attempts to spur indigenous arms production via military technology transfers. They tend to focus on technology transfers in the form of co-production or licensing agreements, access to patents and blueprints, and the reverse engineering of established designs.

What happens as a result of these various responses is something akin to the "product cycle." New or revolutionary technologies are rapidly improved and slowly diffused, as the techniques required to use them effectively or reproduce them are not widespread. But over time, the pace of innovation slows as the potential inherent in any technology is exhausted, and diffusion then moves more rapidly than innovation. Eventually, attention shifts to newer (and possibly radically different) technologies that drive the system in another cycle.

Of course, if investment in military R&D ceases, or becomes too costly, then these new technologies will be slow to appear. An illustration of this is provided by the slow pace of change in military technologies in the eighteenth and early nineteenth centuries: the "Brown Bess" was the standard British firearm from 1690 to 1840, and the field gun of 1840 was only slightly more sophisticated than artillery of the previous two centuries. Similarly, when continued improvements on existing technologies have no military utility, the pace of innovation will also slow. An example of this is the current ability of designers and engineers to build aircraft that are too manoeuvrable for pilots to fly, because of the stresses they place on human endurance.[8]

The evolution of the arms transfer and production system thus depends critically on the relationship between *rates of technological innovation and diffusion*. The two possible relationships have been captured by Figure I. In both scenarios, innovation proceeds rapidly in the early phases of a new technology, and then slows over time as the innovative potential of a new technology is exhausted. What differs, however, is the rate of diffusion. In the first scenario, the rate of diffusion remains constant (a straight line), which means that it crosses the rate of innovation at point *X*. This does *not* mean that at this point both producers/innovators and recipients have equivalent military technology, but only that past time *x*, the gap between the weapons systems possessed by producers and recipients will slowly narrow, eventually reaching virtual equality. An example of this could be the diffusion of small arms and ammunition technology, primitive versions of which can now be produced virtually anywhere.

In the second scenario, the rate of innovation, although slowed, remains *above* the rate of diffusion at all points. This scenario maintains the technology gap (and the lead of innovative producers), but

---

[8] For an excellent overview of military technological evolution see William MacNeill, *The Pursuit of Power* (Oxford: Basil Blackwell, 1983).