

**APPENDIX X. USING IMPLEMENTATION CURVES TO ESTIMATE MARKET
PENETRATION OF NON-REGULATORY POLICIES**

LIST OF FIGURES

Figure X.1.1 Comparison of Exponential and Logistic Curves Showing External
and Internal Influences on Consumers X-2

APPENDIX X. USING IMPLEMENTATION CURVES TO ESTIMATE MARKET PENETRATION OF NON-REGULATORY POLICIES

X.1 Penetration of Non-Regulatory Policies

There is extensive economic literature on the diffusion process of new products as technologies evolve. Some of the literature focuses primarily on the development of analytical models of diffusion patterns of new products for individual consumers or for technologies from competing firms.^{1,2,3,4} One study records researchers' attempts to investigate underlying factors that drive diffusion processes.² Because of distinct characteristics of diverse new products, few studies are conclusive in terms of developing a universally applicable model. Some key findings, however, seem to gain wide recognition in academia and industry.

First, new technologies may not be adopted by all potential users, regardless of their economic benefits and technological merits. Therefore, a ceiling of adoption rate exists for many products. Second, not all adopters purchase new products at the same time; some act earlier to purchase new products, while others respond slowly, waiting for products to become more mature. Third, diffusion processes can be approximately characterized by asymmetric S-curves, depicting three stages of the diffusion: starting, accelerating, and decreasing as the adoption ceiling is being reached.

An important diffusion model, the epidemic model, is widely used in marketing and social studies on diffusion. It assumes a) that consumers value the benefits of a new product identically and b) that the cost of a new product is constant or declines monotonically over time. What induces a consumer to purchase the new product is information about the availability and the benefits of the product. In other words, it is information diffusion that drives new product adoption by individual consumers.² The model embraces information diffusion from both internal sources (news spread by word of mouth from early adopters) and external sources (the announcement effect by government or commercial advertising programs) by superimposing a logistic function with an exponential function.^{1,3}

The degree of relative dominance of influence by internal or external sources will determine the general shape of diffusion curve of a specific product.^{1,3} For instance, if the adoption of one particular product is more influenced by external sources of information diffusion (announcement effect) than by internal sources (word of mouth among earlier adopters to prospective adopters), the rate of diffusion at the beginning stage of the diffusion process is much higher. This reflects the immediate information exposure to a significant number of prospective adopters brought about by external sources, in contrast to the more gradual exposure to internal sources such as news propagation by earlier adopters, a small proportion of the population, to other prospective adopters. Graphically speaking, a relatively dominant external source of information diffusion will give an immediate jump-start to the adoption of a new product in the first years, forming a concave curve with respect to the Y axis (see the exponential curve in Figure X.1.1). Adoption of a new product with a stronger influence by internal sources of information diffusion (such as a socially tightened

network formed by prospective adopters) may start with a few early adopters and gradually increase as the number of adopters grows, and thus form a convex curve (see the logistic curve in Figure X.1.1).

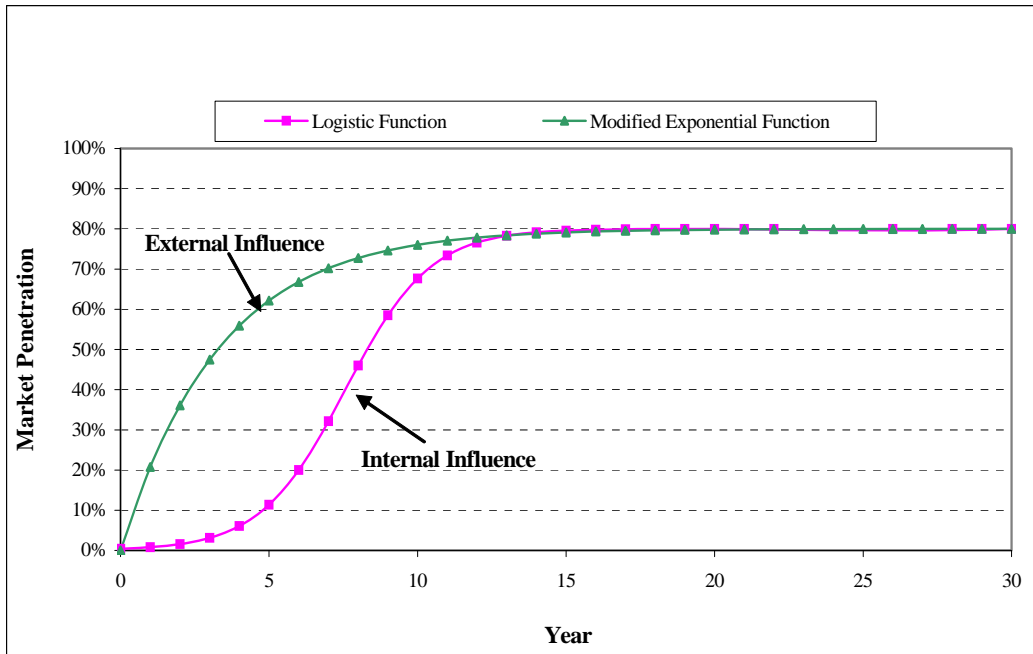


Figure X.1.1 Comparison of Exponential and Logistic Curves Showing External and Internal Influences on Consumers

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