketing-support organization called British Aerospace Enterprises. This network linked the first-tier, core prime-contractor of BAe to small and medium-sized defense firms it owned. Nanoquest was typical of many diversification projects that start with a limited number of innovators and support staff, but gradually increase in size if market penetration is successful.

British Aerospace Enterprises represented the creation of an internal corporate network open to the promotion of dual-use products or technologies, such as supply trucks that can be used in commerce and in war. The initiative never had any important relationship to external trade union initiatives to promote conversion. Enterprises' diversification strategy was not without flaws but did represent an advance over simplistic strategies that co-located civilian and military production in high-cost and high-overhead production platforms. (Later on, the article discusses the relevance of Nanoquest to debates about the civilian promise of defense conversion and diversification.)

Nanoquest substantially reduced its military dependency over an eight year period. Nonetheless, the company eventually was folded into BAe and its independent identity disappeared. The company is representative of many diversification projects which often begin as smaller firms with a limited group of innovators and face political barriers in gaining diversification resources or development free from managerial interference.[25]

Relatedness

The evolution of relatedness in Nanoquest's diversification

After primarily being dedicated to military markets, Nanoquest decided that they could not compete there. In military markets, their competitors included larger companies and more established suppliers like GEC Marconi and Pilkington Optronics. Nanoquest learned from Steinheil that competition from such companies helped drive prices down in military markets. This encouraged Nanoquest to pursue newer, less established commercial markets in continental Europe.

Nanoquest pursued one key commercial market: night vision surveillance equipment mounted on Volkswagen vans. A new market for this equipment emerged with the signing of the Schengen agreement that created open borders within Europe. This led governments to increase border patrols to control drug imports and illegal immigration. This market for paramilitary sales resembled a traditional military one in that both involved security needs and government purchasers. Nanoquest's customers included border police and the national governments of Germany, Hungary, and Austria. Despite such similarities, there were important differences between Nanoquest's commercial market and that found in traditional BAe defense sales (see Table 1).

Nanoquest's skills were selling, designing, assembling, and delivering products

and services. Subcontractors made parts for components like cameras. Thus, the fungibility or transferability of design skills, linked to various organizational innovations, provided a foundation for developing new technologies and customers. Yet, the ability to use common resources in military and civilian markets proved to be insufficient for long-term success.

Synergies and relations with BAe

BAe's army weapons division might have been able to support Steinheil Optronik's optics and electronics capability but refused to cooperate with them.[26] Nanoquest's ability to enter certain markets was initially delayed, if not prevented, when it was of key strategic importance to the mother firm, BAe. British Aerospace managers would attend any Nanoquest meetings with customers in the Middle East because BAe was very reliant on customers there, such as those in Saudi Arabia, which had helped BAe in the past: "they didn't want a smaller company to screw it all up." For this reason, BAe wanted to know exactly what its smaller parts were doing and where they were going. Their interest was in selling big airplanes, not a smaller item, in this case a vehicle with a camera on it.[27] Fears of conflicting with customers created a problem in forging synergies with the smaller firm, a problem independent of so-called transaction cost considerations.

In other areas, there were positive synergies between Nanoquest and BAe. Nanoquest had access to the BAe International Sales Organisation and their intelligence. The BAe name helped open doors and provided access to potential new customers. It helped in securing sales for customers to know that, although they were dealing with a small firm, BAe as a larger firm could back them up and support them. Unlike BAe, however, as a small company Nanoquest had a low-cost base with competitive prices. Nanoquest was also able to exploit British Aerospace's purchasing power via its central purchasing organization. The organization negotiated discounts for materials and supplies from a long list of companies, e.g., renting cars and health care plans.

A major problem was that divisions that did not do what company leaders wanted, were not given funding, or would have to go to extreme lengths to get funding. The top military-oriented managers based at the firm's headquarters controlled most of the firm's resources, so any other division "was a poor relation to them." Richard Evans, former British Aerospace chairman, confirmed a part of this assessment. In his book, he quotes Richard Lapthorne, former Director of Finance, as saying, "we had baronies all over the place." These power wielders influenced technology transfer and intra-firm relations: "the lacuna at the heart of BAe [was] the lack of personal ties, mutual support, shared knowledge." Even though business units were aware of one another, trading business and services, "antagonism and rivalry invariably marred these relationships." Another top manager quoted in the book says, "five years ago all you'd have had were two bits of BAe completely at war with each other."[28]

Table 1: How Nanoquest grew and diversified: the limits of relatedness

Economic activity or organization	*Traditional BAe markets*	*Nanoquest markets*
Knowledge base and learning	Geared to learning about military users	In establishing a foothold in commercial markets, the firm had to learn about the users and purchasers. They would leave technologies for a week or two with potential customers and learned more about the users.
Scheduling and inventory	Long delivery times and negligible inventories	A need to act quickly to serve the customer to avoid sales loss to competitors and to reduce expenditures created by delays. Deliveries were made two to three months after an order was placed. This required components to be held on shelves to be assembled quickly to get them to the customer.
Governance	Command and control management in which suppliers and workers are subject to the hierarchical control of central management	Diminished hierarchy and broadened participation of suppliers, assembly workers, and engineers to improve efficiency.
Testing	Extended testing time	Reduce the testing time by selection of the most arduous tests and by use of existing tested components and assemblies.
Vertical integration/ outsourcing	Retain work in-house	Assessed its core skills and allowed all other work to be subcontracted.
Cost structure	Tradition of high costs in military markets	Design reviews to compare estimated costs against designed costs.
Entrepreneurship and risk	Large organization is risk averse so that a highly risky product can easily be cancelled.	Smaller company has a "can do" attitude that adjusts rapidly to problems that arise.

Source: Author, based on Johnson (2000).

The power behind learning and diversifying: managerial politics of British Aerospace Enterprises

The Nanoquest case sheds light on the utility of British Aerospace Enterprises as a support organization for diversification. Paul Johnson, Nanoquest's manager, found

that British Aerospace Enterprises "didn't seem well respected" by the other major divisions. This led him during his first two or more years as managing director to market his firm's capacities directly to each of the BAe divisions. Despite this, Enterprises became a gateway for gaining information about technology and markets within British Aerospace. For example, the network opened doors for Nanoquest by putting them in touch with contacts in the Far East and Middle East. Enterprises gave its smaller firms clout for accessing resources in the larger firm British Aerospace.

Ian Irving, a key Enterprise manager, helped Nanoquest in marketing and business development. He sat on the Nanoquest board and was readily accessible in providing good, practical business advice. His huge network of contacts with commercial businesses was helpful. If Mr. Johnson had a problem, needed access to someone in British Aerospace, or market help, he could readily get this from Mr. Irving and Enterprises. Enterprises also provided help with publicity and exhibitions.

In 1994 BAe decided to sell Steinheil but retained Nanoquest. Nanoquest was then charged to fund product development based on its own profits. This limited growth, but Johnson compensated for the problem by sharing (when possible) the cost of development with partners like Vickers (in the case of sighting equipment for the Challenger 2 program) and Royal Ordnance (in the case of artillery sighting systems). This approach proved to be very successful and allowed new products to be developed and enhanced existing products.

Johnson observes that "when you're a small company and transfer to a big company it doesn't always work ... Enterprises was trying to solve the problem" of linking a small company to a large one and helped mesh the different corporate cultures. Enterprises had several advantages as an immediate parent to Nanoquest. Unlike BAe, they recognized the need for flexibility, good service, and rapid responses required in the marketplace. Enterprises allowed Nanoquest to operate freely as long as the company remained profitable and the business grew.

In contrast to Enterprises, the central headquarters of British Aerospace played a more interfering role. After the company's first week, every week headquarters wanted a report on sales, cash flow, profit, and cash in bank to the nearest million. Nanoquest only generated thousands of pounds at that point, leading them to fill in reports with a series of zeros. Enterprises was useful, Johnson explains, "because they protected me from the Big Brother ... They went in front of Big Brother and pointed out to them, 'this isn't helping to run the business at all'." Such reporting would take on the order of half a day a week for Nanoquest's financing director. The reporting activity was not proactive, failing to lead to suggestions about new directions, but was more "disciplinary" in function, representing a form of internal regulation without feedback. Enterprises also protected Nanoquest "because anything that came from head office had to come through Enterprises." The parent firm also wanted detailed information about the countries and customers of Nanoquest but here again Enterprises interceded and prevented interference.[29]

After Enterprises was dismantled, Nanoquest became part of the large-firm culture. Mr. Johnson eventually took early retirement, because of demands placed on him by the new big-firm management. His new managing director wanted to create reorganization plans that did not make sense for a firm that had already changed its culture. Johnson then had to protect his firm from the bigger BAe through endless meetings and reports. During the post-Enterprises period, Johnson had to report to the Treasury Department in the British Aerospace head office. He reported to three separate persons there over a nine-month period. This group collected information but provided no guidance or support. No one commented on or provided approval for his long-term plans for the firm, needed to set company strategy. Managers at Enterprises, in contrast, were familiar enough with the business to provide approval. The Treasury Department was more interested in financial figures, not engineering and development issues. The Treasury Department was myopically focused on getting the finances "to look right."

Did diversification barriers or intra-firm politics thwart success?

Enterprises manager Ian Irving says that Nanoquest was among the two most successful of the diversification network's member firms.[30] In 1995, Nanoquest Defence Products Limited became part of British Aerospace Systems and Equipment Limited.[31] In 1996, the company reached its high point in sales because it was involved in contracts that applied sighting equipment for the new British Challenger 2 tank.[32] In 1998, the company experienced a major loss because the parent British Aerospace prevented Nanoquest from negotiating better conditions on an order in the highly competitive Austrian market. Manager Johnson explains: "We were due to

Table 2: Nanoquest's performance, 1991-1998

Year	*Sales in £s*	*Employees*	*Operating profit in £s*	*Product development budget in £s*	*Defense dependency (in %)*
1991	2,167,000	29	230,000	65,000	100
1992	2,367,000	30	403,000	88,000	100
1993	3,170,000	30	490,000	78,000	100
1994	3,050,000	34	580,000	194,000	100
1995	4,025,000	35	662,000	185,000	100
1996	7,030,000	50	1,168,000	376,000	95
1997	4,670,000	53	817,000	521,000	85
1998	3,968,000	52	(150,000)	360,000	60

Note: All figures are in nominal terms, not inflation adjusted.
Source: Johnson (2000).

The Nanoquest case reveals that internal politics and power structures can block success. They define barriers to diversification even when military and civilian technologies are related.

receive a large order in 1999. I had been told by senior management there to take a [loss on a] contract ... because it was a way for the bigger British Aerospace to get in there." British Aerospace did not compensate Nanoquest for the loss of £150,000. The company nevertheless established a record of steady revenue growth and profit under Johnson's tenure (see Table 2 on p. 60).

Conclusion

This case study contributes to an understanding of the dynamics of conversion and diversification processes in defense firms. While not a case of conversion associated with demilitarization, it does show that technical barriers do not necessarily prevent successful development of civilian markets.[33] It reveals that internal politics and power structures can block success. These define barriers to diversification even when military and civilian technologies are related.

The role played by different technological actors, managerial groups, and individuals who shape diversification or technology transfer outcomes was highlighted. Through the bridging activities of top-manager Johnson, Nanoquest was able to overcome some of the learning, marketing, and managerial challenges associated with defense specialization. His experience in both military and civilian firms helped Nanoquest overcome specialization, as did his ability to make distinctions between military and civilian corporate requirements. Nanoquest was able to combine profitability and diversification into nonmilitary markets during the late 1990s, although interference by higher-level managers later made it difficult to link (in an accounting sense) firm performance to actual innovative activities.

The Nanoquest case shows that even when a defense firm diversifies using a base of markets and products similar to those in military markets, it can still face internal political barriers. The ability to diversify even in areas that built upon military-technological relatedness was constrained by wider considerations of politics and markets. At the same time, organizational innovations and firm structures promoted innovation and diversification. Nanoquest as a smaller firm gained a certain degree of flexibility. British Aerospace Enterprises bridged the divide between small and large firm and even between the core firm and the more downstream operations of Nanoquest as a supplier of key components. Thus, the network form of Enterprises and its support role challenges characterizations of defense barriers that are based on a simple static picture of the defense firm and divorced from its larger (supporting) environment. BAe sometimes provided synergies and the Enterprises network offered valuable contacts, or social capital, but such network ties were ultimately insufficient in the face of weak political capital vis-à-vis top BAe managers.[34]

Notes

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1. This case study is based on interviews with key managers, who are identified later on, at BAe and Nanoquest. It focuses on the why and how questions related to organizational change. My final draft and interview notes were reviewed by these managers during the course of my research.

2. Of course not all dual-use scholars make the same claims. This article is directed against the arguments that: (a) defense firms' shift into civilian markets is relatively easy; (b) take an ahistorical view of how firms' capacities develop; or (c) ignore the history behind how military and civilian capacities become more related.

3. These include management theorists like Burns and Stalker (1994).

4. Economic conversion (in the U.K. also known as defense or arms conversion) refers to the political, economic, and technical process of shifting to civilian products and markets. Such conversion can take place in industrial enterprises, laboratories, university research departments, and military bases. Whereas diversification promotes the entry into new markets (military or civilian) by acquisition or internal product development, conversion emphasizes civilian markets and has been less associated with acquisition strategies or strategies that do not promote the retraining and reuse of existing workers. Nevertheless, often conversion depends on diversification or the acquisition of resources external to the firm because specialized defense firms lack knowledge or access to relevant expertise, specialized skills, distribution channels, or other key capacities. Some proponents of diversification do not care if military workers are retrained for new jobs within the company when defense firms enter new markets. Others are indifferent if the defense firm diversification supports a new generation of military (as opposed to civilian) technology. Conversion, in contrast, is linked to the ideas of disarmament and trade union protection of employment possibilities. For more discussion of conversion, see Feldman (2006), Melman (2001), and Schofield (2007).

5. Labour Party (1995), as cited in Spinardi (2000, p. 129).

6. Feldman (1998; 2006).

7. Te Kulve and Smit (2003).

8. Kelley and Watkins (1995).

9. Molas-Gallart (2006, p. 170).

10. Carter (1988, p. 8).

11. Feldman (1998; 2006). At certain times, civilian diversification goals gain in importance, particularly during military budget downturns. The failure of diversification efforts, mergers among defense companies, and divestitures of civilian divisions each help strengthen the hands of military-oriented top managers.

12. Dumas (1986); Melman (1983).

13. Melman (1983).

14. Markusen (1991).

15. All quotes from Carter (1988, pp. 4-5).

16. Alic, *et al*. (1992); Feldman (1998; 1999a; 1999b; 2006).

17. Feldman (1999a; 1999b; 2006).

18. Burns and Stalker (1994).

19. Veblen (1965); Melman (1983).

20. Alic, *et al*. (1992).

21. BAE Systems (2007a; 2007b).

22. Unless otherwise indicated, this account is based on interviews with Hooke, Irving, and Johnson (all 2000). My findings reflect patterns and causal relationships I have identified in other cases in American and Swedish defense firms.

23. BAE Systems (2007b).

24. Some argue that the other side of Enterprises' success with Nanoquest was BAe's failure with Steinheil. BAe acquired the firm because they thought they could help it find new markets and diversify. It was placed first in BAe's Dynamics group, but was resented there because Dynamics had not made the acquisition. Eventually, Steinheil was inherited by Enterprises. An original plan that would have had Steinheil using Nanoquest as a basis for diversification was abandoned.

25. Feldman (1999a; 1999b; 2006).

26. Fraser (2000).

27. Johnson (2000).

28. Evans and Price (1999, pp. 11, 25, 125).

29. Johnson (2000).

30. Irving (2000).

31. BAE Systems (2007a).

32. It is useful to note that military-linked budgets, R&D, financing, and capital are often used by successful defense diversification projects as a kind of banking system. In the absence of a supporting civilian industrial policy, access to military contracts and profits is often critical. This fact does not mitigate the diversionary aspects of military spending (see Dumas, 1986; Melman, 1983).

33. This case highlights how defense engineering staff can be retained in new markets, although some flexibility was gained through subcontracts. It shows the incentives for diversification despite potential barriers rooted in global markets. In a period of restructuring, smaller defense firms can just as easily face global competition from larger military firms. Thus, sticking to military markets to sidestep global competition in civilian markets is not always an option.

34. See also the discussion in Webb (1998).

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Hidden depth: tracing corporate ownership and its implications in the U.K. defense industry

Derek Braddon

The ownership of both U.K. and global defense industries is being dramatically transformed. In part, this ownership revolution represents a natural adjustment to the post-Cold War world with its new and challenging geopolitical requirements, evolving military strategies, new technologies, and the emergence of competitive new suppliers. The symbiotic government-defense company relationships (which in earlier decades created the so-called military-industrial complex) have largely been replaced by a more competitive, increasingly global market for defense procurement in which corporate efficiency and product cost-effectiveness are paramount. Governments still have considerable influence in defense procurement, and many still seek to protect and promote their respective national champions. But the game has changed, fundamentally and irrevocably, and market forces now play an ever more important role in the defense procurement process.

In such a situation, the dynamics of defense company ownership takes on new significance. To what extent, for example, does the ownership revolution in defense create or secure market power? Could the ownership of defense companies by particular kinds of investors (and their country of origin) positively or adversely affect their, or a government's, military strategies and outcomes? Are there important corporate governance issues involved in the transfer of ownership that might influence or constrain corporate behavior? At a time when alleged corporate scandals in the defense industry have become prominent in the media, these issues take on even greater importance.

This article seeks to address questions such as these in an area of defense economics that has been little explored.[1] It does so at two levels: first, at the level of the company, where takeovers, mergers, and strategic alliances across the industry are changing fundamentally the commercial landscape; and second, at the level of the shareholder where ownership takes on a new meaning and where best-practice corporate governance is expected and indeed has become a barometer by which corporate behavior is being increasingly judged. The article offers some reflections on the complex and somewhat obscure territory of defense company ownership and related behavior and on this central question: does defense company ownership actually matter?

The ownership issue

Thirty years ago, discussion about corporate ownership and its implications in the U.K. defense sector would have been largely irrelevant. Almost all major defense supply companies were government controlled and with very limited private sector influence. It was only after the advent of privatization in the United Kingdom in 1980 that the country's major defense prime contractors moved back into the private sector.

For example, in 1981, British Aerospace were part-privatized with 50 percent of the shares being sold to the public. The remainder were sold in 1985 with the British government retaining a "golden share" in the company. Rolls-Royce became a public limited company in 1985 with a stock market float in 1987, the government again retaining a golden share. In 1986, Royal Ordnance was placed on the market with its tank division sold to the Vickers company and the remainder offered as package to the highest bidder, and eventually becoming part of British Aerospace. Shorts of Belfast, the shipbuilders, was sold in 1989 to the highest bidder (Bombardier of Canada). Other state-owned, defense-related shipyards in the U.K. were sold separately, some as management buyouts, in the mid-1980s.

More recently, the government-run Defence Evaluation and Research Agency, formed in 1995, was effectively divided into two sections, one retained under government control (DSTL) and the other transformed into QinetiQ, a private-public partnership with the U.S.-owned Carlyle Group. QinetiQ was floated on the stock market in 2006 and has become a FTSE-250 company. The U.K. government again retain a golden share in this company.

The privatization of the U.K.'s major defense companies since 1980 has been part of a continuing drive for enhanced value for money in defense procurement. From the Levene reforms of the mid-1980s, through the 1992 Competing For Quality initiative, to the Smart Procurement and Smart Acquisition strategies that have dominated procurement reform in the last decade, to the Defence Industrial Strategy of 2005, the U.K. Ministry of Defence has focused with increasing intensity and varying degrees of success on trying to ensure maximum cost-effectiveness in the deployment of the defense equipment budget.[2]

Globally, too, the defense industry is currently experiencing a degree of corporate metamorphosis which is unprecedented. Three important developments explain the revolution in defense company ownership. First, following the end of the Cold War in 1989-1990 and the dramatic reduction in defense procurement budgets, the industry and the defense sector more generally underwent considerable corporate restructuring and more recent developments have led to it undergoing further rapid transformation.[3] Second, following the terrorist attacks of 11 September 2001 and the more recent Madrid and London bombings, the whole concept of what defense and security actually mean in practice changed fundamentally. Coincident with military operations in Afghanistan and Iraq this engendered a new increase in some defense budgets, principally in the United States, where considerations of homeland security and dealing with the "axis of evil," as it was perceived, pushed defense budgets upward again. Critically, in this new resurgence of defense spending, the kind of military procurement required has changed and, as a result, new kinds of defense companies

have been drawn into supplying the defense sector.

The third important development concerns the changing technical nature of defense provision and strategy. Major advances in a range of technologies have enabled the military in countries like the U.S. and U.K. to pursue a completely new kind of warfare strategy. The advent of network-enabled capabilities and network-centric warfare has changed fundamentally the kinds of goods and services required by the military and also the strategic response, processes, and procedures to be used in future conflict resolution. The so-called Revolution in Military Affairs (RMA) and the evolving "rapid reaction" approach to military doctrine, with its associated humanitarian requirements, network-centric warfare developments, and homeland security issues linked to the terrorist threat, have brought – and will continue to bring – new players and new owners into the defense supply business of the future.

The issue of defense company ownership in the U.K., therefore, takes on a greater urgency with the recognition of the revolution currently sweeping through the global defense industry, changing fundamentally its character, location, focus, and modus operandi.[4] Every aspect of the defense sector is being reconfigured from defense budgets, through procurement policies and military objectives and strategy to leading-edge technological developments designed to meet the requirements of the move toward network-centric warfare.[5] These changes are certain to result in a further fundamental restructuring of the U.K. defense industrial base.[6] Major ownership changes have already occurred,[7] and, as the revolution spreads further through the supply base of the industry,[8] further ownership adjustments seem inevitable.

Visible ownership

Driven by the important developments in the defense sector outlined above, the recent consolidation of the defense industry has created a complex, inter-dependent cobweb of transnational corporate ownership – a "spaghetti bowl"[9] maze that, while occasionally hard to trace and disentangle, is at least visible to the researcher. In 2006, 31 organizations received more than £100m from the U.K. Ministry of Defence.[10] Five of these organizations were government agencies (e.g., DSTL, NETMA) and a further eight were essentially service providers (e.g., BT, BP, the Met Office). Twelve U.K. companies and six multinational or non-U.K.-owned organizations were in this category, and it is within this highly defense-dependent subgroup and their principal suppliers that the visible ownership picture has been transformed.

Take, for example, the case of BAE Systems. The visible ownership dimension of BAE Systems in May 2005 is depicted in Figure 1.[11] The linkages of the company at that time were wide-ranging and extended globally across the industry. Within its ownership domain were: Royal Ordnance Defence, Alvis, and 50 percent of Fleet Support Ltd in the UK; 37.5 percent of MBDA, the transnational European guided weapons supplier; 100 percent of the Swedish defense contractors Haaglunds and Bofors, through the U.S. arm of BAE and 35 percent of Saab AB, among others. The

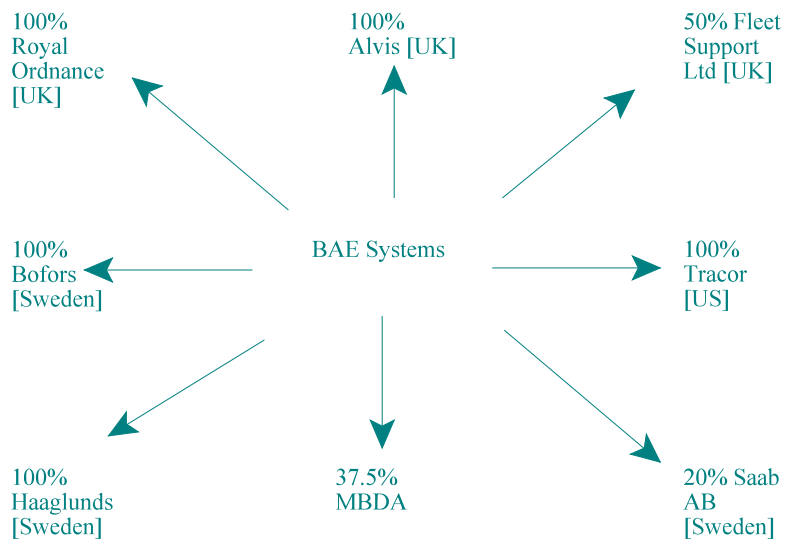

Figure 1.

ongoing ownership revolution in the defense industry is frequently more extensive than it seems on the surface and can exert a significant influence on procurement success in different markets. For example, the takeover of Marconi Electronic Systems by BAE in January 1999 gave BAE control of Tracor, an American electronics company, acquired by GEC Marconi in 1997. With 10,000 U.S. employees, Tracor became at the time the largest U.S. defense enterprise owned by a European-based company. Critically for BAE Systems, this ownership move allowed the company enhanced opportunities in the lucrative and expanding U.S. market.

Additional ownership changes helped to further strengthen the position of BAE Systems in the U.S. market. In April 2000, BAE gained ownership of Lockheed Martin Control Systems (a flight controls designer and manufacturer) and in July 2000 became owner of Lockheed Martin's Aerospace Electronics business division as well. Such acquisitions have given BAE Systems an employment footprint in the U.S. of over 25,000 and have assisted the company to obtain important contracts with U.S. prime contractors and led to the official recognition in 2003 of BAE Systems as an "American" company by the Pentagon in the context of its defense procurement strategy.

In Figure 2, a similar visible ownership picture is displayed for Rolls-Royce Plc,

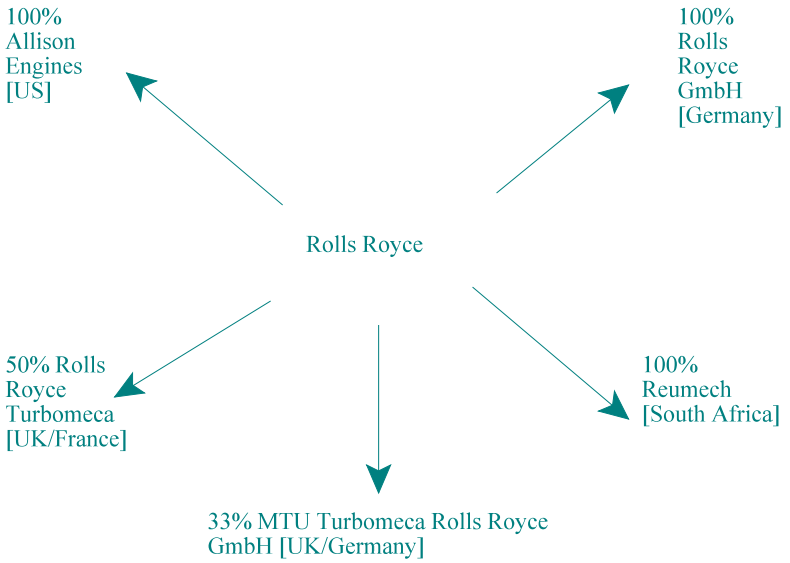

Figure 2.

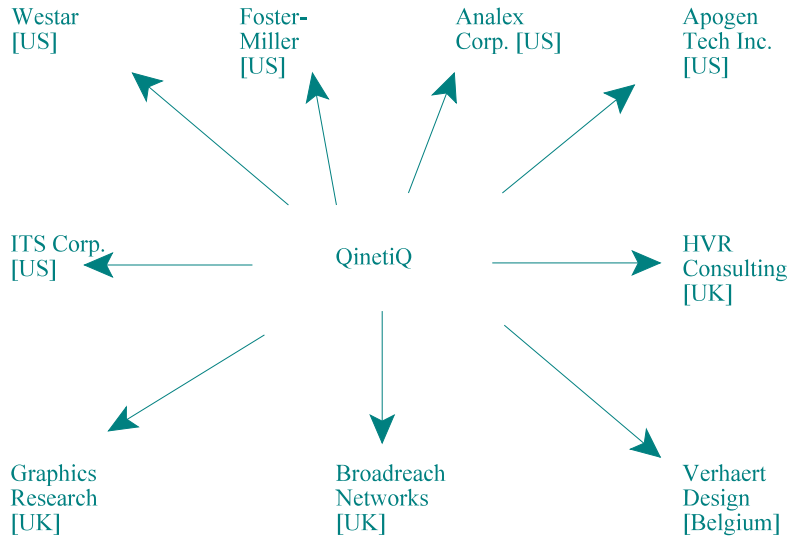

Figure 3.

again for May 2005. In 2005, Rolls-Royce owned both the U.S. aero-engine company, Allison, and the German aero-engine organization, Rolls-Royce GmbH. It also owned half of the Anglo-French aero-engine company Rolls-Royce Turbomeca and one third of the Anglo-German aero-engine company MTU Turbomeca Rolls-Royce (MTR) GmbH. The South African light-armored vehicle manufacturer Reumech was also owned by Rolls-Royce, and the company is a partner in other global co-ownership arrangements with a 50 percent stake in Rolls-Royce Services Limitada, Inc. (the Philippines), an aero-engine maintenance company. It also controls 46.8 percent of IPT SA (Spain), among others. Such cross-shareholdings, partnerships, joint ventures, strategic alliances, and industrial teamings are now commonplace within global high technology industries and are likely to become even more prominent in the defense industrial sector as the technology-shift implicit in the current RMA brings an even wider range of nontraditional players in to the military supply market.

An example of developing global visible ownership links on the high technology side of the defense industry is provided by the case of QinetiQ, depicted in Figure 3. QinetiQ was established as a corporate organization in July 2001, the world's first leading-edge national defense laboratory to move into private sector ownership. The company now owns three U.K. concerns: HVR Consulting, Broadreach Networks, and Graphics Research and also owns Verhaert Designs in Belgium. In the U.S., QinetiQ owns the computer software and support company Westar Aerospace and Defense Group as well as the engineering and technology development company Foster-Miller, Inc. Following full privatization in 2006, ownership of additional foreign-based companies was pursued and the company now has ownership of U.S. companies Analex Corporation, ITS Corporation, and Apogen Technology, Inc.

Within the U.K. defense industry supply chain, too, similar visible ownership changes have been prominent. Smiths Aerospace, a major first-tier supplier to the U.K. aerospace and defense market (and part of the Smiths Group) owns U.S.-based ETI Technology, Inc., SensIR Technologies, LLC, and TRAK Communications, Inc. Smiths also own the Chinese-based Tianjin Timing Seals Co., Ltd and its associated technology. They further acquired the U.S. company Integrated Aerospace, Inc., a privately owned, California-based supplier of specialist landing gear systems and also Dynamic Gunver Technologies, a specialist aero-engine component manufacturer. However, in 2006, a major ownership development occurred when the major U.S. conglomerate General Electric itself captured ownership of Smiths' Aerospace Division for some £2.45bn, placing another newly American-owned supplier right at the heart of U.K. defense procurement.

Cobham Plc is another U.K.-based first-tier defense supply company that has now been transformed into a globally-focused aerospace and military goods supplier which

offers a world-class range of niche products and systems for aerospace, marine, homeland security, and other customers. Cobham now owns around 70 companies across the world, including ACR Electronics, Inc. in the U.S., Air Precision SA in France, Chelton Applied Composites in Sweden, Drager Aerospace in Germany, Falcon Special Air Services in Malaysia, Mastsystem International Oy in Finland, National Jet Systems Pty Ltd in Australia, Orion in Canada, and also Spectronic Denmark A/S in Denmark.

Similar acquisition strategies by the key players in defense markets outside the U.K. also impact on the ownership issue. For example, the acquisition of the U.K. company Racal by Thomson-CSF in 2000 made the French company the second largest defense company operating in the U.K. and enabled it to use its British operations to access the U.S. market more easily.

Invisible ownership: who really owns the U.K.'s defense companies?

At the visible ownership level, then, the U.K.'s defense-related corporate infrastructure has changed dramatically in recent years. However, hidden beneath the "spaghetti bowl" of evolving U.K. and European defense industry restructuring lies an equally important level of ownership, one which is much less visible, namely that of the capital providers to the industry.

The categories of capital required by a defense company should, in principle, be identical to those in any other commercial enterprise. Such capital requirements would include equity share capital, bonds and convertible stocks (securitized borrowings, some of which may have the status of quasi-equity) and borrowings from banks and other financial institutions. Effectively, these become the liabilities on the company's balance sheet and the providers of these forms of capital become the beneficiaries of capital returns generated by the defense industry. In the main, though, it is primarily share capital which will generate ownership rights over the company, giving the potential for some degree of influence or control over corporate decisionmaking.

Financial investors will be attracted to invest in defense supply companies for several reasons. First, the ultimate consumers for the output of the defense industrial sector will primarily be governments and, as such, they represent a more favorable credit risk than customers from the private market. Except in extreme circumstances, governments are unlikely to renege on their defense procurement commitments, implying lower risk for the investor and, consequently, a higher, more attractive risk-adjusted return. Second, once governments have committed to a military purchase, investors will recognize that the defense contractors concerned (in whom they might invest) are now likely to have enhanced negotiating power which can be deployed to their commercial advantage, given the vulnerability of government to interruptions in supply. With the exception of periods when defense budgets are contracting sharply, prime defense contractors are considered by investors to be in a relatively privileged position as commercial enterprises and therefore remain extremely popular with capital providers.

The data required to identify the invisible ownership dimension of the defense industry in the U.K. is much less easily accessed than the visible ownership aspect which receives widespread media coverage on an almost daily basis. However, shareholding information is available to researchers as most major defense companies have a formal listing on one or more stock exchanges and either they, or some other public authority, often require the disclosure of major equity holdings. This may be accessed through the annual report and accounts of the companies concerned or, in some parts of the world, it is possible for members of the public to access a copy of the shareholders' register on payment of a fee. Again, researchers can access shareholder information on specialist databases (as in the case of the FAME database employed in this study).[12] Securitized debt may be held in registered form but this may not be available for public access and owners here are less easy to identify than shareholders. Bearer bonds are not registered and it is therefore essentially impossible to determine ownership. As with personal bank accounts, bank lending to companies is usually confidential, although large syndicated loans may well be in the public record but are notoriously difficult to research.

Most shareholders will have the same legal status but in some ways relevant to this study they will differ significantly from each other. The differences are likely to be in terms of size of shareholding (measured as a proportion of total share capital, or of total "free" share capital), the time period over which the shares are held, and the degree of activity or passivity of the shareholders in relation to corporate votes and actions. For the purpose of this particular piece of research, the most interesting shareholdings in U.K. defense companies would be those significant strategic stakes held by commercial or industrial groups with multinational or other defense interests and by foreign shareholders and/or foreign governments and their agencies. In addition, the researcher would be seeking to identify potential covert or overt connections, networks, cartels, or other kinds of industrial agreements that may exist among the capital providers.

The evidence and does it matter?

This section of the article reports the key findings of a recent pilot study conducted into this rather opaque area of defense company ownership. It must be recognized from the outset that the very nature of global stock market behavior highlights the process of continual share acquisition or disposal – hence, the shareholder register of a public listed company will inevitably be changing most of the time. Significant shifts in the overall profile of corporate ownership can occur quite quickly. Data were derived from the FAME database in mid-2006 and the picture painted by the data of ownership profiles is, in effect, simply a snapshot in time. The figures discussed should therefore be seen as generating an ownership snapshot at one particular moment in time and nothing more. Data for a period before or after that moment

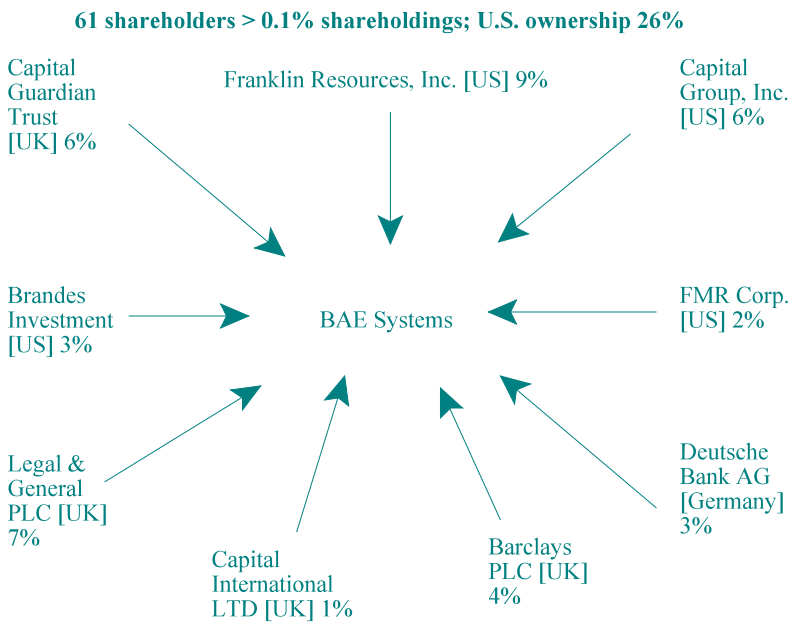

Figure 4.

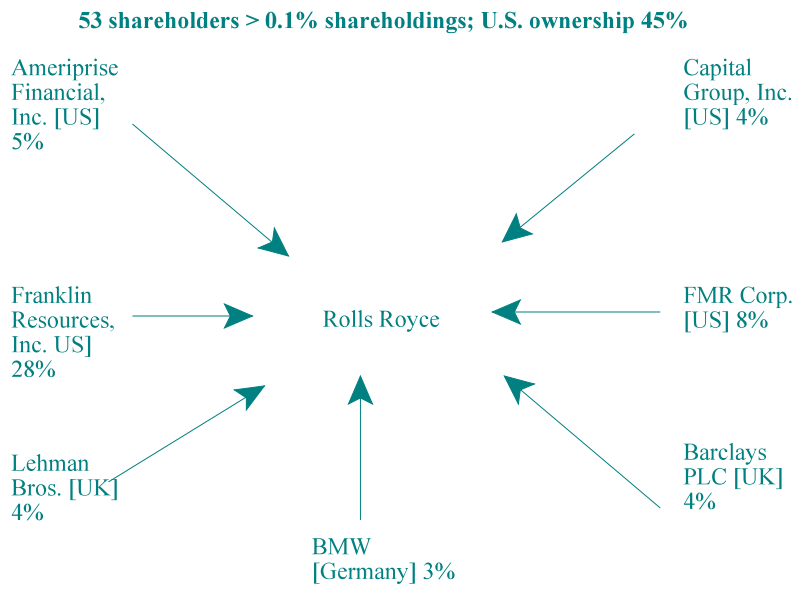

Figure 5.

would have been slightly different, although major shareholders in practice tend to change much more slowly, making it possible to derive both important trends over time and comparisons between ownership profiles of different companies.

In the pilot study, shareholding data was examined for two major U.K. defense companies, BAE Systems and Rolls-Royce Plc, and also for a third company at a lower tier of the defense industry supply chain, namely Cobham Plc. Despite the data limitations, the ownership picture that emerges is interesting and will inform the next phase of research where the process will be repeated for a greater number of companies and examined over a longer period of time.

What, then, does the invisible ownership picture reveal for the mentioned cases? Figure 4 shows the picture in mid-2006 for BAE Systems.[13] A total of 61 shareholders in BAE Systems in mid-2006 had shareholdings exceeding 0.1 percent of total company shares, meaning that the ownership spread is extensive with many small shareholdings. The top-5 investors by percentage shareholding at the time controlled some 32 percent of the company. This figure has increased significantly from just 19.9 percent two years earlier.[14] Ownership concentration appears therefore to be tightening although the investors involved appear genuinely unconnected. Three of them were American and all of them appeared to be passive investment managers rather than industrial groups investing for reasons of corporate strategy.

It appears from this snapshot that BAE Systems has an international and widespread share register in which no single investor, or connected group of investors, has a significant strategic stake. This profile is consistent with the BAE System's commercial position as a major competitor in global defense markets. Both in 2004, and as shown here for 2006, the principal owners of the company were American and British portfolio investors. This is not to say that these owners have no influence at all over company attitudes and behavior; it is simply that their investments would take on much greater strategic significance if these capital providers became less passive and more active investors with shared objectives in terms of corporate policy influence. It is also worthy of note that, as BAE Systems have moved increasingly closer to the U.S. defense market (earning, as noted earlier, formal Pentagon recognition), major U.S. shareholdings in the company have increased from around 12.6 percent of total shares in 2004 to about 26 percent in 2006. This is an important trend and one which will be discussed further in the next section of the article.

Figure 5 presents a similar principal shareholding profile for Rolls-Royce Plc as of mid-2006. Rolls-Royce, like BAE Systems, is a publicly listed company but, unlike that major prime contractor, the company has a much more concentrated share register where American interests are even more in evidence. Some 53 key shareholders each own more than 0.1 percent of total shares, although many of these individual

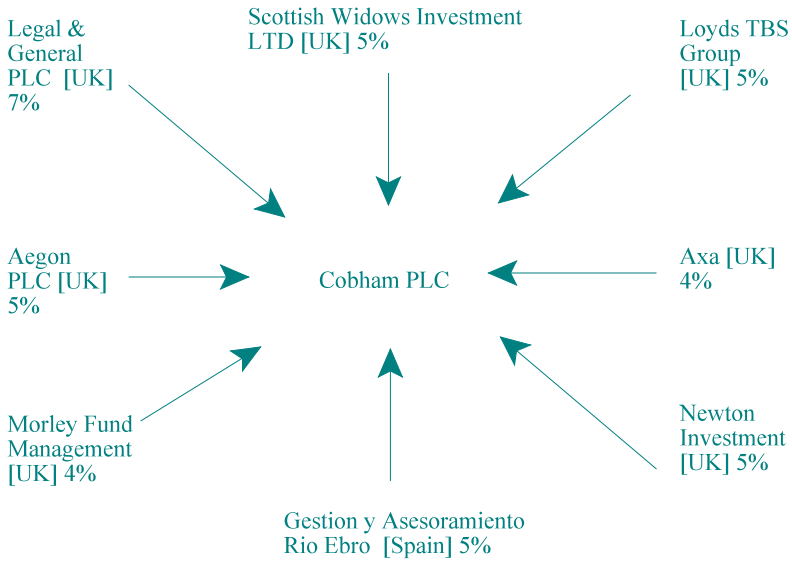

Figure 6.

shareholdings are, in fact, modest. The four most powerful shareholders all are American (Franklin Resources, Inc.; FMR Corporation; Ameriprise Financial, Inc.; and Capital Group) and have a combined ownership of shares held by the key shareholder group of some 45 percent, up from some 25 percent in 2004.[15] The two largest U.K. shareholders in this group (Lehman Bros and Barclays Plc) jointly controlled 8 percent of shares in mid-2006.

A striking feature of Figure 5 is the 28 percent share of Rolls-Royce Plc owned by the U.S. company Franklin Resources, Inc. in mid-2006, up from some 17 percent in 2004.[16] Since Franklin Resources is primarily an asset management company, it could be argued that its shareholdings are held purely for the financial benefit of the funds or clients whose assets it manages and not for its own business purposes, implying therefore that such a strong shareholding has no special strategic significance. But a stake as large as 28 percent might have much greater potential significance to an industrial group with defense interests wishing to influence Rolls-Royce corporate strategy in the future and, at least theoretically, Franklin could sell its shareholding at any time.

Finally, Figure 6 illustrates the shareholding profile for a smaller, second-tier U.K. defense supplier, Cobham Plc. Here, the ownership picture is much more traditional, which may be somewhat surprising given the recent transformation of the company into a global enterprise, itself owning numerous companies in other countries (as discussed earlier). All but one of the major shareholders are U.K. financial sector companies (Scottish Widows; Legal and General; Axa; Lloyds TSB; etc.), companies which would be expected to hold their investments for financial return rather than for the purposes of wielding strategic influence over corporate policy.

A more general examination of U.K. defense company ownership indicated that many of the U.S. and U.K. major investors noted in Figures 3 to 5 also were found to have extensive interests in many other defense contractors. This may imply nothing more than that, in mid-2006, the defense sector was particularly attractive to this range of capital providers and their prominence in the shareholder list is attributable only to financial stimuli in the form of potential shareholder return. Alternatively, it may have a wider meaning that is not immediately apparent and further research into the prominence and significance of certain key investors is clearly needed.

Ownership implications and corporate governance

What are the implications of the ownership profiles observed in this sample of the U.K.'s defense industry? The official government line on this was made abundantly clear in September 2005 in a speech by Lord Drayson, government minister for defense procurement who commented that the "U.K. defence industry is now defined in terms of where technology is created, where high value skills and intellectual property reside, and where the investment is made, not where the shareholders live." Furthermore, before its recent demise, the Department of Trade and Industry took the view that some foreign defense suppliers could be regarded as part of the U.K.'s defense industrial base. The French company Thales, for example, falls into such a category, now owning several small U.K. companies, operating in the U.K. through them, and receiving significant amounts of U.K. Ministry of Defence expenditure.

Against this official view, however, it could be argued that decisions on the future location of Drayson's key definitional attributes – technology creation, high-value skills, intellectual property, and actual investment (as well as production and employment) – in the defense sector may ultimately have a great deal to do with "where the shareholders reside." As noted, the American grip on U.K. defense company ownership is, without question, strengthening, drawing U.K.-based companies such as BAE Systems and Smiths Aerospace ever closer to the U.S. market and, in the case of Smiths, into a total U.S. takeover. In this latter case, it will be interesting in the future to observe how many of the Drayson list of key definitional attributes continue to apply to Smiths' U.K. operations, if any, under full American ownership.

Another important ownership issue which has come to prominence in recent years is that of corporate governance. The governance of companies in many different sectors of business has come under the spotlight in the last 20 years with scandals ranging from the weakness of the Japanese banking system, experience with

pharmaceutical companies' behavior in the EU and in the U.S., the massive fraud associated with the collapse of Enron in the U.S. and Parmalat in Italy, and defense contract concerns in the U.K., U.S., and France.

But the purpose of the current drive toward enhanced corporate governance regimes across the world has more to do with its potential for improving competitiveness than with simply stamping out corrupt business practices. First, corporate governance is about who controls what in the business context and how well they are performing. The ownership issue is critical here. Evidence suggests that well-run companies with sound best practice corporate governance regimes are more attractive to investors since they are perceived to be operating in a way which maximizes the opportunity to secure sustainable competitive advantage in the market.

Second, where investor-owners are private equity concerns (as, for example, in the case of the significant shareholding in QinetiQ held by the Carlyle Group), these owners may be expected to actually influence the governance process itself. Private equity funds are distinct from other kinds of funds, such as mutual funds or hedge funds, mainly due to the fact that they own a significant proportion of a company's shares and take a longer time horizon on investments into account. Such capital providers are likely to become more involved in influencing decisions in their investee companies, particularly with regard to instituting or enhancing a specific corporate governance regime.

If good corporate governance helps determine corporate performance and efficiency, then ownership changes in the defense industry take on greater significance. There are few contributions to the literature to draw on regarding the linkage for defense companies between governance and performance. One study observed that under the market-based corporate governance system (also known as the Anglo-Saxon system) used in the U.S. and the U.K., defense firms consolidated faster and more effectively after the end of the Cold War in the U.S. and U.K. than did defense companies in Europe, and that they gained a comparative advantage in terms of profit margins, market share, and productivity not shared by European companies with their more inclusive stakeholder approach to the governance issue.[17]

Another scholar conducted a case study of the state-controlled Portugese defense industry to assess (a) the relative efficiency of the industry and whether the availability of government subsidies had increased technical efficiency and (b) whether the corporate governance environment surrounding the defense industry helped to enforce the desired improvement in efficiency.[18] The study concluded that (a) the Portugese Ministry of Defense incentive regulations have not achieved their aims and (b) the corporate governance regime for the Portugese defense industry was in urgent need of complete overhaul, yet was not even on the government's agenda.

Conclusions

On the basis of the evidence drawn from a limited sample of U.K. defense supply companies employed in this study, one can draw some initial conclusions. Major U.K. defense companies have a strong American presence in their ownership profile and, increasingly, own U.S.-based companies themselves. The majority of the investor-owners are passive fund managers rather then industrial groups investing for reasons of corporate strategy influence. This, however, may be changing as target contractors (for example, Smiths Aerospace) are "cherry picked" in their entirety. In some circumstances, where a large private equity company holds a significant shareholding in a U.K. defense contractor (as with the Carlyle group and QinetiQ) there may be important concerns about how passive the investor will be. Overall, current ownership profiles do not appear to present a serious problem. However, large, passive owners with significant shareholdings in one or more key U.K. defense company can always choose to sell their stake in the company at short notice, possibly to another large foreign-based concern.

In addition, there are a range of other important issues to consider. At a time when national security is a top government priority, identifying who or what actually owns and may seek to influence the key companies in the U.K. defense sector is essential. Yet, as noted, it is difficult to trace accurately at a point in time, and especially over a period of time, the real extent and nature of invisible ownership in the defense industry.

Furthermore, share ownership is transitory by nature and fully transferable, unless government retain a golden share to resist unwanted outcomes. In other industries, change in ownership can sometimes result in factory closure, lost investments, skill diminution, and corporate relocation to another country. Why should the defense industry, which is being driven increasingly into the global market, be any different? It is through these potential global transfers of investment, core competencies, skills, and, ultimately, production and employment that defense company ownership may really begin to matter as one of the last remaining bastions of British manufacturing is disassembled.

Another important issue may be a tendency toward potential suboptimal outcomes where companies with different ownership profiles and, therefore, corporate governance systems are drawn together in joint ventures, strategic alliances, technology partnerships, and such like. What happens when these governance regimes collide? Who wins and with what consequences?

Finally, from these initial observations, the degree of foreign ownership of major U.K. defense companies seems surprisingly high. Perhaps this reflects a further stage in the financial and industrial integration of business generally in the global economy and of U.S.-U.K. links in the defense sector in particular. U.S. and U.K. links in defense are extremely strong now and mirror closely their military cooperation in Iraq, Afghanistan, and in the so-called war on terror. Against this background, no economist would be surprised that U.S. investors have a healthy interest in U.K. defense industry stocks, nor that both countries are showing ever-increasing interest in the acquisition of the other key players in the defense business. The same

economist, however, would wonder what implications this ownership reshuffle will have for the future existence and survival of a viable, competitive European defense industrial base to challenge U.S. dominance in global markets.

Notes

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1. Braddon and Bradley (2005).

2. Kirkpatrick (2004).

3. Dunne, *et al*. (2007); Braddon (2000).

4. Matthews (2001).

5. Braddon (2004); Hartley (2003).

6. Hayward (2005).

7. Guay and Callum (2002); Hartley and Sandler (2003).

8. Dowdall (2004).

9. A term coined by the Rand Corportion in 2000; http://rand.org/pubs/documented_briefings/DB358/DB358.part1.pdf

10. Clearly, ownership changes occur regularly within the industry, so a date must be chosen if we are to examine the ownership pattern at any point in time. Mid-2005 was selected as such a date during the early phase of research for this article as it marked the apparent end of a major phase of defense industry consolidation.

11. The data for Figures 1 to 3 all are derived from Defence Systems Daily, May 2005, http://defence-data.com/ripley/pagerip1.htm.

12. FAME (Financial Analysis Made Easy) is an Internet-based database of detailed company and financial information on nearly two million major public and private U.K. and Irish companies with summarized information for a further one million companies. It contains up to 10 years of data on each company. FAME allows one to search by any combination of over 300 criteria, including: geographic location, SIC code or activity description, number of employees, statement items, ratios, credit score/rating, legal form, year of incorporation, holding company/subsidiary, and merger and acquisition deals. Further information may be obtained from, and the database accessed through: http://www.uwe.ac.uk/library/resources/general/databases/titles/fame.htm.

13. The data for Figures 4 to 6 all are derived from the FAME database.

14. Braddon and Bradley (2004).

15. Braddon and Bradley (2004).

16. Braddon and Bradley (2004).

17. Harper (1998).

18. Barros (2005).

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The role of external partners in regional cooperation projects in the Middle East

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Regional cooperation projects, including those in the Middle East, are expected to benefit its direct participants. They may also "spill over" to positively affect others. In this article we consider two types of spill-over or externality effects, namely well-known economic benefits, such as employment and income effects, and benefits that are not necessarily measurable in pure economic terms, such as regional stability, the easing of social tensions, and the diminution of international conflicts.[1] Project justification is based on the expected net benefits brought to the direct participants, to the region, and to the world as a whole. But if the decision is taken only by the direct participants, even if by public bodies, market failure may result inasmuch as potentially positive external effects are not part of the decisionmaking calculus. This might justify external involvement. This article examines types of regional cooperation projects in the Middle East that call for such an external involvement, specifically the involvement of bodies outside the region (countries or nongovernmental organizations).

Benefits of Middle Eastern regional cooperation have been categorized into three groups: economies of scale, complementarities between production factors, and externalities.[2] For example, a statistically significant, positive correlation between the Palestinian unemployment rate and the number of suicide, shooting, and total attacks carried out has been found. A cooperation project that reduces the unemployment among Palestinians would create a positive sociopolitical externality that benefits the region, but a private investor would not be expected to take this into account.[3] History provides some encouragement for believing that an investment in joint projects can be successful either as a part of a more comprehensive, that is, macro, framework or as a stand-alone effort that can grow into a much larger cooperative process.[4] This means that such projects possess positive externalities. An example of planting such seeds of cooperation, which gradually spread throughout an entire conflict arena and achieved desirable outcomes, is the formation of the coal and steel community in France and Germany in the 1950s. This cut through the centuries-old conflicts of these two countries and their various allies. A small initial step soon led to other small cooperative steps, for example, the establishment early on of Euratom. These and subsequent other small yet incrementally larger steps eventually led to the adoption, more recently, of a common currency across much of Europe along with the beginnings of banking and political union, culminating in the development of a proposed constitution covering the union of 27 states.

In another example, small but effective cooperative efforts are slowly taking place between North and South Korea. First proposed at the 1997 Peace Science Society International conference in Sydney, Australia, a small-scale cooperative tourism project in the Demilitarized Zone was put forth by Cornell University researchers as a modest way to begin to reduce the likelihood of potential conflict.[5] Efforts along these lines began in 1998 when a contract to establish such a project was signed by the two adversaries. Subsequently, this has lead to additional steps that have significantly reduced tensions between these two nations.

Using an interregional input-output framework, it has been suggested that projects relating to Palestinian sectors of banking and construction are expected to generate a higher multiplier to the region.[6] This multiplier effect is part of the externalities that stem from the project. Even though joint projects can benefit the region, there are many constraints that can prevent their implementation, such as gaps in economic structure between the countries, gaps in social structure and security considerations.[7]

It can be expected that a large portion of the projects will not receive financing from the business sector because they do not internalize the externalities (assuming now that all are positive externalities).[8] Therefore it is possible that the benefits to the Middle East region as a whole or to the world exceed the regional or world costs, even when private business benefits are less than private business costs. That entrepreneurs will not invest in such cases is the result of market failure from the region's point of view. Thus the role of countries involved in project financing amounts to maximizing the region's (or world's) welfare. It should be noted that when the partners of a cooperation project are countries and not individuals, the countries involved internalize part or all of the positive externalities (they still do not internalize the externalities that affect other countries), so they tend to behave in a more efficient way than the private sector. Furthermore, in certain projects, the cost-benefit for the country involved may be negative while the cost-benefit from the regional/world point of view is positive: the country fails to internalize the externalities that other countries in the region (or even the rest of the world) enjoy. Again, the role of other countries in project financing becomes crucial. There are therefore two levels of market failure in financing joint projects in the Middle East: the first concerns the asymmetry between private investors and the countries involved; the second that between the countries involved and other countries that can benefit from the project.

Hypothesis and data

If positive externalities exist at the world level, the involvement of partners from outside the Middle East is an efficient instrument for the solution of regional market failures. External participants, mostly European and the United States, are expected to be attracted by the benefits, both economic and social, that may be provided by the projects with externalities. In practical terms, we do not expect the involvement of external partners to be the same in all types of cooperation projects, but we do expect such involvement to focus mostly on those projects that suffer disproportionately from

market failure and therefore would improve the world's welfare.

A data base compiled by Israel's Ministry of Finance, and further developed by the Ministry of Regional Cooperation, includes 489 regional cooperation ideas which have been raised since 1993.[9] Our analysis is based on the 231 projects for which the data is complete. While these are probably not a representative sample of the 489 projects, we nonetheless believe that they are well suited for our analysis. The reason is that the projects for which we lack data are probably those that did not reach an appropriate stage of maturity and therefore information about them has not yet been collected. They may still be under consideration, or may have been considered and rejected.

A number of projects relate to a single country, but most of them involve at least two Middle Eastern countries. They are Israel, Jordan, Egypt, Lebanon, Syria, and the Palestinian Authority. The data set includes projects that cover a wide variety of areas of cooperation and at various stages of processing. About ten percent of the projects are still in the phase of idea consideration, with no active steps taken yet for implementation. These include many desalination projects, tourism ideas, and research projects. About 20 percent are at the stage of feasibility studies and planning, such as various large-scale Jordan Rift Valley projects (including the Red Sea-Dead Sea canal project), industrial zones, and a joint Israeli-Jordanian airport. Another 35 percent are in active implementation, such as the construction of industrial parks, and some research projects and ecology projects, and the remaining 35 percent of the projects have already been implemented, such as trade agreements, air transport agreements, and energy agreements.

The variables

External partnership, the variable to be explained in our model, is defined as a financial cooperation partner external to the Middle East region.[10] This may be a government (usually from Europe or the United States) or a nongovernmental organization. Explanatory variables are specified according to the types of projects. These are defined according to a classification made on the same data source, using three main variables: sector, extent, and intensity of cooperation.[11] For each, we compare the level of externalities envisioned or achieved with the share of projects having external partners. We expect to find a higher share of external partners at higher levels of (expected) externalities. We present here the two groups of variables: those that define the typology of projects, and those that measure externalities.

Classification

Sectors of cooperation are classified into three main groups. First, infrastructure projects include the building of bridges, railways, airports, seaports, and roads, as well as energy, sewage, water, communication, employment parks. Second, economic activities projects include business agreements, agriculture, and tourism. And third, public service projects include mostly environmental projects, as well as education, research, health, and general framework agreements.

Extent of cooperation reflects the number of countries involved. First, single country projects count only on support from other countries but without actual cooperation in their implementation. Second, bilateral projects involve two countries. Third, multi-lateral projects involve three or more countries in the cooperation project.

The intensity of project cooperation is defined as the level of "jointness" with which the project is run. First, in low-intensity projects cooperation takes the form of mere coordination of actions, without active cooperation. Those may be projects that are conducted by one of the countries for its own interests, but that may affect another country, such as the building of dams, the development of tourism structures in neighboring regions, the installation of basic infrastructures in one country such as a neighboring sea port, and environmental projects in a neighboring region. Second, medium-intensity projects are based on agreements between the countries, but the implementation is mostly performed by the countries separately. Projects in this category include the creation of joint frameworks in various fields (such as joint investment funds, and joint professional organizations and forums), the signing of formal agreements (such as trade, air transport, and water distribution agreements), and the implementation of training programs (mainly in the field of agriculture). Third, high-intensity projects are actively jointly planned or managed. Such projects may be joint industrial parks, joint infrastructure projects (such as bridges between two countries, transregional roads), joint industrial enterprises, environmental care, and administration of water distribution.

Externalities

Externalities are classified as macroeconomic or sociopolitical.[12] The first is defined as the gap between the regional or global impacts of a project and its microeconomic viability; the second is defined as the gap between the same regional or global impacts and the feasibility of the project in terms of sociopolitical constraints (and detailed below). All variables are measured on a scale of 1 (low) to 5 (high), as evaluated by a group of experts. This group included 12 experts from a wide variety of fields. All were professionals involved in the field of economic cooperation in the Ministry of Regional Development and related ministries, professors that dealt with regional development, and economic development planners from private companies. In addition, some of the evaluations were based on a detailed description that accompanied most project proposals (including technical, economic, and financial analyses). Most of this information came from government ministries from Israel, Jordan, the Palestinian Authority, and Egypt.

Microeconomic viability is measured in terms of the evaluation of expected return for capital investments, or business profitability. For public projects that are not

expected to be evaluated in terms of business profitability, microeconomic viability is evaluated in terms of public utility achieved by given amounts of investment.

Regional (or global) impacts are defined as benefits received, or losses incurred, by the region (or the world as a whole) in consequence of the existence of a cooperation project. Such impacts may be of an economic nature, but they can also be viewed in terms of a social nature.

Macroeconomic externalities (MEE) are then defined as the gap between regional (or global) impact and microeconomic viability. The difference is the extra benefit not perceived within the project itself, but received by the economy of the region or the world as a whole. Actually, economic policy should consider the macroeconomic benefits as its major objective and provide incentives to all projects that create externalities. A project with a low level of microeconomic viability may not be implemented because its benefits to the investor are low, but if it has a high level of regional or global impact, public policy and external bodies should support it because of the benefits it brings to the region and to the world as a whole.

Feasibility is the degree to which the project responds to various constraints, both economic and noneconomic, that may inhibit or constrain the ability to cooperate. The evaluation of the feasibility of a cooperation project reflects the influence of such constraints and mostly measures the coherence of the project with the existing social and economic regimes in the partner countries, the intensity of personal contacts needed in the implementation of the project, the potential access to resources, and the potential for conflicts with other factors.

Finally, we define sociopolitical externalities (SPE) as the gap between the regional impact, or the benefits of the project for the region, and the feasibility level of the project. The difference measures the cost of socioeconomic constraints for cooperation in terms of global losses to the region as a whole and to other countries. In other words, a project with a low level of feasibility because of socioeconomic constraints may not be implemented in spite of the potential for long-term benefits and for contributing to the development of the region and to global stability. Projects in which this difference is large should be analyzed in depth in order to identify the constraints on their feasibility, and attempts should be made to find as many solutions as possible for these constraints. In this case, public policy is required for the solution or at least the alleviation of the constraints. The participation of external partners in such projects may alleviate to a certain extent the effects of such constraints by diminishing the intensity of direct contacts between countries in the region and therefore decreasing this type of market failure.

Results

To illustrate the types of projects contained in the data set, we present a short description of two projects. First, the Red Sea-Dead Sea Peace Conduit is a pipeline designed to conserve the Dead Sea by conveying water from the Red Sea to the Dead Sea. At the Dead Sea, desalination plants can be constructed to provide drinking water to populations residing in Jordan, Israel, and the Palestinian Authority. The Peace Conduit project was presented jointly by the governments of Jordan and Israel at the Johannesburg Summit on Sustainable Development in September 2002. The World Bank considered the financing of a comprehensive feasibility study and Environmental Impact Assessment for this project. The project could bring direct economic benefits such as water desalination. The economic feasibility of the project is graded as medium (3) mainly due to the fact that this project requires a big investment and may be substituted by local desalination plants, achieving similar results at lower costs. However, the externalities are relatively high: the economics externalities are graded as 2 (on a scale of -4 to 4) as are the sociopolitical externalities.[13] This stems from the fact that such a project could boost the tourism in the region, which could generate an additional economic value (externality) to each country and to the region. As for the sociopolitical externalities, the cooperation that this project requires from all of the parties could mitigate the conflict and could set a price on conflict: after the project is implemented, any conflict resurgence in the region would require the cost of abolishing the project.

Second, the establishment of safe passage routes between Gaza and the West Bank was stipulated in Annex I of the 1995 Israeli-Palestinian Interim Agreement on the West Bank and Gaza Strip. These routes are designed to ensure free transfer of people and goods between the two sections of the Palestinian Authority, without jeopardizing security in Israel. This project was assigned a low grade for sociopolitical externalities because the safe passage was designed in a way so that no interactions between Palestinians and Israelis would occur: the passage would be isolated and passengers would start their trip in Gaza and end it in the West Bank without stopping in Israeli territory. As for economics, it generates medium levels of externalities in that it could stimulate more efficient economic resource allocation in the Palestinian Authority.

Table 1 shows the distribution of the projects according to the various attributes. The first letter in each group represents the sector type: I - infrastructure; E - economic activities; and P - public services. The second letter represents the extent of each project (S - single country; B - bilateral; M - multilateral), and the last letter represents the intensity of cooperation (L - low; M - medium; H - high).

The largest number of projects are ISL (infrastructure; single-country; low intensity; 15.15 percent of all 231 projects), IBH (infrastructure; bilateral; high intensity; 12.12 percent), IMH (infrastructure; multilateral; high intensity; 9.96 percent), and PMH (public sector; multilateral; high intensity; 9.09 percent). Together they account for about 50 percent of all the projects.

In Table 2, we examine the extent to which the participation of external partners is related to the stage of implementation of the project. About half of the privately financed projects do not pass the stage of feasibility study. This is understandable if private investors cannot internalize the externalities and therefore cannot find an economic justification for the project. When the countries directly involved finance

Table 1: Project distribution by attributes (%)
(in parentheses: percentage of projects implemented or in active implementation)

ISL	15.15 (71)	ESL	3.90 (100)	PSL	2.60 (83)
ISM	0.43 (100)	ESM	0.00 (—)	PSM	0.00 (—)
ISH	0.00 (—)	ESH	0.00 (—)	PSH	0.00 (—)
IBL	3.46 (67)	EBL	0.43 (0)	PBL	0.87 (100)
IBM	4.33 (100)	EBM	3.46 (71)	PBM	1.30 (67)
IBH	12.12 (48)	EBH	4.76 (72)	PBH	6.93 (43)
IML	0.87 (100)	EML	0.00 (—)	PML	0.00 (—)
IMM	5.19 (89)	EMM	4.33 (75)	PMM	5.63 (93)
IMH	9.96 (64)	EMH	5.19 (70)	PMH	9.09 (90)
Total	52.00 (67)		22.00 (77)		26.00 (78)

Notes: I - infrastructure; E - economic activities; P - public services; S - single country; B - bilateral; M - multilateral; L - low; M - medium; H - high. For example, 15.15% of the 231 projects in the data set are single-country, low-intensity, infrastructure projects; of those, 71% are being or have been implemented, the remainder being in the planning phase.

the project, and can internalize part or all of the externalities, about 70 percent of the projects pass the feasibility test. And when external partners are involved in the financing, about 80 percent of the projects are either implemented or are in the process of implementation: this would be expected if external financiers succeed in internalizing all (or most) of the externalities that the project generates.

The influence of sectors

From Table 3 we see that the majority of the 231 cooperation projects for which data are available have the participation of external partners. This implies that the international community probably plays an important role in internalizing the extra benefits (or part of them) that stem from the projects. Thus we next examine which share of projects with external partners is associated with which type of project and level of externalities.[14] We expect to find a higher share of projects with external partners in projects with higher levels of externalities that can be captured (internalized). Table 3 shows that the participation of external international partners in cooperation projects is attracted to sectors with the highest levels of externalities.[15] Although external partners are found in high proportions in all sectors, their highest

Table 2: Project distribution according to different stages and financing

Financing by	*Idea stage*	*Feasibility stage*	*Implementation stage*	*Already implemented*	*Total*
Private parties	11%	36%	32%	21%	100%
Countries involved	13%	17%	36%	34%	100%
External partner	5%	13%	37%	45%	100%

Table 3: Externalities and external participation by type of sector, cooperation extent, and cooperation intensity

	MEE grade (s.d.)	*SPE grade (s.d.)*	*With external. partner/s (%)*	*Number*
Sector				
Infrastructure	1.06 (1.04)	0.33 (1.07)	42	119
Econ./bus. activity	0.73 (0.86)	0.16 (1.02)	52	51
Public services	1.04 (0.93)	0.46 (1.97)	74	61
Extent				
Single country	0.50 (1.06)	0.25 (1.08)	41	51
Bilateral	0.97 (0.89)	0.32 (0.89)	37	87
Multilateral	1.21 (0.49)	0.62 (1.03)	74	93
Intensity				
Low	0.53 (1.04)	-0.23 (1.04)	51	63
Medium	0.76 (0.86)	0.42 (0.89)	67	57
High	1.21 (0.90)	0.52 (0.99)	48	111
Total	0.96 (0.98)	0.31 (1.04)	53	231

Note: MEE - macroeconomic externality; SPE - sociopolitical externality.

share is in the sector of public services (they participate in 74 percent of all projects in this sector), and in this same sector we also find relatively high levels of both macroeconomic externalities and sociopolitical externalities (MEE grade and SPE grade, respectively).

The sector of economic/business activities (mostly private) shows the lowest level of externalities. In percentage terms, here we find lower levels of external

participation (52 percent), although higher than in the infrastructure sector (42 percent), but in absolute terms this involves the smallest number of projects (51). This may be explained by a pure business element in the decision of external partners to join cooperation projects. It seems that cooperation projects in infrastructure involve mostly the cooperating countries in the region, and their externalities are constrained more to the region and to a lesser extent to the international sphere.

The influence of the extent of cooperation

As regards the extent of cooperation, in terms of the number of countries involved has a significant influence upon the participation of external partners. A large portion (74 percent) of the multilateral projects tend to be co/financed by external countries, and at the same time we find that these projects have the highest levels of externalities of both types, macroeconomic (1.21) and sociopolitical (0.62). This suggests that the international community sees a relatively high value for projects that create intensive cooperation between and among countries in the region.

Multilateral projects are expected to create relatively high sociopolitical externalities (for example, the joint project creates a common interest in political stability), as well as a potential for economic gain outside the region. Therefore in some projects the profit of private investors or of the countries involved may be negative, while the benefit to the region/world is positive, and therefore external financing is necessary to achieve global efficiency.

The influence of intensity of cooperation

Finally, with respect to the intensity level of cooperation, we find that projects with the highest levels of externalities (1.21 and 0.52 for MEE and SPE, respectively) are those where the intensity of cooperation is high, e.g., joint management, joint planning of projects. Still, this group attracted the lowest share of external participation (48 percent). The reason may be that projects in which direct and intense cooperation between the parties in the Middle East has been possible, the internalization of the externalities has already been made by the parties themselves. In that case, there is a smaller requirement for the involvement of external parties from the international community, since their marginal contribution would be lower.

The contribution of the international community is expected to be much higher in projects with a medium level of cooperation; mostly projects based on agreements between Middle Eastern countries, with only few direct contacts in implementation. Although the level of externalities in these projects is not as high as that of projects with the highest levels of cooperation, it is still quite high and requires external participation for the attainment of maximum global gain. Here we find the highest share of external participation (67 percent).

Conclusion

The international community – governments and nongovernmental organizations – apparently plays an important role in the optimization of benefits from regional cooperation projects in the Middle East. As a general rule, this is done through participation of external partners in the financing (with or without other channels of cooperation) in projects that generate high levels of externalities, both in economic and in sociopolitical terms. This is the case for projects in the public services sector, mainly in multilateral projects involving a few countries in the Middle East and generating quite high levels of externalities.

Still, a direct, linear relationship between the level of externalities and the level of participation of external partners in cooperation projects does not necessarily exist. Some of the potential project externalities are captured (internalized) by the participating countries themselves. This is the case for projects in which the extent of cooperation between the countries is already very high, so that the contribution of external partners is less needed. In other cases, the participation of external parties can be explained by pure business considerations. This is the case for the quite high levels of external participation in private sector projects, or in projects in which only one country of the Middle East is involved, with relatively low levels of externalities.

Notes

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1. See Bouillon (2004), Forman, *et al*. (2000), Isard (2004), and Weede (2004).

2. See Bar-El and Schwartz (2003).

3. Saleh (2004).

4. Isard (2004).

5. Isard and Hara (2002).

6. Malul, *et al*. (2005).

7. Eken, *et.al*. (1997), Samara (2000); Dinar and Wolf (1997), Giammusso (1999); Bar-El (2005).

8. To internalize the externalities means to take into account the size of a project's economic contribution to the community (or the country) as a whole, beyond its pure business benefits to the investor.

9. Due to the closing of the Ministry of Regional Cooperation, the data set was last updated in 1999. Therefore some of the information about the projects is missing.

10. While the extent of external finance differs for each project, data is lacking to specify the exact amounts.

11. See Bar-El (2005).

12. See Bar-El (2005).

13. All variables are coded as 1 to 5; thus differences can range from -4 to +4.

14. See Bar-El (2005).

15. Macroeconomic externalities (MEE) are defined as the gap between the regional (or global) impact and microeconomic viability. For example, if global impact is 4.5 and microeconomic viability is 3, then MEE is coded as 1.5. Similarly, sociopolitical externalities (SPE) are defined as the gap between the regional impact, or the benefits of the project for the region, and the feasibility level of the project.

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Channels of small-arms proliferation: policy implications for Asia-Pacific

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It is believed that between 50,000 and 100,000 people are killed each year by direct small arms and light weapons fire (SALW), and that at least twice as many die indirectly as victims of SALW-driven conflicts.[1] In this article we are interested in small arms (rather than in light weapons), particularly when held and traded illicitly. Specifically, we first review a recently proposed multi-channel small arms supply-chain model.[2] While we believe that the model has universal application, we restrict ourselves here to a brief description of some salient features of illicit small-arms stocks and flows in Asia-Pacific, and then spell out some policy implications for the region.

The model

Figure 1 captures the gist of a model that identifies the major holders of stocks and traces the (legal and illegal) imports and internal flows of new and used small arms.[3] Briefly, on the left-hand side of the figure, legally-held stock in government and private hands is fed by legal imports and legal domestic manufacture.[4] This stock can of course be internally traded, for example legal sales from government depots to private citizens, or among private citizens, but this is not further considered here. On the right-hand side of the figure, illicitly-held stock is fed by leakages from legally-held stock, illicit domestic manufacture, and various forms of illicit imports. The latter may involve donated supplies by friendly powers or nongovernmental benefactors and are shown in Figure 1 as "illicit imports: foreign-power assistance" and "illicit imports: foreign nongovernment assistance," respectively. In Southeast Asia, for example, arms were transferred to Cambodian factions during the reign of the Khmer Rouge.[5] Many of these weapons have been re-shipped across the region and beyond. In terms of nongovernment involvement in arms transfers, for example, both the United Wa State Army and the Patani United Liberation Army in Thailand have been accused of involvement in arms transfers to other armed movements.[6] Presently, neither of these sources of weapons constitute major inflows into the Asia-Pacific region anymore. While some shipments from abroad may have been free of charge, the recipient may still have to collect them from a particular drop-off point that may be difficult and risky to arrange. As, by definition, these imports are clandestine, the last leg of the delivery process may also necessitate the recipient's direct involvement. This may stretch the recipient's resource base and impose significant transaction costs. The precariousness of external sources is noted by a member of the Moro

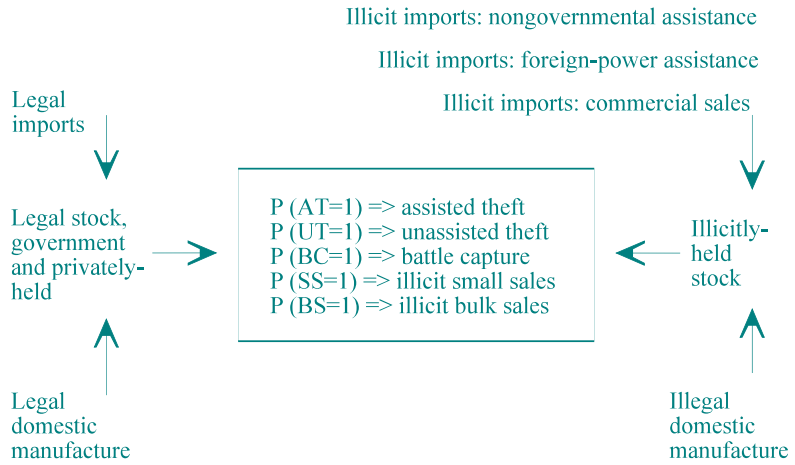

Figure 1: Small arms legal and illegal stocks and flows

Islamic Liberation Front of the Philippines, stating that external arms sources were both "expensive and risky," not to mention the process being "long."[7]

Commercial imports arranged through international (black market) arms dealers, shown in Figure 1 as "illicit imports: commercial sales," may also require a complementary in-kind effort from the recipient to obtain them, and must be paid for at prices set in the arms black market. In some cases, the commercial arrangements take the form of countertrade with firearms paid for by reverse shipments of narcotics or similar barter arrangements. For example, remnants of the Khmer Rouge were supplied with arms from Thailand and bartered for gem and logging concessions in the late 1990s, and the Mong Tai Army, headed by the "opium king" Khun Sa, was said to have bartered narcotics for SA-7 missiles from Cambodia.[8]

But the figure highlights, in particular, within-country transfers (leakages) of small arms from legal to illicit stocks (see the box inside the figure). We focus on five illustrative channels. For example, AT refers to assisted theft, such as when an armory guard is bribed to leave weaponry unguarded. Each channel is either open (e.g., AT=1) or closed (AT=0). Thus, P(AT=1) denotes the probability that the assisted theft channel is active. UT is unassisted theft, a raid on an arsenal for example or theft from private homes or retail outlets. For example, in 2000, the Malaitan Eagle Force raided

the state armories of the Solomon Islands.[9] Weapons captured in armed encounters between rebel forces and military or police forces are designated as battle capture, BC. For example, in Burma (Myanmar), insurgents used an advance of the Burmese army as an opportunity to obtain new weaponry cost-effectively by ambushing the advancing army units.[10] Illicit small sales, SS, reflect the case of government officers "losing" their service weapon or legal arms traders selling firearms illegally to insurgents or criminals. For example, a former combatant in the East Timorese independence movement, Falintil, described how occupying Indonesian forces would sell small amounts of arms and ammunition to members of Falintil.[11] And illicit bulk sales, BS, refer to legal firearms holders engaging in bulk sales of weapons, such as when the Indonesian armed forces were shipping weapons "still in crates" to the separatist movement in the northwestern region of Aceh, orchestrated, according to one writer, by "corrupt generals" for whom it was just "a business deal."[12] P(UT=1), P(BC=1), P(SS=1), and P(BS=1) denote the probabilities that the illicit channels, UT, BC, SS, and BS are active. All examples are illustrative and could be multiplied.

With the help of Figure 2, we discuss the concepts of complexity and dependability of supply-chain channels. For illustration, we pick the assisted theft channel and consider a number of paths along which firearms can move from legal to illicit stocks. Suppose that there are two independent initiators (AT_{11} and AT_{12}) who are willing and able to illegally divert firearms from a government depot. They may or may not know each other's identity, nor the identities of the other elements in the supply chain and of the ultimate recipient/s. AT_{11} is assumed to deal directly with five second-tier intermediaries, AT_{21} to AT_{25}, while AT_{12} deals with only AT_{24} and AT_{25}. AT_{21}, in turn, can forward arms only to a third-tier intermediary, AT_{31}, who supplies the illicit end-destination. The second-tier intermediaries AT_{22} to AT_{24}, can each deal with either AT_{31} or AT_{32}, who deliver firearms to the end-destination. In contrast, AT_{25}, although only a second-tier intermediary, forwards directly to the final recipient.

Certainly, this is a complex if hypothetical network of transfer paths. These paths can be open or closed, they can be one-off or recurrent, they can be routine and frequently used or rarely used, they can be dormant for awhile and then be reactivated, and so on. On the part of the middlemen and final recipients this probably implies path-specific investment and maintenance costs, and perhaps switching costs as well if paths (and channels) are changed. The picture is further complicated when one considers that several originating and recipient stockpiles each may be linked concurrently, and that our comments hold for the other channels (UT, BC, SS, and BS) equally well.

The dependability of the system as a whole increases if the number of channels, *z*, increases and alternative *a* channels can be used to meet the end-user requirement. Similarly, the availability of alternative paths within a channel increases the channel's dependability. For example, in Figure 2, each path from the legally to illegally-held stocks consists of a series of arms transfers among different intermediaries. If one of these intermediaries is removed from a sequence, the path under consideration is

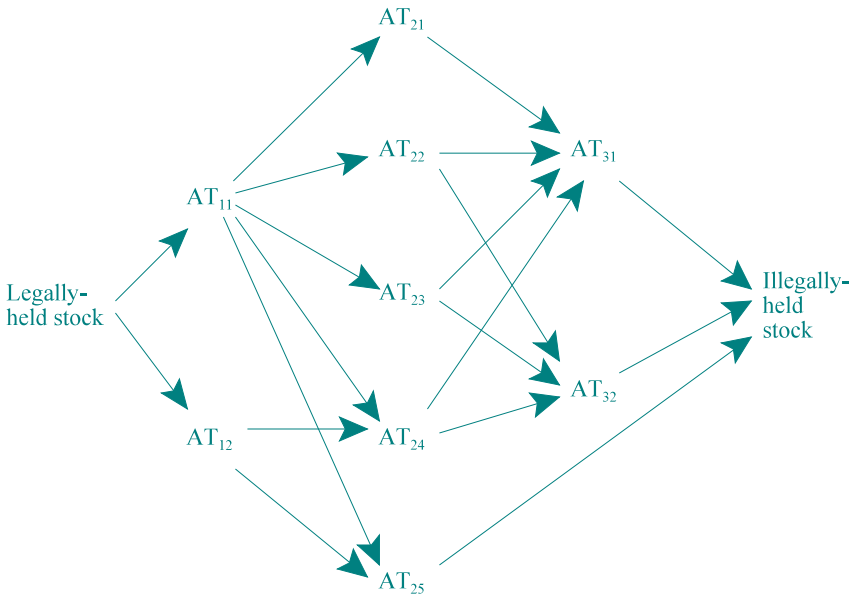

Figure 2: Supply-channel complexity

disabled. Thus, the path $AT_{11} \Rightarrow AT_{21} \Rightarrow AT_{31}$ is active as long as all three intermediaries are active. Eleven parallel paths comprise the assisted theft channel, AT, in Figure 2. Listed sequentially, they are:

$AT_{11} \Rightarrow AT_{21} \Rightarrow AT_{31}$ | $AT_{11} \Rightarrow AT_{22} \Rightarrow AT_{31}$ | $AT_{11} \Rightarrow AT_{23} \Rightarrow AT_{31}$ |
$AT_{11} \Rightarrow AT_{24} \Rightarrow AT_{31}$ | $AT_{11} \Rightarrow AT_{25}$ | $AT_{11} \Rightarrow AT_{22} \Rightarrow AT_{32}$ |
$AT_{11} \Rightarrow AT_{23} \Rightarrow AT_{32}$ | $AT_{11} \Rightarrow AT_{24} \Rightarrow AT_{32}$ | $AT_{12} \Rightarrow AT_{24} \Rightarrow AT_{31}$ |
$AT_{12} \Rightarrow AT_{24} \Rightarrow AT_{32}$ | $AT_{12} \Rightarrow A_{T25}$ |

If only a single firearm is to be leaked from the legally to illegally-held stocks, it would be sufficient for only one of the eleven paths to be open and successful in getting the weapon to its end-destination. The parallel arrangement of delivery paths in the AT-channel provides redundancy so that if any one path is disabled each one of the remaining paths is a perfect substitute for it. When a larger quantity of firearms is required at the illicit destination, two or more paths will have to be used to meet the requirement. In the latter case, the transfer capacity of each delivery path would have to be considered. The amount of intra-channel redundancy is a function of both the quantity of weapons needed and the transfer capacity of each channel.

The parallel arrangement of paths within each channel and channels within the supply chain is more robust than the series arrangement (a linear configuration of intermediaries between legally and illegally-held stocks). This is because disruption of particular flows or disablement of a supply channel may have no impact on the overall quantity supplied as other paths and channels are available. When the supply chain is arranged as a parallel (multi-channel) delivery system, it is more dependable as it is relatively easier to tie the source of weapons to its end destination. It is, thus, more difficult for government agencies to cut across the parallel structure to disable the supply chain. For example, to effectively disable the supply channel shown in Figure 2, government agencies would have to "take out" the first tier of intermediaries (AT_{11} and AT_{12}), or all of the second tier (AT_{21} to AT_{25}), or the third (AT_{31}, AT_{32}, and AT_{25}), or some other combinations of intermediaries at different tiers. Naturally, it is as much in the interest of illicit small-arms recipients to minimize the probability of system disruption or disablement by building redundancy into the supply chain as it is in the presumed interest of government to maximize that probability.

Even from this rudimentary discussion, it must be clear that successfully and continuously disrupting illicit small-arms flows is a daunting undertaking. We return to this in our outline of policy implications.

Features of small-arms stocks and flows in Asia-Pacific

By all appearances, trade in illegal small arms flourishes in South and Southeast Asia and the West Pacific.[13] Despite the absence of active interstate wars in the region, several ongoing intrastate conflicts generate demand for small arms. Most markedly, Burma (Myanmar) and the Philippines remain host to a number of protracted insurgencies. Ethnically-based armies continue to pepper the Thai-Burmese border. The Philippines is host to the region's most serious communist insurgency, the New People's Army, as well as a number of factionalized Islamist groups in the southern islands of the country. A long-running secessionist movement in Aceh in the northwest of Indonesia reached a negotiated end only in 2005, and a resurgent Islamist insurgency has simmered in Thailand's south since 2004. In recent decades, there have been armed conflicts in the western Pacific in Bougainville, eastern Papua New Guinea, Fiji, and in the Solomon Islands. The southern highlands region of Papua New Guinea is notorious for local outbreaks of violence. Insurgencies and rebel movements numbering tens of thousands of armed participants are active in Nepal and Northeast India as well, and a long-running civil war plagues Sri Lanka.[14] To some measure, nonstate actors in these conflicts have used small arms that are either leaked from official stockpiles or fabricated by the combatants themselves.

Some state actors appear to seek to bolster the military capacity of friendly movements elsewhere if they see it as politically expedient to do so. For example, for several decades Thailand helped to construct a bulwark of armed nonstate actors along its border with Burma, keeping both Burmese and communists at bay.[15] Various groups hold arms illicitly and sharp distinctions among them cannot easily be drawn. For example, small arms tend to be acquired and used by insurgents and/or criminal elements. These groups often functionally overlap as many insurgent groups cross-subsidize their primary activities (the armed struggle) by engaging in secondary criminal activities, such as kidnappings and extortion, protection rackets, narcotics trade, and plain robbery. For example, the United Wa State Army (UWSA) in Burma was a former communist insurgent group that, since the ceasefire with Burma's military regime, has grown to become a major illicit exporter of narcotics (heroin and methamphetamines) and trafficker of small arms into Laos, Cambodia, and India's northeast regions.[16] This is the case of the poacher turned gamekeeper as, since the ceasefire, the UWSA also has become an important and highly influential ally of the Burmese military government. This is not to say that all nonstate entities are inherently criminally inclined. At least at the outset, some insurgent groups see themselves as legitimate entities (that is, governments-in-waiting), provide social services, and collect taxes in regions under their direct control. Weapons are also redirected to paramilitary entities that act as adjuncts to national security forces. The Indonesian-backed militias in East Timor at the time of the latter's vote for independence in 1999 are probably the most notorious example of paramilitarization in the region.[17]

It appears that over the past few years, ideologically motivated cross-border supplies have become less significant in Southeast Asia. China was a major supplier of small arms to protégé groups in the region – for example, the Khmer Rouge in Cambodia were receiving supplies well into the 1990s and Chinese arms have reached nonstate entities in northeastern Burma and India – but there is no evidence of current large-scale transfers to armed insurgent groups for political, nor even financial, gain. There are also indications that cross-border traffic in small arms has been in decline recently.[18]

Small arms in the hands of nonstate actors range from pre-WWII era rifles to recently-issued weapons. Asia-Pacific, as defined in this article, is not a market characterized by large injections of new weapons from outside the region, but is typified by the recycling of older weapons. This is especially the case in Southeast Asia, where the wars in Cambodia and Vietnam – linchpin arms supply states – left a legacy of huge quantities of small arms still circulating in the region. For example, two million Soviet arms and over 270 million rounds of ammunition were supplied between 1964 and 1971 to North Vietnam.[19] Departing U.S. forces left behind in Vietnam over 150,000 tons of ammunition and over two million small arms including handguns, assorted rifles including M16A1s, M60s, and grenade launchers. American small arms transfers to Laos and Cambodia from 1950 to 1975 totaled over 500,000 items. Vietnam War-era weapons have subsequently been re-exported to as far as Cuba and Latin America and, closer to the source, to the New People's Army in the Philippines. Ex-Vietnam small arms have also been included in drug shipments to Hong Kong and sent back to collectors and dealers in the United States.[20] Similar

examples can be provided for Cambodia.

While not listed in any order of significance or magnitude, the main transfer features of the illicit South and Southeast Asian small arms market are smuggling across borders, leakage from state security stocks, and the capture and fabrication of weapons within conflict zones. Such smuggling and leakage also takes place in the West Pacific but battle-captures there are minimal, and the fabrication of weapons, usually craft production, is not as sophisticated as elsewhere in the region.

Weapons old and new are also taken from state stockpiles (leakage), seemingly the principal source of small arms acquired by insurgents and criminal elements. Governments originally acquired these arms legitimately from domestic or foreign sources, i.e., from either private or government manufacturers and/or foreign governments. The leakage can be due to poor stockpile management (linked to weak state management and administration, corruption, or inadequate stockpile security) or due to deliberate siphoning-off of weapons for personal or political gain. Weapons are also captured from government stocks through raids that can be violent or cleverly exploitative, with targets including armories, convoys, checkpoints, and outposts as well as individuals employed in the security sector. Other forms of leakage range from the sale of bullets and grenades by soldiers on the front line to large shipments arranged by officers or officials as business deals.[21]

The relatively simple technology of the weaponry and the protracted nature of many of the conflicts have encouraged the craft production of small arms in the region.[22] Craft-produced weapons in the Pacific are mostly simple arms fabricated to look like military firearms but with limited attention paid to quality and utility for warfighting conditions. While craft producers are often highly skilled, they may only have access to poor-quality materials. Nonetheless, craft production can be quite significant in terms of numbers of weapons. For example, craft-produced small arms comprised almost three-quarters of those handed over in the Solomon Islands in 2000-01.[23] Gunsmithing techniques are more advanced in mainland South and Southeast Asia with a number of craft producers, including many arms holders themselves, demonstrating a capacity for firearm, mortar, rocket-propelled grenade, and ammunition manufacture and refabrication.[24] For example, gunsmiths in the Philippines are known for their craftsmanship and, thus, able to produce and/or modify more sophisticated weapons. Craft-industry weapons may compete on price and availability with other sources of illicit supply.

Policy implications

Initiatives to restrict the proliferation of small arms have been prominent in recent years.[25] A catalyst was the U.N. 2001 Programme of Action to Prevent, Combat and Eradicate the Illicit Trade in SALW. The U.N. Firearms Protocol signed in 2001, the first binding global agreement on small arms, came into force in 2005. But to develop effective policy to contain SALW, it is necessary to have a good understanding of how illicit small arms are distributed and illicit stocks formed. As the first section of this article has suggested, to date, not only are the mechanics of SALW supply chains still poorly understood, but the structural complexity of illicit supply chains is likely to be considerable. Moreover, as we argue below, small arms proliferation is often a symptom of other, deeper problems that need to be confronted if small arms-related trafficking is to be contained.

As mentioned, the single-channel arrangement (the pure series supply chain) offers the greatest potential for a government seeking to disable the flow of small arms to illicit holders. In this case, it is sufficient to remove any one of the elements comprising the supply chain to break the tie between the input and the output and, thus, disable the flow of illicit small arms. To disable a multi-channel supply chain, the government would have to disable (cut through) every channel and, as channels are likely to comprise many parallel delivery paths, at least one element of every path. To reduce the cost of intervention, the government should identify a minimal set of all elements it wished to disable so that the entire multi-channel supply chain could be disabled cost effectively. In reality, when the number of channels, z, is large, and each channel comprises many delivery paths, it is rather unlikely that governments of countries threatened with insurgency and/or faced with a large-scale criminal sector have the necessary resources to disable the flow of firearms to illicit stocks.[26] To be cost effective, the government may have to concentrate on the most vulnerable channels and target weak links along every delivery path. For example, it may reduce the flow of arms by aiming to disable the channels with the greatest throughput capacity. Or it may target particular types (tiers) of intermediaries. The cost of removing elements of supply channels may be measured in money terms or in terms of the physical effort required to disable a particular link (e.g., the scale of military operations needed or the number of government infiltrators/spies planted in insurgent and criminal organizations). However, to identify and remove all weak links, the government would need superior intelligence about the structure of the supply chain to decide on the most resource-effective course of action. In practice, the presence of informational asymmetries and the cost of securing the relevant intelligence would make the identification of weak elements of each channel most unlikely. For example, the assisted theft channel may comprise many people who are prepared to steal arms from the government stock. They may do so for personal, political, or ideological reasons. They may also engage in theft to assist illicit arms holders as a protection payment (economically, an "insurance premium") to ensure that they or their families are not targeted in armed attacks and kidnappings. As threats posed to the government by illicit arms holders are essentially asymmetric, they are often intended to coerce those involved in the machinery of government to induce their tacit support and collaboration. There also may be numerous people who steal from government stocks for financial gain, particularly in instances where the government sector is inherently corrupt or where security sector personnel are inadequately paid.

As the number of elements in the supply chain and, in particular, the number of

channels, increase, while only some channels, say y out of z, are needed to meet the demand for illicit arms, the sheer complexity of the supply chain makes it very costly to identify even a single set of vulnerable links (a "cut set" of links) that could be effectively targeted and disabled. Such complexity in the multi-channel supply chain and the associated information asymmetries are the essence of the challenge faced by those aiming to stop the proliferation of small arms.

The challenge becomes even greater when disabling a supply chain requires collaboration between two or more governments. For example, consider the case of illicit commercial imports of weapons. A supply chain may originate in a country where large quantities of small arms remain from a previous conflict (e.g., Cambodia). These stocks are often dispersed among the local population, which sells them to local arms dealers, who in turn may resell to international dealers. The latter arrange transport to illicit buyers in the destination country. In this case, the government in the destination country can do little to disable the upstream segment of the supply channel unless the government of the source country is prepared to cooperate. In the exporting country, the government has more options to disable the in-country segment of the supply channel. For example, as the population itself constitutes a set of supply-chain intermediaries, the government can arrange a buy-back program to crowd out local arms dealers. Firearm ownership could be made illegal and all existing owners ordered to surrender their weapons within a designated time period and in exchange for a set fee (or by arranging some form of gun-amnesty). But to be successful, the government would have to buy a sufficient quantity of the weapons and this would drive the black market price up. At times, this has produced perverse results as higher prices for old weapons allows arms holders to sell them to the buy-back agency and use the money to purchase newer weapons smuggled in to meet demand. Essentially, buy-back programs are government demand and function as a siphon that draws in new supplies. Alternatively, governments may arrange crackdowns on local arms dealers to drive them out of business (to remove another set of intermediaries to disable all those channels that depend on their services for effective operation). There is less scope for either source or destination country governments to drive international arms dealers out of business as they are likely to be located outside the jurisdiction of both governments.

The analysis presented here highlights the sheer complexity of the multi-channel supply chain formation. Some of that complexity is likely to be a matter of deliberate design on the demand side of arms trafficking when illicit arms-holders diversify sources of supply to enhance the robustness of the supply chain. But some of it may be intrinsic to the socioeconomic makeup of a country under consideration. That is, the combination of corruption, poverty, ethnic and religious tensions and political instability, and previous or ongoing conflict provide many opportunities for arms delivery initiatives to originate on the supply side of the arms flow. The combination of these demand and supply factors makes it very difficult for any government to identify minimal sets of vulnerable links that must be cut to disable the associated supply channels. In this respect, illicit arms supply chains are even more difficult to deal with than supply chains for illegal drugs. While the supply chain for illegal drugs is driven almost entirely by (black) market forces alone, in the case of illicit arms flows there are additional political, ideological, financial, religious, and ethnic factors that influence the direction, complexity, and intensity of arms flows.

To significantly restrict the flow of weapons to illicit arms holders requires, on the logic of this article, superior intelligence, massive resources, and incorruptible enforcement agencies, few of which are ordinarily available to governments of developing countries.

To significantly restrict the flow of weapons by illicit arms holders requires, on the logic of this article, superior intelligence, massive resources, and incorruptible enforcement agencies, few of which are ordinarily available to governments, especially those of developing countries. Moreover, as the opportunity cost of these resources in developing countries is likely to be perceived as high by policy makers, we would not expect much effort to be devoted to small arms reduction. The odds are in favor of illicit arms suppliers and recipients who, given the scope for channel redundancy, can easily tie the sources of supplies to their illicit destination. In contrast, to be effective, governments would have to disable a large number of active and dormant supply channels. Governments thus often turn a blind eye to illicit arms flows. It is only when violence associated with the proliferation of small arms poses a credible threat to economic growth or government survival that the marginal benefit of small arms reduction increases and induces government to devote more resources to the disablement of illicit supply channels.

Most importantly, however, the proliferation of illicit small arms is a symptom of a deeper socioeconomic malaise rather than its cause. For example, when corrupt or unprofessional elements in the security sector sell their weapons to insurgents or criminals, the problems to address are the lack of professionalism and all-pervasive corruption in the public sector. Unless corruption is stamped out, those with access to government stocks will find a way of facilitating firearm transfers to illicit holders. In the short run, much-publicized initiatives to disable supply channels, such as arms buy-backs, may have some useful demonstration effects but, given the complexity of supply chains, they are unlikely to have much impact on the illicit stocks and flows. But as the experience of East Asia shows, if long-run economic growth accelerates and its benefits are widely shared, the incentives to supply and demand small arms change at both ends of the supply chain. While there are pockets of active insurgency, there appears to be less small arms-fueled violence in South and Southeast Asia than a decade or two ago. By contrast, in the Pacific, where the slowly developing island economies are poorly integrated into the international division of labor, firearms-related violence has increased.[27] In our view, the key challenge for governments that

are serious about small arms-fueled violence is to address the opportunity cost of holding and using illicit arms, and this is a challenge for economic policymakers rather than security agencies. In this regard, more studies examining successful cases of limited penetration of small arms in host populations would be most welcome.

Notes

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1. These "real weapons of mass destruction" (SAS, 2001, p. 1) include revolvers and self-loading pistols, rifles and carbines, assault rifles, submachine guns, and light-machine guns, and light weapons such as heavy machine guns, handheld under-barrel and mounted-grenade launchers, portable antitank and antiaircraft guns, recoilless rifles, portable launchers of antitank and antiaircraft missiles, and mortars of less than 100mm caliber (U.N. Panel of Governmental Experts on Small Arms, 1997, in SAS, 2006, p. 9). The U.N.'s definition is policy-oriented, developed to build a practical framework to address the challenges posed by widespread use of SALW in numerous conflicts in developing countries.

2. See Markowski, *et al*. (forthcoming).

3. We focus on stocks of firearms at a point in time (or averages of stocks held over a period of time). Clearly, there are deletions from as well as additions to stocks, e.g., some firearms can be exported or destroyed. Legally-held small arms awaiting their shipment overseas or destruction are included in legally-held stock in Figure 1.

4. This stock includes inventories of finished and semi-finished firearms held by legal arms manufacturers.

5. Capie, 2002 (pp. 28, 97-98, 100-101).

6. FEER (2000); Capie (2002, p. 41).

7. Davis (2003b, p. 33).

8. Phongpaichit, *et al*. (1998, pp. 145-148); Davis (2003c, p. 17).

9. Alpers and Twyford (2003, p. 39).

10. See Smith (1999, p. 307). Clearly, arms can also be captured from insurgents, and often are, by government forces. This results in a negative value for BC, that is, a net removal of weapons from illicit stocks, and is not explicitly shown in the figure.

11. Pinto and Jardine (1997, p. 102). These retail activities are often opportunistic, ad hoc, and small scale. In their totality, though, they may be quite significant.

12. Kingsbury (2003, p. 209). Alternatively, they may sell intelligence or leave the gates open to insurgents or criminals.

13. See, for example, Alpers (2005); Alpers and Twyford (2003); Buchanan and Atwood (2002); Capie (2002, 2003); Davis (2003a, b); Phongpaichit, *et al*. (1998).

14. Interestingly, within India the northeast and the continuing conflict in Sri Lanka, involving Tamil residents in the southern Indian province of Tamil Nadu, receive more attention in daily discussions than do the nuclear-arms aspirations of China, India, and Pakistan.

15. Phongpaichit, *et al*. (1998, p. 129); Smith (1999, p. 277).

16. Davis (2003a).

17. Greenless and Garran (2002).

18. Davis (2003a); Buchanan and Atwood (2002); Phongpaichit, *et al*. (1998).

19. Capie (2002).

20. Examples drawn from Ezell (1988) and Capie (2002).

21. Buchanan and Atwood (2002, p. 21).

22. Small arms production involves mature technology. When commercial considerations dominate, more sophisticated technologies would be accessible for illicit gunsmiths once prices increase enough to allow them to buy high-quality materials and devote more effort to high-quality machining of components. Ultimately, many top-quality civilian small arms are made by hand by jobbing gunsmiths.

23. Capie (2002, p. 73); TT (2005); Alpers (2005, p. 45); Alpers and Twyford (2003, p. 25).

24. Buchanan and Atwood (2002).

25. Stohl, Schroeder, and Smith (2007).

26. For discussion see Markowski, *et al.* (forthcoming).

27. Alpers and Twyford (2003); Capie (2003).

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