negative externalities, the final price and level of production will probably not go beyond point *E*; instead it lies somewhere within the box *CEBD* in Figure 5.6.

5.4 THE GLOBAL WEAPONS MARKET

The international weapons trade comprises a very small portion of the global military industry. In 2002, global military arms transfers amounted to $30 billion, with approximately $13 billion of the sales originating from the United States.[18] This amount was down from a peak of over $40 billion in 2000.[19] These sales figures pale in comparison to sales by defense firms to their home governments, and, given what we discussed in Chapter 4, are even substantially less than the revenue generated in the market for PMC personnel.

5.4.1 Growth of the Global Arms Market

Despite its relatively diminutive size, the global arms market has nevertheless become increasingly important for contractors. Total world-wide government military expenditures peaked in 1985, but as government military expenditures declined with the end of the Cold War, firms began to seek weapon markets outside their home country. Selling to foreign governments allowed firms to maintain high production levels, which in turn enabled the realization of lower average per unit costs. This process, known as **economies of scale,** is illustrated by Figure 5.7. The quantity of units produced, *Q*, is measured on the horizontal axis, while the average cost per unit, *AC*, is measured on the vertical axis. As firms produce a higher quantity of units (Q_1 to Q_2), **fixed costs** are distributed over more and more units. Fixed costs are costs that do not vary with the quantity of goods produced. A common example of a fixed cost is rent. As the fixed costs are distributed over more and more units, the average cost of production begins to decline. This is depicted by the downward sloping cost curve.

Figure 5.7
Economies of Scale

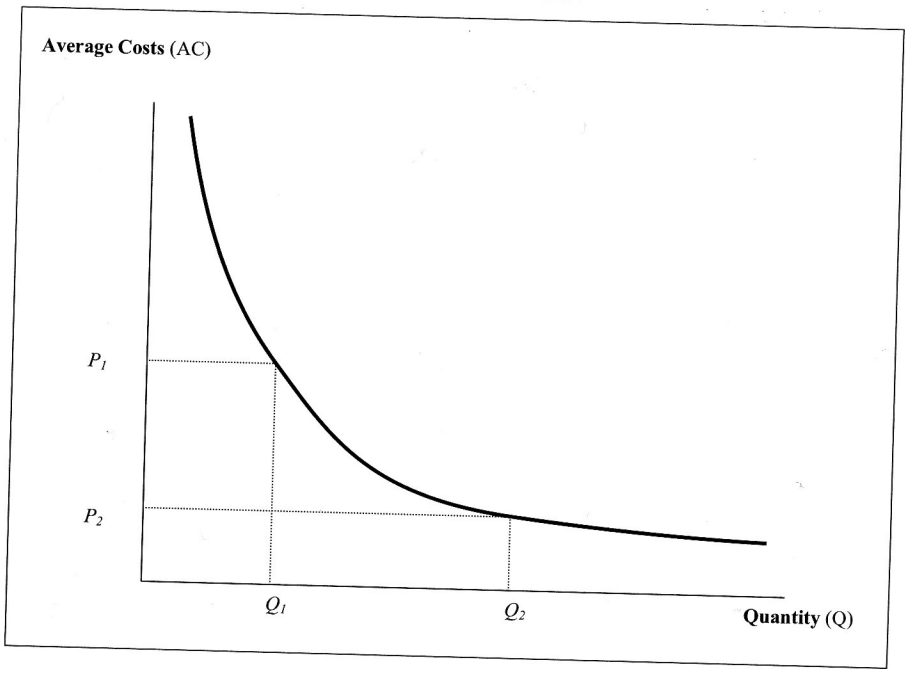


Table 5.4
World Arms Exporters (1995–2002)
(in millions of constant 2002 U.S. dollars)

	Worldwide Arms Transfer Agreements			Worldwide Arms Deliveries		
Country	1995–1998	1999–2002	2002	1995–1998	1999–2002	2002
USA	42,339	57,986	13,272	75,176	53,976	10,241
Russia	21,189	25,287	5,700	13,899	15,243	3,100
France	15,196	11,164	1,100	24,413	11,027	1,800
UK	10,198	3,415	800	26,314	21,953	4,700
China	3,835	5,103	300	3,746	2,838	800
Germany	7,075	8,076	1,100	8,006	4,963	500
Italy	2,591	3,014	1,500	1,050	1,597	400
All other European	11,640	18,088	3,800	17,108	10,230	1,800
All others	9,198	7,646	1,600	9,730	9,106	2,100
Total	**123,261**	**139,779**	**29,172**	**179,422**	**130,933**	**25,441**

Source of data: Grimmett, R. F. "Conventional Arms Transfers to Developing Nations, 1995–2002." Congressional Research Service Report for Congress. September 22, 2003, pp. 21, 33.

NOTE: The columns about arms transfer agreements indicate agreement to make sale. Arms deliveries columns measure items actually transferred.

Table 5.5
World Arms Importers (1997–1999)
(in billions of 2003 U.S. dollars)

Country	1997–1999	Country	1999
Saudi Arabia	27.5	Saudi Arabia	7.7
China-Taiwan	17.4	Turkey	3.2
Japan	7.9	Japan	3.0
United Kingdom	6.6	China-Taiwan	2.6
Turkey	6.2	United Kingdom	2.6
Israel	5.8	Israel	2.4
South Korea	5.3	South Korea	2.2
United States	5.1	Greece	1.9
Australia	4.0	United States	1.6
United Arab Emirates	3.7	Germany	1.3

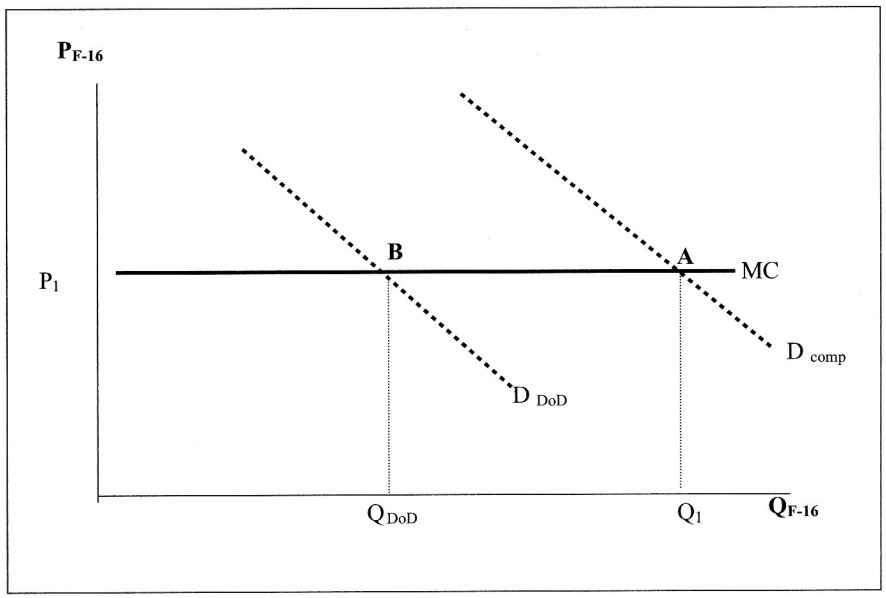
Source of data: U.S. Department of State *World Military Expenditures and Arms Transfers. (WMEAT) 1999–2000.* February 6, 2003. Available at www.state.gov/t/vc/rls/rpt/wmeat/1999_2000/.

This situation is why the Clinton administration in 1995 added domestic economic considerations to the list of criteria for approving weapons exports.[20] The end result was for global arms sales to reach their highest levels in the late 1990s.

Table 5.4 shows the largest weapons exporters in the world. Given the United States' high level of military expenditures and extensive military-industrial base, it unsurprisingly was the largest exporter of military weapons in 2002, and has been the largest military exporter over the previous decade.

To where do these exports go? Table 5.5 shows the largest weapons importers in the world from 1997–1999 and in 1999. Developing and middle-income countries comprise a significant number of the top recipients, with Saudi Arabia, Turkey, and China-Taiwan in the top five. The propensity for weapons exports to concentrate in the developing world will be discussed in more detail in Chapter 6.

Figure 5.8
Perfectly Competitive International Arms Market



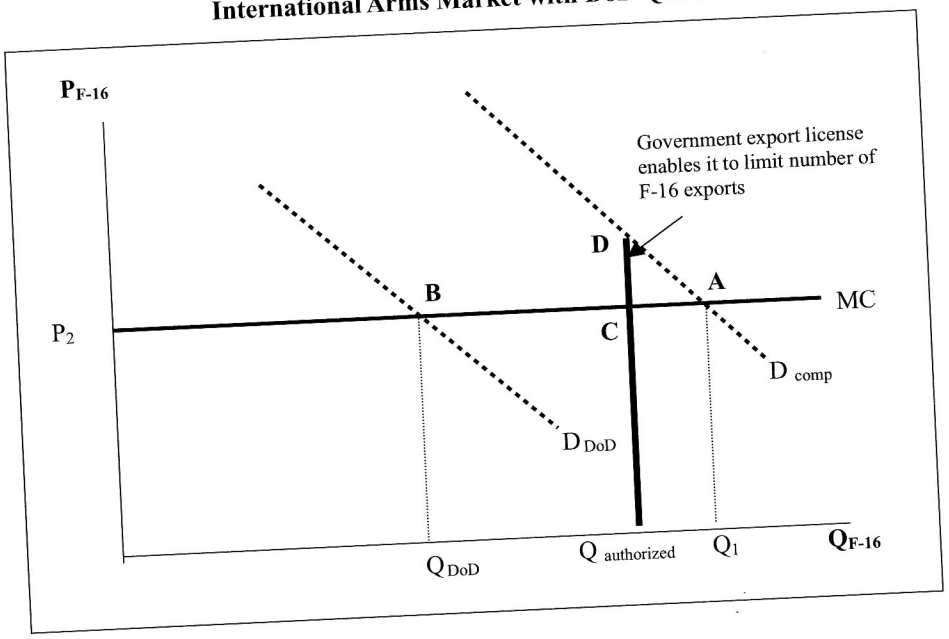
5.4.2 Analyzing the Global Arms Market

Because the most widely traded major weapon system is the Lockheed-Martin F-16 fighter (at a price of approximately $19 million), it will serve as an example for analyzing the international weapons market. Theoretically, free trade of arms means the arms market is a perfectly competitive market. In the theoretical scenario in Figure 5.8, Q_{DoD} is the level of F-16 fighters bought by the DoD; and Q_1–Q_{DoD} is the quantity of F-16 fighters exported to other countries.

However, this scenario is not how the market for F-16 fighters operates in reality. The international military weapons trade is different than other multinational and transnational commercial industries. Namely, few arms companies are truly private sector entities. For instance, nearly three-quarters of French arms exporters are state-owned, and of course U.S. arms companies receive public funds. Governments also exercise direct influence on the international sale of weapons produced in their countries. As a result of this governmental influence, international arms sales can be divided into two general categories: government-to-government and firm-to-foreign government/firm.[21]

Government-to-government arms transaction: Transactions between the DoD and another government are called **Foreign Military Sales** (FMS). The U.S. administration arranges the deal and is required to notify Congress of sales over $14 million for "major" defense articles (or $50 million for other defense items). In many instances, the DoD subsidizes the foreign government's purchase through a **direct grant of military aid.** In 1996, Turkey spent $4.3 billion on F-16s, but the U.S. gave $3.2 billion in grants and loans to seal the deal. Overall, the U.S. gives out $5 billion per year in military aid, the majority of which goes to Israel, about $2 billion, and Egypt (about $1 billion).

Figure 5.9
International Arms Market with DoD Quota



Firm-to-foreign government/foreign firm arms transaction: An arms transaction between a U.S. firm and a foreign government is called a **Direct Commercial Sale** (DCS). The transfer is negotiated between the U.S. manufacturing company and the foreign buyer, but it must be approved by the U.S. Department of State through the issuance of an **export license.** The U.S. government requires each sale to be licensed in order to remain the sole possessor of some technology.

The U.S. government's ability to control the quantity of weapons on the world market through an export license serves as a **quota** on the quantity of weapons exported. This quota creates economic DWL equal to the area *ACD* in Figure 5.9. However, this economic DWL may not necessarily be harmful for society. Specifically, though government restrictions are economically inefficient, it may benefit society that weapons are not sold to every entity with a willingness to buy. For instance, some organizations willing to purchase an F-16 are also willing to use it to harm the United States (such as transnational terrorist organizations). Other entities the U.S. will not sell to include oppressive regimes wishing to use such armaments against its own people.[22]

A DCS may also contain a "licensing agreement" that provides the purchasing state with access to newer arms technology and/or production jobs. Such provisions are typically called **offset arrangements.** Through this arrangement, the U.S. government grants compensatory economic measures to the foreign arms buyer so as to "offset" the heavy cost of the weapon. Offsets convert firm-to-foreign government transactions into firm-to-foreign firm transactions. U.S. firms will outsource production steps, as well as co-produce weapons and co-research with foreign firm.

Consider a few examples. Lockheed had to use British-made Rolls-Royce engines instead of General Electric engines to power Apache attack helicopters sold in Europe. In 1996, the U.S. allowed the parts for a sale of F-16 fighters to be shipped to Turkey and then assembled by 2,000 Turkish laborers. In 2002, Lockheed permitted Poland to build the engines for 40 F-16 fighters Poland had purchased.[23] In a $3.3 billion agreement for the

sale of 40 F-15K Strike Eagle jets to South Korea, Boeing gave Korea avionic software, and design technology. The wings and front fuselage were made in Korea and then returned to Boeing's St. Louis plant for final assembly.

Controversies surrounding offsets: Offsets are not without controversy. First, several critics argue that these provisions, by shifting production overseas, eliminate U.S. jobs. Yet, this argument must be balanced with the recognition that many foreign sales would not have gone through in the first place without the offset. A 2001 presidential commission on offsets surveyed eight large U.S. defense contractors. Seven estimated that they would lose 50 to 90 percent of foreign sales without offsets.[24]

Second, critics contend that the required sharing of technology places the United States at a strategic disadvantage, because other countries are now able to produce as advanced, if not more advanced, weapons. On the other hand, the U.S. government controls the sale of weapons to foreign governments and many countries can purchase U.S. weaponry. Members of NATO and countries deemed important non-NATO allies (such as Australia, Japan, and Pakistan) face the lowest restrictions in obtaining DCS transactions, or the least U.S. government interference, when their companies engage in joint projects with U.S. weapons producers.

Modeling offsets and aid: Offset arrangements (and direct military aid used in FMS) serve as a **transfer payment** or government gift to the purchasing country. Looking at Figure 5.10, suppose that the NATO allies of the United States only wish to purchase Q_{NATO} of F-16 fighters. However, suppose that U.S. contractors would like for its allies to purchase $Q_{authorized}$ of F-16 fighters. The military aid or offset arrangement from the DoD increases NATO's demand for F-16s, represented by the shift of D_{NATO} from D_{NATO} to $D_{NATO + offsets/aid}$.

Figure 5.10
International Arms Market with DoD Subsidy