Illinois Libraries Contribution to Community Economic Development: Estimating the Monetary Value of Library Assistance to Entrepreneurs in 12 different Industries

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> *Library resources are the point of first resort for very few inquiries and are the last resort (or no resort at all) for many* (Monroe (1979)).

Little has changed since 1979; a significant proportion of the population rarely or never uses libraries (Coker 1993; Choy 2011). In this age of "tablet PC" access to resources, there is mounting pressure on librarians to demonstrate that the information services they provide are vital resources for community economic development. How can the contribution of public library services for community economic development be measured? This paper addresses this question using data from the US Census and the Public Libraries Survey.

Theoretical Setting

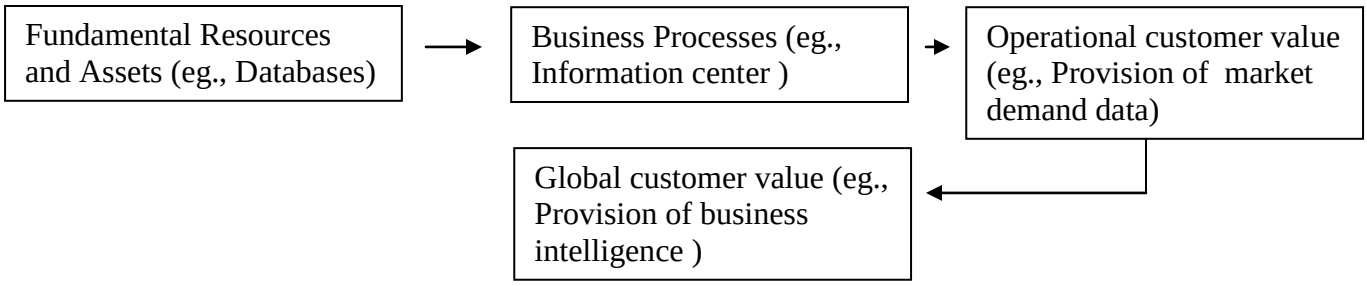
Consider Figure 1; it presents the process of converting library resources into customer value. Often, customers think of value at a global or macro level: for example, an entrepreneur may request "business information". At a more operational level, this need can be broken down into specific attributes such as information about market demand for a product, and competitive intensity in the product category. It is then up to the library's business processes to enhance customer value by providing the needed information; satisfy customer needs (Porter 1985).

Research into library value chain is scarce (a Google Scholar search using the phrase "library value chain" failed to produce any document detailing a library's value chain). However, several studies have explored the two major components of the library value chain: "benefits to communities", and "efficiency" of library business processes.

For example, a research involving 100 randomly selected public libraries in Illinois found that it is common for librarians to provide business intelligence to small business owners, and entrepreneurs (Sciacca 1998). Recently, Hamilton-Pennell (2008) provided more examples of public libraries helping businesses succeed in the marketplace. Our study adds to this literature by providing quantitative estimates of public library contribution to community economic development.

Regarding the efficiency of public library business processes, it can be gleaned from a study by Aabo (2009). Based on a secondary analysis of 34 library valuation studies, Aabo (2009) concludes that one dollar investment in libraries produce $4.31 in benefits. Since benefits are realized after costs (Rossiter 1996), we believe that library business-processes are efficient.

Figure 1: Matching Customer Value to Resources through Business Processes



Method

A county level statistical model of the form:

$y_i = \alpha + \sum_{i=1}^{102} \sum_{j=1}^{12} \beta_j x_{ij} + u_i,$ was calibrated.

In this formulation, *y* is the average, per capita operating cost of the libraries in each of the 102 counties in Illinois, and the *x* are proportions of self-employed in the county's work force in each of the 12 major industry sectors: agriculture, construction, manufacturing, wholesale trade, retail trade, information, transportation, finance, education, professional, arts industry, and other sectors (see www.naics.org for industry sector definitions).

Data on library operating costs were sourced from the Institute of Museum and Library Services (IMLS; Manjarrez, Miller, Craig, Dorinski, Freeman, Isaac, O'Shea, Schilling, and Scotto (2011)). The IMLS public use data file contains information on 9225 public libraries in the US. Our focus was limited to the 634 libraries in Illinois. The variable, "total operating expenditures" (TOTOPEXP) was scaled by county population to derive per capita measures.

The independent variables were collated from the American Community Survey. These are the 2010 five-year estimates of self-employment in Illinois counties (Table B24080, and DP3). Appendix 1 lists the data used in the analysis.

Results and Discussion

Table 1 shows the results of model estimation. The partial r^2's are obtained by the formula:

$$\frac{t^2}{t^2 + df}$$

The simple r^2 is the square of the correlation of average cost to provide library services and the proportion of entrepreneurs in that category. The partial and simple r^2 are presented together to highlight redundancies or put another way, saliencies of the explanatory variables. For example, the library needs of an educational entrepreneur costs more to fulfill than the needs of an entrepreneur in the professional-services sector although the latter's simple correlation with the dependent variable is higher.

Table 1: Library Cost Regressions

Variable	Coefficient	SE	*t* ratio	Partial r^2	Simple r^2	Average Cost to Service an Entrepreneur
Agriculture	36.59	30.1	1.22	0.02	0.27	0
Construction	68.05	37.08	1.84	0.04	0.01	21.36
Mfg.	50.81	59.92	0.85	0.01	0.01	4.12
Retail	64.42	48.91	1.32	0.02	0.05	17.73
Wholesale	219.63	87.70	2.5	0.06	0.09	172.94
Inf.	152.51	177.84	0.86	0.01	0.06	105.82
Transp.	41.67	61.14	0.68	0.00	0.08	0
Finance	141.16	54.8	2.58	0.07	0.22	94.47
Education	161.36	38.81	4.16	0.16	0.19	114.67
Professional	143.9	41.25	3.49	0.12	0.36	97.21
Arts	16.61	64.27	0.26	0.00	0.10	0
Other	0					
Constant	-46.69	25.4	-1.84			

$R^2 = 0.46$

In general, each regression coefficient measures the change in *y* for a unit increase in that dependent variable *holding other variables constant*. In this paper, since the independent variables are proportions, it is impossible to hold other variables constant. The proper interpretation of regression coefficients in Table 1 is as follows:

Put the value of Education = 1, all others 0. Then the estimated value of the dependent variable = (Coefficient of Education + Constant) = (161.36 – 46.69) = 114.67. This is the average cost of providing library services to an entrepreneur in the education sector. Similarly, the coefficient of professional + constant = 143.9 – 46.69 = 97.21 is the average cost of providing library services to an entrepreneur in the professional services industry. The last column of Table 1 provides cost information for all the entrepreneurial categories. Note that the negative intercept suggests that the average cost of servicing entrepreneurs in the "other" category is zero.

The analysis point out that demand for library services comes from entrepreneurs in the education, professional services, finance, wholesale, and the construction sectors. The question is whether the counties have the resources to service these clients. For example, majority of entrepreneurs in Logan County work in the construction, manufacturing, and professional services industries (53%; see Appendix 1). Since professional entrepreneurs demand business intelligence much more than others, it is essential for the Logan county managers to ensure that the county libraries provide books, periodicals, databases, and more importantly technical assistance, to cater to the needs of "professional" businessmen.

Summary and Conclusion

This study is an empirical assessment of Illinois public libraries contribution for entrepreneurial development. Specifically, it is shown that libraries spend:

1. $114.67 to service an entrepreneur in the educational sector;
2. $97.21 to provide library services to an entrepreneur in professional services, and
3. $94.47 to service an entrepreneur in the financial services sector.

It is hoped that armed with this information, and the county-level entrepreneurial mix data provided in Appendix 1, county managers will assess the adequacy of library resources in their county. Job creation has become the mantra of almost all local governments in Illinois. This study shows how library services help in this objective.

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Appendix 1: Data Matrix

			Proportion of Self-Employed in …..													
County	Population	Per Capita Library Exp.	Number of Self-Employed Persons	Workforce	AG	CON	MFG	RET	WS	IT	TRAN	FIN	EDU	PRO	ART	OTHR
ADAMS	67054	36.31	3798	0.12	0.12	0.15	0.03	0.10	0.03	0.01	0.04	0.06	0.19	0.11	0.05	0.12
ALEXANDER	7914	9.86	112	0.04	0.17	0.25	0.00	0.00	0.06	0.00	0.11	0.13	0.00	0.00	0.00	0.29
BOND	18103	8.84	841	0.10	0.28	0.22	0.02	0.05	0.01	0.01	0.07	0.04	0.08	0.10	0.01	0.10
BOONE	54020	14.81	1833	0.08	0.07	0.16	0.09	0.10	0.03	0.00	0.05	0.05	0.12	0.18	0.03	0.12
BROWN	6591	16.62	483	0.21	0.39	0.25	0.00	0.04	0.00	0.00	0.02	0.07	0.10	0.02	0.00	0.11
BUREAU	34699	30.43	1653	0.10	0.25	0.12	0.02	0.09	0.04	0.00	0.05	0.08	0.09	0.10	0.04	0.12
CALHOUN	5019	4.58	210	0.10	0.26	0.21	0.08	0.06	0.00	0.04	0.07	0.01	0.00	0.17	0.06	0.06
CARROLL	15749	23.67	1076	0.14	0.25	0.24	0.03	0.07	0.03	0.00	0.07	0.02	0.07	0.07	0.05	0.10
CASS	13559	26.71	511	0.08	0.20	0.15	0.03	0.05	0.01	0.00	0.04	0.04	0.18	0.10	0.02	0.19
CHAMPAIGN	195671	56.94	7423	0.07	0.09	0.12	0.03	0.06	0.01	0.02	0.04	0.09	0.16	0.19	0.07	0.12
CHRISTIAN	34253	14.60	1715	0.11	0.21	0.22	0.02	0.06	0.02	0.00	0.06	0.05	0.05	0.12	0.02	0.16
CLARK	16657	30.20	1153	0.15	0.30	0.19	0.01	0.05	0.01	0.00	0.05	0.09	0.03	0.06	0.04	0.16
CLAY	13538	19.43	656	0.11	0.27	0.11	0.00	0.10	0.00	0.00	0.04	0.00	0.19	0.13	0.06	0.10
CLINTON	36368	12.18	1733	0.10	0.22	0.15	0.02	0.12	0.02	0.01	0.06	0.07	0.07	0.12	0.03	0.11
COLES	52065	19.21	2098	0.09	0.10	0.15	0.08	0.09	0.01	0.01	0.06	0.05	0.12	0.13	0.03	0.16
COOK	5287037	56.16	204096	0.08	0.00	0.15	0.03	0.07	0.03	0.02	0.05	0.10	0.13	0.23	0.08	0.10
CRAWFORD	19433	30.97	716	0.08	0.22	0.25	0.03	0.07	0.02	0.03	0.03	0.03	0.07	0.11	0.05	0.09
CUMBERLAND	10716	16.68	559	0.11	0.31	0.19	0.02	0.11	0.00	0.00	0.03	0.02	0.11	0.05	0.02	0.14
DEKALB	107333	42.72	4604	0.09	0.07	0.19	0.03	0.06	0.02	0.01	0.02	0.06	0.13	0.17	0.10	0.13
DE WITT	16034	58.63	643	0.08	0.32	0.21	0.00	0.13	0.00	0.00	0.04	0.03	0.09	0.07	0.01	0.10

AG: Agriculture, Forestry, fishing, and related activities CON: Construction MFG: Manufacturing RET: Retail Trade WS: Wholesale Trade IT: Information Technology TRAN: Transportation and warehousing FIN: Finance and insurance EDU: Educational services PRO: Professional, scientific, and technical services ART: Arts, entertainment, and recreation OTHR: Other services, except public administration

County	Population	Per Capita Library Exp.	Number of Self-Employed Persons	Workforce	AG	CON	MFG	RET	WS	IT	TRAN	FIN	EDU	PRO	ART	OTHR
DUPAGE	932541	82.20	47802	0.10	0.00	0.14	0.05	0.07	0.05	0.01	0.04	0.12	0.13	0.24	0.05	0.11
EDGAR	18471	12.64	1049	0.12	0.37	0.12	0.01	0.08	0.03	0.00	0.02	0.01	0.09	0.16	0.01	0.11
EDWARDS	6444	11.59	351	0.11	0.38	0.12	0.08	0.02	0.00	0.00	0.05	0.03	0.06	0.09	0.00	0.18
EFFINGHAM	34424	18.38	2262	0.13	0.10	0.18	0.07	0.07	0.03	0.00	0.09	0.10	0.12	0.10	0.02	0.12
FAYETTE	20935	22.59	1317	0.13	0.28	0.14	0.04	0.10	0.00	0.01	0.04	0.05	0.05	0.12	0.08	0.11
FORD	13911	30.79	860	0.13	0.24	0.30	0.02	0.04	0.01	0.00	0.02	0.03	0.17	0.07	0.01	0.10
FRANKLIN	39312	13.46	1374	0.09	0.06	0.25	0.04	0.08	0.01	0.01	0.03	0.04	0.07	0.11	0.05	0.25
FULTON	36652	34.37	1510	0.10	0.19	0.17	0.03	0.05	0.04	0.00	0.06	0.05	0.13	0.07	0.05	0.15
GALLATIN	5705	2.62	267	0.11	0.30	0.25	0.00	0.07	0.00	0.00	0.17	0.05	0.01	0.02	0.02	0.10
GREENE	13567	13.71	874	0.14	0.28	0.16	0.01	0.08	0.02	0.00	0.05	0.02	0.06	0.10	0.05	0.17
GRUNDY	48421	39.88	1861	0.08	0.09	0.19	0.05	0.13	0.03	0.01	0.03	0.10	0.12	0.10	0.07	0.08
HAMILTON	8096	4.75	511	0.14	0.34	0.06	0.06	0.01	0.04	0.02	0.06	0.04	0.01	0.06	0.00	0.31
HANCOCK	18359	27.18	1270	0.14	0.29	0.14	0.06	0.06	0.01	0.01	0.02	0.03	0.12	0.05	0.05	0.13
HARDIN	4358	5.53	140	0.09	0.18	0.21	0.03	0.05	0.06	0.00	0.09	0.00	0.00	0.00	0.04	0.35
HENDERSON	7354	27.37	461	0.13	0.39	0.11	0.04	0.07	0.00	0.00	0.11	0.01	0.03	0.12	0.03	0.09
HENRY	49314	45.82	2297	0.10	0.20	0.20	0.02	0.08	0.05	0.01	0.06	0.06	0.07	0.10	0.05	0.12
IROQUOIS	29690	30.69	2188	0.15	0.29	0.15	0.01	0.06	0.01	0.01	0.04	0.02	0.06	0.15	0.06	0.13
JACKSON	58103	20.48	2170	0.08	0.08	0.16	0.02	0.10	0.03	0.00	0.03	0.05	0.09	0.14	0.10	0.20
JASPER	9530	15.24	804	0.17	0.39	0.09	0.00	0.03	0.01	0.00	0.03	0.13	0.08	0.06	0.06	0.12

County	Population	Per Capita Library Exp.	Number of Self-Employed Persons	Workforce	AG	CON	MFG	RET	WS	IT	TRAN	FIN	EDU	PRO	ART	OTHR
JEFFERSON	39944	19.05	1744	0.10	0.13	0.22	0.05	0.13	0.03	0.00	0.05	0.04	0.08	0.11	0.03	0.13
JERSEY	22549	18.47	1060	0.10	0.12	0.21	0.07	0.04	0.03	0.00	0.09	0.04	0.04	0.16	0.05	0.16
JO DAVIESS	21990	32.26	2059	0.17	0.26	0.19	0.02	0.08	0.01	0.01	0.04	0.06	0.07	0.08	0.09	0.09
JOHNSON	13730	1.63	236	0.06	0.24	0.08	0.15	0.06	0.00	0.00	0.01	0.03	0.11	0.10	0.07	0.14
KANE	511892	74.85	20268	0.08	0.02	0.19	0.05	0.07	0.04	0.02	0.04	0.08	0.11	0.21	0.07	0.10
KANKAKEE	113215	33.13	3945	0.08	0.09	0.20	0.04	0.06	0.01	0.01	0.05	0.08	0.14	0.13	0.03	0.16
KENDALL	104821	32.15	4156	0.08	0.05	0.21	0.06	0.06	0.01	0.02	0.04	0.09	0.08	0.18	0.03	0.16
KNOX	51648	35.04	1735	0.08	0.20	0.13	0.04	0.06	0.01	0.01	0.03	0.04	0.15	0.10	0.12	0.11
LAKE	712567	92.87	36811	0.11	0.01	0.14	0.05	0.09	0.04	0.01	0.03	0.11	0.11	0.26	0.05	0.09
LASALLE		36.31	4837	0.09	0.16	0.15	0.04	0.10	0.01	0.02	0.09	0.03	0.07	0.14	0.08	0.12
LAWRENCE	16408	9.86	555	0.09	0.28	0.13	0.12	0.02	0.01	0.00	0.10	0.03	0.03	0.12	0.02	0.14
LEE	34919	8.84	1617	0.09	0.22	0.15	0.05	0.05	0.02	0.00	0.04	0.09	0.12	0.10	0.03	0.13
LIVINGSTON	37777	14.81	1944	0.11	0.25	0.17	0.05	0.09	0.02	0.00	0.06	0.03	0.06	0.08	0.05	0.12
LOGAN	29776	16.62	1149	0.09	0.26	0.22	0.02	0.08	0.01	0.00	0.03	0.07	0.05	0.11	0.01	0.13
MCDONOUGH	32770	30.43	1620	0.11	0.22	0.12	0.01	0.06	0.01	0.00	0.09	0.10	0.09	0.12	0.09	0.11
MCHENRY	320961	4.58	16012	0.10	0.03	0.16	0.09	0.08	0.05	0.03	0.03	0.09	0.08	0.22	0.05	0.10
MCLEAN	167699	23.67	6116	0.07	0.09	0.19	0.02	0.12	0.01	0.01	0.01	0.06	0.16	0.17	0.04	0.12
MACON	108204	26.71	3775	0.08	0.10	0.15	0.02	0.09	0.05	0.01	0.04	0.05	0.15	0.12	0.06	0.15
MACOUPIN	47774	56.94	2347	0.10	0.18	0.19	0.03	0.09	0.02	0.00	0.04	0.03	0.11	0.11	0.07	0.14

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MADISON	268457	14.60	9751	0.08	0.05	0.17	0.05	0.11	0.02	0.01	0.04	0.10	0.11	0.15	0.06	0.14
MARION	39008	30.20	1382	0.08	0.10	0.11	0.04	0.12	0.04	0.03	0.03	0.07	0.13	0.10	0.08	0.14
MARSHALL	12702	19.43	519	0.09	0.28	0.12	0.02	0.09	0.00	0.02	0.10	0.05	0.05	0.08	0.03	0.16
MASON	14785	12.18	836	0.13	0.33	0.08	0.03	0.07	0.04	0.00	0.05	0.04	0.20	0.09	0.02	0.05
MASSAC	14970	19.21	595	0.09	0.14	0.29	0.03	0.02	0.00	0.00	0.00	0.07	0.04	0.12	0.11	0.19
MENARD	12466	56.16	718	0.11	0.20	0.10	0.03	0.03	0.00	0.02	0.08	0.08	0.10	0.16	0.03	0.16
MERCER	16276	30.97	945	0.11	0.29	0.06	0.00	0.09	0.00	0.00	0.06	0.01	0.18	0.08	0.07	0.15
MONROE	33236	16.68	1615	0.10	0.10	0.14	0.02	0.10	0.04	0.03	0.04	0.15	0.04	0.14	0.06	0.15
MONTGOMERY	29500	42.72	1721	0.14	0.33	0.13	0.03	0.08	0.00	0.00	0.01	0.04	0.09	0.15	0.05	0.08
MORGAN	34897	58.63	1462	0.09	0.22	0.15	0.03	0.10	0.03	0.02	0.04	0.03	0.13	0.09	0.02	0.15
MOULTRIE	14392	24.84	694	0.10	0.24	0.22	0.07	0.11	0.00	0.00	0.01	0.03	0.07	0.11	0.01	0.12
OGLE	55336	82.20	2972	0.11	0.17	0.15	0.04	0.10	0.02	0.00	0.09	0.08	0.09	0.08	0.06	0.12
PEORIA	185816	12.64	6006	0.07	0.05	0.15	0.04	0.09	0.02	0.01	0.02	0.08	0.14	0.18	0.08	0.14
PERRY	22424	11.59	866	0.10	0.16	0.19	0.03	0.08	0.05	0.03	0.01	0.02	0.07	0.12	0.10	0.14
PIATT	16550	18.38	849	0.10	0.29	0.13	0.04	0.04	0.00	0.00	0.06	0.00	0.14	0.08	0.04	0.16
PIKE	16273	22.59	973	0.13	0.30	0.14	0.02	0.05	0.01	0.00	0.03	0.03	0.15	0.10	0.05	0.11
POPE	3991	30.79	288	0.16	0.22	0.45	0.00	0.06	0.00	0.00	0.05	0.07	0.06	0.04	0.02	0.02
PULASKI	6218	13.46	219	0.10	0.25	0.16	0.00	0.02	0.00	0.00	0.09	0.00	0.05	0.20	0.01	0.22
PUTNAM	6009	34.37	275	0.09	0.23	0.14	0.00	0.08	0.10	0.03	0.05	0.07	0.11	0.07	0.08	0.04
RANDOLPH	32686	2.62	1302	0.10	0.19	0.14	0.05	0.11	0.01	0.00	0.03	0.04	0.06	0.18	0.07	0.12
RICHLAND	15523	13.71	772	0.10	0.19	0.16	0.03	0.08	0.08	0.00	0.03	0.06	0.10	0.08	0.08	0.12

County	Population	Per Capita Library Exp.	Number of Self-Employed Persons	Workforce	AG	CON	MFG	RET	WS	IT	TRAN	FIN	EDU	PRO	ART	OTHR
ROCK ISLAND	146826	39.88	5456	0.08	0.06	0.14	0.04	0.06	0.02	0.01	0.03	0.06	0.15	0.18	0.06	0.18
ST. CLAIR	263617	4.75	9141	0.08	0.04	0.15	0.04	0.10	0.03	0.01	0.04	0.10	0.12	0.17	0.05	0.14
SALINE	25738	27.18	1185	0.12	0.10	0.18	0.03	0.13	0.04	0.00	0.04	0.07	0.07	0.09	0.06	0.19
SANGAMON	195716	5.53	8059	0.08	0.05	0.18	0.02	0.09	0.02	0.01	0.02	0.08	0.14	0.17	0.07	0.15
SCHUYLER	6730	27.37	398	0.12	0.20	0.28	0.09	0.19	0.00	0.00	0.05	0.05	0.00	0.01	0.00	0.12
SCOTT	5193	45.82	317	0.12	0.50	0.11	0.03	0.04	0.03	0.00	0.02	0.00	0.12	0.09	0.03	0.04
SHELBY	21803	30.69	1409	0.13	0.37	0.17	0.02	0.07	0.03	0.00	0.01	0.04	0.07	0.09	0.03	0.09
STARK	6019	20.48	455	0.16	0.38	0.12	0.02	0.08	0.02	0.01	0.01	0.06	0.09	0.10	0.00	0.11
STEPHENSON	46537	15.24	2175	0.10	0.28	0.15	0.05	0.05	0.03	0.01	0.04	0.08	0.08	0.10	0.06	0.08
TAZEWELL	132466	19.05	4461	0.07	0.10	0.14	0.02	0.09	0.02	0.01	0.04	0.10	0.10	0.15	0.06	0.15
UNION	18005	18.47	716	0.10	0.15	0.15	0.06	0.09	0.02	0.00	0.03	0.04	0.03	0.21	0.03	0.20
VERMILION	80067	32.26	3460	0.10	0.13	0.19	0.02	0.13	0.02	0.00	0.06	0.05	0.07	0.15	0.05	0.13
WABASH	11997	1.63	609	0.11	0.35	0.09	0.01	0.10	0.00	0.00	0.05	0.00	0.14	0.11	0.04	0.11
WARREN	17409	74.85	947	0.12	0.24	0.20	0.02	0.03	0.05	0.00	0.09	0.03	0.12	0.03	0.05	0.14
WASHINGTON	14560	33.13	1079	0.14	0.31	0.10	0.00	0.07	0.02	0.00	0.10	0.03	0.13	0.09	0.03	0.12
WAYNE	16294	32.15	871	0.11	0.31	0.18	0.01	0.11	0.01	0.01	0.02	0.03	0.02	0.10	0.04	0.15
WHITE	14661	35.04	768	0.11	0.32	0.11	0.00	0.12	0.03	0.00	0.02	0.03	0.07	0.11	0.07	0.12
WHITESIDE	58961	92.87	2789	0.10	0.16	0.17	0.06	0.08	0.01	0.01	0.07	0.07	0.05	0.11	0.05	0.16
WILL	685251	36.31	25470	0.08	0.02	0.19	0.04	0.09	0.04	0.01	0.06	0.10	0.11	0.20	0.06	0.10
WILLIAMSON	65169	9.86	2588	0.09	0.03	0.18	0.04	0.11	0.02	0.01	0.02	0.10	0.10	0.20	0.06	0.14

County	Population	Per Capita Library Exp.	Number of Self-Employed Persons	Workforce	AG	CON	MFG	RET	WS	IT	TRAN	FIN	EDU	PRO	ART	OTHR
WINNEBAGO	299702	8.84	10727	0.08	0.02	0.14	0.09	0.10	0.03	0.02	0.03	0.07	0.12	0.17	0.06	0.16
WOODFORD	38862	14.81	1642	0.09	0.20	0.21	0.04	0.07	0.02	0.01	0.04	0.03	0.08	0.16	0.05	0.10

AG: Agriculture, Forestry, fishing, and related activities CON: Construction MFG: Manufacturing RET: Retail Trade WS: Wholesale Trade IT: Information Technology TRAN: Transportation and warehousing FIN: Finance and insurance EDU: Educational services PRO: Professional, scientific, and technical services ART: Arts, entertainment, and recreation OTHR: Other services, except public administration