1-4-1996

The Effect of Quality on Circulation in an Aging Collection

E. Stewart Saunders
Purdue University, ssaunder@purdue.edu

Studies have shown that there is but a small relationship between book review evaluations and subsequent library circulation for recently published books. The object of this present study is to look at the relationship between review evaluations and library circulation as a collection ages or matures. The issue for librarians can be stated as follows. Does the effort to build a quality academic collection as reflected in reviewer evaluations result in greater use in the long run as reflected in higher circulation? To examine this issue two hypotheses are proposed which in broad terms ask whether quality has a temporal element, i.e., is its effect on circulation more evident as the collection matures. To test these hypotheses they are formulated in statistical terms using data from an academic collection.

Hypotheses:

1. The strength of relationship between book review evaluations and library circulation will become stronger as the book becomes older. In the first two or three years after a book is published its circulation will depend only marginally on quality as reflected in the opinion of book reviewers. After this initial period, however, “good books,” that is ones well regarded by reviewers, will have a staying power with the academic community, while “bad books” will gradually decline in favor.

2. The effect of the relationship between review evaluation and circulation as a collection ages is not discipline dependent. This means that books in all subjects respond to this maturing process or “sanctification.”

The causal model on which these hypotheses are based assumes that books are qualitatively different: some books are better than other books. It can be assumed that the quality of a book is in general reflected in the kind of review it receives. Quality is also reflected in the frequency of use or circulation. This being the case, book reviews should be a predictor of circulation, and the two measures should correlate. The model does not assume that readers read book reviews and thereby select reading material based on those reviews, but rather that the same quality which results in a good review will also result in a wider readership.

The first hypothesis has some inherent logic to support it. It seems only reasonable that academic readers will have a curiosity about a new book and will judge it for themselves rather than be influenced by reviews. Thus both "good books" and "bad books" will circulate equally when they first appear. On the other hand, as time passes, truly "good books" should become minor classics, to be revisited by students and public year after year. Just the opposite will happen to "bad books." Over time they will cease to be read and will eventually be relegated to storage or removed from the collection. The second hypothesis simply expands this generality to all subjects. The present study tests these hypotheses using a restudy of a sample of titles which were the subject of an original study carried out by John P. Schmitt[*] and E. Stewart Saunders twelve years ago.[1] The earlier study tested the relationship between review evaluations in **Choice** and circulation of the reviewed books during the first two to three years after publication. The present study adds new circulation data on the same set of books in order to see the effect of quality on circulation as the books age.

[*] I wish to thank John P. Schmitt, University of Wyoming, for his permission to reuse our original data.

One of the more remarkable of the few studies of this kind comes from Herbert Goldhor's research on the Evansville Public Library in 1958.[2] He looked at the circulation records from 1918 to 1958 of 278 titles in the Dewey classification 612-613.9. His conclusions may be summarized as follows:

1. During their first five years on the shelves there was no statistically significant relationship between circulation and review evaluation. This included circulation counts both by title and by copy.

2. Over the entire 40-year period he found a statistically significant relationship between positive reviews and higher circulation figures of each title. However, he found no relationship between positive reviews and per copy circulation (more highly rated titles had more copies).

Since Goldhor found a significant relationship between review evaluations and circulation of titles for the entire 40 year period but not for the first 5 years, this suggests that a relationship may hold for the period after the first 5 years. Goldhor, however, proposed no hypothesis about this relationship for older books, nor did he attempt to test such a relationship. Even had he done so, his results would have been suspect based on the data he used. The Evansville Public Library had had an ongoing weeding program, and so many of the books with lower review ratings had been weeded. Without the lower-rated titles in the older collection, a controlled comparison would not be possible. In addition, because the Evansville Public Library owned more copies per title of the more highly rated titles, this increased the likelihood of a higher circulation per title for these books.

Eleanor Broadus examined the relationship of reviews to circulation for all books published in 1961 which were acquired by the Northern Illinois University Library.[3] The circulation data were based on the first four years in the collection and the reviews were based both on the number of reviews received and on the ratings given by reviews. Like Goldhor she found no relationship between review evaluation and circulation of books during an initial period on the shelves. Although her data had none of the ambiguities found in Goldhor's data, no follow-up study was made.

The Original Choice Study

The 1983 study attempted to evaluate **Choice** as a source of reviews for college libraries by comparing a selection of reviews to actual circulation.

1. 310 titles were selected to meet three criteria: (1) reviewed in **Choice** between November 1978 and April 1979, (2) included a balanced representation of titles from history, philosophy, English and American literature, political science, sociology, and education, and (3) cataloged for the Purdue University Libraries between spring 1978 and summer 1979. This was a stratified cluster sample from the population of titles reviewed by **Choice** and selected for the Purdue University Libraries. Because **Choice** mainly reviews books relevant to academic libraries, titles in this sample could be considered in general as representative of the universe of academic collections.

2. Each review was read and assigned one of the following levels depending on the rating given by the reviewer:

5 - Highly recommended for broad audiences.

4 - Generally recommended for most levels of students.

3 - Recommended for specialized audiences.

2 - Reserved recommendation. Some doubts about the quality of the book.

1 - Not recommended.

3. Circulation records were examined for each title in the summer of 1981. This gave a 2 to 3.5 year shelf-period for each title. Differences in time on the shelf were randomly distributed within the sample and across review levels and therefore were not felt to affect the analysis.

This study provided modest support for the idea that a relationship may exist between circulation and the level of evaluation given by reviewers for recently published books. The Spearman rank-order correlation for all 310 titles was Rs=.137, and the probability of error from sampling was quite small (p=.008). However, when the titles dealing with the humanities (history, philosophy, and English and American literature) were tested separately, the relationship of circulation to review evaluations did not hold up. The Spearman rank-order correlation was only Rs=.043, and the probability of error was not significant (p=.3) at the .05 level. As it turned out, the correlation found for all 310 titles came from the social science titles in the sample. Tested separately, these showed a correlation of Rs=.233 and a significance of p= .002. The presence of this modest relationship can probably be ascribed to the review policy of **Choice.** **Choice** asks reviewers to consider not only the quality of work and scholarship but the appropriateness of the title for broad audiences versus specialized audiences. Reviews used by Goldhor and Broadus did not use these criteria.

Research Design

The present study regresses **Choice** review evaluations used by Schmitt and Saunders in their original study on the circulation data for an early and later time period. The circulation data for the early period are the same as those used by Schmitt and Saunders. The circulation data for the later period cover the period 1981 to 1991 and were collected in 1991. The circulation data are interval data, and the review evaluations are treated as interval data in the way that Likert scales are interval data. Not all of the 310 titles could be used in the restudy as some were missing and others had spent extended periods on reserve. After eliminating these titles from the sample, it was possible to use 293 of the original 310 titles. Analysis of the residuals indicates that the error components of the regressions approximate a normal distribution and are approximately equal.

Statistical analysis (Hypothesis I)

In order to test the hypothesis statistically, a numerical measure is needed that shows the degree to which circulation depends on the quality of a book, or as measured here, on the level of its review. For this study it was determined that a regression coefficient, B, which links review levels to circulation, should be used. Hence, the higher the value of B, the greater the influence of book quality or review level on circulation. If the regression coefficient for the second period of circulation, B_2, is significantly larger than the regression coefficient for the first period, B_1, then statistical support for the first hypothesis is present. The size of the coefficient, $B_2 - B_1$, is thus a direct measure of how much more quality influences circulation as the book collection becomes older. (See statistical appendix for the derivation of the formula used.)

The estimated value for the regression coefficient, $B_2 - B_1$, and the t-test for its significance appear in the following table. The values for B_1 and B_2 are also included in the table.

1. Regression Results for All Titles

Parameters	B_2 (second period)	B_1 (first period)	$B_2 - B_1$ (difference between second and first)
Parameter Estimates	.121	.094	.027
Null Hypothesis	$B_2 = 0$	$B_1 = 0$	$B_2 - B_1 \leq 0$
Probability of Error in Rejecting Null Hypothesis	p = .016 (two-tailed test)	p = .063 (two-tailed test)	p = .304 (one-tailed test)
R^2	.020	.012	.000

N = 293

Statistical Analysis (Second Hypothesis)

If there is a maturing effect of quality, does it apply to all subjects? To consider this point is the purpose of the second hypothesis. The sample consists of titles from the humanities and social sciences, but not from the natural sciences. While the lack of data from the natural sciences precludes a total view of this issue, the possibility of dividing the sample into humanities titles and social science titles in order to analyze each separately should not be overlooked. The logic, the formulas, and the procedures are all the same as for the first hypothesis. The only difference is that the data have been segregated into these two subject groups. Tables showing the results for each group appear below.

2. Regression Results for Humanities Titles

Parameters	B_2 (second period)	B_1 (first period)	$B_2 - B_1$ (difference between second and first)
Parameter Estimates	.029	.005	.023
Null Hypothesis	$B_2 = 0$	$B_1 = 0$	$B_2 - B_1 \leq 0$
Probability of Error in Rejecting Null Hypothesis	p = .621 (two-tailed test)	p = .939 (two-tailed test)	p = .355 (one-tailed test)
R^2	.001	.000	.001

N = 141

3. Regression Results for Social Science Titles

Parameters	B_2 (second period)	B_1 (first period)	$B_2 - B_1$ (difference between second and first)
Parameter Estimates	.216	.183	.032
Null Hypothesis	$B_2 = 0$	$B_1 = 0$	$B_2 - B_1 \leq 0$
Probability of Error in Rejecting Null Hypothesis	p = .007 (two-tailed test)	p = .008 (two-tailed test)	p = .355 (one-tailed test)
R^2	.047	.045	.000

N = 152

Conclusions

The estimated values of the regression coefficients did increase in the second period of circulation. This was true for titles in the humanities and in the social sciences as well as for all titles. The increases, however, were so small that it would be difficult to place any faith in the notion that the probability of circulation of "good books" increases with time.

Not only is the increase in the regression coefficients quite small but, as the low R^2 values indicate, the quality of a book explains very little of the variability in circulation. The small increases in regression coefficients together with the low R^2 values account for the fact that the increases in regression coefficients over time, $B_2 - B_1$, were not statistically significant at the .05 level. Statistically, therefore, one must reject the hypothesis of an increase in coefficient values between the two circulation periods.

While the analysis did not bear out the hypotheses of the investigation, a noteworthy result did emerge. This is the stability of circulation as a function of review level. This function remained stable over time. The regression coefficients for the two periods are almost identical when analyzing all of the titles (.094 and .121 for the first and second period respectively). What is more, the same is true for the humanities and social science titles considered separately. The coefficient for the humanities titles was minuscule for both periods (.005 and .029); for the social sciences it was larger (.183 and .216). This stability suggests that some sort of law is involved here, a law about the relationship between readers and books. Follow-up to this finding, however, must be the subject of another study.

Does the effort to build a quality academic collection as reflected in reviewer evaluations result in greater collection use in the long run? This is the question posed by this research. The earlier research by Goldhor, Broadus, and Schmitt and Saunders had considered this relationship for newly acquired titles and found it wanting. Since the assumption that collections of high quality are more heavily used has long been accepted in academic librarianship, the author had hoped to find statistical support for this belief

by studying the Purdue collection as it aged. The statistics do not provide such support. While the decision to acquire titles of merit will not hurt circulation, the academic librarian in his or her pursuit of excellence should not expect to find justification for this in circulation figures.

STATISTICAL APPENDIX

The purpose of this appendix is to provide more detail about the data, assumptions about data distributions, and the statistical models used to analyze the data. The circulation data for each title are the outcomes of counting distributions that are dependent on time. Most likely they are Poisson distributed. Because the regression coefficients derived from this type of data are affected by the length of time over which the data are collected and because the length of the two periods for which circulation data were gathered were different, all circulation data were transformed to a unit normal scale. This allows a direct comparison of circulation data for the two periods and eliminates the effect of time on the coefficients.

The regression equation for each period of circulation is represented by:

$$Y_2 = C_2 + B_2X + E_2 \quad \text{(second period)}$$

$$Y_1 = C_1 + B_1X + E_1 \quad \text{(first period)}$$

Notation Used in the Equations

Measures	First Period	Second Period
Circulation	Y_1	Y_2
Constant	C_1	C_2
Regression Coefficient	B_1	B_2
Review Level	X	X
Error	E_1	E_2

In order to obtain a regression coefficient representing the difference in the effect of quality between the first period of circulation and the second, the circulation for the first period was subtracted from the circulation for the second period, giving the equation

$$Y_2 - Y_1 = (C_2 - C_1) + (B_2 - B_1)X + (E_2 - E_1)$$

and the coefficient $B_2 - B_1$. The estimate of $B_2 - B_1$ is derived from a least squares fit and tested for significance using a t-test. An analysis of residuals showed the error terms to be approximately normally distributed and approximately equal.

REFERENCES

1. Schmitt, John P. and Stewart Saunders, "An Assessment of **Choice** as a Tool for Selection," **College and Research Libraries** 44 (Sept 1983): 375-80.

2. Goldhor, Herbert, "Are the Best Books the Most Read?" **Library Quarterly** 29 (Oct 1959): 251-5.

3. Broadus, Eleanor H., "A Study of the Relationship Between Book Reviews and the Circulation of Books in a University Library," unpublished MA Thesis, Northern Illinois University, 1966.