

The present patent regime is premised on the argument that perfectly competitive markets fail to reward inventors sufficiently and that society consequently suffers a sub-optimal level of R&D if a patent regime is not in place. The level of R&D can be raised by assuring investors in new knowledge-generating industries super-normal profits long enough to recoup their investment. For such a profitable market, the price must exceed the incremental cost of the product. Thus, in industries where the private market mechanism does not result in profits that can offset investment in innovation, the patent system is clearly indispensable. After all, if only a few innovations get produced, then there is not much new knowledge that can go around and spread to other industries, nor will consumers receive the benefits of new goods and eventually lower prices. It is also clear that an efficient patent system should not let a patent go on too long and thus deprive the patentee's competitors and consumers full benefits of new technology and goods. Thus, the determination of optimal patent life requires balancing the goal of stimulating investment in innovations against the goal of spreading new knowledge. Let me illustrate the nature of the trade-off involved in the determination of the optimal patent term by using a simple numerical example.

● Optimal Patent Term: *An Example*

To illustrate the effect of a patent system on welfare, consider Figure 1. The industry demand curve is $X(P)$. The unit cost, OC_0 , say equal to \$100, is constant. Price without patents is OP_0 , which equals the incremental cost and unit cost, such that output is OX_0 , or say equal to 10 units. After incurring R&D resource costs, an innovation is produced and a patent of life T , say 20 years, is obtained which lowers costs to OC^1 , say to \$80. The price remains at the pre-innovation level at \$100, so consumers do not benefit from the innovation for the life of the patent. Instead, there is a gain of the area P_0P_1AB or \$200 per year of *rents* for T years to the patentee. The innovative firm can produce the output of 10 units and appropriate the monopoly rent or it can license the patent to existing producers, charging a royalty of \$200 per year. After T years the patent expires and price falls to OP_1 or \$80, and output expands to OX_1 , say equal to 12 units, so there are now gains in the surplus to consumers of the area P_0P_1AD .

First, it is clear that the level of welfare changes as T , the patent life, changes. To determine the optimal patent life, we need to take into consideration: (a) the present value of rents captured by the patentee; plus (b) the present value of the total consumers' surplus from the expiry of the patent to the time the product is no longer marketed; minus (c) the innovator's R&D costs. Suppose that a patent term extension from 20 years to 21 years is being considered. How does this affect a potential patentee, who is trying to figure out what R&D investment to make? One consequence of the extension will be that the patentee will legally get to appropriate the rents of $P_0P_1AB = \$200$ for one additional year.