

often small (unit costs are higher because of smaller production runs), they are also more often forced to trade technologies as well as weapons to their best customers.⁵

Behind these states lie a third tier of arms producers who are able only to copy or develop the most rudimentary or low-tech variations of any given weapons system. These weapons may be perfectly adequate for the range of threats these states may face, but they are seldom effective on the battlefield against a technologically superior opponent. Arms industries in these states are often highly export dependent (because of a small domestic market) or internationally uncompetitive (when the domestic market is large and the industry is protected), investments in R&D are very low, and production often occurs in an industrial "enclave," with few positive linkages or synergies to the rest of the economy.⁶ What is most important about third-tier producers, however, is their potential to upset or derail control arrangements (such as blanket supplier embargoes of combatants), with their aggressive pursuit of niche markets. An excellent example of this was given by the eight-year long Iran-Iraq war, during which one or both combatants laboured under embargo restrictions of varying severity. Ultimately, more than 50 states supplied weapons, parts, or military technologies to one or both sides, including prominent third-tier producers such as Brazil, North Korea, Egypt, Taiwan, Czechoslovakia and China.⁷

The final, and most important, element of the arms transfer and production system is its *evolutionary dynamic*. The arms trade exists because there are large differences in the capabilities of the weapons that are possessed by (or can be produced by) various states, and because these disparities matter in the competition for international power and influence. All participants in the system thus respond to different sets of incentives that push it forward. First tier states tend to invest in R&D, and are more willing to entertain restrictions on technology transfers in order to keep their leading position. Second-tier states attempt to acquire advanced technologies from the first-tier innovators, not only to "keep pace," but to copy or reproduce the successes of the innovators. For these states, access to technology is as important as access to weapons themselves. Behind them, the third tier states struggle to climb the international hierarchy, at first through weapons acquisitions and later through

⁵ Germany, France, Britain and Italy accounted for 39 percent of the total number of licensed and co-production agreements for weapons or military technologies that in place in 1992. The United States and Russia accounted for 38 and 7 percent of the total respectively, which is a lower percentage than their share of the total arms market. Stockholm International Peace Research Institute, *SIPRI Yearbook 1993: World Armaments and Disarmament* (Oxford: Oxford University Press, 1993), 483-518.

⁶ See, for a comprehensive case study, Patrice Franko-Jones, *The Brazilian Defense Industry* (Boulder: Westview, 1992).

⁷ The most complete list of suppliers is offered by Anthony Cordesman, *The Impact of Arms Transfers on the Iran/Iraq War* (London: Royal United Services Institute, 1987), 14, using State Department information.