II

THE THEORY OF THE OPTIMAL PATENT TERM

The purpose of the patent grant is to enable innovators to capture rents from their innovations and to provide an incentive to invest in innovations. An innovation is achieved through an advance in knowledge. An advance in knowledge that results in a *final* good not previously available is called a **product innovation**. A **process innovation** is an improvement in the production process such that the cost of producing existing products is reduced.[11]

One aspect of economic efficiency of perfectly competitive markets is that the profit maximizing firms bring forth a socially optimum level of private investment. But marginal cost pricing[12] of innovations in competitive markets will result in such a small price that private profits will be too low to achieve an efficient level of investment in innovations.

Take a current example in the consumer product field. Before the high-definition television (HDTV) can be marketed to consumers, substantial R&D expenditures have to be incurred upfront. Only a few firms are willing to develop the HDTV by committing such a large sum. To make a profit on the project, the innovating firms will price their product above its marginal cost. These profits will lure competitors to move into the HDTV market. The new entrants could simply "reverse engineer" the HDTV production process without incurring the upfront cost in R&D. As the number of firms marketing HDTV increases, the price will equal marginal cost such that firms make little or no economic profit. Innovators of HDTV will not be able to recoup their large "sunk" investments.

The HDTV example shows that if firms cannot recoup their investments through profits from selling innovative products and processes, they will not undertake R&D in HDTV in the first place. Society will forgo benefits of innovations and will be saddled with too low a level of R&D activity. Thus, the grant of an IP right to the inventor is an appropriate policy in this situation.

The patent offers a temporary right to exclude competitors from marketing the innovation. Inventors can expect that prices will remain above post-invention production and marketing costs long enough such that the discounted present value of the profits will exceed the value of the front-end investment.

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[11] Inventions are a result of basic or fundamental research. It is at the point of commercial introduction that the new product or process is described as an innovation.

[12] Marginal cost is the cost of producing an incremental unit.