

## *DISSERTATION ABSTRACT OF PHILIP G. GAYLE*

This thesis investigates theoretically and empirically the relations between market structure and innovation. The objective is to understand how market concentration tends to evolve as new innovative opportunities arise, and whether more concentration tends to facilitate or hinder innovation in an industry.

Chapter one of the thesis develops a theoretical model that explores the incentives of incumbents and potential entrants in inventing a patentable new product. Winning the new product enables an oligopoly incumbent to internalize the externalities between the new and existing products, but it may either strengthen or weaken the incumbent's competitive position in its existing business. The equilibrium outcomes are shown to depend in interesting ways on the number of incumbents and on the nature of the relations between the two products. In particular, the incumbents tend to have stronger incentive to innovate the new product if the two products are strategic complements, and an entrant tends to have stronger incentive if the two products are strategic substitutes.

Chapter two extends the previous model into a setting with stochastic discovery. The uncertainty in discovery introduces additional complications to the analysis, but the basic insights of the deterministic model are shown to carry over to the stochastic setting. Together, the theoretical models in these two chapters generalize the literature on the issue of market dominance, with several well-known models embedded as special cases. How concentration in an industry will change as new products are introduced depends crucially on how the new products are related to the existing products.

Chapter three conducts a new empirical examination of the Schumpeterian hypothesis that more concentrated industries stimulate innovation. The NBER-Case-Western University R&D patents dataset is employed for the empirical analysis. The dataset contains firm specific information on over 4800 U.S. Manufacturing firms spanning the period 1965 to 1995. The econometric model is a simultaneous system consisting of three equations. The first equation models the firm's choice of R&D intensity. The second equation models the innovative output resulting from the firm's R&D decisions. Since the measure of innovative output used is classified as count data, a random effects negative binomial model is used. The third equation in the simultaneous system takes account of the effect that successful innovation has on a firm's market share. The empirical analysis shows that the lack of evidence for the hypothesized relationship in recent empirical literature is largely due to the use of simple patent counts as the measure of innovative output. When citation-weighted patent count, arguably a more accurate measure of innovative output, is used, the empirical evidence supports the Schumpeterian hypothesis.

In the near future I will further consider applying the theoretical and empirical analysis in several areas, possibly including the R&D decisions of multinational firms, and innovations in specific industries.