arl.wp1 6/20/06
1st rev 6/29/06
2nd rev 9/1/06
3rd rev 10/6/06
4th rev 7/12/07

RUNNING HEAD: ARL Quantitative Statistics

Some Alternative Quantitative Library Activity Descriptions/Statistics That Supplement the ARL Logarithmic Index

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Q. *What quantitative scores have historically been reported by the ARL Statistics and Measurement Program?*

A. Traditionally, the primary quantitative score reported by the ARL Statistics and Measurement Program has been the "ARL Membership Criteria Index" (hereafter, "ARL Index"). As explained within ARL documentation[1],

> The criteria for academic library membership in the Association of Research Libraries are based partly on quantitative data that provide a view of the range of resources deployed among the existing members of the Association. Statistical analysis shows a high degree of homogeneity in respect to five data categories:
>
> --volumes held
> --volumes added, gross
> --current serials
> --total library expenditures
> --total professional plus support staff
>
> Each year ARL uses the statistical method of principal component analysis to identify the commonalities in the membership. The analysis is conducted on the 35 charter members of ARL and produces coefficients, or weights, for each of the five data categories. When the data for a given library are multiplied by the weights and summed, the result is a "score" for that library. This process of multiplying by weights and summing is carried out for each ARL academic library. The resulting scores comprise what is known as the ARL Membership Criteria Index. The term "score" in this context is not a judgment about the library's quality or performance. "Score" is a term from principal component and factor analysis that refers to the summation of data. The ARL index score in effect aggregates the five measures of size and resources. Each year the current year's data in the five categories are published in <u>The Chronicle of Higher Education</u>, arranged in descending rank order by the ARL Index scores.
>
> The weights and data categories can also be applied to the data of non-ARL libraries. This technique is one of the tests used to determine potential members of the Association. Candidates for membership are required to have a score on the ARL index scale of at least -1.65 for the most recent four years in order to be considered. This criterion was established to ensure that new members share the essential characteristics of the existing members in regard to the five measures of size. The membership criteria also include other

[1] <**http://www.arl.org/newsltr/197/criteria.html**>.

requirements to ensure the homogeneity of the membership.[2]

Q. *What prior literature exists with respect to the ARL Index?*
A. A variety of articles and reports on the ARL Index have been published through the years, first by Kendon Stubbs, later by Martha Kyrillidou, as well as by persons unaffiliated with ARL (e.g., Weiner, 2005). Appendix A presents a sampling of these articles and reports.

Q. *What does the ARL Index measure?*
A. By its very nature, the ARL Index is a measure of **resources input** into the library (i.e., collections and staffing).

Q. *Why are other quantitative statistics necessary today?*
A. First, input statistics were never meant to capture all aspects of research library operation. For example, input statistics do not characterize the **output service quality** that libraries provide to users. Thus, at the October, 1999 ARL Membership Meeting, the ARL Statistics and Measurement Committee and the ARL Research Library Leadership and Management Committee initiated the ARL "New Measure Initiative." Among these initiatives have been projects such as:

--LibQUAL+®, a protocol for measuring users' perceptions of library service quality;[3]

--MINES ("Measuring the Impact of Networked Electronic Services"), a protocol for measuring users' purposes when accessing specific digital services;[4] and

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[2]See <**http://www.arl.org/stats/factor.html**> for more detail on the membership index. The formulas for recent years used to compute the ARL Index can be found at: <**http://www.arl.org/stats/index/indxform.html**>.

[3]LibQUAL+® has now been completed by more than 700,000 library users at more than 700 libraries around the world (e.g., the United States, Canada, Australia, New Zealand, England, France, Ireland, Scotland, the Netherlands, Switzerland, Denmark, Finland, Sweden, Egypt, the United Arab Emirates, and South Africa). Both (a) the development and (b) the use of LibQUAL+® data to improve service quality have been documented in more than 4 dozen articles published in journals such as College and Research Libraries, IFLA Journal, Journal of Academic Librarianship, Journal of Library Administration, Library Administration & Management, Library Quarterly, Library Trends, Performance Measurement and Metrics, and portal.

[4]The Project MINES for Libraries™ protocol has been used at the Ontario Council of University Libraries (OCUL) across 16 libraries. Local institutional implementations have taken place as part of larger indirect cost studies carried out by various universities. A three-year implementation has been agreed upon

--COUNTER ("Counting Online Usage of Networked Electronic Resources"), a project formally incorporated in England as a not-for-profit company in 2003, which facilitates the development of standards and protocols involving the recording and exchange of online usage data.

Second, the increased emphasis on libraries providing digital content to users also has exponentially impacted the need to consider new quantitative statistics in addition to the ARL Index. The ARL statistics on (a) circulation and (b) reference transactions, reported in Figures 1 and 2, reflect the impacts of this movement by users toward greater use of digital content.

Q. *Are there any technical/statistical differences between the analyses reported here versus those employed in computing the ARL Index?*

A. Yes. The ARL Index is <u>not</u> based directly on the 5 variables (e.g., volumes held, volumes added, gross). Instead, the ARL Index is based on the <u>natural logarithmic</u> values of these five datapoints[5].For illustrative purposes, below are presented 5 numbers of volumes held, and their respective log values.

Volumes Held	log of Volumes Held
3,800,000	15.15051
1,900,000	14.45736
1,398,000	14.15055
1950	7.57558
3	1.09861

The rightmost values are the kinds of data actually analyzed in computing the ARL Index scores. Clearly, the log values are not in the metric in which most librarians think.

There are arguably some good statistical reasons to use log values in computing the ARL Index scores (e.g., log values make nonlinear dynamics more linear, and focus on relative differences versus absolute differences in data such as collection size). Nevertheless, an alternative focus on data in its more familiar form is not unreasonable, and also is in keeping with the purpose of the present work.

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with the University of Iowa starting data collection activities in 2007.

[5]The log of a number can be computed in Excel using the "=LN" function (e.g., "=LN(3)" yields a log value of 1.09861). For the perversely curious, more details on logarithms can be found in Bruce Thompson (2006), <u>Foundations of Behavioral Statistics</u>, pages 403-407.

Figure 1
c:\p_point\arl_fig1.doc

Figure 2
c:\p_point\arl_fig2.doc

Q. *What was the goal of the present analyses?*
A. The goal of the analyses reported here was to develop some supplementary quantitative statistics that might be used by ARL libraries to help benchmark performance against additional quantitative statistics beyond the ARL Index. Conversely, the analyses were not conducted to offer alternative ARL membership criteria or to replace the ARL Index.

Q. *What quantitative data for ARL libraries were available for use in the present study?*
A. Only data collected by the ARL Statistics and Measurement Program were available for use in the analyses. Included are the five variables used in the current ARL Index.
Data from the years 2000 through 2004 were available at the time these analyses were performed. Data from multiple years were used to generate more stable results, by providing more data for selected analyses, and then to facilitate analyses that confirmed the stability of results across years. Results that are stable are inherently more useful in benchmarking efforts.
Data on several dozen variables have been collected during this 5 year time period. Additionally, data on an additional 8 variables, primarily involving digital content expenditures and library hours and number of staffed service points, have been collected only recently. Data on these last variables were widely available only for 2004. Table 1 lists all the variables available for the current study.

Q. *What was the primary statistical method used in the present analyses?*
A. The primary statistical method employed in these analyses is called factor analysis or principal component analysis. The purpose of factor analysis is to identify the groupings of variables that cluster together based on differentially larger relationships with each other[6]. These are the same statistical methods originally used in creating the ARL Index.

Q. *What were the initial analyses that were performed?*
A. The initial analyses were performed to begin to identify how many factors or components might be suitable for benchmarking, and which variables listed in Table 1 might be most suitable for these purposes. In selecting variables, some preference was afforded to using variables for which there was relatively little missing data. Some of these

[6]More detail on factor analysis is provided in Bruce Thompson (2004), Exploratory and Confirmatory Factor Analysis, which uses LibQUAL+® data for most of the book's heuristic examples.

initial analyses are presented in Appendix B.
Note that the sample sizes (i.e., n's) vary across different combinations of variables. A case was deleted if any data were missing for a given combination of variables. Thus, in general analyses involving more variables tended to have somewhat smaller sample sizes.

Table 1.
Variables Available for the Analyses

Abbreviation	Variable Label
Widely Available for 2000-2004	
vols	**'Vols In Library'**
volsadg	**'Vols Added (Gross)'**
volsadn	'Vols Added (Net)'
mono	'Monographs Purchased (Vols)'
serpur	'Curr Serials Purchased (Subs.)'
sernpur	'Curr Serials Not Purchased'
currser	**'total Current Serials'**
microf	'Microform Units'
govdocs	'Govt Documents'
compfil	'Computer Files'
mss	'Manuscripts and archives'
maps	'Carto-graphic Materials'
graphic	'Graphic Materials'
audio	'Audio Materials'
video	'Film / Video'
prfstf	'Prof Staff (FTE)'
nprfstf	'Support Staff (FTE)'
studast	'Stud Assistants (FTE)'
totstf	**'Total Staff W/O Students (FTE)'**
totstfx	'Total Staff W Students (FTE)'
expmono	'Monographs Expenditures'
expser	'Curr Serials Expenditures'
expoth	'Other Library Materials Expenditures'
expmisc	'Misc Materials Expenditures'
explm	'Tot Lib Materials Expenditures'
expbnd	'Contract Binding Expenditures'
salprf	'Prof Staff Salaries/Wages'
salnprf	'Supp Staff Salaries & Wages'
salstud	'Stud Asst Salaries & Wages'
totsal	'Total Salaries/Wages'
opexp	'Other Operating Expend'
totexp	**'Total Lib Expend'**
grppres	'Library Present to Groups'
presptcp	'Participants in Group Presentations'
reftrans	'Reference Transactions'
initcirc	'Initial Circ Transactions'
totcirc	'Total Circ Transactions'
illtot	'Loaned Total Items (ILL)'
ilbtot	'Borrowed Total Items (ILL)'
phdawd	'PhDs Awarded'
phdfld	'PhD Fields'
totstu	'Full-time (FTE) Total'
gradstu	'Grad Full-time (FTE)'
fac	'Faculty'

Widely Available Only for 2004

expcompf	'SU Computer Files Exp'
expeserl	'SU Elect Serials Exp.'
expbibul	'SU Lib Exp: Bibl Utilities, Networks'
expbibue	'SU Ext Exp: Bibl Utilities, Networks'
exphaso	'SU Exp: Computer Hardware Software'
expddill	'SU Exp: Doc Delivery/Interlib Loan Exp.'
svcpoint	'SU Staffed Service Points'
svchours	'SU Lib Service Hours'

Note. The variables presented in **bold** are the 5 variables used in the current ARL Logarithmic Index.

Q. *What were the variables and factors that were isolated from these analyses?*

A. Table 2 presents the three components isolated in this analysis. The components involve Holdings, User Interactions, and Interlibrary Loan Activities. The components are reflected in 4, 3, and 2 measured variables respectively. The first component includes variables used in computing the ARL Index, although the Index employs log values of its variables, as explained previously.

Table 2.
Varimax-Rotated Principal Components for 9 Variables Measured Across All 5 Years (n = 538)

Variable		Factor I	Factor II	Factor III
VOLS	'Vols In Library'	.92602	.22221	.13553
VOLSADG	'Vols Added (Gross)'	.91031	.23143	.08555
TOTSTF	'Total Staff W/O Students (FTE)'	.86895	.33393	.04720
CURRSER	'total Current Serials'	.85125	.21545	.16406
PRESPTCP	'Participants in Group Presentations'	.19965	.87510	.12552
GRPPRES	'Library Present to Groups'	.22521	.85142	.01234
REFTRANS	'Reference Transactions'	.32277	.61515	.17599
ILBTOT	'Borrowed Total Items (ILL)'	-.00867	.03965	.88865
ILLTOT	'Loaned Total Items (ILL)'	.27068	.18227	.76170

Note. Pattern/structure coefficients greater than |.35| are underlined. The third and fourth eigenvalues (λ) were 1.14 and 0.62, respectively. The three components account for 78.6% of the observed variance in the 9 variables.

Q. *Must only variables already part of the ARL Statistics be used in these new library activity descriptions/statistics?*

A. No. First, the ARL Statistics and Assessment Committee could develop new variables that might flesh out these three dimensions (e.g., "unique/rare volumes held," "web-based reference transactions," "shared storage square feet," "collaboratively-held common holdings").

Second, new variables might be developed to define new dimensions not currently described by existing variables. For example, a Service Quality Improvement description might be developed, by adding variables such as "number of user focus

groups conducted," "FTE staff assigned to service quality assessment activities," "number of continuing education training sessions on service quality improvement attended by library staff").

Q. *Is the structure of these 9 variables sufficiently stable such that the scores on these 3 indices may be used across (a) institution types and (b) time?*

A. Yes, these components appear to be reasonably stable. Appendix C presents the component pattern/structure coefficients for different university types. Appendix D presents the component pattern/structure coefficients computed independently for each of the years 2000 through 2004.

The coefficients also appear to be invariant to the use of different factor analytic computation methods. For example, Appendix E presents the pattern/structure coefficients computed using principal axis factor analysis, rather than principal components analysis.

Q. *How much do the scores on these three components overlap with scores on the existing ARL Index, and with other variables?*

A. Pearson product-moment correlation coefficients were computed between scores on the three components and scores on the ARL Index and other variables, and are reported in Appendix F.[7] When squared, these coefficients quantify the proportion of information (i.e., variability) that two scores have in common. Thus, r values greater than $|0.71|$ ($0.71^2 = 50\%$) indicate scores that have more than half their information in common.

Scores on the first component, Holdings, and the ARL Index have 82.6% ($0.9090^2 = 0.826$) of their information in common. Of course, $82.6\% \neq 100\%$. The Holdings component also shares 74.7% ($0.8644^2 = 0.747$) of information with the variable, Total Library Expenditures. However, the User Interaction and the Interlibrary Loan indices have relatively little information in common with either the ARL Index or the other variables.

Q. *Is the three component structure stable when controlling for expenditure differences across libraries?*

A. The variables measuring or related to monetary expenditures were subjected to a principal components analysis in order to identify key expenditure variables. Two uncorrelated components emerged, as reported in Appendix G. The two key variables were Total Library Expenditures and Total Number of Full-time Equivalent Students.

Two additional principal components analyses of the 9

[7]More information about correlation coefficients, and their properties and interpretations, can be found in Chapter 5 in Bruce Thompson (2006), Foundations of Behavioral Statistics.

variables were conducted using these two expenditure-related variables. First, all the variance in the 9 variables common to Total Library Expenditures was removed from the 9 variables, and then a principal components analysis of what was left in the 9 variables was conducted. Second, all the variance in the 9 variables common to Total Number of Full-time Equivalent Students was removed from the 9 variables, and then a principal components analysis of what was left in the 9 variables was conducted. The resulting components are presented in Appendix H. The results indicate that the Table 2 structure is stable even when controlling for key expenditure variables.

Q. *How can these results be used by libraries for benchmarking purposes?*

A. The three indices are **uncorrelated or independent** of each other. This means that scores on any combinations of the three indices may be used. Different libraries may reasonably focus on different combinations of indices.

For example, a given institution might elect to focus on their ARL Index rankings, but also look at standing on the User Interaction index. An interest in User Interaction dynamics is reasonable, given that our LibQUAL+® research shows that users care a lot about the service orientation and customer care focus of library staff.

The third statistic, Interlibrary Loan Activities, is a measure of the external connectedness of the library: how much a library contributes to and takes from the collection resources of the broader community. As reported in Appendix F, this connectedness is not driven by library wealth. For example, the common variance between Interlibrary Loan Activities scores and Total Library Expenditures is only 0.3% ($r^2 = 0.0565^2$).

One useful way to interpret these statistics invokes norms tables[8]. Appendix J presents some related normative tables. Tables such as these quantify what percentage of libraries fall below a given score. For example, in 2004, 75% of ARL libraries that year had a lower score on the Interlibrary Loan Expenditures index than the score of +0.233. The comparability of the normative tables across years for a given factor also supports the view that the indices may reasonably be used over time, and are not idiosyncratic in different years.

Q. *How will the increasing movement toward the use of digital content affect the use of the ARL Index and the three supplementary indices described here?*

[8]The use of norms tables in the library context is explained in our portal journal article, Colleen Cook, Fred Heath, and Bruce Thompson (2002), "Score norms for improving library service quality: A LibQUAL+™ study" (vol. 2, pp. 13-26): http://muse.jhu.edu/journals/portal_libraries_and_the_academy/v002/2.1cook.html

A. Unfortunately, the ARL Statistics and Measurement Program has only collected data related to digital content during the recent past. Thus, it was not possible to conduct a thorough statistical analysis as to whether these data will merely reflect the same patterns occurring within more traditional data. However, the correlation coefficients reported in Tables 3 and 4 offer some tentative insights into these issues.

Table 3.
Correlations of the New Indices with **Digital Spending**

Digital Spending	New Indices		
	Holdings	Interact	Loan_Act
EXPCOMPF	.2526	.0695	-.0846
	(97)	(97)	(97)
EXPESERL	.3163	.2545	.1520
	(105)	(105)	(105)
EXPBIBUL	.3792	.1147	.1001
	(100)	(100)	(100)
EXPBIBUE	.0660	.2991	.1307
	(50)	(50)	(50)
EXPHASO	.4439	.3377	.0342
	(105)	(105)	(105)
EXPDDILL	.3018	.0188	.1572
	(102)	(102)	(102)

Table 4.
Correlations of **Digital Spending** with Traditional Variables

Digital Spending	Traditional Variables			
	TOTEXP	TOTSTU	PHDAWD	INDEX
EXPCOMPF	.5561	.0960	.1990	.4108
	(102)	(102)	(101)	(102)
EXPESERL	.4151	.2559	.3016	.4088
	(110)	(110)	(109)	(110)
EXPBIBUL	.6721	.1294	.2698	.5091
	(105)	(105)	(104)	(105)
EXPBIBUE	.2335	.2493	.2672	.2221
	(52)	(52)	(51)	(52)
EXPHASO	.5865	.3103	.4807	.5757
	(110)	(110)	(109)	(110)
EXPDDILL	.2559	.3141	.5108	.3236
	(107)	(107)	(106)	(107)
SVCPOINT	.7339	.5490	.5670	.7393
	(111)	(111)	(110)	(111)
SVCHOURS	.2813	.1751	.2916	.2959
	(112)	(112)	(111)	(112)

First, the correlation coefficients reported in Table 3 suggest that the three indices proposed here overlap minimally with expenditures related to providing users access to digital content. This in turn suggests the potential for eventually developing a fourth statistic related to this service area.

Second, the results presented in Table 4 suggest some relationships between expenditures on digital content and aggregate expenditures. For example, there is 45.2% ($\underline{r}^2$ = 0.6721^2) common information between Total Library Expenditures and Library Expenditures on Bibliographic Utilities and Networks. There is 34.4% ($\underline{r}^2$ = 0.5865^2) common information between Total Library Expenditures and Library Expenditures on Computer Hardware and Software.

Of course, the "Google-ization" of the information world has brought exponentially increasing changes with research libraries, and even in the ways that library users think about libraries and librarians. A classic example of these impacts is this statement made by one of the users interviewed in grounding LibQUAL+® within the mindsets of users:[9]

> ...first of all, I would turn to the best search engines that are out there. That's not a person so much as an entity. In this sense, librarians are search engines [just] with a different interface.

Thus, the impacts of this evolution ought to be revisited on an on-going basis by the ARL Statistics and Measurement Program.

Q. *What form might a modified ARL Index statistic take?*

A. As University of Georgia University Librarian and Associate Provost William Potter noted in an e-mail communication with Martha Kyrillidou, the ARL Director of Statistics and Service Quality Programs, in December, 2005:

> Once you include one form of electronic publication in the "traditional" counts of volumes held and volumes added [in the ARL Index], then I do not see the logic behind not including other forms of electronic publication. For example, if a library scans a book itself and provides access to that book through the catalog, how is this different from the same book that a vendor has scanned and sold to the library? The really interesting thing in all this is that *if you have two libraries of similar nature and budget and one spends all its resources on print while the other is very aggressive in replacing print with*

[9] A comprehensive presentation of these qualitative studies is provided in the Ph.D. dissertation of Carol Colleen Cook (2001), "A mixed-methods approach to the identification and measurement of academic library service quality constructs: LibQUAL+™" (University Microfilms No. AAT3020024).

> *electronic, I expect that the library that focuses on print will have higher ranks in the ARL statistics even though the library users will have less access*. [emphasis added]

The use of a measure of total expenditures versus the use of some combination of (a) volume counts (historically part of the older statistics) and (b) expenditures on digital resources (only recently measured as part of the supplementary statistics) could (1) finesse the difficulty of distinguishing these two resources (2) while at the same time recognizing the changing face of the library in an increasingly digital world. Table 5 presents the pattern/structure coefficients for a component/factor involving two of the variables in the current ARL Index (total expenditures and total staff) and two expenditure variables (professional salaries and materials expenditures). Scores (n = 563) on the alternative factor from the correlation matrix (i.e., the rightmost factor) correlate r = +0.8997 (r^2 = 0.8997^2 = 80.9%) with scores on the current ARL Index.

Table 5
An Expenditure-Focused Alternative Statistic

Variable		Component Source: Covariance	Component Source: Correlation
TOTEXP[a]	'Total Lib Expend'	1.000	.99236
TOTSTF[a]	'Total Staff w/o Students'	0.946	.96722
SALPRF[b]	'Prof Staff Salaries/Wages'	0.940	.94793
EXPLM[b]	'Total Lib Materials Expenditures'	0.944	.94408

[a]Already in the current ARL Index.
[b]Not in the current ARL Index.
Note. Factors or components can be computed from several sources, including a variance/covariance matrix, such that factors are sensitive to both relationships and data dispersion, or a correlation matrix, such that factors are based only on relationships among and the shapes of the data. Here the component structure was very similar across both computational methods, which means that the results were not an artifact of analytic choice.

Q. *Can statistics like those reported here make the decision about what variables should be built into quantitative Indices of library quality, or must the people within the ARL community instead make this decision?*

A. The responsibility for making the decision about what variables should be built into quantitative Indices of library quality can not atavistically be foisted onto statistics. Statistics can only help to inform these decisions by people. Instead, for two reasons, the people within the ARL community ultimately must make this decision.

First, analysis of the variables on which ARL has previously collected data is inherently limited, because these variables are neither (a) all the possible data about libraries nor (b) a random sample from the universe of all the possible choices of library datapoints. Thus, the decisions about what data were previously collected inescapably limit the generalizability of statistical results using the data. We simply could not use statistical analyses to build indices using data that were not even collected, for whatever reasons the absent data were not collected.

Second, statistical analyses of existing data tend to be backward-looking in perspective, rather than forward-looking. Unfortunately, given the rapid, transformational changes occurring with the world of information services, a forward-looking perspective is exactly what is required. Only people are well suited to anticipating what the library of tomorrow will look like.

In formulating a vision of the library of tomorrow, we will probably be well advised to remember the widely accepted wisdom that in predicting change we (a) tend to overestimate technological changes that will occur within a year and (b) massively underestimate the magnitude of changes that will occur over the course of the next 10 years. One solace is that our vision, once formulated, need not be fixed in form for all time; we can revisit our formulations as we continue to receive new information.

Appendix A
Illustrative Articles and Reports on the ARL Index

A number of these pieces are available by following the links toward the bottom of the Web page:
<**http://www.arl.org/stats/factor.html**>

Kendon Stubbs
Stubbs, K. (1993). Access and ARL membership criteria. Proceedings of the 125th Meeting of the Association of Research Libraries, 117-122. <**http://www.arl.org/stats/stubbs_93.pdf**>
Stubbs, K. (1981). University libraries; Standards and statistics. College and Research Libraries, 42, 527-538.
Stubbs, K. (1988). Apples and oranges and ARL statistics. Journal of Academic Librarianship, 14, 231-235.
Stubbs, K. (1986a, May). On the ARL Library Index. Paper presented at the 108th meeting of Research Libraries: Measurement, Management, Marketing, Minneapolis, MN.
Stubbs, K. (1986b, May). Lies, damned lies, ... and ARL statistics? Paper presented at the 108th meeting of Research Libraries: Measurement, Management, Marketing, Minneapolis, MN.

Martha Kyrillidou
Kyrillidou, M., & Crowe, W. (1998). In search of new measures. ARL, 197, 8-10. <**http://www.arl.org/newsltr/197/newmeas.html**>
Kyrillidou, M. (2005/2006). Library assessment as a collaborative enterprise. Resource Sharing and Information Networks (special issue of on the theme "Creative Collaborations: Libraries Within Their Institutions and Beyond"), 1/2, 73-87. <**http://www.libqual.org/documents/admin/kyrillidou_haworth_sept72004.pdf**>
Kyrillidou, M. (2002). From input and output measures to quality and outcome measures, or, from the user in the life of the library to the library in the life of the user. Journal of Academic Librarianship, 28, 42-46. <**http://www.arl.org/stats/arlstat/jal01.html**>
Kyrillidou, M. (2001). To describe and measure the performance of North American research libraries. IFLA Journal, 4, 257-263. <**http://www.arl.org/stats/arlstat/ifla01.html**>
Kyrillidou, M. (2000). Research Library Trends: ARL Statistics. Journal of Academic Librarianship, 26,427-436. <**http://www.arl.org/stats/arlstat/jal99.html**>

Other
Mekkawi, M. (1982). The ARL Library Index as a decision-making tool. College and Research Libraries, 43, 396-401.
Weiner, S. (2005). Library quality and impact: Is there a relationship between new measures and traditional measures? Journal of Academic Librarianship, 31, 432-437.

Appendix B
Preliminary Exploratory Principal Components
Rotated to the Varimax Criterion

Table B.1
Principal Components for 21 Variables
Across All Five Years (n = 447)

	Factor			
Variable	I	II	III	IV
VOLSADG	.88666	.19765	.18988	.11246
VOLSADN	.87082	.17311	.17645	.10773
VOLS	.81934	.17319	.36972	.23407
TOTSTF	.77628	.42936	.27778	.10555
CURRSER	.74181	.18902	.21535	.36319
PRFSTF	.72984	.29889	.29914	.14231
NPRFSTF	.71474	.45340	.23470	.07331
COMPFIL	.54833	.02921	-.13311	-.14754
TOTCIRC	.53932	.24685	.24800	.13002
MICROF	.53629	.12255	.20626	.26048
STUDAST	.52099	.28508	.36144	.29388
GRPPRES	.20067	.82628	.04716	.10908
PRESPTCP	.23347	.79326	.18196	.12427
VIDEO	.14252	.64817	.06803	.12189
REFTRANS	.35750	.50357	.30199	-.01306
MSS	.24424	.19378	.81429	.12957
GRAPHIC	.11283	.06876	.74076	-.04829
AUDIO	.35619	.18659	.53918	.11644
ILBTOT	-.00236	.03774	-.19664	.80819
ILLTOT	.19770	.29519	.14880	.75189
MAPS	.19347	.04140	.25922	.49918

Note. The fourth and fifth eigenvalues (λ) were 1.20 and 0.98, respectively. The four components account for 64.2% of the observed variance in the 21 variables.

Table B.2
Principal Components for 21+10 Variables
Across All Five Years (n = 442)

	Factor					
Variable	I	II	III	IV	V	VI
TOTEXP	.92162	.24018	.20502	.09456	.11510	.09589
TOTSAL	.87094	.31537	.22005	.15123	.09407	.09645
EXPLM	.86915	.07126	.23715	.15289	.21499	.09798
SALPRF	.84288	.36872	.06760	.04574	.03621	.12029
EXPMONO	.81522	.16120	.14823	.13932	.23852	.07381
TOTSTF	.81392	.20669	.36095	.26580	.15448	.01729
PRFSTF	.80740	.32059	.18038	.08440	.10510	.13030
SALNPRF	.80644	.15126	.33724	.25268	.08796	.00901
EXPBND	.79212	.12368	.08571	.11810	-.03041	.01444
EXPSER	.79162	.04233	.14279	.12270	.18231	.07478
OPEXP	.75021	.22675	.04756	-.16042	-.02184	.05757
NPRFSTF	.72674	.12061	.42062	.33654	.16458	-.04719
VOLSADG	.72118	.21311	.15869	.22095	.45457	.10636
VOLS	.68987	.35515	.12786	.33245	.34398	.16538
VOLSADN	.66416	.19735	.14821	.24201	.47946	.09733
CURRSER	.65687	.19485	.13719	.33490	.25437	.29134
MSS	.36527	.73924	.13152	.18347	-.13537	.02341
GRAPHIC	.12470	.60160	.09842	.12052	.09576	-.13324
SALSTUD	.52825	.54530	.18096	.03252	.29999	.30231
STUDAST	.42983	.53974	.21563	.03014	.29769	.37160
AUDIO	.36252	.53349	.11117	.37543	-.11891	-.03149
GRPPRES	.23661	.12908	.79856	-.01426	.08276	.16177
PRESPTCP	.18432	.23761	.79004	.11546	.17183	.13912
VIDEO	.37753	-.09426	.58876	.26614	-.35657	-.01952
REFTRANS	.20285	.44460	.50759	.00982	.30137	.06173
MAPS	.07680	.16600	.03178	.73986	-.01099	.23522
MICROF	.39022	.14582	.10240	.47541	.20938	.12132
TOTCIRC	.27359	.24807	.27987	.45884	.40328	.02489
COMPFIL	.24204	-.03628	.07362	.03676	.63183	-.08730
ILBTOT	.03906	-.17803	.03104	.10317	-.05499	.81262
ILLTOT	.22266	.17757	.25552	.21892	-.00679	.73569

Note. The sixth and seventh eigenvalues (λ) were 1.02 and 0.96, respectively. The six components account for 74.1% of the observed variance in the 31 variables.

Table B.3
Principal Components for 17+10 Variables
Across All Five Years (n = 499)

	Factor			
Variable	I	II	III	IV
TOTEXP	.94506	.24898	.06939	.04903
TOTSAL	.90969	.30691	.10916	.04497
EXPLM	.90181	.19489	.06238	.16138
SALPRF	.89861	.21259	.07982	-.11800
TOTSTF	.87872	.31985	.02458	.24462
EXPMONO	.87784	.14907	.05870	.14511
PRFSTF	.87512	.27494	.07689	-.04610
VOLS	.84243	.24698	.21136	.21025
EXPBND	.82434	.06456	.08790	-.12350
VOLSADG	.82396	.27116	.13228	.23849
SALNPRF	.82177	.28860	.05914	.26072
NPRFSTF	.78934	.31264	-.00837	.38806
VOLSADN	.78858	.24610	.11622	.27027
EXPSER	.76258	.21309	.14164	.07263
OPEXP	.75709	.12466	-.03698	-.12909
CURRSER	.74270	.24924	.24342	.18925
MSS	.61783	.11640	.15935	-.24492
MICROF	.51786	.22145	.14867	.22678
PRESPTCP	.16168	.84339	.05977	.16176
GRPPRES	.19223	.80413	-.06894	.11579
REFTRANS	.26421	.67635	.18164	-.02784
STUDAST	.44787	.61370	.37825	-.22538
SALSTUD	.54449	.56119	.37687	-.20139
ILBTOT	-.02706	.01957	.75328	.16196
ILLTOT	.21162	.21025	.74426	.08193
MAPS	.06920	.01538	.34250	.51687
TOTCIRC	.37338	.44247	.13972	.44672

Note. The fourth and fifth eigenvalues (λ) were 1.05 and 0.96, respectively. The four components account for 73.1% of the observed variance in the 27 variables.

Table B.4
Principal Components for 21+10+5 Variables
Across All Five Years (n = 430)

	Factor						
Variable	I	II	III	IV	V	VI	VII
TOTEXP	.92108	.21884	.20171	.11955	.12432	.08152	.07754
TOTSAL	.87252	.23117	.22492	.20376	.18020	.06701	.06338
SALPRF	.86158	.09880	.10081	.21915	.20352	.07802	.01580
EXPLM	.84279	.33437	.17895	-.00266	.05439	.12971	.16260
EXPMONO	.82357	.15317	.17266	.08981	.06992	.07983	.21515
PRFSTF	.80810	.20507	.19338	.20543	.16159	.08957	.06946
TOTSTF	.78358	.40627	.31056	.17852	.11511	.00534	.10595
SALNPRF	.77985	.36749	.28018	.12339	.09599	.00703	.04732
OPEXP	.77747	-.06788	.10718	.05759	.05366	.01555	-.03859
EXPBND	.76328	.22599	.06632	.10655	.02685	.00161	-.05032
EXPSER	.75530	.35051	.04005	-.07108	.10624	.12800	.13080
VOLSADG	.72640	.21751	.20259	.20904	.07047	.09128	.42872
VOLS	.69961	.24258	.15912	.35290	.21194	.15030	.32527
NPRFSTF	.68260	.47134	.34020	.14380	.07675	-.04149	.11415
VOLSADN	.67713	.19724	.20555	.21488	.05437	.07925	.45522
CURRSER	.63817	.29537	.13475	.28513	.08643	.28369	.22474
SALSTUD	.56857	-.00136	.33160	.32053	.29979	.23202	.29503
GRADSTU	.53489	.53038	-.01959	.07720	.40017	.11276	.19887
STUDAST	.45875	.04294	.35215	.32244	.29803	.30854	.28171
TOTSTU	.13126	.75387	.39462	.14654	.11818	.16237	.16545
FAC	.40557	.69046	.21440	.01217	.14979	.05853	.05156
PHDFLD	.30494	.60688	.06674	.29394	.04882	.20696	.06482
PHDAWD	.54930	.57493	.03873	.29510	.20427	.10429	.14582
VIDEO	.29930	.46159	.45777	.03352	-.12878	-.01039	-.44119
TOTCIRC	.26458	.37650	.25501	.35712	.16249	.02564	.37635
GRPPRES	.24666	.12644	.79978	.04188	-.03503	.12761	-.00130
PRESPTCP	.17703	.29625	.76700	.07950	.13948	.13277	.08122
REFTRANS	.24621	.05036	.61267	.18517	.24513	.00913	.26156
MAPS	.05360	.24636	.04845	.69775	-.04953	.19066	.00369
AUDIO	.40274	.01580	.20912	.66196	.19621	-.12868	-.10850
MICROF	.33894	.40943	.04022	.41486	.02688	.11489	.17044
GRAPHIC	.12238	.24614	.07423	-.05283	.83658	-.03532	.07309
MSS	.42799	-.00684	.21908	.31808	.65950	.01057	-.14502
ILBTOT	.04131	.09846	.02943	.00408	-.11167	.84650	-.03810
ILLTOT	.22175	.18444	.24951	.19258	.15292	.73335	-.03949
COMPFIL	.22041	.17040	.10587	-.07213	-.04072	-.10110	.60568

Note. The seventh and eighth eigenvalues (λ) were 1.02 and 0.87, respectively. The four components account for 75.4% of the observed variance in the 36 variables.

Table B.5
Principal Components for 17+10+5 Variables
Across All Five Years (n = 486)

	Factor				
Variable	I	II	III	IV	V
TOTEXP	.91823	.26456	.20849	.06574	.02371
SALPRF	.88818	.16595	.17163	.11737	-.10766
TOTSAL	.87737	.29765	.25649	.11000	.01320
EXPMONO	.86926	.16626	.14772	.02142	.16860
EXPLM	.85862	.32694	.14785	.02609	.06603
PRFSTF	.84803	.24422	.23064	.09914	-.07308
TOTSTF	.81879	.42745	.26406	-.01712	.13486
VOLS	.81112	.30208	.18999	.18985	.20327
EXPBND	.79968	.14708	.04058	.11657	-.06570
VOLSADG	.78991	.30549	.22762	.09879	.20860
OPEXP	.77274	-.00125	.12971	.00038	-.02287
VOLSADN	.76512	.26763	.21901	.06865	.25841
SALNPRF	.76374	.41927	.23333	.00588	.15284
NPRFSTF	.71645	.48854	.25577	-.08240	.24074
EXPSER	.69039	.43347	.10415	.14246	-.12029
CURRSER	.68660	.36196	.18257	.21149	.12169
MSS	.63758	-.02095	.09703	.22824	-.11982
SALSTUD	.54223	.09612	.53066	.44945	-.06196
TOTSTU	.03803	.76310	.43238	.21679	.08355
FAC	.31135	.73683	.26304	.06944	-.11683
PHDAWD	.49415	.66888	.12829	.28480	.03696
PHDFLD	.28143	.63545	.06150	.37421	.12553
GRADSTU	.56092	.60212	.07798	.22030	-.17355
TOTCIRC	.31164	.48960	.35341	.08045	.24783
MICROF	.43027	.45813	.09859	.14377	.06614
PRESPTCP	.12460	.31455	.79860	.05941	.04543
GRPPRES	.18632	.16404	.79407	-.06746	.04345
REFTRANS	.26581	.11456	.66747	.21661	.04467
STUDAST	.43507	.12193	.57697	.45975	-.10924
ILLTOT	.16527	.26038	.12712	.72548	.10204
ILBTOT	-.03696	.16728	.05793	.65029	.16135
MAPS	.06622	.03488	.04421	.23739	.81068

Note. The fifth and sixth eigenvalues (λ) were 1.05 and 0.94, respectively. The four components account for 74.3% of the observed variance in the 32 variables.

Table B.6
Principal Components for 17+10+5 **Plus 7 Digital** Variables
Only for **2004** (n = 80)

	Factor								
Variable	I	II	III	IV	V	VI	VIII	IX	X
TOTEXP	.92886	.22736	.15667	.13167	.08101	.05174	.13942	-.00166	.04906
SALPRF	.89462	.19743	.04598	.22433	.04579	-.02008	.04156	-.06226	-.01592
EXPLM	.89408	.16839	.12196	.02302	.13802	.20228	.07054	-.09231	.14361
TOTSAL	.88279	.29970	.19541	.14562	.05623	-.02833	.14374	.04496	-.04362
TOTSTF	.86621	.37023	.26091	.00578	-.00078	.05110	.00347	.06887	.00775
EXPMONO	.86176	-.08790	.10812	.00873	.14339	.21918	.14111	.08684	.06474
PRFSTF	.85896	.22805	.10357	.21344	.05949	.04274	-.07482	-.09670	.07677
VOLS	.81767	.30327	.07339	.18219	.12464	.29052	.04232	.00413	-.06578
EXPBND	.81181	.19874	-.01844	.13650	.05283	-.13087	-.08263	.02991	-.14362
VOLSADG	.79920	.18434	.12108	.21391	.16377	.36595	.06910	.03789	.06266
SALNPRF	.78609	.35509	.28636	-.07380	.03209	-.04762	.19405	.12641	-.06060
VOLSADN	.78213	.13976	.11551	.19964	.17227	.39785	.01495	.05176	.03413
NPRFSTF	.78095	.41353	.32419	-.11388	-.03526	.05062	.04801	.15669	-.03263
OPEXP	.77570	.06322	.07544	.26261	.00418	-.03881	.23266	.05257	.10871
EXPSER	.61680	.47343	.00294	.16186	.20468	.05568	.06182	-.31490	.08169
CURRSER	.61577	.30276	.14045	.14257	.01919	.29570	.08687	.10992	.16545
SVCPOINT	.58986	.44944	.31977	.07013	.20964	.05484	-.24636	-.07060	.16788
MSS	.55396	.17098	.01665	.35484	-.00620	.01209	-.25293	-.20222	-.48585
EXPHASO	.50208	.09771	.36349	.13859	-.01421	-.30400	.49664	-.05664	-.03667
EXPBIBUL	.46865	-.23232	.01312	.40599	.24022	-.15788	.13506	.41928	.04168
PHDAWD	.44407	.76803	.03404	.08639	.10686	.13993	.20377	.10531	-.01690
PHDFLD	.24368	.74515	.06131	.00127	.18542	.13409	.08057	-.02665	.14144
TOTSTU	.00872	.73439	.41737	.12249	.16201	.15709	.08119	.18087	.04677
FAC	.30208	.73341	.23493	.16777	-.03568	-.08956	.02668	.04452	.20554
GRADSTU	.48297	.70782	.01694	.18035	.06404	-.07031	.11398	-.13208	-.15299
EXPESERL	.35683	.40598	.27691	-.23397	.22044	-.08081	-.00139	-.35275	.09870
TOTCIRC	.30129	.38137	.34199	.07757	.04528	.24351	.28628	.06676	-.20350
PRESPTCP	.16096	.32662	.81892	.20091	-.01970	.11699	.07240	-.03961	-.04871
GRPPRES	.21316	.03113	.81864	.11431	.12184	-.00932	-.04204	-.04432	.12839
REFTRANS	.23724	.35413	.44822	.33644	.21069	.08299	-.29282	.11315	-.09222
STUDAST	.28215	.20642	.27144	.79560	.16420	.06799	.06569	.06106	.20448
SALSTUD	.34927	.18688	.24869	.75148	.17442	.06426	.23198	.10367	-.04453
ILBTOT	.09326	.06682	.06741	.09157	.83496	-.07013	.05800	.11476	.04822
ILLTOT	.21201	.37746	.10770	.19005	.70628	.04744	.00473	-.07934	-.09929
EXPCOMPF	.31106	.04123	.17204	-.01083	-.18159	.56430	.13059	-.28334	-.22815
MICROF	.45748	.39830	-.02012	.12290	.00274	.51660	.05792	.19032	.10367
EXPDDILL	.16820	.27524	-.07064	.15314	.08975	.16952	.76165	-.03590	.01631

MAPS	.09545	.12513	-.00085	.06055	.05473	-.01787	-.03913	.78660	-.09062
SVCHOURS	.23346	.26231	.07417	.16580	-.01464	-.06075	-.04387	-.19101	.78444

Note. The ninth and tenth eigenvalues (λ) were 1.00 and 0.89, respectively. The four components account for 80.3% of the observed variance in the 39 variables.

Table B.7
Principal Components for 17 Variables
Across All Five Years (n = 504)

	Factor		
Variable	I	II	III
VOLS	.90795	.20083	.19917
VOLSADG	.89173	.22321	.12854
TOTSTF	.88987	.31123	.06969
VOLSADN	.87700	.19420	.11983
PRFSTF	.84447	.26583	.04133
NPRFSTF	.82301	.30503	.07889
CURRSER	.79801	.20843	.23717
MSS	.61912	.09400	.01993
MICROF	.60640	.16953	.14944
TOTCIRC	.49686	.38611	.20832
PRESPTCP	.19555	.86103	.10161
GRPPRES	.18200	.84718	-.00954
REFTRANS	.32413	.64244	.11805
STUDAST	.46783	.54631	.23914
ILBTOT	-.06418	.10287	.81570
ILLTOT	.22919	.22471	.71774
MAPS	.15592	-.02871	.48782

Note. The third and fourth eigenvalues (λ) were 1.27 and 0.93, respectively. The three components account for 66.1% of the observed variance in the 17 variables.

Appendix C
Principal Components Across Settings

Table C.1
Principal Components Across Years for
Universities with **Neither a Law Nor a Medical School**
(n = 107)

	Factor		
Variable	I	II	III
VOLSADG	.85450	.02292	.01001
TOTSTF	.80716	.11554	.00200
VOLS	.79765	.14268	-.12459
CURRSER	.77484	.06320	-.18942
GRPPRES	.09469	.85896	.10643
REFTRANS	-.02594	.83631	-.13405
PRESPTCP	.24438	.80247	.10292
ILLTOT	-.03360	.16956	.86636
ILBTOT	-.16631	-.10846	.84119

Table C.2
Principal Components Across Years for
Universities with **a Law School But Not a Medical School**
(n = 94)

	Factor		
Variable	I	II	III
TOTSTF	.86720	.37608	.11543
VOLSADG	.85973	.40065	.19404
CURRSER	.85492	.16917	.39747
VOLS	.83047	.40225	.34091
PRESPTCP	.30492	.86912	.08107
REFTRANS	.25643	.78582	.28178
GRPPRES	.50298	.62849	.02203
ILBTOT	.18484	.01732	.91003
ILLTOT	.24946	.28642	.83252

Table C.3
Principal Components Across Years for
Universities with **a Medical School But Not a Law School**
(n = 54)

	Factor		
Variable	I	II	III
VOLS	.87697	-.10787	-.01945
TOTSTF	.86816	.03871	.09634
VOLSADG	.80652	.39638	.19303
CURRSER	.66269	.14567	.29083
GRPPRES	.12847	.86047	-.12625
PRESPTCP	-.09831	.80331	.22953
REFTRANS	.30768	.60312	.33962
ILBTOT	.13365	-.02100	.89617
ILLTOT	.14831	.25641	.82097

Table C.4
Principal Components Across Years for
Universities with **Both a Medical School and a Law School**
(n = 283)

	Factor		
Variable	I	II	III
VOLS	.95265	.08132	.11994
VOLSADG	.92887	.12531	.06665
TOTSTF	.86744	.34690	.00877
CURRSER	.84148	.19160	.15761
GRPPRES	.16909	.90111	-.01288
PRESPTCP	.13208	.89437	.16635
REFTRANS	.29133	.44336	.29456
ILBTOT	-.07652	.10087	.85683
ILLTOT	.28240	.09986	.76162

Table C.5
Principal Components Across Years for
Private Universities (n = 137)

	Factor		
Variable	I	II	III
VOLS	.95787	.08282	.06083
VOLSADG	.95644	.12677	.02759
TOTSTF	.95210	.12943	.00046
CURRSER	.90717	.18651	.12061
PRESPTCP	.06611	.93030	.04856
GRPPRES	.20088	.84773	.07790
REFTRANS	.11142	.77421	-.02161
ILBTOT	-.07797	.08364	.86746
ILLTOT	.20847	-.01240	.84801

Table C.6
Principal Components Across Years for
Public Universities (n = 333)

	Factor		
Variable	I	II	III
CURRSER	.90007	.15742	.13811
VOLS	.87790	.28109	.23108
VOLSADG	.85936	.28517	.19738
TOTSTF	.78641	.45010	.15325
PRESPTCP	.26823	.84631	.09527
GRPPRES	.26909	.83013	.00976
REFTRANS	.20866	.59032	.39004
ILBTOT	.07400	.04283	.87821
ILLTOT	.34101	.18152	.70220

Appendix D
Principal Components Across Years

Table D.1
Principal Components for **Year 2000** Data (n = 106)

	Factor		
Variable	I	II	III
VOLS	.92435	.22033	.12641
VOLSADG	.91474	.21394	.07841
TOTSTF	.88589	.31873	.02543
CURRSER	.86866	.18568	.17819
GRPPRES	.24687	.88393	-.02597
PRESPTCP	.18334	.87895	.22410
REFTRANS	.32766	.59423	.30880
ILBTOT	-.05120	.08585	.88664
ILLTOT	.32475	.19153	.65385

Table D.2
Principal Components for **Year 2001** Data (n = 109)

	Factor		
Variable	I	II	III
VOLSADG	.93197	.20057	.08443
VOLS	.93156	.20166	.13184
TOTSTF	.88580	.31096	.03549
CURRSER	.87632	.20975	.19791
GRPPRES	.19506	.86066	-.00226
PRESPTCP	.20288	.86044	.19086
REFTRANS	.25532	.69066	.16288
ILBTOT	-.00177	.04421	.89750
ILLTOT	.29497	.24104	.69843

Table D.3
Principal Components for **Year 2002** Data (n = 108)

	Factor		
Variable	I	II	III
VOLS	.93506	.20367	.13552
VOLSADG	.92266	.22038	.06306
TOTSTF	.88227	.31107	.03841
CURRSER	.87018	.21802	.15987
PRESPTCP	.17293	.89782	.08211
GRPPRES	.24667	.84733	.01027
REFTRANS	.27289	.67821	.17000
ILBTOT	-.00964	.02491	.88241
ILLTOT	.24030	.16726	.78740

Table D.4
Principal Components for **Year 2003** Data (n = 108)

	Factor		
Variable	I	II	III
VOLS	.92425	.22433	.12803
VOLSADG	.89472	.24108	.08479
CURRSER	.86137	.21908	.15044
TOTSTF	.85116	.35467	.05278
PRESPTCP	.19179	.89112	.10123
GRPPRES	.29987	.79812	-.02174
REFTRANS	.47033	.53780	.17562
ILBTOT	-.01493	.00297	.89941
ILLTOT	.27494	.13585	.80827

Table D.5
Principal Components for **Year 2004** Data (n = 107)

	Factor		
Variable	I	II	III
VOLS	.92788	.19659	.15465
VOLSADG	.90878	.21295	.12847
TOTSTF	.86008	.32767	.09571
CURRSER	.81416	.21114	.10876
GRPPRES	.18173	.88233	.09648
PRESPTCP	.29238	.86330	.07632
REFTRANS	.48868	.52406	.09629
ILBTOT	.03908	.02019	.90011
ILLTOT	.23659	.16609	.81892

Appendix E
Principal Axis Factors Across Years

Table E.1
Principal Axis Pattern/Structure Coefficients
Across All Years (n = 538)

	Factor		
Variable	I	II	III
VOLS	.92985	.21438	.16531
VOLSADG	.88927	.23768	.10885
TOTSTF	.84624	.34210	.06534
CURRSER	.77805	.24581	.19176
PRESPTCP	.19563	.88759	.15059
GRPPRES	.26589	.71189	.05798
REFTRANS	.34674	.44684	.18454
ILBTOT	.02056	.05011	.65273
ILLTOT	.25131	.17884	.64418

Appendix F
Correlation Coefficients Among Scores on the Three Components (Holdings, User Interactions, and Interlibrary Loan Activity) With Other Variables (n's in Parentheses)

	Holdings	Interact	Loan_Act	TOTEXP	EXPCOMPF	EXPESERL	EXPBIBUL	EXPBIBUE	EXPHASO	EXPDDILL
Holdings	1.0000									
	(538)									
Interact	.0000	1.0000								
	(538)	(538)								
Loan_Act	.0000	.0000	1.0000							
	(538)	(538)	(538)							
TOTEXP	.8644	.2774	.0565	1.0000						
	(538)	(538)	(538)	(565)						
EXPCOMPF	.2526	.0695	-.0846	.5561	1.0000					
	(97)	(97)	(97)	(102)	(102)					
EXPESERL	.3163	.2545	.1520	.4151	.1505	1.0000				
	(105)	(105)	(105)	(110)	(101)	(110)				
EXPBIBUL	.3792	.1147	.1001	.6721	.3918	-.0436	1.0000			
	(100)	(100)	(100)	(105)	(95)	(103)	(105)			
EXPBIBUE	.0660	.2991	.1307	.2335	-.1214	-.0156	.1946	1.0000		
	(50)	(50)	(50)	(52)	(50)	(52)	(51)	(52)		
EXPHASO	.4439	.3377	.0342	.5865	.1780	.2100	.4450	.3471	1.0000	
	(105)	(105)	(105)	(110)	(100)	(108)	(104)	(52)	(110)	
EXPDDILL	.3018	.0188	.1572	.2559	.1252	.1163	.1157	.2878	.3167	1.0000
	(102)	(102)	(102)	(107)	(97)	(105)	(101)	(50)	(106)	(107)
SVCPOINT	.6568	.4092	.1795	.7339	.1692	.3800	.3685	-.0627	.4566	.2079
	(106)	(106)	(106)	(111)	(101)	(110)	(104)	(52)	(109)	(106)
SVCHOURS	.2043	.1302	.0583	.2813	-.0789	.1487	.1737	.0379	.2788	.1490
	(107)	(107)	(107)	(112)	(101)	(110)	(104)	(52)	(109)	(106)
TOTSTU	.3051	.4814	.2477	.2757	.0960	.2559	.1294	.2493	.3103	.3141
	(538)	(538)	(538)	(565)	(102)	(110)	(105)	(52)	(110)	(107)
GRADSTU	.6562	.1788	.1382	.6708	.2899	.3213	.4223	.2011	.5301	.3622
	(538)	(538)	(538)	(565)	(102)	(110)	(105)	(52)	(110)	(107)
PHDAWD	.6911	.2560	.1970	.6283	.1990	.3016	.2698	.2672	.4807	.5108
	(536)	(536)	(536)	(563)	(101)	(109)	(104)	(51)	(109)	(106)
PHDFLD	.4857	.2129	.3417	.4335	.1040	.3112	.0834	.1925	.4032	.2522
	(528)	(528)	(528)	(555)	(100)	(108)	(103)	(52)	(108)	(105)
FAC	.4712	.3181	.1555	.4815	.1406	.3481	.2302	.1229	.3472	.3293
	(537)	(537)	(537)	(564)	(102)	(110)	(105)	(52)	(110)	(107)
INDEX	.9090	.3092	.1144	.8989	.4108	.4088	.5091	.2221	.5757	.3236
	(538)	(538)	(538)	(565)	(102)	(110)	(105)	(52)	(110)	(107)

	SVCPOINT	SVCHOURS	TOTSTU	GRADSTU	PHDAWD	PHDFLD	FAC	INDEX
SVCPOINT	1.0000							
	(111)							
SVCHOURS	.3118	1.0000						
	(111)	(112)						
TOTSTU	.5490	.1751	1.0000					
	(111)	(112)	(565)					
GRADSTU	.6084	.2787	.5235	1.0000				
	(111)	(112)	(565)	(565)				

PHDAWD	.5670	.2916	.6241	.7430	1.0000		
	(110)	(111)	(563)	(563)	(563)		
PHDFLD	.4902	.3134	.5974	.5726	.6879	1.0000	
	(109)	(110)	(555)	(555)	(553)	(555)	
FAC	.5500	.3765	.6982	.6363	.6340	.5093	1.0000
	(111)	(112)	(564)	(564)	(562)	(554)	(564)
INDEX	.7393	.2959	.4153	.7250	.7463	.5816	.5742	1.0000
	(111)	(112)	(565)	(565)	(563)	(555)	(564)	(565)

Note. Coefficients involving more than 50% common variance (i.e., $\underline{r}^2 > 0.71^2 = 50\%$) are underlined.

Appendix G
Principal Components Underlying the Variables Measuring Monetary Expenditures

Table G.1
Varimax-rotated Principal Components Analysis of the Variables Measuring Monetary Expenditures (n = 547)

Variable	I	II
TOTEXP	**.94744**	.29625
TOTSAL	.91504	.32579
SALPRF	.90533	.18183
EXPMONO	.88547	.21409
EXPLM	.88200	.33597
OPEXP	.85668	.07685
EXPBND	.84160	.21652
SALNPRF	.82997	.40048
INDEX	.80228	.50368
EXPSER	.67989	.49625
SALSTUD	.51226	.50981
TOTSTU	-.01080	**.90227**
FAC	.23564	.79211
PHDAWD	.42595	.78406
PHDFLD	.21544	.76185
GRADSTU	.50478	.67856

Appendix H
Principal Components When Controlling for Monetary Expenditures

Table H.1
Principal Components Underlying the 9 Variables
When Controlling for **Total Library Expenditures**
(n = 538)

	Factor		
Variable	I	II	III
XVOLS	.86105	.01139	.14705
XVOLSADG	.82402	.04849	.00985
XCURRSER	.57690	.00836	.30392
XTOTSTF	.57210	.35599	-.18648
XPRESPTC	.03949	.85956	.13656
XGRPPRES	-.07469	.83450	.03379
XREFTRAN	.30088	.60742	.08157
XILBTOT	.00435	.04859	.83843
XILLTOT	.17022	.14235	.78486

Table H.2
Principal Components Underlying the 9 Variables
When Controlling for **Total FTE Student Enrollment**
(n = 538)

	Factor		
Variable	I	II	III
ZVOLS	.93421	.16830	.10741
ZVOLSADG	.91374	.17465	.05138
ZTOTSTF	.88861	.22614	-.03160
ZCURRSER	.84828	.13210	.12069
ZPRESPTC	.07228	.88253	.02716
ZGRPPRES	.17532	.83970	-.03447
ZREFTRAN	.26669	.52650	.13068
ZILBTOT	-.05826	-.02413	.85921
ZILLTOT	.20949	.11785	.78864

Appendix I:
Factor Score Coefficient Matrices Across Years

Year 2000

VOLS	.30560	-.10324	-.00805
VOLSADG	.30699	-.09590	-.04599
TOTSTF	.27349	-.00682	-.10821
CURRSER	.28797	-.12317	.04598
GRPPRES	-.11850	.54801	-.21211
PRESPTCP	-.16172	.51178	.00162
REFTRANS	-.03979	.26491	.11639
ILLTOT	.03267	-.07667	.48177
ILBTOT	-.10927	-.10088	.72449

Year 2001

VOLS	.30913	-.10242	-.01575
VOLSADG	.31429	-.09626	-.05412
TOTSTF	.27612	-.00947	-.10536
CURRSER	.27889	-.09456	.04224
GRPPRES	-.11647	.49634	-.14715
PRESPTCP	-.13268	.46622	.00888
REFTRANS	-.07097	.35201	.00572
ILLTOT	-.00777	-.01725	.50223
ILBTOT	-.10055	-.10303	.72233

Year 2002

VOLS	.31541	-.11184	-.00344
VOLSADG	.31303	-.09237	-.05707
TOTSTF	.27708	-.02452	-.07922
CURRSER	.28354	-.08936	.01924
GRPPRES	-.10633	.46262	-.08705
PRESPTCP	-.15487	.50552	-.03166
REFTRANS	-.06954	.33831	.04253
ILLTOT	-.01590	-.02169	.54355
ILBTOT	-.09101	-.05721	.64857

Year 2003

VOLS	.33446	-.15133	-.02541
VOLSADG	.31997	-.12626	-.05313
TOTSTF	.26406	-.02123	-.07525
CURRSER	.30464	-.13449	-.00218
GRPPRES	-.13619	.51917	-.08223
PRESPTCP	-.23260	.62426	.01299
REFTRANS	.01030	.24891	.04762
ILLTOT	-.01320	-.02238	.53173
ILBTOT	-.11149	-.02902	.63465

Year 2004

VOLS	.33418	-.15042	-.01570
VOLSADG	.32387	-.13080	-.03336
TOTSTF	.27127	-.03005	-.05927
CURRSER	.28473	-.10189	-.03590
GRPPRES	-.19941	.58036	-.01662
PRESPTCP	-.14196	.53428	-.04312
REFTRANS	.04621	.22599	-.02804
ILLTOT	-.04457	-.01028	.54704
ILBTOT	-.09787	-.06231	.63981

Appendix J:
Percentiles for the Three Indices
Across Years 2000 to 2004

Percentiles for **Holdings**

Year 2000

Mean	-.042	Median	-.389	Std dev	1.018
Kurtosis	2.117	Skewness	1.523	Minimum	-1.700
Maximum	3.697				

Percentile	Value	Percentile	Value	Percentile	Value
1.00	-1.683	2.00	-1.399	3.00	-1.061
4.00	-1.035	5.00	-.994	6.00	-.978
7.00	-.968	8.00	-.931	9.00	-.894
10.00	-.879	11.00	-.876	12.00	-.866
13.00	-.861	14.00	-.824	15.00	-.812
16.00	-.805	17.00	-.797	18.00	-.789
19.00	-.766	20.00	-.754	21.00	-.746
22.00	-.739	23.00	-.736	24.00	-.729
25.00	-.721	26.00	-.705	27.00	-.700
28.00	-.699	29.00	-.697	30.00	-.686
31.00	-.678	32.00	-.662	33.00	-.656
34.00	-.651	35.00	-.648	36.00	-.643
37.00	-.629	38.00	-.612	39.00	-.598
40.00	-.594	41.00	-.592	42.00	-.584
43.00	-.563	44.00	-.538	45.00	-.526
46.00	-.501	47.00	-.470	48.00	-.438
49.00	-.399	50.00	-.389	51.00	-.379
52.00	-.372	53.00	-.336	54.00	-.310
55.00	-.296	56.00	-.286	57.00	-.232
58.00	-.219	59.00	-.213	60.00	-.195
61.00	-.121	62.00	-.098	63.00	-.089
64.00	-.077	65.00	-.026	66.00	.021
67.00	.031	68.00	.072	69.00	.133
70.00	.145	71.00	.200	72.00	.245
73.00	.309	74.00	.334	75.00	.361
76.00	.435	77.00	.489	78.00	.517
79.00	.538	80.00	.577	81.00	.604
82.00	.673	83.00	.714	84.00	.849
85.00	.879	86.00	.921	87.00	1.030
88.00	1.180	89.00	1.375	90.00	1.622
91.00	1.942	92.00	2.092	93.00	2.215
94.00	2.260	95.00	2.283	96.00	2.312
97.00	2.445	98.00	3.052	99.00	3.658

Year 2001

Mean	-.005	Median	-.352	Std dev	1.019
Kurtosis	2.538	Skewness	1.623	Minimum	-1.584
Maximum	3.920				

Percentile	Value	Percentile	Value	Percentile	Value
1.00	-1.559	2.00	-1.279	3.00	-1.036
4.00	-1.006	5.00	-.968	6.00	-.947
7.00	-.932	8.00	-.927	9.00	-.865
10.00	-.836	11.00	-.829	12.00	-.801
13.00	-.787	14.00	-.768	15.00	-.760
16.00	-.752	17.00	-.751	18.00	-.741
19.00	-.736	20.00	-.729	21.00	-.720
22.00	-.714	23.00	-.696	24.00	-.691
25.00	-.690	26.00	-.684	27.00	-.677
28.00	-.662	29.00	-.643	30.00	-.635
31.00	-.621	32.00	-.615	33.00	-.607
34.00	-.605	35.00	-.601	36.00	-.593
37.00	-.565	38.00	-.552	39.00	-.541
40.00	-.515	41.00	-.510	42.00	-.496
43.00	-.490	44.00	-.483	45.00	-.479
46.00	-.466	47.00	-.442	48.00	-.402
49.00	-.367	50.00	-.352	51.00	-.336
52.00	-.304	53.00	-.290	54.00	-.276
55.00	-.258	56.00	-.242	57.00	-.238
58.00	-.233	59.00	-.180	60.00	-.171
61.00	-.146	62.00	-.128	63.00	-.099
64.00	-.059	65.00	-.041	66.00	.018
67.00	.062	68.00	.152	69.00	.248
70.00	.277	71.00	.280	72.00	.288
73.00	.305	74.00	.359	75.00	.426
76.00	.448	77.00	.464	78.00	.525
79.00	.553	80.00	.578	81.00	.666
82.00	.695	83.00	.746	84.00	.798
85.00	.873	86.00	.913	87.00	.992
88.00	1.083	89.00	1.437	90.00	1.527
91.00	1.689	92.00	1.799	93.00	2.196
94.00	2.507	95.00	2.621	96.00	2.677
97.00	2.715	98.00	2.806	99.00	3.811

Year 2002

Mean	-.002	Median	-.320	Std dev	1.020
Kurtosis	2.234	Skewness	1.542	Minimum	-1.505
Maximum	3.754				

Percentile	Value	Percentile	Value	Percentile	Value
1.00	-1.503	2.00	-1.470	3.00	-1.309
4.00	-1.059	5.00	-1.038	6.00	-.980
7.00	-.933	8.00	-.930	9.00	-.902
10.00	-.890	11.00	-.857	12.00	-.803

13.00	-.798	14.00	-.772	15.00	-.760
16.00	-.748	17.00	-.743	18.00	-.738
19.00	-.718	20.00	-.705	21.00	-.686
22.00	-.684	23.00	-.677	24.00	-.677
25.00	-.673	26.00	-.668	27.00	-.665
28.00	-.665	29.00	-.662	30.00	-.652
31.00	-.611	32.00	-.593	33.00	-.590
34.00	-.576	35.00	-.553	36.00	-.545
37.00	-.528	38.00	-.523	39.00	-.513
40.00	-.505	41.00	-.490	42.00	-.481
43.00	-.472	44.00	-.449	45.00	-.429
46.00	-.423	47.00	-.412	48.00	-.375
49.00	-.342	50.00	-.320	51.00	-.301
52.00	-.297	53.00	-.295	54.00	-.291
55.00	-.288	56.00	-.265	57.00	-.255
58.00	-.192	59.00	-.171	60.00	-.135
61.00	-.077	62.00	-.012	63.00	.007
64.00	.033	65.00	.045	66.00	.053
67.00	.130	68.00	.152	69.00	.153
70.00	.163	71.00	.178	72.00	.234
73.00	.288	74.00	.301	75.00	.340
76.00	.361	77.00	.389	78.00	.484
79.00	.589	80.00	.640	81.00	.763
82.00	.784	83.00	.803	84.00	.835
85.00	.866	86.00	.896	87.00	.916
88.00	1.170	89.00	1.415	90.00	1.626
91.00	1.704	92.00	2.064	93.00	2.228
94.00	2.353	95.00	2.438	96.00	2.621
97.00	2.754	98.00	2.945	99.00	3.684

Year 2003

Mean	-.003	Median	-.297	Std dev	.954
Kurtosis	2.436	Skewness	1.497	Minimum	-1.476
Maximum	3.698				

Percentile	Value	Percentile	Value	Percentile	Value
1.00	-1.474	2.00	-1.417	3.00	-1.232
4.00	-1.097	5.00	-.991	6.00	-.988
7.00	-.978	8.00	-.950	9.00	-.891
10.00	-.866	11.00	-.863	12.00	-.840
13.00	-.825	14.00	-.794	15.00	-.773
16.00	-.760	17.00	-.747	18.00	-.726
19.00	-.706	20.00	-.692	21.00	-.638
22.00	-.630	23.00	-.622	24.00	-.616
25.00	-.616	26.00	-.605	27.00	-.583
28.00	-.580	29.00	-.571	30.00	-.566
31.00	-.548	32.00	-.536	33.00	-.532
34.00	-.525	35.00	-.513	36.00	-.506
37.00	-.497	38.00	-.495	39.00	-.487
40.00	-.472	41.00	-.465	42.00	-.453

43.00	-.438	44.00	-.408	45.00	-.367
46.00	-.328	47.00	-.325	48.00	-.318
49.00	-.313	50.00	-.297	51.00	-.285
52.00	-.260	53.00	-.238	54.00	-.211
55.00	-.199	56.00	-.171	57.00	-.160
58.00	-.149	59.00	-.129	60.00	-.086
61.00	-.054	62.00	-.010	63.00	.027
64.00	.043	65.00	.068	66.00	.123
67.00	.126	68.00	.136	69.00	.149
70.00	.193	71.00	.207	72.00	.231
73.00	.269	74.00	.290	75.00	.365
76.00	.457	77.00	.482	78.00	.488
79.00	.507	80.00	.542	81.00	.671
82.00	.722	83.00	.779	84.00	.841
85.00	.946	86.00	.987	87.00	.995
88.00	1.025	89.00	1.224	90.00	1.273
91.00	1.571	92.00	1.717	93.00	2.051
94.00	2.146	95.00	2.160	96.00	2.273
97.00	2.394	98.00	2.892	99.00	3.635

Year 2004

Mean	.052	Median	-.289	Std dev	1.004
Kurtosis	3.006	Skewness	1.663	Minimum	-1.155
Maximum	4.280				

Percentile	Value	Percentile	Value	Percentile	Value
1.00	-1.149	2.00	-1.081	3.00	-1.052
4.00	-.995	5.00	-.943	6.00	-.938
7.00	-.926	8.00	-.915	9.00	-.911
10.00	-.904	11.00	-.879	12.00	-.875
13.00	-.850	14.00	-.848	15.00	-.830
16.00	-.789	17.00	-.778	18.00	-.766
19.00	-.747	20.00	-.725	21.00	-.653
22.00	-.622	23.00	-.605	24.00	-.579
25.00	-.567	26.00	-.547	27.00	-.541
28.00	-.528	29.00	-.516	30.00	-.507
31.00	-.500	32.00	-.490	33.00	-.477
34.00	-.473	35.00	-.462	36.00	-.452
37.00	-.432	38.00	-.430	39.00	-.407
40.00	-.391	41.00	-.384	42.00	-.382
43.00	-.376	44.00	-.369	45.00	-.363
46.00	-.341	47.00	-.313	48.00	-.301
49.00	-.291	50.00	-.289	51.00	-.267
52.00	-.259	53.00	-.255	54.00	-.242
55.00	-.234	56.00	-.217	57.00	-.164
58.00	-.128	59.00	-.084	60.00	-.062
61.00	-.054	62.00	-.027	63.00	.016
64.00	.018	65.00	.028	66.00	.078
67.00	.119	68.00	.138	69.00	.151
70.00	.167	71.00	.178	72.00	.317

73.00	.423	74.00	.436	75.00	.451
76.00	.511	77.00	.525	78.00	.538
79.00	.571	80.00	.626	81.00	.652
82.00	.768	83.00	.867	84.00	.889
85.00	.992	86.00	1.017	87.00	1.166
88.00	1.193	89.00	1.533	90.00	1.602
91.00	1.746	92.00	1.946	93.00	2.221
94.00	2.275	95.00	2.352	96.00	2.437
97.00	2.660	98.00	2.817	99.00	4.165

Percentiles for **User Interactions**

Year 2000

Mean	.003	Median	-.192	Std dev	.966
Kurtosis	2.021	Skewness	1.378	Minimum	-1.691
Maximum	3.147				

Percentile	Value	Percentile	Value	Percentile	Value
1.00	-1.674	2.00	-1.436	3.00	-1.316
4.00	-1.271	5.00	-1.227	6.00	-1.177
7.00	-1.163	8.00	-1.144	9.00	-1.085
10.00	-1.035	11.00	-.932	12.00	-.861
13.00	-.798	14.00	-.768	15.00	-.763
16.00	-.754	17.00	-.714	18.00	-.687
19.00	-.675	20.00	-.657	21.00	-.639
22.00	-.627	23.00	-.616	24.00	-.606
25.00	-.586	26.00	-.565	27.00	-.530
28.00	-.522	29.00	-.509	30.00	-.467
31.00	-.464	32.00	-.453	33.00	-.434
34.00	-.425	35.00	-.415	36.00	-.402
37.00	-.397	38.00	-.390	39.00	-.366
40.00	-.343	41.00	-.323	42.00	-.314
43.00	-.304	44.00	-.286	45.00	-.248
46.00	-.223	47.00	-.215	48.00	-.211
49.00	-.205	50.00	-.192	51.00	-.177
52.00	-.157	53.00	-.136	54.00	-.130
55.00	-.125	56.00	-.111	57.00	-.101
58.00	-.097	59.00	-.078	60.00	-.071
61.00	-.061	62.00	-.039	63.00	-.001
64.00	.043	65.00	.051	66.00	.079
67.00	.103	68.00	.115	69.00	.129
70.00	.143	71.00	.158	72.00	.195
73.00	.204	74.00	.238	75.00	.267
76.00	.276	77.00	.288	78.00	.292
79.00	.330	80.00	.405	81.00	.494
82.00	.576	83.00	.647	84.00	.667
85.00	.905	86.00	.920	87.00	.939
88.00	1.069	89.00	1.602	90.00	1.633
91.00	1.725	92.00	1.854	93.00	1.894
94.00	2.073	95.00	2.199	96.00	2.571
97.00	2.727	98.00	3.036	99.00	3.143

Year 2001

Mean	-.043	Median	-.311	Std dev	1.008
Kurtosis	2.434	Skewness	1.622	Minimum	-1.535
Maximum	3.202				

Percentile	Value	Percentile	Value	Percentile	Value
1.00	-1.535	2.00	-1.489	3.00	-1.285

4.00	-1.203	5.00	-1.175	6.00	-1.166
7.00	-1.136	8.00	-1.099	9.00	-1.029
10.00	-.996	11.00	-.925	12.00	-.878
13.00	-.840	14.00	-.797	15.00	-.793
16.00	-.773	17.00	-.753	18.00	-.744
19.00	-.705	20.00	-.678	21.00	-.678
22.00	-.674	23.00	-.663	24.00	-.634
25.00	-.606	26.00	-.600	27.00	-.597
28.00	-.595	29.00	-.590	30.00	-.582
31.00	-.573	32.00	-.563	33.00	-.558
34.00	-.540	35.00	-.521	36.00	-.505
37.00	-.500	38.00	-.432	39.00	-.399
40.00	-.394	41.00	-.390	42.00	-.385
43.00	-.376	44.00	-.369	45.00	-.359
46.00	-.354	47.00	-.351	48.00	-.333
49.00	-.321	50.00	-.311	51.00	-.267
52.00	-.258	53.00	-.248	54.00	-.229
55.00	-.216	56.00	-.208	57.00	-.195
58.00	-.168	59.00	-.161	60.00	-.128
61.00	-.122	62.00	-.113	63.00	-.105
64.00	-.099	65.00	-.082	66.00	-.061
67.00	-.051	68.00	-.031	69.00	-.008
70.00	.003	71.00	.016	72.00	.022
73.00	.027	74.00	.057	75.00	.111
76.00	.144	77.00	.157	78.00	.207
79.00	.230	80.00	.232	81.00	.439
82.00	.467	83.00	.537	84.00	.613
85.00	.850	86.00	1.119	87.00	1.205
88.00	1.263	89.00	1.318	90.00	1.349
91.00	1.565	92.00	2.176	93.00	2.239
94.00	2.354	95.00	2.529	96.00	2.660
97.00	2.905	98.00	3.153	99.00	3.201

Year 2002

Mean	.031	Median	-.249	Std dev	1.026
Kurtosis	4.190	Skewness	1.893	Minimum	-1.441
Maximum	4.035				

Percentile	Value	Percentile	Value	Percentile	Value
1.00	-1.426	2.00	-1.261	3.00	-1.185
4.00	-1.152	5.00	-1.100	6.00	-1.068
7.00	-1.047	8.00	-.984	9.00	-.942
10.00	-.859	11.00	-.825	12.00	-.812
13.00	-.806	14.00	-.796	15.00	-.786
16.00	-.764	17.00	-.742	18.00	-.727
19.00	-.699	20.00	-.688	21.00	-.679
22.00	-.667	23.00	-.634	24.00	-.614
25.00	-.594	26.00	-.533	27.00	-.526
28.00	-.518	29.00	-.509	30.00	-.487
31.00	-.468	32.00	-.464	33.00	-.441
34.00	-.406	35.00	-.406	36.00	-.405

37.00	-.401	38.00	-.396	39.00	-.379
40.00	-.364	41.00	-.361	42.00	-.337
43.00	-.319	44.00	-.311	45.00	-.299
46.00	-.288	47.00	-.284	48.00	-.279
49.00	-.261	50.00	-.249	51.00	-.243
52.00	-.226	53.00	-.217	54.00	-.172
55.00	-.152	56.00	-.125	57.00	-.108
58.00	-.097	59.00	-.093	60.00	-.070
61.00	-.032	62.00	-.014	63.00	.027
64.00	.054	65.00	.062	66.00	.096
67.00	.100	68.00	.113	69.00	.119
70.00	.126	71.00	.158	72.00	.189
73.00	.196	74.00	.201	75.00	.221
76.00	.263	77.00	.375	78.00	.386
79.00	.475	80.00	.479	81.00	.498
82.00	.533	83.00	.572	84.00	.613
85.00	.685	86.00	.801	87.00	1.093
88.00	1.309	89.00	1.392	90.00	1.407
91.00	1.548	92.00	1.843	93.00	1.985
94.00	2.032	95.00	2.243	96.00	2.843
97.00	3.169	98.00	3.821	99.00	4.029

Year 2003

Mean	.033	Median	-.228	Std dev	1.036
Kurtosis	2.933	Skewness	1.654	Minimum	-1.458
Maximum	3.748				

Percentile	Value	Percentile	Value	Percentile	Value
1.00	-1.458	2.00	-1.430	3.00	-1.291
4.00	-1.213	5.00	-1.163	6.00	-1.133
7.00	-1.032	8.00	-.973	9.00	-.941
10.00	-.923	11.00	-.904	12.00	-.868
13.00	-.865	14.00	-.842	15.00	-.817
16.00	-.809	17.00	-.803	18.00	-.788
19.00	-.768	20.00	-.742	21.00	-.726
22.00	-.678	23.00	-.657	24.00	-.615
25.00	-.608	26.00	-.601	27.00	-.598
28.00	-.592	29.00	-.571	30.00	-.518
31.00	-.497	32.00	-.488	33.00	-.463
34.00	-.449	35.00	-.419	36.00	-.408
37.00	-.398	38.00	-.392	39.00	-.369
40.00	-.344	41.00	-.338	42.00	-.327
43.00	-.315	44.00	-.308	45.00	-.301
46.00	-.294	47.00	-.262	48.00	-.252
49.00	-.233	50.00	-.228	51.00	-.210
52.00	-.160	53.00	-.136	54.00	-.120
55.00	-.087	56.00	-.071	57.00	-.021
58.00	-.010	59.00	.002	60.00	.005
61.00	.021	62.00	.044	63.00	.078
64.00	.109	65.00	.115	66.00	.132

67.00	.155	68.00	.157	69.00	.164
70.00	.181	71.00	.214	72.00	.219
73.00	.227	74.00	.242	75.00	.300
76.00	.345	77.00	.361	78.00	.375
79.00	.389	80.00	.500	81.00	.515
82.00	.573	83.00	.639	84.00	.669
85.00	.699	86.00	.721	87.00	.864
88.00	1.127	89.00	1.244	90.00	1.597
91.00	1.795	92.00	1.896	93.00	2.217
94.00	2.369	95.00	2.614	96.00	2.978
97.00	3.128	98.00	3.362	99.00	3.718

Year 2004

Mean	-.024	Median	-.208	Std dev	.978
Kurtosis	2.638	Skewness	1.527	Minimum	-1.636
Maximum	3.674				

Percentile	Value	Percentile	Value	Percentile	Value
1.00	-1.616	2.00	-1.385	3.00	-1.339
4.00	-1.236	5.00	-1.200	6.00	-1.152
7.00	-1.110	8.00	-1.075	9.00	-1.052
10.00	-.999	11.00	-.977	12.00	-.965
13.00	-.916	14.00	-.895	15.00	-.837
16.00	-.771	17.00	-.738	18.00	-.717
19.00	-.707	20.00	-.693	21.00	-.684
22.00	-.681	23.00	-.675	24.00	-.673
25.00	-.644	26.00	-.636	27.00	-.617
28.00	-.568	29.00	-.550	30.00	-.545
31.00	-.535	32.00	-.529	33.00	-.512
34.00	-.491	35.00	-.481	36.00	-.474
37.00	-.466	38.00	-.460	39.00	-.425
40.00	-.421	41.00	-.412	42.00	-.394
43.00	-.361	44.00	-.325	45.00	-.307
46.00	-.301	47.00	-.276	48.00	-.222
49.00	-.211	50.00	-.208	51.00	-.194
52.00	-.160	53.00	-.153	54.00	-.137
55.00	-.111	56.00	-.108	57.00	-.102
58.00	-.084	59.00	-.070	60.00	-.038
61.00	-.010	62.00	.002	63.00	.025
64.00	.068	65.00	.074	66.00	.082
67.00	.088	68.00	.096	69.00	.104
70.00	.118	71.00	.138	72.00	.166
73.00	.195	74.00	.209	75.00	.223
76.00	.300	77.00	.304	78.00	.334
79.00	.375	80.00	.399	81.00	.460
82.00	.505	83.00	.517	84.00	.552
85.00	.609	86.00	.833	87.00	.877
88.00	1.022	89.00	1.276	90.00	1.435
91.00	1.647	92.00	1.741	93.00	2.008
94.00	2.284	95.00	2.404	96.00	2.564

97.00	2.669	98.00	2.844	99.00	3.610

Percentiles for **Interlibrary Loan Activity**

Year 2000

Mean	-.057	Median	-.235	Std dev	1.002
Kurtosis	6.993	Skewness	2.212	Minimum	-1.803
Maximum	4.922				

Percentile	Value	Percentile	Value	Percentile	Value
1.00	-1.765	2.00	-1.260	3.00	-1.210
4.00	-1.099	5.00	-1.078	6.00	-1.044
7.00	-1.028	8.00	-.995	9.00	-.943
10.00	-.911	11.00	-.897	12.00	-.880
13.00	-.876	14.00	-.873	15.00	-.853
16.00	-.845	17.00	-.821	18.00	-.812
19.00	-.786	20.00	-.765	21.00	-.757
22.00	-.742	23.00	-.734	24.00	-.727
25.00	-.711	26.00	-.695	27.00	-.656
28.00	-.648	29.00	-.608	30.00	-.600
31.00	-.595	32.00	-.584	33.00	-.574
34.00	-.555	35.00	-.529	36.00	-.515
37.00	-.508	38.00	-.492	39.00	-.479
40.00	-.406	41.00	-.355	42.00	-.341
43.00	-.318	44.00	-.307	45.00	-.300
46.00	-.293	47.00	-.270	48.00	-.251
49.00	-.244	50.00	-.235	51.00	-.227
52.00	-.213	53.00	-.199	54.00	-.189
55.00	-.180	56.00	-.170	57.00	-.163
58.00	-.129	59.00	-.121	60.00	-.086
61.00	-.033	62.00	-.016	63.00	.000
64.00	.021	65.00	.048	66.00	.053
67.00	.067	68.00	.077	69.00	.087
70.00	.099	71.00	.105	72.00	.110
73.00	.111	74.00	.114	75.00	.136
76.00	.201	77.00	.208	78.00	.223
79.00	.281	80.00	.330	81.00	.354
82.00	.433	83.00	.479	84.00	.519
85.00	.571	86.00	.631	87.00	.661
88.00	.774	89.00	1.084	90.00	1.203
91.00	1.390	92.00	1.505	93.00	1.521
94.00	1.533	95.00	2.187	96.00	2.620
97.00	2.745	98.00	3.440	99.00	4.826

Year 2001

Mean	-.027	Median	-.259	Std dev	.967
Kurtosis	5.004	Skewness	1.867	Minimum	-1.349
Maximum	4.384				

Percentile	Value	Percentile	Value	Percentile	Value
1.00	-1.342	2.00	-1.285	3.00	-1.260

4.00	-1.163	5.00	-1.090	6.00	-1.077
7.00	-1.062	8.00	-1.021	9.00	-1.007
10.00	-.926	11.00	-.903	12.00	-.873
13.00	-.858	14.00	-.847	15.00	-.842
16.00	-.809	17.00	-.783	18.00	-.768
19.00	-.733	20.00	-.726	21.00	-.713
22.00	-.703	23.00	-.694	24.00	-.691
25.00	-.687	26.00	-.681	27.00	-.678
28.00	-.635	29.00	-.615	30.00	-.602
31.00	-.571	32.00	-.568	33.00	-.568
34.00	-.563	35.00	-.547	36.00	-.532
37.00	-.461	38.00	-.428	39.00	-.417
40.00	-.405	41.00	-.381	42.00	-.374
43.00	-.346	44.00	-.345	45.00	-.343
46.00	-.336	47.00	-.317	48.00	-.290
49.00	-.273	50.00	-.259	51.00	-.251
52.00	-.231	53.00	-.226	54.00	-.209
55.00	-.185	56.00	-.155	57.00	-.114
58.00	-.101	59.00	-.082	60.00	-.054
61.00	-.024	62.00	-.004	63.00	.041
64.00	.058	65.00	.070	66.00	.119
67.00	.148	68.00	.156	69.00	.208
70.00	.227	71.00	.269	72.00	.299
73.00	.307	74.00	.339	75.00	.377
76.00	.393	77.00	.397	78.00	.399
79.00	.420	80.00	.473	81.00	.691
82.00	.721	83.00	.730	84.00	.751
85.00	.764	86.00	.801	87.00	.829
88.00	.899	89.00	1.017	90.00	1.059
91.00	1.283	92.00	1.377	93.00	1.511
94.00	1.704	95.00	1.773	96.00	2.151
97.00	2.876	98.00	3.368	99.00	4.289

Year 2002

Mean	-.024	Median	-.250	Std dev	1.024
Kurtosis	3.837	Skewness	1.717	Minimum	-1.414
Maximum	4.080				

Percentile	Value	Percentile	Value	Percentile	Value
1.00	-1.413	2.00	-1.397	3.00	-1.348
4.00	-1.271	5.00	-1.253	6.00	-1.222
7.00	-1.153	8.00	-1.074	9.00	-1.044
10.00	-1.039	11.00	-1.000	12.00	-.946
13.00	-.938	14.00	-.914	15.00	-.885
16.00	-.830	17.00	-.811	18.00	-.800
19.00	-.773	20.00	-.750	21.00	-.746
22.00	-.743	23.00	-.740	24.00	-.719
25.00	-.670	26.00	-.634	27.00	-.631
28.00	-.621	29.00	-.609	30.00	-.604
31.00	-.590	32.00	-.580	33.00	-.579
34.00	-.576	35.00	-.563	36.00	-.506

37.00	-.467	38.00	-.439	39.00	-.413
40.00	-.400	41.00	-.395	42.00	-.389
43.00	-.383	44.00	-.347	45.00	-.324
46.00	-.311	47.00	-.301	48.00	-.285
49.00	-.258	50.00	-.250	51.00	-.236
52.00	-.220	53.00	-.215	54.00	-.213
55.00	-.198	56.00	-.184	57.00	-.177
58.00	-.163	59.00	-.123	60.00	-.081
61.00	-.039	62.00	-.021	63.00	.009
64.00	.054	65.00	.077	66.00	.089
67.00	.099	68.00	.112	69.00	.126
70.00	.167	71.00	.192	72.00	.218
73.00	.246	74.00	.286	75.00	.304
76.00	.341	77.00	.463	78.00	.478
79.00	.498	80.00	.517	81.00	.569
82.00	.704	83.00	.760	84.00	.786
85.00	.861	86.00	.926	87.00	.960
88.00	1.080	89.00	1.262	90.00	1.294
91.00	1.417	92.00	1.524	93.00	1.679
94.00	1.852	95.00	2.054	96.00	2.470
97.00	3.108	98.00	3.680	99.00	4.052

Year 2003

Mean	.037	Median	-.240	Std dev	1.028
Kurtosis	5.385	Skewness	1.878	Minimum	-1.426
Maximum	5.105				

Percentile	Value	Percentile	Value	Percentile	Value
1.00	-1.415	2.00	-1.297	3.00	-1.248
4.00	-1.221	5.00	-1.170	6.00	-1.122
7.00	-1.056	8.00	-1.023	9.00	-.962
10.00	-.927	11.00	-.925	12.00	-.909
13.00	-.877	14.00	-.856	15.00	-.790
16.00	-.756	17.00	-.743	18.00	-.728
19.00	-.719	20.00	-.707	21.00	-.698
22.00	-.697	23.00	-.651	24.00	-.639
25.00	-.613	26.00	-.611	27.00	-.592
28.00	-.561	29.00	-.543	30.00	-.511
31.00	-.493	32.00	-.488	33.00	-.472
34.00	-.461	35.00	-.446	36.00	-.427
37.00	-.405	38.00	-.392	39.00	-.362
40.00	-.333	41.00	-.327	42.00	-.326
43.00	-.301	44.00	-.289	45.00	-.271
46.00	-.263	47.00	-.260	48.00	-.255
49.00	-.248	50.00	-.240	51.00	-.234
52.00	-.231	53.00	-.208	54.00	-.188
55.00	-.180	56.00	-.163	57.00	-.122
58.00	-.120	59.00	-.110	60.00	-.072
61.00	-.035	62.00	.004	63.00	.071
64.00	.108	65.00	.134	66.00	.155
67.00	.158	68.00	.165	69.00	.220

70.00	.294	71.00	.313	72.00	.337
73.00	.361	74.00	.391	75.00	.413
76.00	.444	77.00	.512	78.00	.558
79.00	.605	80.00	.630	81.00	.648
82.00	.681	83.00	.726	84.00	.737
85.00	.846	86.00	1.018	87.00	1.114
88.00	1.158	89.00	1.181	90.00	1.542
91.00	1.575	92.00	1.687	93.00	1.821
94.00	2.011	95.00	2.277	96.00	2.455
97.00	2.570	98.00	3.025	99.00	4.926

Year 2004

Mean	.071	Median	-.175	Std dev	.991
Kurtosis	2.443	Skewness	1.478	Minimum	-1.272
Maximum	3.701				

Percentile	Value	Percentile	Value	Percentile	Value
1.00	-1.270	2.00	-1.237	3.00	-1.179
4.00	-1.148	5.00	-1.139	6.00	-1.136
7.00	-1.125	8.00	-1.082	9.00	-1.025
10.00	-.934	11.00	-.874	12.00	-.854
13.00	-.849	14.00	-.769	15.00	-.767
16.00	-.760	17.00	-.748	18.00	-.717
19.00	-.700	20.00	-.683	21.00	-.654
22.00	-.630	23.00	-.607	24.00	-.569
25.00	-.558	26.00	-.538	27.00	-.515
28.00	-.479	29.00	-.452	30.00	-.443
31.00	-.443	32.00	-.437	33.00	-.429
34.00	-.419	35.00	-.397	36.00	-.387
37.00	-.380	38.00	-.361	39.00	-.353
40.00	-.337	41.00	-.328	42.00	-.313
43.00	-.285	44.00	-.268	45.00	-.260
46.00	-.232	47.00	-.215	48.00	-.209
49.00	-.182	50.00	-.175	51.00	-.143
52.00	-.135	53.00	-.108	54.00	-.093
55.00	-.077	56.00	-.032	57.00	.012
58.00	.023	59.00	.026	60.00	.037
61.00	.063	62.00	.072	63.00	.091
64.00	.100	65.00	.124	66.00	.174
67.00	.184	68.00	.204	69.00	.241
70.00	.283	71.00	.309	72.00	.324
73.00	.357	74.00	.368	75.00	.372
76.00	.406	77.00	.506	78.00	.533
79.00	.546	80.00	.573	81.00	.577
82.00	.589	83.00	.623	84.00	.773
85.00	1.133	86.00	1.265	87.00	1.299
88.00	1.389	89.00	1.445	90.00	1.513
91.00	1.592	92.00	1.731	93.00	1.892
94.00	2.075	95.00	2.247	96.00	2.471
97.00	2.895	98.00	3.335	99.00	3.677

Appendix J: Percentiles for the Indices