

**BIG PICTURE IN STATISTICAL FRAME—  
A DATA VISUALIZATION PROJECT OF  
ELECTRONIC RESOURCES' PRICE CHANGES IN  
ACADEMIC LIBRARIES**



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# Introduction

- Why ???
- Statistics analysis is vital for efficient assets management, and user needs satisfaction
  - *It help us understand user demand, predict future trends, and optimize resources*
- Statistics analysis is one of the most solid ways to support decision making

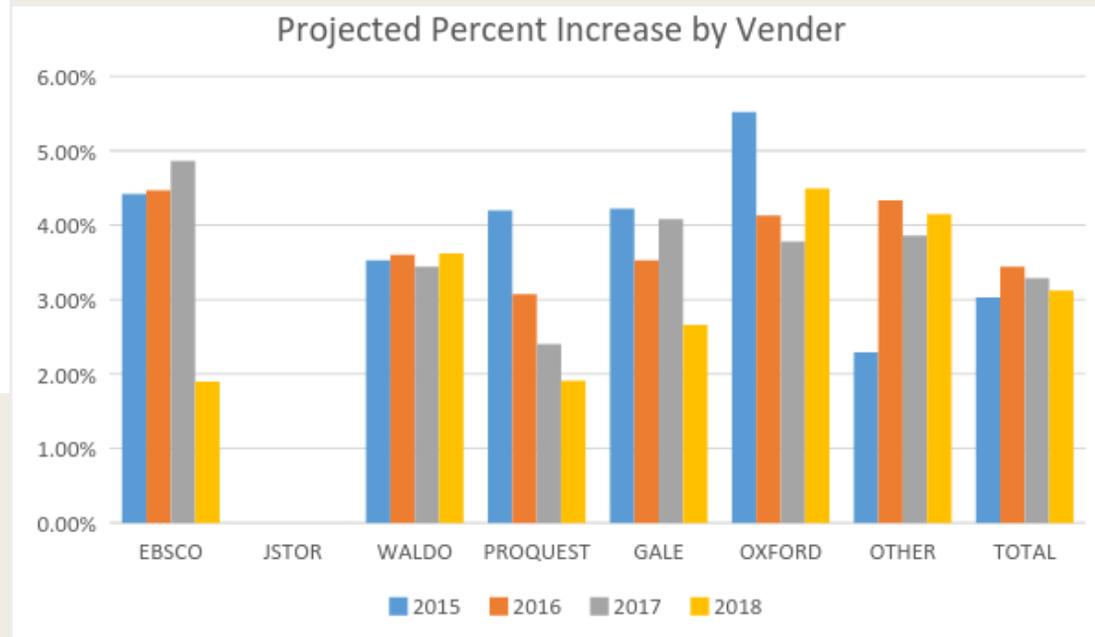
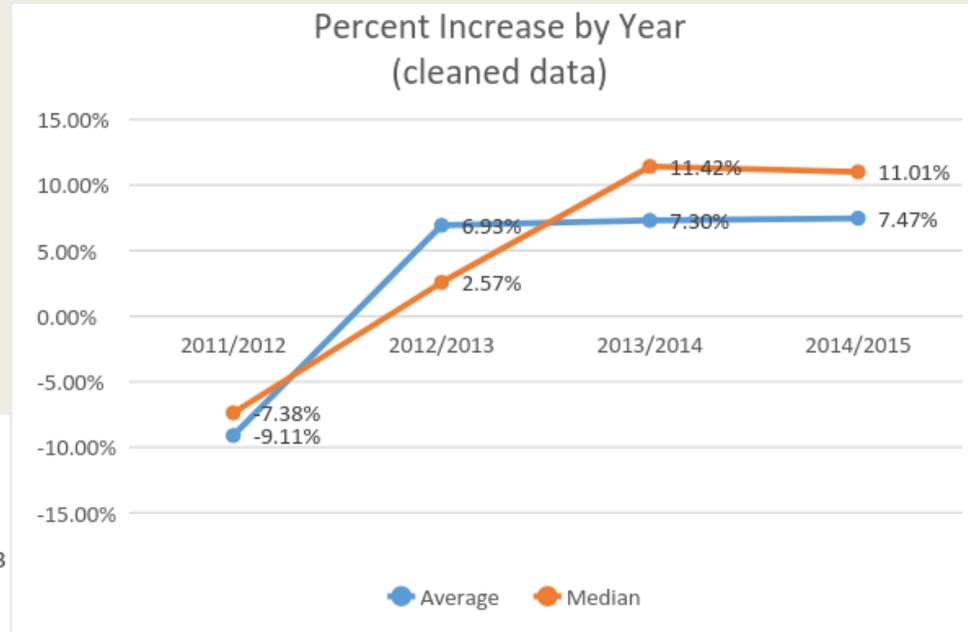
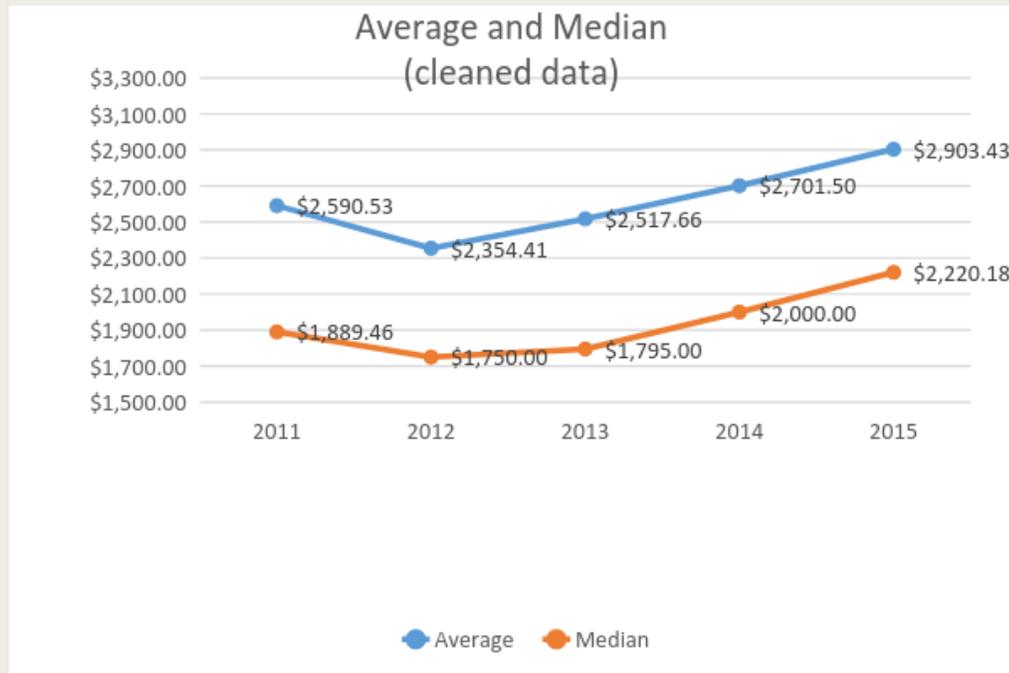
# Introduction

- Statistics analysis is a demonstrated tool for operation and strategy optimization
- Data visualization is the method to make stats understandable for human
  - *Administration and stakeholder need something understandable*



# Introduction

- After:

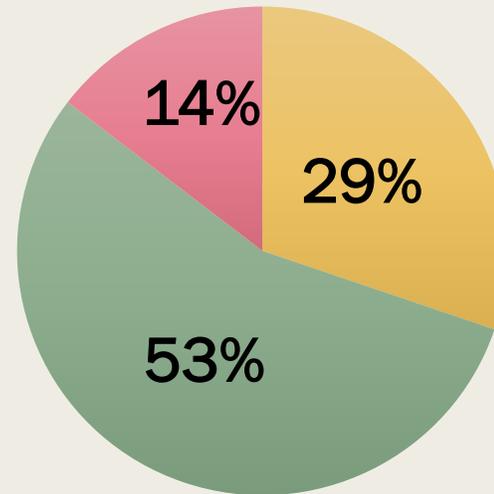


# Agenda

- External price studies and price changing trends – Colleen
- Statistical Analysis and Data Visualization project – Cheng

# Library Budgets

## PCG Serial Budget Forecast 2017



■ Budget Increase   ■ Static   ■ Decrease

Source: PCG. "Public Communications Group (PCG) Library Budget Predictions for 2017":  
<http://www.pcgplus.com/wp-content/uploads/2017/05/Library-Budget-Predictions-for-2017-public.pdf>

# External Price Studies

- Majority of information is for print-based titles, some online
- Used to forecast local increases
- *Library Journal's Periodicals Price Survey*
- *Prices of U.S. & Foreign Published Materials Price Index*
- *EBSCO's Serials Price Projection Report*

# LJ's Periodical Price Survey

- “Gathers information from broad sources in order to measure price changes in the marketplace”
- Uses a print-preferred pricing model on a selected sample of titles

## Periodical Prices for University and College Libraries

**TABLE 7: 2018 COST PROJECTIONS FOR TITLES INDEXED IN ACADEMIC SEARCH COMPLETE**

Overall price increases for titles in EBSCO's Academic Search Complete are expected to be in the 6% range for 2018.

ACADEMIC SEARCH COMPLETE	# OF TITLES	% OF LIST	2017 AVG COST PER TITLE	% OF COST	PROJECTED % OF INCREASE	PROJECTED 2018 AVG COST PER TITLE	% OF COST	PROJECTED OVERALL % INCREASE
<b>U.S.</b>	3,170	38	\$911	39	6	\$965	39	5.6
<b>NON-U.S.</b>	5,084	62	1,424	61	5.5	1,503	61	

SOURCE: LJ PERIODICALS PRICE SURVEY 2017

Source: Library Journal. "Periodical Price Survey 2017": [https://lj.libraryjournal.com/2017/04/publishing/new-world-same-model-periodicals-price-survey-2017/#\\_](https://lj.libraryjournal.com/2017/04/publishing/new-world-same-model-periodicals-price-survey-2017/#_)

TABLE 3: COST HISTORY FOR ONLINE TITLES IN CLARIVATE ANALYTICS  
(FORMERLY ISI) INDEXES

SUBJECT	AVERAGE # OF TITLES 2015-17	AVERAGE COST PER TITLE 2015	AVERAGE COST PER TITLE 2016	% OF CHANGE 2015-2016	AVERAGE COST PER TITLE 2017	% OF CHANGE 2016-17
<b>Agriculture</b>	80	\$1,044	\$1,098	5	\$1,155	7
<b>Anthropology</b>	26	489	517	6	545	7
<b>Arts &amp; Architecture</b>	60	523	556	6	585	4
<b>Astronomy</b>	11	1,880	1,957	4	2,026	4
<b>Biology</b>	201	2,375	2,497	5	2,632	6
<b>Botany</b>	24	1,845	1,940	5	2,075	7
<b>Business &amp; Economics</b>	320	853	912	7	964	5
<b>Chemistry</b>	72	4,311	4,506	5	4,759	4
<b>Education</b>	124	870	938	8	993	6
<b>Engineering</b>	189	2,087	2,209	6	2,343	6
<b>Food Science</b>	14	1,486	1,569	6	1,686	8
<b>General Science</b>	44	1,349	1,422	5	1,502	3
<b>General Works</b>	20	410	434	6	452	2

Source: Library Journal. "Periodical Price Survey 2017": [https://lj.libraryjournal.com/2017/04/publishing/new-world-same-model-periodicals-price-survey-2017/#\\_](https://lj.libraryjournal.com/2017/04/publishing/new-world-same-model-periodicals-price-survey-2017/#_)

# LJ's Periodical Price Survey

- Annual serial price inflation has been around 6% since 2012 and will most likely remain there for 2018
- Survey also contains info about:
  - *Current economy*
  - *State spending*
  - *Spending on education*
  - *Library budgets*
  - *CPI*
  - *Forecast for upcoming year*

# The Prices of U.S. and Foreign Published Materials Price Index

- Published by the Association for Library Collections and Technical Services (ALCTS)
- “A price index will measure the change in price for a limited but consistent set of items.”
- Contains the U.S. Periodical Price Index (USPPI) table

Index	Percent Change				
	2012	2013	2014	2015	2016
CPI	1.7	1.5	0.8	0.7	2.1
Periodicals	5.9	6.1	6.1	6.0	7.1
Legal serials services	6.1	10.5	11.3	13.9	9.0
*Hardcover books	5.18	-2.57	6.45	0.44	-1.41
+Academic books	n.a.	n.a.	-2.2	1.3	n.a.
+Academic e-books	n.a.	n.a.	-8.3	-4.3	n.a.
+Textbooks	n.a.	n.a.	-7.2	10.5	n.a.
College books	2.15	4.21	-1.41	-0.59	3.39
*Mass market paperbacks	1.00	-0.28	0.57	-0.14	2.12
*Trade paperbacks	31.96	-12.31	5.04	-2.72	8.73
*Audiobooks	-10.96	-4.76	0.18	-15.21	-20.50
*U.S. e-books	-6.37	22.03	-9.12	-17.19	7.21
++Serials	n.a.	7.2	6.7	5.8	6.0
++Online Serials	n.a.	6.0	7.2	6.4	6.2
British academic books	10.81	1.67	1.0	7.1	9.9

n.a. = not available  
\* = figures revised based on BISAC categories  
+Beginning with 2009, new data source  
++Data set changes each year.

Source: ALCTS. "Prices of U.S. and Foreign Published Materials- USPP1"

<https://alair.ala.org/bitstream/handle/11213/8099/LMPI%20Article%202017.pdf?sequence=1&isAllowed=y>

**Table 8 / Average Price of Serials, Based on Titles in Select Serial Indices, 2013–2017**

Subject	LC Class	Avg. No. of Titles	2013 Avg. Price	2014 Avg. Price	2014–13 % of Price Increase	2015 Avg. Price	2015–14 % of Price Increase	2016 Avg. Price	2016–15 % of Price Increase	2017 Avg. Price	2017–16 % of Price Increase
Agriculture	S	505	\$788	\$835	6.0 %	\$883	5.7 %	\$938	6.2 %	\$1,001	6.8 %
Anthropology	GN	130	429	469	9.3	494	5.2	521	5.5	552	6.0
Arts and architecture	N	207	331	356	7.5	377	6.0	421	11.6	446	5.9
Astronomy	QB	67	1,529	1,617	5.8	1,731	7.1	1,788	3.3	1,880	5.2
Biology	QH	1,150	1,814	1,918	5.7	2,029	5.8	2,143	5.6	2,267	5.8
Botany	QK	151	1,069	1,158	8.3	1,218	5.1	1,276	4.8	1,353	6.0
Business and economics	HA-HJ	1,275	1,072	1,148	7.1	1,224	6.6	1,305	6.6	1,353	3.7
Chemistry	QD	390	3,439	3,652	6.2	3,808	4.3	3,965	4.1	4,136	4.3
Education	L	473	604	657	8.9	708	7.7	759	7.1	800	5.5
Engineering	T	1,799	1,411	1,510	7.1	1,616	7.0	1,725	6.8	1,818	5.4
Food science	TX	80	1,265	1,376	8.7	1,472	7.0	1,547	5.1	1,623	5.0
General science	Q	245	991	1,051	6.0	1,121	6.7	1,176	5.0	1,241	5.5
General works	A	166	236	264	11.7	268	1.4	300	12.0	310	3.4
Geography	G-GF	292	819	879	7.4	927	5.4	984	6.2	1,056	7.3
Geology	QE	219	1,288	1,371	6.4	1,466	6.9	1,565	6.7	1,664	6.4
Health sciences	R	4,079	895	959	7.2	1,018	6.1	1,088	6.9	1,159	6.5

Source: ALCTS. “Prices of U.S. and Foreign Published Materials”

<https://alair.ala.org/bitstream/handle/11213/8099/LMPI%20Article%202017.pdf?sequence=1&isAllowed=y>

# EBSCO Serials Price Projection Report

**Projected Price Increase by Customer Billing Currency**

Billing Currency	Journals Priced by Publishers in U.S. Dollars %	Journals Priced by Publishers in British Pounds %	Journals Priced by Publishers in Euros %
Australian dollar	1 to 2	9 to 10	9 to 10
British pound	-4 to -3	5 to 6	7 to 8
Canadian dollar	-3 to -2	5 to 6	6 to 7
Euro	-3 to -2	4 to 5	5 to 6
New Zealand dollar	3 to 4	10 to 11	11 to 12
South African rand	-1 to 0	5 to 6	8 to 9
U.S. dollar	5 to 6	9 to 10*	10 to 11*

*\* Note, less than five percent of U.S. customer's content is priced by publishers in a currency other than U.S. dollars.*

- Predicts overall effective publisher price increases for academic and medical libraries for 2018 (before currency impact) to be in the range of 5-6%

Source: EBSCO. "2018 EBSCO Serials Price Projection Report":  
<https://www.ebsco.com/blog/article/2018-ebsco-serials-price-projection-report>

# Background

- Need vision for what's going on in the market
- Administration and stakeholder need something understandable
- A practice for future operation

# Goal

- Analyze and visualize the price changing pattern of common electronic resources
- Provide predictions for future price changes at vendor level
- Discover any potential cause of such price changes
- A practice of skills and techniques for statistical analysis and data visualization

# Criteria and data cleaning

- More than 80 aggregating databases with consistent annual subscriptions from 2010-2015
- No electronic serials, ebooks, one-time purchases and annual access fees were included
- Titles without continuing payment records, or have value far away from the mean, were also eliminated

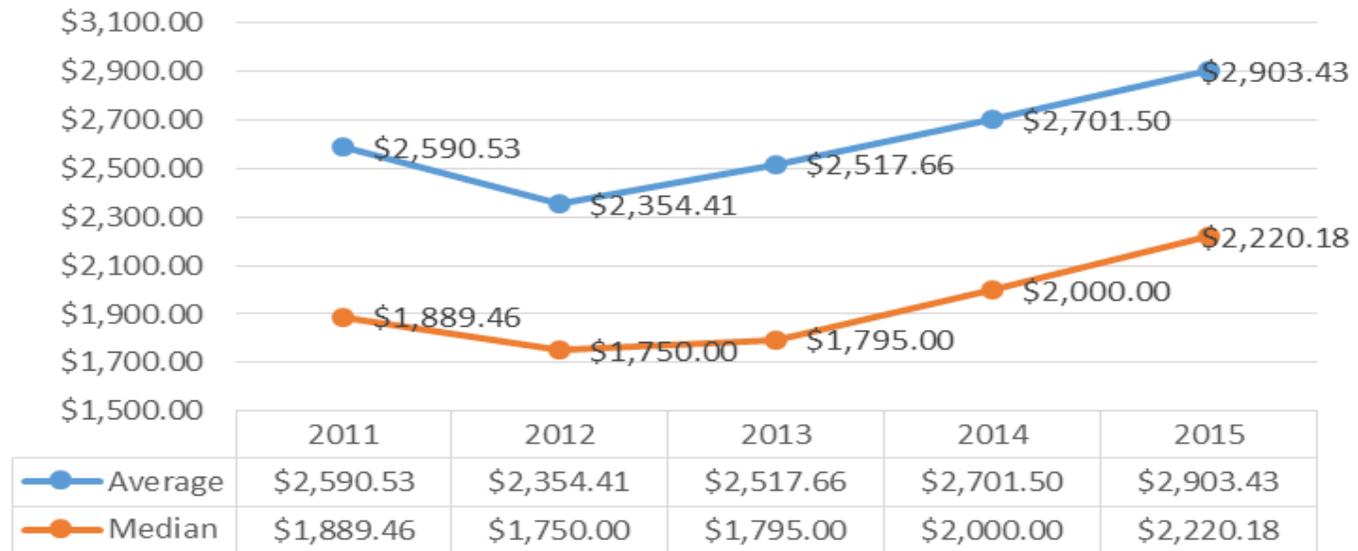
# Tools

- Office Excel
- IBM SPSS
- And most importantly.....
- .....HUMAN

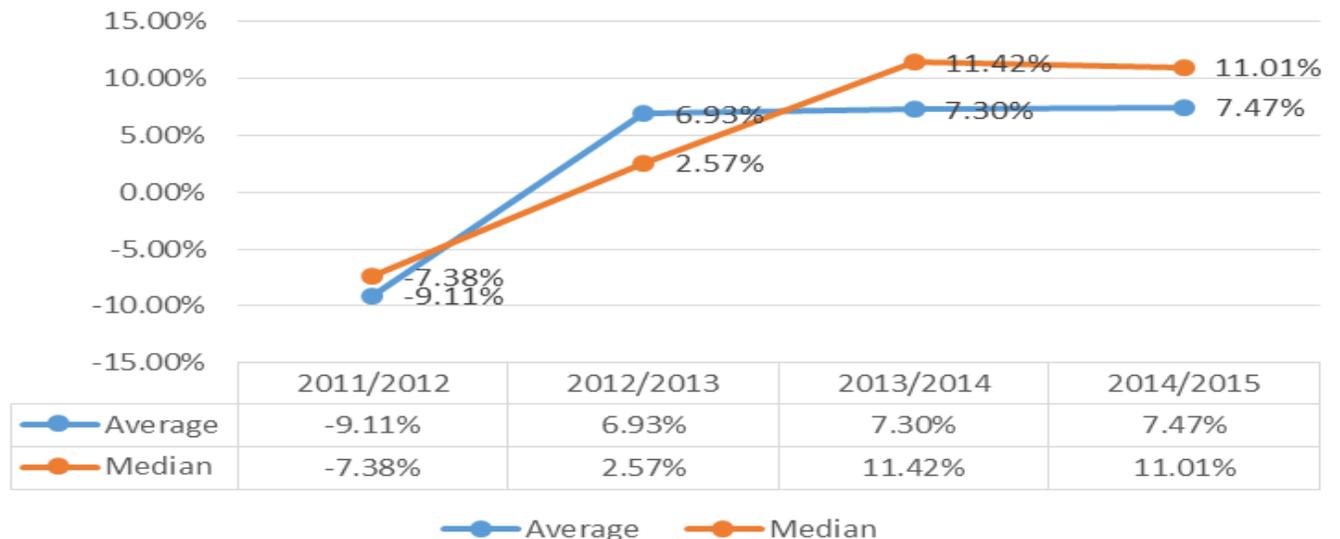
On the right, we have both price and percent increase of selected resources over years.

As we can see, figures show there is a consistent price increase since 2011; The price increases in 2014 and 2015 were fierce

Average and Median  
(cleaned data)



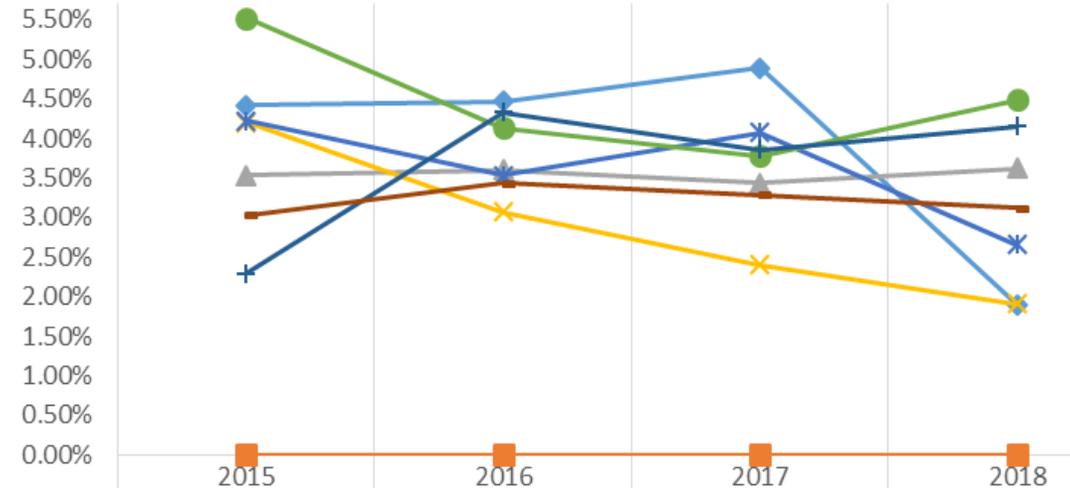
Percent Increase by Year  
(cleaned data)



- The projectile (on the right) based on past stats suggest in 2017 and 2018 it may be relatively moderate, which is likely a sign that this price increase cycle is approaching its cap.
- The model for future price prediction is based on the expenditure data from the previous years, and that value varies based on vendor.
- It is important to note that the further into the future the prediction, the less accurate it is.
- It is also important to note that compare to the enormous size of the aggregating databases market with numerous products available, this project only covered a very small facet of it.

## PREDICTED RATES OF INCREASE BY VENDER

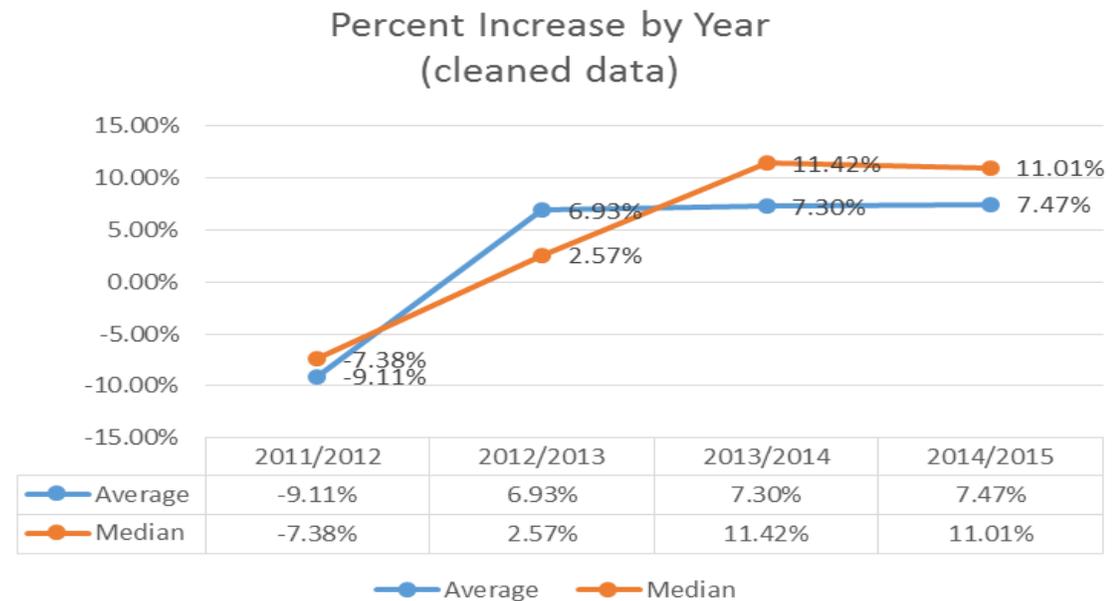
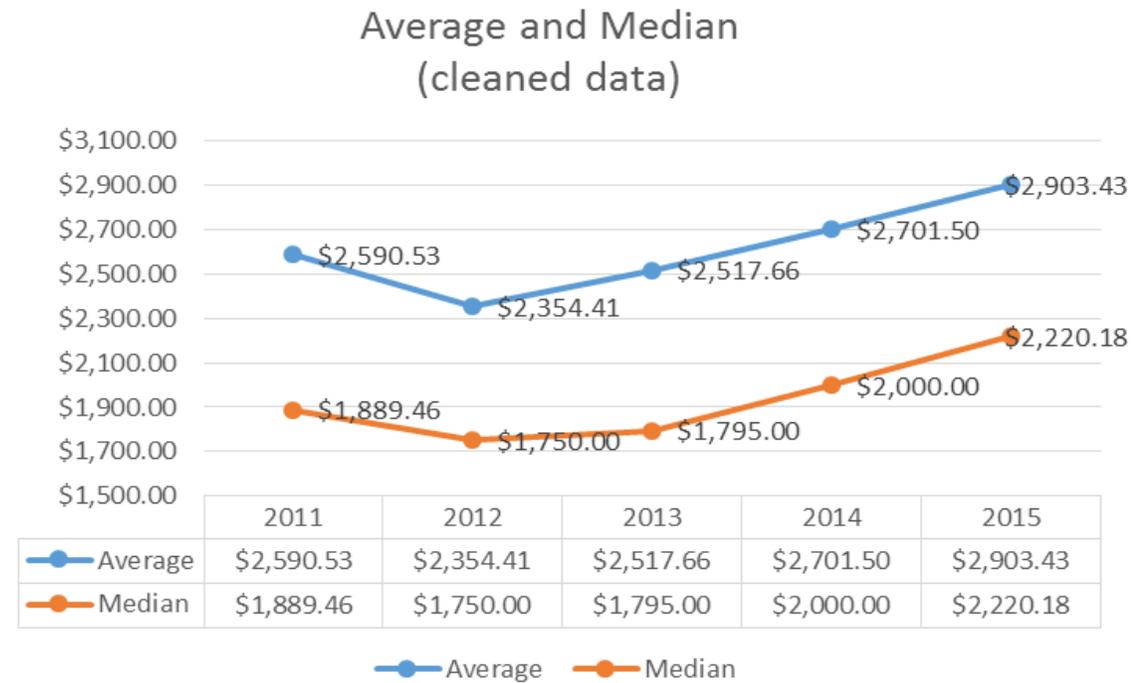
◆ EBSCO    ■ JSTOR    ▲ WALDO    ✕ PROQUEST  
 ✱ GALE    ● OXFORD    + OTHER    — TOTAL

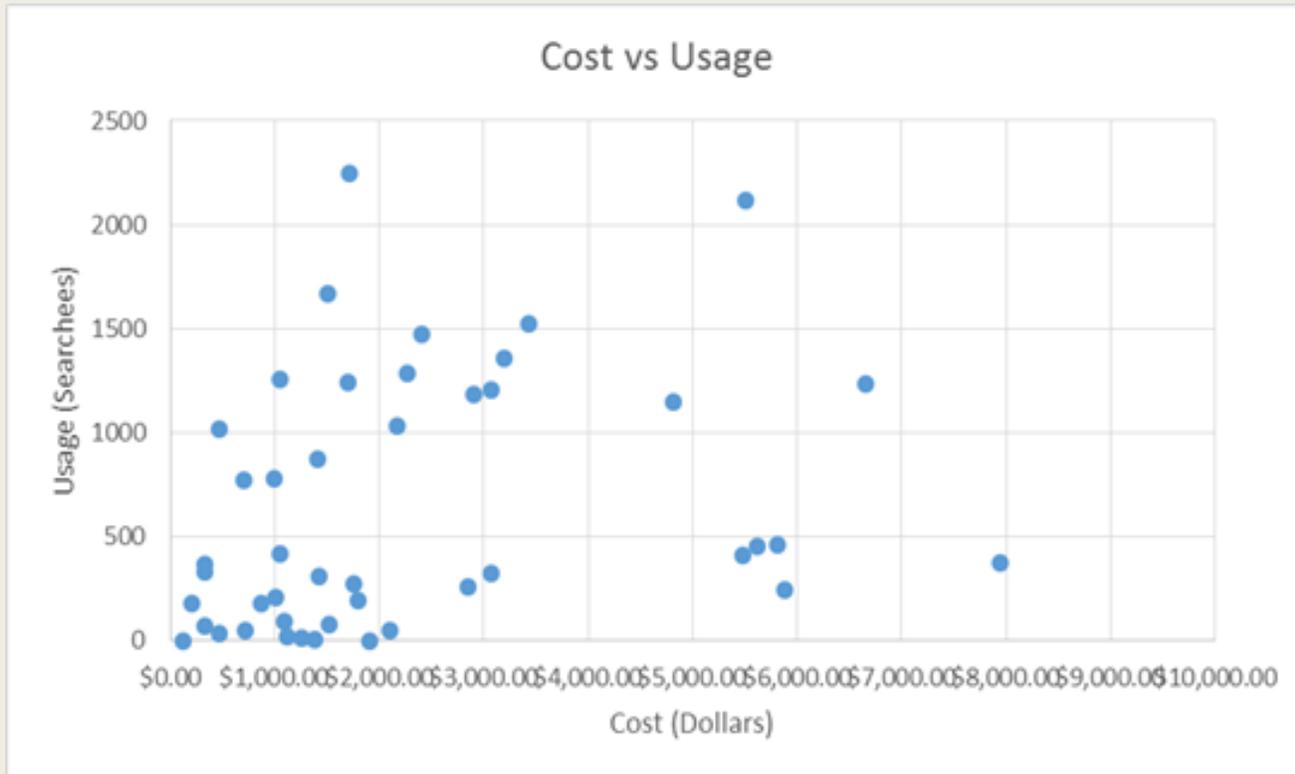


◆ EBSCO	4.42%	4.47%	4.89%	1.90%
■ JSTOR	0.00%	0.00%	0.00%	0.00%
▲ WALDO	3.53%	3.60%	3.44%	3.62%
✕ PROQUEST	4.20%	3.07%	2.40%	1.91%
✱ GALE	4.22%	3.53%	4.08%	2.66%
● OXFORD	5.52%	4.13%	3.78%	4.49%
+ OTHER	2.29%	4.33%	3.86%	4.15%
— TOTAL	3.03%	3.44%	3.29%	3.12%



Compared the price changing trends and the picture of general economy (up) at the same period, it is very obvious that the pricing trend has been influenced by the national economy trend





The connection between usage and cost is less obvious, although resources with higher usage tend to cost more, probably because to vendors, high usage indicates high-demand.

# What we learned

- Provide visualized trend of Electronic Resources price changes
- Prediction for future price change
- It proved that a statistical analysis and data visualization project could be done in small academic libraries without any additional cost.

# What we learned

- Available tool is the best tool
- Vision and goal
- Don't be overwhelming regarding project scale
- Bigger pool, bigger fun

# What we learned

- Be consistent
- Legal and liabilities

Thank you!!

