

Thus, the patent term plays two investment-inducing roles. First, an optimal patent policy sees to it that the monopoly rent stimulates R&D investment just sufficient to equate the economy-wide marginal gain from further cost reduction with marginal cost. Second, the patent grant must persuade investors that competitive imitation will be deferred sufficiently long to make discounted rents exceed the R&D investment level. Neither aspect can be ignored in designing an optimal patent policy.

● Different Industries, Different Optimal Patent Term

The nature of innovation activity differs across industries. In some industries, large outlays bring forth small innovations, while in others, R&D expenditures need not be that large. Markets for innovations differ as well. In some markets, customers will pay the high monopoly price to buy the latest, whereas in others they may wait until the price falls on the patent's expiry. Optimal patent term is longer for high cost R&D projects and small market size than for small to medium cost innovations that are sold in large markets. Moreover, drastic and risky innovations would generally merit a longer rather than a shorter patent term. Therefore, in theory, a fixed patent term is not optimal, although it may be unavoidable in practice.

II.2. PATENT TERM ISSUES IN ECONOMICS LITERATURE

A. The Patent Carrot: *Useful or Shrivelling Carrot?*

● *Imitation Eats into Patent Rents*

The patent regime is designed to keep imitators out. Patent protection is weak if there are many viable solutions to a technical problem, such that other firms can "invent around" a given patented solution. Nor can a longer patent term be effective in preventing imitation when patent protection turns out to be weak. To be sure, companies often seek to fence in their technological domain by patenting every conceivable variation on a product or process. But individual patents that solidly protect a whole field of product or process technology are rare. Nevertheless, patent protection appears to be relatively important where the coverage is an all-or-nothing affair. For example, to introduce a new drug during the late 1980s in the U.S., Scherer and Ross¹⁷ estimated the R&D and testing costs at between \$50 to \$100 million. Most of these costs were incurred discovering molecules with desirable therapeutic effects in humans and proving through extensive clinical testing that the substances were effective and safe. After that, it typically costs only a few hundred

¹⁷ F.M. Scherer and D. Ross, *Industrial Market Structure and Economic Performance*, Boston, MA: Houghton Mifflin, 1990.