

Frederic M. Scherer: Over a half century—and counting—of seminal scholarly contributions

By: David B. Audretsch, [Albert N. Link](#), and John T. Scott

Audretsch, D.B., Link, A.N. & Scott, J.T. Frederic M. Scherer: Over a Half Century—and Counting—of Seminal Scholarly Contributions. *Review of Industrial Organization* **52**, 501–508 (2018). <https://doi.org/10.1007/s11151-017-9611-y>

This version of the article has been accepted for publication, after peer review (when applicable) and is subject to Springer Nature’s [AM terms of use](#), but is not the Version of Record and does not reflect post-acceptance improvements, or any corrections. The Version of Record is available online at: <http://dx.doi.org/10.1007/s11151-017-9611-y>.

Abstract:

This introduction to the special issue of the *Review of Industrial Organization* in honor of Frederic M. Scherer provides an overview of his many seminal contributions to the scholarly literature about industrial organization, his enthusiastic service and support of the industrial organization community and its scholars, and his leadership and service within the economics profession more generally.

Keywords: Frederic M. Scherer | industrial market structure | intellectual property | inter-industry technology flows | market performance | patents | productivity | public policy | research and development (R&D) | technological change

Article:

Frederic M. (Mike) Scherer has influenced generations of industrial organization scholars. This special issue of the *Review of Industrial Organization* is dedicated to him in honor of his many influential contributions that span more than half a century. His journal publications have expanded the understanding of the economics of technological change and of the behavior and performance of industry more generally. His landmark treatise provided the essential compilation of myriad studies and approaches to solidify what became known as the field of industrial organization. The book detailed the richness of the knowledge about the field and its open questions and inspired other scholars, who then devoted careers to exploring those questions. Both his journal publications and his treatise have consequently been an essential reference for evaluating and developing public policy toward industry.

F. M. Scherer’s education and appointments span a broad swath across public and private universities, liberal arts colleges, research centers, and public agencies. His knowledge of the economics of industry combined with his intellectual energy and enthusiastic interaction with scholars and policy makers have made him an omnipresent force in the venues where industrial organization is developed and applied. F. M. Scherer has provided an infrastructure for the field of industrial organization with his seminal research, field-defining treatise, creative teaching,

generous editorial work, enthusiastic participation in seminars and conferences, and public service in public policy institutions that are responsible for antitrust and innovation policies.¹

Industrial Market Structure and Economic Performance—Scherer (1970, 1980, and, with Ross, 1990)—with its window on the history of thought and the literature—inspired young scholars with its perspective of the richness of the industrial organization literature and with the many exciting open questions that awaited new investigation. Many young scholars, plunging into that literature to begin new research projects with the guidance provided by the treatise, quickly realized the seminal power of Scherer’s research articles.²

His senior honors project at University of Michigan launched his interest in Schumpeter’s views about industrial organization and technological change (Scherer 1984b, p. viii). Then, with a MBA from the Harvard Business School and a Ph.D. from Harvard University, seminal contributions (Peck and Scherer 1962; Scherer 1964) about the interplay between government and contractors in the acquisition of advanced weapon systems under his belt, his initial senior honors excitement about the Schumpeterian hypotheses resulted in several seminal mid-1960s articles about the economics of technological change. Those articles—including Scherer (1965, 1966, 1967a, b) as well as several other articles that he published in the mid-1960s—provided the foundational theory and evidence for the questions about technological change that have remained at the heart of industrial organization: questions about rivalry among competitors and about the sizes of firms.

Scherer’s foundational articles described technological innovation as determined endogenously by demand-pull and technology-push, with rivalry among firms quickening the pace of the innovations. The papers by Jaffe and Chappell (this issue) and by Link and Scott (this issue) follow in the tradition that Scherer forged. Jaffe and Chappell develop and extend the literature by broadening the set of intangible assets studied and examining the relations among firm size and rivalry among competitors and investments in intangible assets more generally and the resulting performance of firms. Link and Scott explore the relation between firm size and technological change that is associated with R&D activity.

In the context of the great interest in the causes of the productivity slowdown in the 1970s, Scherer addressed the links from R&D investments to productivity with the use of data from the Line of Business (LB) program of U.S. Federal Trade Commission (FTC). Linking LB data and patent data, he devised a way to study Schmooklerian technology flows. Firms create innovations with their R&D investments, and those innovations are often used by other industries

¹ Biographical and bibliographic details about the career of F. M. Scherer are available at <https://www.hks.harvard.edu/fs/fmscherer/>. In this essay, we have used information from that authoritative source, but it provides many more details about Scherer’s articles, books, appointments, and service to the profession.

² Among the many reasons for the success of the treatise as an introduction to the literature is Scherer’s gift for capturing the complex economic arguments in his journal articles with original, helpful, and memorable graphs. One example is the illustration [Scherer (1980, Figure 15.2, p. 427), based on Scherer (1966, 1967b)] of the tradeoff between the time of development until an innovation’s commercial introduction and the development costs on the one hand, and, on the other, the discounted value of the benefits—the excess of revenues above the production and distribution costs. Another example is the illustration [Scherer (1980, Figure 14.2, p. 395, and Figure 14.3, p. 396), based on Scherer (1979)] of the surplus implications of a product’s location in the product characteristics space and the impacts of introducing an additional product variant.

where the firms benefit from the technology that was originated outside their own industry. As Griliches (1984, p. 13) observed:

... Scherer's [1984a] important contribution... describes in detail a major and valuable data construction effort whose basic purpose was to reallocate R&D expenditures from an industrial "origin" classification (where they are done) to a classification of ultimate "use" (where they will have their major productivity-enhancing impact). This was accomplished by examining over 15,000 patents in detail and assigning them to both industrial origin and industrial use categories and categorizing them into product and process patent categories. The detailed R&D by line of business data collected by the FTC were then reallocated from industry of origin to industries of use in proportion to the "use" distribution of their patents, thereby generating a kind of technological flow table. The many conceptual and practical difficulties in such an enterprise are discussed by Scherer in some detail. The appendix to his paper presents the most detailed data on R&D by three- and four-digit Standard Industrial Classification (SIC), by origin, and by use ever made available. These data will prove invaluable in future studies of productivity growth and differential industry R&D activity. Scherer reports briefly on an analysis of productivity growth in which, once the quality of the output growth data is controlled for, the newly generated R&D by industry of use data prove superior to the industry of origin data in the explanation of interindustry productivity growth differences.

The research described in Scherer's (1984a) 1981 conference paper led to many other prominent papers, including Scherer (1982a, b, c, 1983a), with further development and refinements in Scherer (1993, 2003). In these articles, his detailed matrix revealed how technology flows among the industries in the U.S. economy, and he used the matrix to analyze productivity growth that was lagging in the 1970s, as it is again now.

Scherer's studies of the Schumpeterian technology flows address one of the most fundamental questions in the field of industrial organization: the link between investments in new knowledge and performance at the level of the firm. His observations and evaluation of the performance that results from innovative investments were developed further with a series of articles two decades later. Scherer (1965) observed the skewed distribution of the quasi-rents from innovation, and in several articles beginning in the late 1990s and including Scherer (1998) and Harhoff et al. (1999, 2003), Scherer and his co-authors documented the distribution of returns to patented inventions and their relationship to citations. Scherer's FTC LB papers, and the subsequent papers about the distribution of rewards to innovative investment, focus on the R&D investments and the resulting performance; the literature on investment in intangible assets and firm performance originally focused on R&D. As noted above, the paper by Jaffe and Chappell (this issue) extends that literature by focusing on investments in intangible assets more generally and the resulting firm performance.

Scherer also used the FTC LB data to examine further the Schumpeterian market structure tests that he had pioneered in his mid-1960s articles. Those studies include Scherer (1984b, chapter 11; 1984c) and Scherer and Ross (1990, chapter 17, pp. 657–660), with the study of relationships between firm size and diversification and firm inventive inputs and outputs, and Scherer's

(1983b; 1984b, chapter 13) examination of the nexus among seller concentration, R&D, and productivity change, and the examination of the propensity to patent in Scherer (1983c).

With Ravenscraft, Scherer also addressed the issue of how mergers and acquisitions affect the R&D investments of the firms that grow because of the acquisitions. Ravenscraft and Scherer (1987) use the FTC LB data to examine “how merger history and intensity affected R&D” and find there is “no support for the hypothesis that R&D was *stimulated* by the parent-subsidiary relationships following merger. If acquired lines achieved more rapid growth, it did not happen because of extraordinary technological effort” (Ravenscraft and Scherer 1987, pp. 120–121, italics in original). More generally, Ravenscraft and Scherer (1987) used the detailed FTC LB data to document the inefficiencies that are associated with the U.S. conglomerate merger wave in the 1960s and 1970s.

In their 1987 book and in several related articles, Scherer and Ravenscraft provided important evidence to weigh against various theoretical arguments about mergers and acquisitions. Another landmark book (Scherer et al. 1975) and six related journal articles about multi-plant economies also provided needed evidence—drawn from the economies of several nations—to inform theoretical arguments about the concentration of sellers in markets and about the integration of sellers across national markets.

The pharmaceutical industry is one of many industries where Scherer applied his research skills and his deep knowledge of industrial organization and public policy. Well over a dozen of his publications have been directed specifically at the behavior and performance in pharmaceuticals and the related public policy. Discussing one of those articles that addressed the regulation of drug pricing, Comanor et al. (this issue) observe: “Scherer’s point is that regulatory actions may create economic distortions even when successful in achieving their primary objective.” Comanor et al. then develop a new analysis of an important public policy: value-based criteria for regulating pharmaceutical prices. Policy toward the pricing of pharmaceuticals is currently an important issue of debate, and Audretsch (this issue) explains that a hallmark of industrial organization scholarship has been the willingness of researchers to tackle the most pressing policy issues of their eras; and moreover, he describes the important role that has been played by Scherer in the success of industrial organization scholars developing and applying new knowledge to important policy questions.

F. M. Scherer has made many important contributions in the general area of the economics of industrial organization. We have only briefly touched on contributions that ranged across studies of the many types of behavior and performance of firms within industries, technological change and growth, and intellectual property. The topics of his research have been remarkably diverse, with the great range in the topics well illustrated by the focus of his early studies on the economics of weapons acquisitions in Peck and Scherer (1962) and Scherer (1964)—as contrasted with the focus of his more recent studies of economics of creative industries, including Scherer (2004) and several subsequent journal articles.

Scherer has often focused on the policy applications of the knowledge about industry that he has developed. Indeed, the list of Scherer’s publications (see footnote 1) shows dozens of important contributions to the formulation of a wide range of public policies including policies toward

antitrust [for just one of numerous examples, Scherer (2015a)] and regulation [Scherer (2000) provides an example, as highlighted by Comanor et al. (this issue)], technology [for an example, Scherer (2011)], intellectual property [for two examples among many, Scherer (2009, 2015b), with insights and policy implications about the first mover advantages for innovators that make patents less than essential for the R&D investments], and the provision of economic data in publicly available data collections [for one example, Scherer (1990)]. Scherer's knowledge of industry and public policy infuses the important book, Scherer (1996), which provides an ideal vehicle for teaching the subject of industrial organization.

One indication of the importance of Scherer's publications for public policy is the use of his work to bolster the arguments in the opinions of the U.S. Supreme Court. For just one example among many, in the landmark precedent-setting *Leegin* (2007) case that overturned the Court's interpretation of vertical restraints law that had stood for almost a century, the majority opinion cited Scherer and Ross (1990) five different times, and the dissenting opinion cited Scherer (1983d) two different times, Scherer and Ross (1990) two different times, and the *amici curiae* brief that was submitted in *Leegin* (2007) by William S. Comanor and F. M. Scherer five different times.

We conclude this introduction with an expression of gratitude for F. M. (Mike) Scherer's willingness happily to share his knowledge and to support generously the research of others. Just a few anecdotes, from among many accumulated over several decades, illustrate his unwavering exuberance in encouraging other scholars: For one, a freshly-minted assistant professor, teaching industrial organization for the first time and using Scherer (1970) as the textbook, wrote Scherer a letter introducing himself and asking questions about a particular passage of the textbook. Scherer provided a helpful response laced with humorous reference to the arrival of the letter being analogous to a visit from Dickens' *Ghost of Christmas Past*.

For another anecdote, a young professor, traveling to Europe for the first time and presenting a paper at the meetings of the European Association for Research in Industrial Economics (EARIE), was welcomed during his presentation by a questioner who began by quoting, in the language of the host country, the most prominent and world-renowned poet who wrote in that language. The quote was then used as an explanation for why further discussion from the presenter was needed. The humorous presentation of the substantive question was welcoming and helped move the presentation along; the questioner was Mike Scherer who was one of the co-founders of EARIE.

On another occasion, when a young scholar who was developing a research paper asked Mike if he could have access to a variable that Scherer had developed in a published paper, the information was promptly provided, which made possible the completion of the paper. For yet another example, a professor visiting to serve as an examiner for Scherer's economics honors students was treated to an enthusiastic guided tour, with Mike providing lots of informative and interesting commentary, of his immense personal library in his home that was a short walk from campus.

On countless occasions, Mike has generously provided detailed and extraordinarily helpful comments on manuscripts. Such comments are invariably accompanied with important

information not only about the relevant literature, but also about the history of thought and the institutions important for complete understanding of the research presented in the manuscript.³ Mike's substantive comments on research manuscripts have often been accompanied by humorous references to the arts and literature beyond economics.⁴

Beyond the behind-the-scenes work with individual scholars, F. M. Scherer has provided leadership: in the administration of public policy—for example, as the Director of the FTC's Bureau of Economics; and in professional economics associations—for example, as the President of the International J. A. Schumpeter Society and as the President of the Industrial Organization Society.⁵

We are grateful for and enriched by Mike Scherer's research and writing, his wise and generous support of individual scholars, his tireless and enthusiastic support of conferences and meetings and many professional economics associations, and his service to the institutions and missions of economics public policy.

Acknowledgements

We thank Dietmar Harhoff, F. M. Scherer, and Lawrence J. White for helpful comments on an earlier version.

References

- Audretsch, D. B. (this issue). Industrial organization and the organization of industries: Linking industry structure to economic performance. *Review of Industrial Organization*. <https://doi.org/10.1007/s11151-018-9615-2>.
- Comanor, W. S., Schweitzer, S. O., Riddle, J. M., & Schoenberg, F. (this issue). Value based pricing of pharmaceuticals in the US and UK: Does centralized cost effectiveness analysis matter? *Review of Industrial Organization* (in press).
- Griliches, Z. (1984). Introduction. In Z. Griliches (Ed.), *R&D, patents, and productivity* (pp. 1–19). Chicago: University of Chicago Press for the National Bureau of Economic Research.
- Harhoff, D., Narin, F., Scherer, F. M., & Vopel, K. (1999). Citation frequency and the value of patented inventions. *Review of Economics and Statistics*, 81(3), 511–515.

³ A collection of these shared observations of the history of thought and the institutions important for scholarship in industrial organization would by itself make an entire article.

⁴ For just a couple of examples, in one case to make the point that a manuscript was unnecessarily complicated, Mike quoted Henry David Thoreau recommending simplicity and also quoted the Emperor Joseph in the movie, *Amadeus*, admonishing Mozart on the premiere of Mozart's "Marriage of Figaro" that he had "Too many notes!" Pointing up an unfortunate mis-spelling that dramatically changed the meaning of a passage in another manuscript, Mike quoted a caustic song written by Tom Lehrer.

⁵ See footnote 1 for a link to a detailed list of appointments, service to the profession, and honors.

- Harhoff, D., Scherer, F. M., & Vopel, K. (2003). Exploring the tail of patent value distributions. In O. Granstrand (Ed.), *Economics, law, and intellectual property* (pp. 279–309). Boston: Kluwer.
- Jaffe, A., & Chappell, N. (this issue). Intangible investment and firm performance. *Review of Industrial Organization* (in press).
- Leegin v. PSKS, Inc. (2007). 127 S. Ct. 2705.
- Link, A. N., & Scott, J. T. (this issue). Propensity to patent and firm size for small R&D-intensive firms. *Review of Industrial Organization* (in press).
- Peck, M. J., & Scherer, F. M. (1962). *The weapons acquisitions process: An economic analysis*. Boston: Harvard Business School Division of Research.
- Ravenscraft, D. J., & Scherer, F. M. (1987). *Mergers, sell-offs, and economic efficiency*. Washington, D.C.: Brookings.
- Scherer, F. M. (1964). *The weapons acquisition process: Economic incentives*. Boston: Harvard Business School Division of Research.
- Scherer, F. M. (1965). Firm size, market structure, opportunity, and the output of patented inventions. *American Economic Review*, 55(5), 1097–1125.
- Scherer, F. M. (1966). Time-cost trade-offs in uncertain empirical research projects. *Naval Research Logistics Quarterly*, 13(1), 71–82.
- Scherer, F. M. (1967a). Market structure and the employment of scientists and engineers. *American Economic Review*, 57(3), 524–531.
- Scherer, F. M. (1967b). Research and development resource allocation under rivalry. *Quarterly Journal of Economics*, 81(3), 359–394.
- Scherer, F. M. (1970). *Industrial market structure and economic performance* (1st ed.). Chicago: Rand McNally.
- Scherer, F. M. (1979). The welfare economics of product variety: An application to the ready-to-eat cereals industry. *Journal of Industrial Economics*, 28(2), 113–134.
- Scherer, F. M. (1980). *Industrial market structure and economic performance* (2nd ed.). Chicago: Rand McNally.
- Scherer, F. M. (1982a). Demand-pull and technological invention: Schmookler revisited. *Journal of Industrial Economics*, 30(1), 225–237.
- Scherer, F. M. (1982b). Interindustry technology flows in the united states. *Research Policy*, 11(4), 227–245.
- Scherer, F. M. (1982c). Interindustry technology flows and productivity growth. *Review of Economics and Statistics*, 64(4), 627–634.
- Scherer, F. M. (1983a). R&D and declining productivity growth. *American Economic Review*, 73(2), 215–218.

- Scherer, F. M. (1983b). Concentration, R&D, and productivity change. *Southern Economic Journal*, 50(1), 221–225.
- Scherer, F. M. (1983c). The propensity to patent. *International Journal of Industrial Organization*, 1(1), 107–128.
- Scherer, F. M. (1983d). The economics of vertical restraints. *Antitrust Law Journal*, 52(3), 687–707.
- Scherer, F. M. (1984a). Using linked patent and R&D data to measure interindustry technology flows. In Z. Griliches (Ed.), *R&D, patents, and productivity* (pp. 417–461). Chicago: University of Chicago Press for the National Bureau of Economic Research.
- Scherer, F. M. (1984b). *Innovation and growth: Schumpeterian perspectives*. Cambridge, MA: MIT Press.
- Scherer, F. M. (1984c). Technological change and the modern corporation. In B. Bock, H. J. Goldschmid, I. M. Millstein, & F. M. Scherer (Eds.), *The impact of the modern corporation* (pp. 270–297). New York: Columbia University Press.
- Scherer, F. M. (1990). Sunlight and sunset at the Federal Trade Commission. *Administrative Law Review*, 42(4), 461–487.
- Scherer, F. M. (1993). Lagging productivity growth: Measurement, technology, and shock effects. *Empirica*, 20(1), 5–24.
- Scherer, F. M. (1996). *Industry structure, strategy, and public policy*. New York: Harper Collins.
- Scherer, F. M. (1998). The size distribution of profits from innovation. *Annales d'Economie et de Statistique*, (49/50), 495–516.
- Scherer, F. M. (2000). The pharmaceutical industry. In A. J. Culyer & J. P. Newhouse (Eds.), *Handbook of health economics* (pp. 1298–1336). Amsterdam: Elsevier Science.
- Scherer, F. M. (2003). Technology flows matrix estimation revisited. *Economic Systems Research*, 15(3), 327–358.
- Scherer, F. M. (2004). *Quarter notes and bank notes: The economics of music composition in the eighteenth and nineteenth centuries*. Princeton, NJ: Princeton University Press.
- Scherer, F. M. (2009). The political economy of patent policy reform in the United States. *Journal on Telecommunications and High Technology Law*, 7(2), 167–216.
- Scherer, F. M. (2011). Abuse of dominance by high-technology enterprises: A comparison of U.S. and E.C. approaches. *Economia e Politica Industriale-Journal of Industrial and Business Economics*, 38(1), 39–62.
- Scherer, F. M. (2015a). The Federal Trade Commission, oligopoly, and shared monopoly. *Review of Industrial Organization*, 46(1), 5–23.
- Scherer, F. M. (2015b). First mover advantages and optimal patent protection. *Journal of Technology Transfer*, 40(4), 559–580.

Scherer, F. M., Beckenstein, A., Kaufer, E., & Murphy, R. D. (1975). *The economics of multi-plant operation: An international comparisons study*. Cambridge, MA: Harvard University Press.

Scherer, F. M., & Ross, D. (1990). *Industrial market structure and economic performance* (3rd ed.). Boston: Houghton Mifflin.