8
Economic Choices: Swords or Plowshares?

Military expenditures have opportunity costs: the other activities that are given up to provide the military resources. In the literature, this is often referred to as the choice between guns or butter or swords and plowshares. The latter choice comes from the Bible. Isiah 2:4 says 'They will beat their swords into plowshares and their spears into pruning hooks. Nation will not take up sword against nation, nor will they train for war anymore.' However, the less quoted, Joel 3:10 says 'Beat your plowshares into swords and your pruning hooks into spears. Let the weakling say, "I am strong".'

In having opportunity costs, military expenditures are no different from other sorts of government expenditures and one can apply standard public finance theory. In most cases, there is nothing special, in economic terms, about military expenditures and the money spent on it is an appropriate measure of its opportunity cost. There are exceptions. When there is conscription, the expenditure underestimates the opportunity costs. In planned economies or in times of war, when there are very high levels of military expenditure and non-market mechanisms, like price controls and rationing, the expenditure may again underestimate the opportunity costs. It is often thought that there are specific economic externalities, positive or negative, that are associated with military expenditure, which give it distinctive effects and a distinctive role with macroeconomic consequences for the whole economy. Clearly its use is different from health or education, but it is not clear that it has special economic effects that require a different treatment from other sorts of expenditure. For most purposes, the usual economic theories of public expenditure can as easily be applied to defence as they can to other categories of public expenditure. With current shares of military expenditure, less than 5 per cent of GDP, the macroeconomic effects

of military expenditure are probably small and decisions about defence budgets should be taken in terms of threats and opportunity costs, not macroeconomic effects. There are more effective macroeconomic policy instruments than the defence budget.

There is one respect in which military expenditures are quite different from other categories of government expenditure. No other category of government expenditure goes through such large changes as the increases in military expenditure at the beginning of a large war or reductions at the end. The special issue with military expenditures is how to manage very large adjustments. In both world wars UK military expenditure rose from around 3 per cent of GDP to around half of GDP and then fell back by similar amounts after the wars; thus war financing does raise special economic issues.

Budget constraints

The money flows that a government has to balance are called the government budget constraint. The government surplus or deficit, the difference between revenue and expenditure (military and non-military), must be matched either by changes in the money supply or by changes in government assets and liabilities. Thus an increase in military expenditure must be financed by some combination of reductions in other government expenditures; increased taxes; printing more money; borrowing by issuing more debt; or selling assets. The UK partly financed both world wars by selling foreign assets. Many countries finance their military expenditures from taxes on resource rents, like oil revenues.

The government may borrow from its own population, in domestic currency, or it may borrow from abroad, with the debt denominated in foreign currency. These have different implications. Payments on domestic debts are just transfers within the country and so not a cost to the country as a whole. They may have distributional consequences if the government taxes the poor, to pay debt interest to the rich. Interest payments on foreign debts transfer money out of the country and are thus a cost to the country as a whole. Governments control their own currency and can pay their domestic debts by printing money or debasing the coinage. Paying foreign debts requires foreign currency, which they cannot produce so easily. Printing money may cause inflation, reducing the real value of the debt, effectively defaulting on part of it. Inflation has distributional consequences, reducing the wealth of those who lent to the government. The political and economic consequences

of default on domestic and foreign debts may be different. In both cases, creditors are less likely to lend to a government that defaults and this loss of future credit may be a large cost. Defaulting on your citizens may provoke riots and political instability, defaulting on foreigners may provoke other sorts of political action. In more robust days, defaults provoked lenders to send gunboats to ensure repayment, as was done with Egypt and Turkey in the 19th century. With both citizens and foreigners, the consequences of default depend on the degree of organisation of the creditors and their capacity to retaliate, both political issues.

Revenues come largely from taxes, either direct taxes on incomes or indirect taxes on expenditures, such as import tariffs or sales taxes. There are usually political obstacles to raising tax rates; but these may be less in times of war. Wars have tended to be times of fiscal innovation, when governments have found new ways to raise revenues. Income taxes were introduced in the UK during the French Revolutionary Wars, in 1798; abolished after the war in 1816, but reintroduced in 1842; and expanded substantially during World War I. US income taxes were introduced in 1861, during the Civil War, rescinded after the war and then subsequently reintroduced. Taxes may have economic as well as political effects: income taxes may reduce the incentive to work and high tax rates may cause evasion.

Expenditures also include debt interest and it is sometimes useful to look at the primary deficit: revenues less expenditures other than debt interest. If a government is running a deficit which it finances by issuing debt, this tends to add to the deficit in the following periods since expenditure to pay the debt interest is increased. The effects of financing by printing money or issuing debt are rather different. The government can use its ability to issue money to extract resources: people give it valuable goods in return for cheaply produced pieces of paper. The profits from this activity are called seigniorage, the difference between the value of money and the cost of producing it, and can be an important source of government finance. On an international scale the US has benefited substantially from the willingness of the world to exchange expensive goods for cheap pieces of green paper. However, there are limits. If the government pays by printing money, that puts money into the hands of those it purchased from. They can then spend the money adding to the demand for goods and services in the economy. If there is a shortage of goods and services, the increased demand tends to increase their price, causing inflation: too much money chasing too few goods. If this process accelerates into hyperinflation, there comes a point when inflation destroys the value of money and people are not willing

to accept money from the government in payment for goods. Many wars, including the US revolutionary war of independence, have ended in hyperinflation. To stop inflation, governments often try to control prices. Sometimes this works, but it can also create distortions and black markets.

Inflation is normally seen as a problem of paper money, but it can also happen with gold and silver money. After the conquest of the new world, Spain paid its bills with gold and silver that it had shipped from the Americas; this caused a general European inflation resulting from the increase in money supply. Governments that issue gold and silver coins are also tempted to debase the currency by increasing the proportion of base metals in the coins. When this happens people tend to hold on to the older, good, coins with a higher proportion of gold and pass on the new, bad, coins. This is summarised in Gresham's law: bad money drives out good. Sir Thomas Gresham was a 16th-century financier and adviser of Queen Elizabeth I of England. As with most laws named after people, it is not clear that he originally formulated it.

When the government issues money to finance the deficit, people tend to spend the money; but when it issues debt, the people who lend cut their spending to buy the government bonds. Thus when the government issues debt, there is matching savings, reduced demand for goods and services, which there is not when the government prints money. Government bonds are promises to pay interest at regular intervals and to repay the principal, the amount lent, at a particular time. Governments can only borrow, sell bonds, if lenders have confidence in the ability of the government to repay. Governments that lose wars are usually unable to repay their debts. Those who bought Confederate bonds, during the US Civil War, lost their investment. During the 18th century the national debt was described as Britain's secret weapon in war. Following the establishment of the Bank of England in 1694, an innovation copied from the Netherlands, Britain had a well-organised way of raising money. Unlike most continental monarchs, Britain did not default; therefore it was able to raise money relatively easily, on good terms and low interest rates. It could thus borrow to finance its wars, often subsidising continental allies to do the fighting. In *The Cash Nexus*, Niall Ferguson (2001) argues that it was finance, as much as firepower, that decided wars and that wars were a major source of financial innovation over the period 1700–2000. There is a positive feedback. If you have good credit, you can borrow to finance wars. This money makes it more likely that you will win the war and be able to pay back your creditors, raising your credit further.

Behind the monetary flows are the real flows of goods and services, which one can think of as the output–expenditure balance. The total output of the economy, all the goods and services produced, is equal to the total expenditure of the economy. The expenditure goes on consumption; investment, the construction of new capital goods; government demand for goods and services, military and non-military; and exports. Some of this expenditure is produced not at home but abroad, so imports are subtracted from this total to give production. In preparing for war, the government must consider where the resources to meet the demand for military expenditure can come from. It will first try to raise output. If there are unemployed resources these can be used; in World War II the UK and US increased their labour forces substantially by calling on women who had not worked in peacetime. Table 8.1 gives US GDP in 1939 prices in 1939 and 1944. Over this period real GDP grew by 90 per cent, military spending grew massively from under $2 billion to over $75 billion, but real non-military expenditure also grew by almost $10 billion, so it was not a pure displacement of non-military by military expenditures. The data come from the Bureau of Economic Analysis, National Income and Product Accounts and the military expenditure total is the national defence component of government consumption and investment. The table assumes that military and non-military prices grew at the same rate. Using different price indexes for the two categories would change the numbers, but not the basic story: much of the military expenditure in the US for World War II was financed by an expansion of real GDP rather than merely displacement of non-military expenditure. This can only be done if there are unemployed resources that can be utilised.

Raising output is rarely enough and the government will try to cut consumption, either by higher taxes, higher prices (which cut real wages) or rationing. The government will try to direct investment to projects necessary to prosecute the war and it will cut government expenditures that do not contribute to the war. It will also try to increase

Table 8.1 US Financing of World War II

Billions of Dollars 1939 prices			
	1939	**1944**	**Change**
GDP	92.20	175.18	82.98
Military	1.50	75.33	73.83
Non-Military	90.70	99.85	9.15

imports, to the extent that it can. During World War II, Britain was very dependent on US imports, under schemes like 'lend lease' and in both world wars sold foreign assets to pay for imports.

To pay for war, governments can rely on market mechanisms and borrowing or use planning and rationing. Wartime governments differ in their effectiveness at mobilising resources. In World War II, German economic mobilisation seems to have been less effective than the UK, US or USSR. In major conflicts, direction of labour and conscription is usually necessary. While output in general may be adequate, shortages of particular specialised resources may be a bottleneck and societies search for substitutes. In World War II UK, production of aircraft was constrained by shortage of metal and metal workers, so aircraft, such as the successful Mosquito fighter-bomber, were made out of wood, using workers from the furniture trades. Military products can only be rapidly produced by civilian factories when the technologies are similar and development times are short. In the 1991 Gulf War the US and UK forces needed a large number of GPS sets, but since there was a civilian market these could be purchased off the shelf from civilian industry. In the Falklands War, the UK could not rapidly produce air-to-air missiles and had to buy Sidewinders, which could be fitted to Harriers, from the US.

Economic effects

At all times, higher military expenditure means other government expenditures are lower; taxes are higher; or the budget deficit is higher. As the economy grows, even with fixed tax rates, tax revenues grow so expenditure can grow in line. Higher budget deficits may mean higher interest rates, which may reduce consumption and investment. In the 1990s the US and UK got a 'peace dividend' as military expenditures were reduced after the Cold War; most of this came through budget surpluses and lower interest rates. If there is unemployment, higher military expenditure boosts demand and can reduce unemployment, as happened with World War II rearmament after the Great Depression of the 1930s. With relatively full employment, using workers for military purposes diverts them from other productive activities. Military Expenditure, by increasing budget deficits and interest rates, may 'crowd-out' investment and may influence technical progress, through Research and Development (R&D), and human capital, through training. The arms trade may have effects on the balance of payments. None of these macroeconomic effects seem particularly large at relatively low levels of military expenditure, below 5 per cent of GDP. There is also a large

microeconomic literature on the conversion of military resources to civilian use; through local reconstruction after base closures and conversion of arms factories to commercial products. Michael Brzoska (2007) provides a survey of the experience of conversion after the end of the Cold War.

One would not expect any simple relationship between military expenditure and growth because there are both positive, demand, effects (growing countries can afford higher military expenditure) and negative, supply, effects (military expenditure displaces investment and other factors that increase growth). In the US and UK at the beginning of World War II military expenditure went up and growth increased, while at the end of the Cold War military expenditure went down and growth increased. The net balance will depend on the threat, which influences the demand for military spending, and the growth potential of the economy, which influences the supply response. As a result anything is possible; all four combinations of high and low growth and high and low shares of military spending in GDP are observed in practice. Countries with a high threat, so high military expenditure, but great growth potential, like South Korea and Taiwan in the 1970s and 1980s, show a high share of military and a high growth rate. Countries where a high share of military expenditure displaced investment and other factors hinder growth, show a high share of military expenditure and low growth; the Soviet Union being an example. Countries like post-war Japan and Germany that restricted their military expenditure and could devote it to investment showed low shares and high growth. In most countries of sub-Saharan Africa shares of military expenditure are low, wars are fought with cheap conscripts and low-technology weapons, but growth rates are also low. For developing countries there is a complex interaction between military expenditures, conflict, resources and economic capacity. The economic capacity reflects education and institutions. Thus the outcome will depend on the balance of economic and security factors: there will not be a simple association between military expenditure and growth.

Technological spin-off

The output a society can produce depends on its capital, labour and technology, which will depend on the scientific and engineering skills available to the society. Since there are strong links between the military and society, there will be links between the military and civilian science and engineering.

The military has to recruit from society, though it often has to remedy the deficiencies of its recruits, for instance, in basic literacy or physical fitness, even in societies like the US and UK. Trying to ensure soldiers are literate is something that the army has long done; trying to ensure that they have the advanced engineering skills the military now need is more difficult, when relatively few young people in the US and UK want to study science and engineering. The commercial solution, substituting with engineers from China and India, is less available to the military. The links often go both ways. Global Positioning System, GPS, is a military system that has very wide civil applications. It was also a technology that was crucial to the military in the 1991 Gulf War. Armies have always had difficulty navigating in deserts and Desert Storm could not have been fought in the way it was without GPS. Before that campaign most military vehicles did not have GPS, but it could be rapidly fitted using commercial receivers.

The gap between the science, technology and engineering used by the military and by the rest of society plays a central role. During World War II the gap was quite small: civilian factories could be switched to producing tanks and aircraft. After the war the gap widened: military equipment became increasingly specialised and different. Then the gap narrowed again as civilian technology overtook military technology and the military started to buy COTS: commercial off-the-shelf. Even arcane technologies that had once been the sole preserve of the military and the intelligence community, such as cryptography, became dominated by civilian research, because of its commercial importance, particularly in finance. Whereas once the defence industry would have designed and built specialised electronic components and software for the military, increasingly the military rely on standard components from commercial suppliers, though this causes problems with time-scales. The life-cycle of commercial electronics is about 18 months, driven by Moore's law that the computing capacity of integrated circuits doubles every 18 months. The average military procurement time is about seven years, about four generations of electronics. This means when the military system goes into service, the electronics is not merely obsolete but no longer even in production. The gaps between military and commercial technology and time-scales have implications for rapid mobilisation and the provision of urgent operational requirements.

Many military activities became central to wider society: mapping (the name of the UK organisation Ordnance Survey reflects its military origin), meteorology, air traffic control, Internet and GPS. Often, as their civilian importance grows, they are spun off from the military,

like mapping and meteorology. There is a large scientific and engineering component to a range of things that the military do for the wider society: search and rescue, coastguards, protection of oil rigs and aid to the civil power in times of emergency. This aid can include maintaining bio-security during pandemics; providing support during natural disasters like floods; maintaining public order during large-scale disruptions; or, in a previous generation, planning to run the country after a nuclear war. To fulfil these functions the military need the skills to interact with the wider society and have a broad spectrum of technological capabilities. It may be useful to have the military provide these functions, but societies without armed forces like Iceland and Costa Rica provide these services in other ways than the military. The military often leave the armed forces at a comparatively young age and have careers later in civil society and they take their skills with them. There are examples like management education and logistics where commercial firms have learned from the military.

The extent of the spin-off of technology from the military to the rest of society is controversial with strong positions on both sides. Vernon W. Ruttan (2006), an expert of innovation, asks *Is War Necessary for Economic Growth?* He concludes that the answer is yes, though his argument has been widely criticised. It is certainly true that many technologies have military or wartime origins, though many have not. If a large part of national resources and R&D are devoted to the military, as they were during the world wars and Cold War, it is not surprising that many technologies have military origins. However, had those resources been spent on civil R&D without the secrecy restrictions and diversion of scarce scientific and technical skills to the military, there may have been even more innovations.

The military origins of many technologies is not necessarily an argument for support of military R&D. The fact that the US Defence Advanced Research Projects Agency (DARPA) produced the Internet is given as an argument for supporting military research; but the fact that European Centre for Nuclear Research (CERN) produced the World Wide Web is rarely given as a reason to support research into particle physics. If you want to promote technology there are generally better and less expensive ways to do it than relying on the military to spin it off. In any event, it is quite difficult for governments to target innovation effectively. Consider the growth of India as a major software producer. Partly this was the result of an education system that produced very good software engineers. But partly this was because the Indian Government did not treat software as a serious industry. Software benefited from

not having the extensive government support and intervention that doomed many other Indian industries, particularly in manufacturing.

Because the military is inter-twined in society, absorbing substantial resources, it does have effects on technology and the economy. It does create employment and those jobs can be politically crucial, particularly if they are in a marginal constituency. But if you want to create employment, there are many more effective ways of doing it than spending on the military; similar is the case with technology. There are strong scientific and engineering links between military and society, but they are complicated, operate in both directions and are difficult to manage. Acquiring the technology the military need and acquiring weapons is difficult enough when the objective is buying the best value military capability. The Government Accountability Office (GAO) and National Audit Office (NAO) regularly document the problems in doing this. If you further complicate the procurement process, by trying to fine-tune the technological spin-offs, there is a danger that the decision makers will be incapacitated by the complexity of their objectives, resulting in even worse procurement decisions.

Economic warfare

There are two aspects to economic warfare. Economic measures can be a complement to military action, used as part of normal warfare; or they can be a substitute for military action, used as sanctions. Economic measures have always been used in war. Retreating armies burn crops and destroy supplies to stop them being used by the enemy. States blockade their enemies to stop supplies; in both world wars, German submarine attacks on shipping almost crippled Britain.

Economic sanctions are usually a substitute for military actions, where the international community disapproves of some policies of the target country but is unwilling to use force. Such sanctions restrict the free movement of trade, capital, technology or people to or from the sanctioned country. They may be widely targeted or focus on particular goods, such as arms, or on particular people, such as the assets or travel of the leadership. There is a large amount of empirical and theoretical work on sanctions, but few clear conclusions. Kaempfer and Lowenberg (2007) provide a survey of the political economy of sanctions. Sanctions may have various objectives. They may be instrumental, intended to change the behaviour of the targeted state: to persuade South Africa to abandon apartheid or to persuade potential proliferators not to acquire nuclear weapon. They may be punitive, punishing

apartheid South Africa for its behaviour. They may be expressive, showing the disapproval of the states imposing the sanctions, even if they are ineffective in instrumental or punitive terms; neither changing the target's behaviour nor punishing it. Expressive policies may be adopted because policy makers are under public pressure to do something, however ineffective. The objectives of sanctions are rarely clear, which makes it difficult to judge their success, the extent to which they meet their objectives. Even when countries do change their behaviour in desired ways, South Africa abandons apartheid or Libya abandons its attempt to acquire nuclear weapons, it can be difficult to judge the contribution of sanctions to the policy change.

Analysing the economic operation of sanctions is as complicated as specifying the objectives and outcomes. Sanctions may do more damage to the country imposing them, through lost exports or having to substitute more expensive imports, than to the target. Sanctions may also be a covert form of trade protection: stopping competitive imports from the target country. Sanctions may be more effective on friends, to whom close ties are important, than on enemies. The US financial threats to the UK and France, after their 1956 invasion of Suez, were effective in forcing withdrawal because of the integration of the UK and France into the international system, their desire to maintain fixed exchange rates and the importance of their trade links with the US. Sanctions can strengthen the target regime by increasing domestic cohesion against the hostile powers imposing the sanctions. Sanctions can be evaded at a cost, and the cost of evasion can be much lower than the cost of enforcement. The target state may even benefit from the sanctions through its control of the embargoed item, either at home or abroad. This is particularly the case with high value items: South Africa had little difficulty selling its gold and diamonds. Sanctions may stimulate the development of domestic industries which produce the sanctioned products, such as arms, and may encourage the substitution against sanctioned products, for instance, by replacing conventional with nuclear weapons. Forcing foreign companies to divest their assets in the target country allows those in the target country to acquire productive assets cheaply. The sanctions may hurt the poor or oppressed in the target country more than the ruling elites. In principle smart sanctions target the elite but it can be very difficult to identify the elite and target them effectively. Kaempfer and Lowenberg (2007) point out that in contrast to the economic sanctions on South Africa, which hit blacks harder than whites, the sports sanctions primarily hit whites, the only ones who cared about rugby or cricket.

Empirical evaluation of sanctions is made more difficult because we observe cases where sanctions were imposed and these may not be typical. The threat of sanctions may often be effective in inducing compliance, so we only observe the cases where the threat failed and sanctions were actually imposed. Since these are cases where the target country was willing to incur the sanctions rather than comply, these are hard cases, giving us a more negative view of sanctions than is justified. Alternatively, we may only observe cases where sanctions were imposed because the sanctioning country expected that they would work, giving us a more positive view than is justified.

Markets may impose their own sanctions in response to political actions which they see as threatening to profitability. After the conflict between Russia and Georgia in August 2008, the rouble exchange rate dropped rapidly and the Russian authorities had to intervene to defend it; Russian shares halved in value and the authorities had to close the stock market to restore order; and the inflow of foreign investment more than halved. Markets move in mysterious ways, so it is difficult to know the extent to which this flight of capital was a response to the Georgian war, the credit crunch or the fall in the oil price, since all happened simultaneously.

Another form of economic warfare is to institute an arms race that will impose very heavy economic costs on your antagonist, as they struggle to match your military build-up. Some attribute the collapse of the Soviet Union to economic warfare of this sort by President Reagan, in particular his use of the threat of the Star Wars missile defence system. It is difficult to know if this was a deliberate US strategy and what effect that it had on Soviet decision makers. But if it was a US strategy, it was quite a dangerous one. If the antagonist anticipates that it will be militarily dominated in the future, the incentive is to start the war now, rather than to wait until it is in a weaker position.

A relatively new form of economic warfare, which may be a substitute or complement for military action, is electronic attacks on critical infrastructure. During the Cold War it was planned to use the electromagnetic pulse from nuclear weapons to destroy electricity and communication systems. But it may now be possible for state or non-state actors to disrupt critical infrastructure by hacking into the computers that control electricity, water or transport systems.

The maintenance of economic security, protection against economic warfare, is a natural government objective. Christopher Dent in Collins (2007) discusses economic security in wider terms and brings out the theoretical difficulties in defining it. Economic security is a vague

concept, particularly when it is extended beyond protection against economic warfare to protection against any economic change which may endanger a country's livelihood. Economic change is a constant and military–political responses to economic change are rarely effective because of their unintended consequences. Actions designed to increase economic security may well undermine it, inhibiting innovation and other economic processes on which long-term security is dependent. The measures adopted may not only be expensive but also be counter-productive, since adapting to change may be more effective than trying to protect against it. Japan destroyed Switzerland's major industry, mechanical watch-making, by the development of electronic watches in the early 1970s. The Swiss do not seem to have contemplated a military response and managed to adjust, creating a very different type of watch industry.