

# Research on the Economics of Libraries

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ECONOMICS CAN BE DEFINED by both its subject matter and its approach. Although people tend to think of economics in connection with buying and selling, its subject, more generally, is *choices*: the allocation of resources among competing ends. Economics can be and has been applied to virtually every sphere of human behavior: not just in the market, but in such diverse areas as crime, marriage and discrimination<sup>1</sup>—wherever people are making choices among competing alternatives.

The essence of the economic approach is its assumptions: (1) that people generally behave rationally to maximize their utility or well-being, and (2) that they compare costs and benefits and allocate their resources, including time and money, to achieve this goal. One way in which people act to increase their utility is to trade resources in the market. Economics further assumes that the market generally, but not always, results in the allocation of goods and services that creates the greatest net benefit for all concerned. This description of the economic approach, of course, is an extreme simplification. Becker<sup>2</sup> and MacKenzie<sup>3</sup> have described the economic approach at greater length.

The economic approach can be applied to many topics and has been applied recently to a topic which includes libraries—the economies of information.

Two major research areas are subsumed to by the term *the economics of information*. One is concerned with the role that information

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plays in market activities, that is, with information as an input or as an element in economic activity and decision-making.<sup>4</sup> The other is concerned with information as a product or output, a commodity that is produced and disseminated. Much of the research in this area deals with information services, as distinct from information itself. It consists of the application of economic tools and concepts to those organizations and individuals (including libraries, librarians, publishers, and other information services and professionals) that produce information and related products and services: the information industry.

The subject of this review is the economics of libraries, which falls under the information-as-output branch of the economics of information. Libraries produce not information but information services; that is, libraries give access to and assistance in using information. The economics of libraries is concerned with the choices that are made within and about libraries. Presumably, the goal of the library is to provide the maximum benefit to its clients, given the available resources. Decisions have to be made about which services the library will provide, to what extent and to whom; and about how best to allocate the library staff, collection and other resources among different activities to produce those services. Other decisions affecting the library are made by potential users and by funding agencies. Libraries' clients make decisions about whether to use libraries, how much and for what purposes. Funders (governments, colleges and universities, and other parent institutions) decide how much to spend on library services.

The economics of libraries is shaped in part by the unusual nature of information. Information is intriguingly different from most other commodities. For example, it is possible to sell it and keep it at the same time, because one still knows what one tells someone else. It is difficult to value information apart from the use to be made of it, meaning that the same information has different values to different people and in different contexts. Furthermore, like education, to which information is frequently compared, information also has value to people other than its immediate consumer.

Partly as a result of the unusual nature of information, many information services are tax-supported rather than being bought and sold on the market. The library manager, therefore, turns to the economist for help in making decisions that might otherwise be made by the market, or with the help of market information. The public support of library services also gives rise to questions about the proper roles of the public and private sectors in the provision of information services,

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about which library services should be publicly funded, and how such services should be funded.

The present review summarizes the major applications of economic theory and research methods to libraries. Within the space available, it is impossible to cite all the relevant research on the economics of libraries—let alone that on the economics of information and information services more generally—or to do an historical survey. This review discusses the major topics in the economics of information as it has been applied to libraries and cites important or representative current research.

This review begins by describing several overviews of the economics of information and of library services. Then it considers research related to the supply of library services—that is, the mix of services and the amount of each provided. Supply decisions depend on the means by which services can be generated, and the inputs required and their costs. Next it reviews research into the demand for library services. Then it summarizes the discussions of the reasons for and the implications of tax support for libraries, and the appropriate role of user fees, important issues because so many libraries are in the public sector. Finally, to function effectively libraries need adequate numbers of skilled professionals, and so the last section reviews research into the information labor market.

### **Overviews**

No single introductory text or literature review adequately covers the economics of libraries. Several reviews, collections, and bibliographies, however, are available to acquaint readers with the economics of information services and libraries. The most recent is a collection of key papers on the costs, pricing and value of information products and services edited by King, Roderer and Olsen.<sup>5</sup> Casper<sup>6</sup> provides a succinct and readable introduction to some key issues. Over the past fourteen years, the *Annual Review of Information Science and Technology* has featured three reviews of the topic: those by Cooper,<sup>7</sup> Hindle and Raper,<sup>8</sup> and Wilson.<sup>9</sup> Varlejs<sup>10</sup> has a good selected annotated bibliography. Finally, Olsen's comprehensive bibliography<sup>11</sup> is now dated but remains useful as a conceptualization of the field of the economics of information and as an exhaustive review of the literature up to that time.

## The Supply of Library Services

In the private sector, which goods and services will be produced and how much of each depend on what consumers are willing to buy, what suppliers are willing to sell, and at what prices. When services are not sold on the market, these decisions have to be made in other ways. The library manager must decide which services to provide, how much of each, and the allocation of resources (including staff and collection) among them. This, generally speaking, is the subject of research into the supply of library services: relating benefits, outputs, and inputs to determine how the library can maximize its benefits within the constraints of its budget and available technology.

A major problem confronting the researcher is that of defining and measuring the library's outputs. Libraries provide many different services, some of which (e.g., circulation) are easier to measure than others (e.g., archiving materials against future need). Some researchers have used one output measure (usually circulation), others have used several (e.g., circulation, reference and in-house use of materials). Hamburg<sup>12</sup> defined the basic output of the library as hours of exposure of individuals to documents, into which he translated other measures of library use, such as circulation and reference. Bookstein<sup>13</sup> defines the product of the library as service potential, on the grounds that measures of output such as circulation reflect demand as much as supply. He demonstrates that this abstract nature of library service has stymied microeconomic analysis of the library, and that basing allocation decisions on measurable outputs such as circulation will result in inefficient decisions.

### *Production Functions*

Research into the supply of library and information services can be divided into several major topics: the development of production functions; costing; and cost-benefit or cost-effectiveness analysis. A production function relates the mix of inputs (e.g., staff, collection, equipment) to a single measure of output (e.g., circulation). The usual procedure is to use cross-sectional data from a set of similar libraries to derive a mathematical function describing how changes in the levels of the different inputs affect the volume of output. An underlying assumption is that the sample libraries are producing the maximum output possible with the resources at their disposal. The resulting function shows the trade-offs among different inputs at a given level of output, and gives the optimal mix of inputs to produce a defined level of output. It can be used to determine whether there are economies of scale

in production, that is, to determine the most efficient size for a library. It can also be combined with cost and budget information to determine the allocation of the organization's budget across different resources needed to maximize the outputs produced under a fixed budget, or the budget needed to produce a given level of service.

Early attempts to describe a library production function include one developed for the National Advisory Commission on Libraries by Baumol and others<sup>14</sup> and Goddard's<sup>15</sup> for a sample of Indiana public libraries. More recently, Hayes<sup>16</sup> has derived production functions for several groups of public libraries to optimize the allocation of resources between capital and labor for a central library, for a branch library and for a system composed of both. Hayes and Borko<sup>17</sup> developed a production function for of academic libraries which related faculty research productivity to collection size.

#### *Costs, Cost Functions, and Production Functions*

Costs are fundamental to economic analysis. Many studies have measured the costs of various library services and functions. Mick<sup>18</sup> concludes an extensive review of the literature on the cost analysis of information systems and services by saying that, while there is no lack of methodological tools for costing, the applications studies lack standardization and therefore reliability and external validity. He calls for more standardization so that cost data can be generalized from one library to another. His point is well-taken: the costs of a specific operation in a specific library developed for a specific purpose may have little in common with those of the same operation in another library developed for quite another purpose. It is this author's contention, however, that such generalizations are neither possible nor desirable. As Bickner<sup>19</sup> says, costs depend on the choice and the chooser. Which cost elements are included and how they are evaluated depends on the comparisons made.

Of more general interest are studies in which the major product is not a measure of costs but rather methods or models for costing that can be used in a variety of circumstances. For example, Palmour and his colleagues<sup>20</sup> present a methodology for comparing the costs of owning versus borrowing periodicals. Lawrence<sup>21</sup> simplified and adapted their model to collection storage decisions. Wiederkehr<sup>22</sup> developed a complex model for comparing the costs of different library catalog formats. The usefulness of these studies is that their methods can be translated to other situations.

In addition to measuring costs, the economist tries to understand how they are determined (and, by implication, how they can be reduced). Cost functions relate total costs to the mix of services provided, describe the effects of changes in levels of outputs on total costs and estimate the cost trade-offs among different services. Like production functions, they are used to test for economies of scale.

An interesting application of a cost function to libraries is Kantor's<sup>23</sup> Best Trade Off function. For samples of similar libraries, he regressed total costs on three measures of library output: circulation, reference and in-house use of materials. He then proposed<sup>24</sup> that the deviation of a given library's cost of operation from that predicted by the average cost function (based on its output levels) could be interpreted as its reserved capacity (if positive) or as its overload (if negative). That is, if a library is spending more than it should for a given mix of outputs, as predicted by the function, the library is assumed to have the capacity to provide more service than is being demanded of it; if its costs are low for its level of output, it is being overused.

### *Economies of Scale*

Both cost and production functions have been applied to the question of optimal library size. The basic question is whether libraries experience economies of scale, that is, whether large libraries can provide service of a given quality at a lower cost per unit. If so, there may be an optimal size for a library of a particular type, or at least there may be reason to consolidate libraries into larger units. Either production or cost functions can be used to test for economies of scale: (1) production functions by looking at whether outputs increase faster than inputs, and (2) cost functions by comparing the rates of increase of total costs (rather than inputs) and outputs.

Several problems exist with the current research on economies of scale, including the definition and measurement of outputs and the inability to measure service quality. The research findings are inconclusive. Cooper<sup>25</sup> found approximately constant returns to scale among California public libraries. From a national sample of public libraries, Feldstein<sup>26</sup> concluded that there were slight economies of scale for larger libraries which were wiped out by the added costs of multibranch systems. Among academic libraries, Cooper found diseconomies of scale among smaller college and university libraries<sup>27</sup> and economies of scale among larger ones.<sup>28</sup> Kantor found slight diseconomies among academic libraries<sup>29</sup> and he found economies of scale in scientific and technical libraries.<sup>30</sup>

*Productivity*

Another consideration in cost determination is the investigation of trends in costs and productivity in libraries and information services over time. As early as 1967, Baumol and his colleagues<sup>31</sup> warned that the labor-intensive nature of information services would mean that their costs would increase faster than those in the economy as a whole and said that increased use of capital (e.g., equipment) could balance increasing labor costs to keep costs down. The result would be growing costs for services (including libraries) relative to the rest of the economy. They suggested that automation was the answer. Baumol and Blackman have recently noted,<sup>32</sup> however, that the decline in computer hardware prices has increased the share of software and other labor-intensive activities in the total cost of computing, leaving the "electronic library" in the same situation as the conventional library. Others have disagreed, however. White<sup>33</sup> analyzed the costs of public library services and found that there have been productivity improvements in the past, although not in the last two decades, and argued that computers offer the hope of considerable additional improvements in productivity.

What is important about this line of research is its implications for libraries' future ability to maintain service levels without exponentially increasing budgets, and its evaluations of alternative actions that might be undertaken to stave off the disasters predicted by Baumol. It is not at all clear whether libraries can expect increasing or static productivity, with or without computers. Further research is needed into the internal and external factors that affect library productivity.

*Cost-Effectiveness, Cost Benefit, and Value*

Decisions about the allocation of resources to and within libraries are based on comparing costs and benefits or value. As difficult as output is to measure, it is even more difficult to evaluate its worth, especially for outputs not bought and sold on the market. Cost-benefit and cost-effectiveness analysis are methods of comparing the costs and benefits of alternatives. The difference between them is the measure of value or benefit used and the uses to which such methods can be put.

Comparing library services to other, dissimilar uses of the same resources (e.g., another chemistry lab for the campus or patrol cars for the local police department) ideally requires the ability to express the costs and benefits of both activities in common units of measure. True cost-benefit analysis reduces all possible costs and benefits to dollars. Cost-effectiveness expresses the results or value of the activity in mea-

asures of effectiveness: cost effectiveness can only be used to compare alternatives that have the same objectives. For example, cost-effectiveness measures can be used to compare different methods of providing the same library service. Cost-effectiveness is less general than cost-benefit, and can only be used for resource allocation decisions within the library. Cost-benefit analysis can be used to compare library services with other activities. As with cost studies, the results of cost-benefit and cost-effectiveness studies generally lack external validity; that is, they are only true for the particular situation being studied. The methods, however, can be translated to many other situations. Flowerdew and Whitehead<sup>34</sup> and Oldman and Willis<sup>35</sup> reviewed the literature on cost-benefit analysis of information services and concluded that most of what has passed for cost-benefit analysis is really cost-effectiveness; that is, benefits are not expressed in dollar terms. The reason for this is the difficulty of evaluating in monetary terms the services provided by libraries and related agencies.

Griffiths<sup>36</sup> reviewed the literature on the value of information and related systems, products and services. Some interesting attempts have been made at cost-benefit analysis of libraries and information centers. Mason and Sassone<sup>37</sup> developed a method of evaluating the benefits of information centers according to the value of the user time saved. Newhouse and Alexander<sup>38</sup> addressed the question of how a public library should allocate its book budget among different subject areas to maximize social benefit. They valued a book loan according to the book's purchase price and the likelihood that the user would have bought it had the library not provided it. For the New York Public Library branch system, Getz<sup>39</sup> derived values for each use (circulation plus in-house use of materials) from the cost to the user (in travel time and transit fare) of traveling to the next closest branch. By relating levels of use to service levels and estimating the marginal costs of different services, he could compare the marginal costs of generating additional uses through changes in the service levels to marginal benefits. Raffel and Shishko<sup>40</sup> asked academic library users to make direct evaluations by giving them a limited budget to allocate across a range of services, each with a price attached.

Two studies have inferred the value that library managers place on services from their past budget decisions. Hamburg and his colleagues<sup>41</sup> translated all measures of library output into user hours of exposure to library materials. Using national public library data, they then imputed the value of exposure hours by relating library expenditures on various services to the exposure hours that they produced. This approach



assumes that the decisions that library managers have made are, on average, optimal. Unfortunately, when Hamburg et al. found different values for groups of libraries of different sizes, they concluded that larger libraries are less efficient. They might as easily have concluded that the value of exposure hours in larger libraries (with a greater variety of services) is greater. Another *post hoc* study, at the University of Durham,<sup>42</sup> used a linear programming model to measure the trade-offs that library managers had made in allocating resources among services. The marginal values of various services were inputted by comparing the resources allocated to them and the levels of output that resulted.

Each of these studies has its limits, but the methods are useful beginnings to valuing library services. One major shortcoming of cost-benefit analysis is its inability to place relative values on the benefits to different groups. Raffel<sup>43</sup> notes that this is where economic analysis gives way to political analysis: the economist cannot tell the manager how to equate different groups' preferences.

### **Demand For Information Services**

The demand for a good or service is a function of many factors—economic and otherwise. The analysis of the demand for library services is complicated by the fact that they are often provided at no direct monetary cost to the user. Thus, nonmonetary factors, which are difficult to identify and to measure, are that much more important in determining demand for library services.

Demand for library services can be divided into demand for the provision of the service and demand for its use. The first has to do with the factors that determine the level of library service that its parent institution chooses to support. At this point economics shades into political science, with a mutual concern for the process of collective decision-making. In public libraries, Feldstein<sup>44</sup> attempted to explain expenditures on public libraries as a function of community characteristics and past expenditure levels. Getz<sup>45</sup> related library expenditures and service levels (e.g., volumes, hours) to community characteristics and local economic conditions.

Whereas in public libraries models of the demand for provision of library services have been used to explain decisions that have already been made, in academic libraries such models have been used to guide decision-making. Several universities, especially multicampus systems, have used a function based on campus characteristics (e.g., numbers of students and faculty and numbers of degrees offered) to determine

library budgets.<sup>46</sup> Generally, these functions are initially developed by analyzing past expenditure levels, on the assumption that past decisions were acceptable; and the implicit bases for these decisions can be made explicit and used to guide future budget decisions.

The other kind of demand is for use of library services. This is the subject of user studies, of which there have been many in all types of libraries (e.g., see Zweizig and Dervin<sup>47</sup>). This review is only concerned with those that were based on economic theory.

Feldstein<sup>48</sup> used consumer choice theory to relate circulation to demographic characteristics of the community as a whole and to relate circulation measures of the price, search cost and quality of library service. Getz<sup>49</sup> hypothesized that decisions about use and levels of service were interdependent. That is, more service (e.g., larger bookstocks) is provided where use is greatest, and vice versa. Getz's two-stage approach involves first relating levels of service to exogenous variables (e.g., cost of space and political power of an area), and then relating its use to levels of service. Van House<sup>50</sup> described the individual's use of the library as a function of its nonmonetary costs, which depended on the amount of user time required and its value, which varied in turn across users and uses. By placing a monetary value on nonmonetary user costs, she could also use her model to consider the effect on use of introducing fees. Casper<sup>51</sup> explained the number of requests originated by institutional users of medical library services as a function of the institutions' characteristics.

## Finance

Because many libraries are tax-supported, an important topic within the economics of libraries is how such libraries are financed—including whether, when and how users should be charged. Public finance is that branch of economics that is concerned with under what conditions the public provision of a good or service is justified. The criteria for public provision of a good or service and the ways in which these criteria have been applied to information in general and to libraries in particular are too complex to do them justice here. However, it is possible to summarize them by stating that public intervention is justified when the nature of the good or service is such that leaving its provision to the market would not result in the greatest possible social benefit.

Numerous researchers have applied public finance theory to the question of whether public libraries should be publicly-supported,

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among them White,<sup>52</sup> Goddard,<sup>53</sup> Getz,<sup>54</sup> Braverman,<sup>55</sup> Gell,<sup>56</sup> and Van House.<sup>57</sup> There is no consensus among them. What the reader can conclude, however, is that public support of library services is debatable, and the answers are not easy.

Little empirical research is possible in this area. Two relevant investigations, however, are those by White<sup>58</sup> and Weaver and Weaver<sup>59</sup> of the tax incidence of public library services. Both studies compared the demographics of library users to the extent to which different parts of the population pay the taxes that support the public library. Weaver and Weaver used national data; White's were for the Philadelphia Free Library. Both concluded that low-income people pay relatively heavy taxes to support the library but receive little benefit from it. Both argued that the current method of supporting public libraries is therefore basically inequitable.

### *Fees*

The question of whether publicly-funded libraries should charge fees (and, if so, for what, and how they should go about setting them) has been of particular interest since many libraries started charging fees for online searches.<sup>60</sup> Most of the discussions of fees—as with those of public finance—are concerned with under what circumstances fees are or are not justified. Discussions of fees include those by Casper,<sup>61</sup> Cooper,<sup>62</sup> Gell,<sup>63</sup> Blake and Perlmutter,<sup>64</sup> and Van House.<sup>65</sup> As with the public finance discussions, no firm conclusions have been reached.

Waldhart and Bellardo<sup>6</sup> reviewed the literature on fees in publicly-funded libraries comprehensively and concluded that, in order to determine when and how fees should be charged, more information is needed on the impact of fees on users' access to information. Little research has been done, however, on the effect of fees on user behavior or on library services. Hicks<sup>67</sup> studied the Dallas Public Library's nonresident fee, and concluded that it had the intended effect of reducing use among nonresidents. Casper<sup>68</sup> estimated the price elasticity of demand for library services among institutional users of a medical library. Cooper and DeWath (Van House)<sup>69</sup> measured the effect of fees on librarians' behavior and the cost of online searches.

One of the most comprehensive discussions of fees is that by Van House<sup>70</sup> who reviewed the public finance basis for fees in public libraries and developed a model of demand for services into which fees can be incorporated. The model also used the value of the user's time to predict different user groups' responses to fees of different kinds. Van House did not test the model empirically, however.

## The Library Labor Market

An important component of the information industry is the people that it employs. Several recent developments have shaped the research in this area. One is the imbalances experienced by the library labor market: the shortage of librarians of the 1950s and 1960s has been followed by a chronic (if low-level) surplus. Another is the development of a market for information professionals in settings other than libraries: the growth of computer-related work, in particular, has opened new possibilities for people with training in library and information science. Finally, concerns about the causes of sex differentials in career patterns and salaries within the labor force generally have raised questions about possible inequities in librarianship in particular.

The Occupational Survey of Information Professionals<sup>71</sup> measured and described the information profession by function and by setting, using an all-inclusive definition of an information professional. A more detailed study of the library labor market, with some reference to the nonlibrary information market, was the Library Human Resources Study,<sup>72</sup> which collected exhaustive descriptive information on library employment and education and developed forecasts of supply and demand based on models that relate the state of the library labor market to conditions in libraries and the economy as a whole. In this study, Cooper<sup>73</sup> developed further the demand modeling and Van House<sup>74</sup> the supply modeling. The conclusions were that that library market would probably remain fairly well balanced and stable through the 1980s, with most job openings coming from retirements and occupational transfers rather than new positions.

Van House's models of librarian supply were grounded in human capital theory, the fundamental premise of which is that people invest in themselves (through education, for example) in the expectation of future monetary and nonmonetary returns. She also calculated the return on investment in library education<sup>75</sup> and found that that it was negative, more so for men than for women. The differences between what librarians might have earned in other occupations and what they earn as librarians, are greater for men than for women, on average. Van House suggested that the predominance of women in the profession could be explained in part by the occupation's greater opportunity cost for men.

Another study of the library labor market, performed by Heim and Estabrook,<sup>76</sup> related personal, career and professional differences to salaries for a sample of American Library Association members. Heim

and Estabrook found differences between the salaries of men and women that remained statistically significant after factors other than gender had been taken into account.

### **Conclusions and Implications**

Research on the economics of libraries and information services began in the mid-190s with the work done by Baumol and his colleagues for the National Advisory Commission on Libraries.<sup>77</sup> Since that time, economic theory and methods have contributed significantly to our understanding of library services and operations. They have also pointed toward future problems and opportunities that will require attention from library and information science researchers.

This review has suggested some areas where more research is needed. One such area is the definition and measurement of library outputs, including measures of service quality as well as quantity. Another is that of value. Many different approaches to valuing library services have been proposed: can one best method be identified? Some researchers have tackled the problem of measuring the information industry's contribution to the economy as a whole.<sup>78</sup> Is it possible to measure the economic effects of libraries of various sorts, as others have measured the contribution of a variety of education programs to the Gross National Product? A more manageable problem, perhaps, is that of developing cost and production functions when the library's output is more readiness to serve than actual (measurable) services provided. And more research is required on the pragmatic problems of relating service levels to inputs and costs. The question of whether there is an optimal size for libraries of various sorts has yet to be fully answered. Another area in need of attention is demand for library services. The current demand functions explain only a small part of the observed variation: more systematic research is needed into the determinants of demand for both service provision and use in all types of libraries. If an increased use of fees is in the future of many libraries, as some have predicted, then more information is needed on the effects of fees on users and librarians, and on how to set fees in conformity with the library's goals. Finally, more information is needed on the dynamics of the information labor market if libraries are to be sure to have qualified staff in adequate numbers and librarians are to have jobs.

This list of research needs is just a beginning. Economics is a large and diverse field, and its possible applications to information and to library services many and varied. Library researchers can take their cue

from researchers in such fields as the economics of education and the economics of health services, where many problems have proven amenable to economic analysis.

Research into the economics of information, however, has suffered from the lack of a critical mass of researchers in this area. As is true of research generally, progress requires a community of people with similar interests and expertise to stimulate and critique one another's work. Much of the economic research on library issues has consisted of one or, at best, a very few studies, with little continuity and few attempts to build on previous work. One reason for this lack—as in other areas where the conceptual base of another discipline is being applied to libraries—is that good research requires that investigators have expertise in both subject areas. Ideally, research into the economics of libraries would be a contribution to both disciplines: not just a functional application of long-standing economic theories and methods to libraries, as much of the research cited in this review has been, but also research that expands our understanding of economics in the process of applying and adapting it to libraries.

## References

1. See, for example Becker, Gary S. *The Economic Approach to Human Behavior*. Chicago: University of Chicago Press, 1976.
2. Ibid.
3. McKenzie, Richard B. "The Economist's Paradigm." *Library Trends* 28(Summer 1979):7-24. Also in *Key Papers in the Economics of Information*, edited by Donald W. King, et al., pp. 136-53. White Plains, N.Y.: Knowledge Industry Publications, 1983.
4. For a review of this topic, see Spence, A. Michael. "An Economist's View of Information." In *Annual Review of Information Science and Technology*, vol. 9, edited by Carlos A. Cuadra and Ann W. Luke, pp. 57-78. Washington, D.C.: American Society for Information Science, 1974.
5. King, Donald W., et al. *Key Papers in the Economics of Information*. White Plains, N.Y.: Knowledge Industry Publications, 1983.
6. Casper, Cheryl A. "Economics and Information Science." In *Information Science in Action: System Design* (Proceedings of the NATO Advanced Study Institute on Information Science, Crete, Greece, 1-11 Aug. 1978), edited by Anthony Debons and Arvid G. Larson, vol. II, pp. 565-72. Boston: Nijhoff, 1983.
7. Cooper, Michael D. "The Economics of Information." In *Annual Review of Information Science and Technology*, vol. 8, edited by Carlos A. Cuadra and Ann W. Luke, pp. 5-40. Washington, D.C.: American Society for Information Science, 1973.
8. Hindle, Anthony, and Raper, Diane. "The Economics of Information." In *Annual Review of Information Science and Technology*, vol. 11, edited by Martha E. Williams, pp. 27-54. Washington, D.C.: American Society for Information Science, 1976.
9. Wilson, John H., Jr. "Costs, Budgeting, and the Economics of Information Processing." In *Annual Review of Information Science and Technology*, vol. 7, edited by Carlos Cuadra and Ann W. Luke, pp. 39-68. Washington, D.C.: American Society for Information Science, 1972.

## Research on the Economics of Libraries

10. Varlejs, Jana, ed. *The Economics of Information*. Jefferson, N.C.: McFarland & Co., 1982.
11. Olsen, Harold A. "The Economics of Information: Bibliography and Commentary on the Literature." *Information-Part 2* (March-April 1972):1-26.
12. Hamburg, Morris, et al. *Library Planning and Decision-Making Systems*. Cambridge, Mass.: MIT Press, 1974.
13. Bookstein, Abraham. "An Economic Model of Library Service." *Library Quarterly* 51(Oct. 1981):410-28.
14. Baumol, William J., et al. "The Cost of Library and Informational Services." In *Libraries at Large: Tradition, Innovation, and the National Interest*, edited by Douglas M. Knight and E. Shepley Nourse, pp. 168-227. New York: R.R. Bowker, 1969.
15. Goddard, Haynes C. "Analysis of Social Production Functions: the Public Library." *Public Finance Quarterly* 1(April 1973):191-204.
16. Hayes, Robert M. "The Management of Library Resources: the Balance Between Capital and Staff in Providing Services." *Library Research* 1(March 1979):119-42.
17. Hayes, Robert M., and Borko, Harold. "Mathematical Models of Information System Use." *Information Processing and Management* 19(no. 3, 1983):173-86.
18. Mick, Colin K. "Cost Analysis of Information Systems and Services." In *Annual Review of Information Science and Technology*, vol. 14, edited by Martha E. Williams, pp. 37-64. White Plains, N.Y.: Knowledge Industry Publications, 1979.
19. Bickner, Robert E. "Concepts of Economic Cost." In *Cost Considerations in Systems Analysis*, edited by Gene H. Fisher, pp. 24-63. New York: Elsevier North-Holland Inc., 1971. Also in *Key Papers in the Economics of Information*, pp. 10-49.
20. Palmour, Vernon E., et al., *Costs of Owning, Borrowing, and Disposing of Periodical Publications*. Arlington, Va.: Public Research Institution, 1977.
21. Lawrence, Gary S. "A Cost Model of Storage and Weeding Programs." *College & Research Libraries* 42(March 1981):139-47.
22. Wiederkehr, Robert R. V. *Alternatives for Future Library Catalogs: a Cost Model*. Rockville, Md.: King Research, Inc., 1980.
23. Kantor, Paul B. "Cost and Productivity in Library Operations." In *Productivity in the Information Age* (Proceedings of the 46th ASIS Annual Meeting, vol. 20, Washington, D.C., 1983), edited by Raymond F. Vondran, et al., pp. 297-300. White Plains, N.Y.: Knowledge Industry Publications, 1983; "Levels of Output Related to Cost of Operation of Scientific and Technical Libraries." *Library Research* 3(Spring 1981):1-28; and \_\_\_\_\_ . "Levels of Output Related to Cost of Operation of Scientific and Technical Libraries: Part II. A Capacity Model of the Average Cost Formula." *Library Research* 3(Summer 1981):144-54.
24. \_\_\_\_\_ , "Cost and Productivity."
25. Cooper, Michael D. "Economics of Library Size: A Preliminary Inquiry." *Library Trends* 28(Summer 1979):63-78.
26. Feldstein, Kathleen Foley. "The Economics of Public Libraries." Ph.D. diss., Massachusetts Institute of Technology, 1976.
27. Cooper, Michael D. "Economies of Scale in Academic Libraries." *Library and Information Science Research* 5(Summer 1983):207-19.
28. \_\_\_\_\_ . "Economies of Scale in Large Academic Libraries." (unpublished manuscript,) University of California at Berkeley, 1983.
29. Kantor, "Cost and Productivity."
30. \_\_\_\_\_ . "Levels of Output."
31. Baumol, et al, "The Cost of Library and Informational Services"; and Baumol, William J., and Marcus, Matityahu. *Economics of Academic Libraries*. Washington, D.C.: American Council on Education, 1973.
32. Baumol, William J., and Blackman, Sue Anne Batey. "Electronics, the Cost Disease, and the Operation of Libraries." *JASIS* 34(May 1983):181-91.
33. White, Lawrence J. *The Public Library in the 1980's: the Problems of Choice*. Lexington, Mass.: Lexington Books, 1983.

34. Flowerdew, A.D.J., and Whitehead, C.M.E. *Cost-Effectiveness and Cost/Benefit Analysis in Information Science*. London: London School of Economics and Political Science, 1974.
35. Oldman, Christine, and Wills, Gordon. *The Beneficial Library*. Bradford-West Yorkshire, England: MCB Books, 1977.
36. Griffiths, José Marie. "The Value of Information and Related Systems, Products, and Services." In *Annual Review of Information Science and Technology*, vol. 17, edited by Martha E. Williams, pp. 269-84. White Plains, N.Y.: Knowledge Industry Publications, 1982.
37. Mason, Robert M. and, Sassone, Peter G. "A Lower Bound Cost Benefit Model for Information Services." *Information Processing and Management* 14(no. 2, 1978):71-83.
38. Newhouse, Joseph P., and Alexander, Arthur J. *An Economic Analysis of Public Library Services: Prepared for the City of Beverly Hills*. Santa Monica, Calif.: Rand Corporation, 1972.
39. Getz, Malcolm. *Public Libraries: An Economic View*. Baltimore, Md.: Johns Hopkins University Press, 1980.
40. Raffel, Jeffrey A., and Shishko, Robert. *Systematic Analysis of University Libraries: An Application of Cost-Benefit Analysis to the MIT Libraries*. Cambridge, Mass.: MIT Press, 1969.
41. Hamburg, et al., *Library Planning*.
42. University of Durham. *Project for Evaluating the Benefits from University Libraries: Final Report*. Durham, England: University of Durham, 1969.
43. Raffel, Jeffrey A. "From Economic to Political Analysis of Library Decision Making." *College & Research Libraries* 35(Nov. 1974):412-23.
44. Feldstein, "Economics of Public Libraries."
45. Getz, *Public Libraries*.
46. See, for example, Clapp, Verner W., and Jordon, Robert T. "Quantitative Criteria for the Adequacy of Academic Library Collections." *College & Research Libraries* 26(Sept. 1965):371-90.
47. Zweig, Douglas, and Dervin, Brenda. "Public Library Use, Users, Uses: Advances in Knowledge of the Characteristics and Needs of the Adult Clientele of American Public Libraries." In *Advances in Librarianship*, vol. 7, edited by Melvin J. Voight and Michael H. Harris, pp. 232-55. New York: Academic Press, 1977.
48. Feldstein, "Economics of Public Libraries."
49. Getz, *Public Libraries*.
50. Van House, Nancy A. *Public Library User Fees: the Use and Finance of Public Libraries*. Westport, Conn.: Greenwood Press, 1983; and \_\_\_\_\_. "A Time Allocation Theory of Public Library Use." *Library and Information Science Research* 5(Summer 1984):365-84.
51. Casper, Cheryl A. "Estimating the Demand for Library Service: Theory and Practice." *JASIS* 29(Sept. 1978):232-37. Also in *Key Papers in the Economics of Information*, pp. 179-84.
52. White, *The Public Library in the 1980's*.
53. Goddard, "Analysis of Social Production Functions."
54. Getz, *Public Libraries*.
55. Braverman, Miriam. "From Adam Smith to Ronald Reagan: Public Libraries as a Public Good." *Library Journal* 107(15 Feb. 1982):397-401.
56. Gell, Marilyn Killebrew. "User Fees I: the Economic Argument." *Library Journal* 104(1 Jan. 1979):19-23; and \_\_\_\_\_. "User Fees II: the Library Response." *Library Journal* 2(15 Jan. 1979):170-73.
57. Van House, *Public Library User Fees*.
58. White, *The Public Library in the 1980's*.



## *Research on the Economics of Libraries*

59. Weaver, Frederick Stirton, and Weaver, Serena Arpene. "For Public Libraries the Poor Pay More." *Library Journal* 104(1 Feb. 1979):352-55.
60. See, for example: DeWath, Nancy Van House. "Fees for Online Bibliographic Search Services in Publicly-Supported Libraries." *Library Research* 3(Spring 1981):29-45.
61. Casper, Cheryl A. "Pricing Policy for Library Service." *JASIS* 30(Sept. 1979):304-09.
62. Cooper, Michael D. "Charging Users for Library Service." *Information Processing and Management* 14(no. 6, 1978):419-27.
63. Gell, "User Fees I."; and \_\_\_\_\_, "User Fees II."
64. Blake, Fay M. and Perlmutter, Edith L. "The Rush to User Fees: Alternative Proposals." *Library Journal* 102(1 Oct. 1977):2005-10.
65. Van House. *Public Library User Fees*.
66. Waldhart, Thomas J., and Bellardo, Trudi. "User Fees in Publicly Funded Libraries." In *Advances in Librarianship*, vol. 9, edited by Michael H. Harris, pp. 31-61. New York: Academic Press, 1979.
67. Hicks, Donald A. "Diversifying Fiscal Support by Pricing Public Library Services - a Policy Impact Analysis." *Library Quarterly* 50(Oct. 1980):453-74.
68. Casper, "Estimating the Demand for Library Services."
69. Cooper, Michael D., and DeWath, Nancy A. "The Effect of User Fees on the Cost of On-Line Searching in Libraries." *Journal of Library Automation* 10(Dec. 1977):304-19. Also in *Key Papers in the Economics of Information*, edited by Donald King et al., pp. 163-178.
70. Van House, *Public Library User Fees*.
71. Debons, Anthony., et al. *The Information Professional: Survey of an Emerging Field*. New York: Marcel Dekker, 1981.
72. King Research, Inc. *Library Human Resources: A Study of Supply and Demand*. Chicago: ALA, 1983.
73. Cooper, Michael D. "Projections of the Demand for Librarians in the United States." *Library Quarterly* (in press).
74. Van House, Nancy A. "Projections of the Supply of Librarians." *Library Quarterly* (in press).
75. \_\_\_\_\_. "The Return on the Investment in Library Education." *Library and Information Science Research* (in press).
76. Heim, Kathleen M., and Estabrook, Leigh S. *Career Profiles and Sex Discrimination in the Library Profession*. Chicago: ALA, 1983.
77. Baumol, et al., "The Cost of Library and Informational Services."
78. Rubin, Michael Rogers, and Taylor, Elizabeth. "The U.S. Information Sector and GNP: An Input-Output Study." *Information Processing and Management*. 17(no. 4, 1981):163-94; Rubin, Michael Rogers, and Sapp, Mary E. "Selected Roles of Information Goods and Services in the U.S. National Economy." *Information Processing and Management* 17(no. 4, 1981):195-213; Machlup, Fritz. *The Production and Distribution of Knowledge in the United States*. Princeton, N.J.: Princeton University Press, 1962; and Porat, Marc Uri. *The Information Economy: Definition and Measurement*, 9 vols. Washington, D.C.: U.S. Dept. of Commerce, USGPO, 1977.

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