The Lewis Journals-to-Gas-Price Inflation Index for 2018

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In 2008, David W. Lewis, wrote a commentary for *C&RL News* on academic publishing and library budgets. As many others have done, Lewis recounted the fact that journal prices have outpaced the rate of general inflation. At this point in his column, Lewis could have reused a widely distributed figure from the ARL—one that shows just how much journal price inflation has outpaced library budgets (Association of Research Libraries. n.d.). But how many of us in universities actually work with an ARL-sized budget on a daily basis and even if we do, does it feel like real money? To bring the skyrocketing prices of scholarly journals a little closer to how we understand expense on a daily basis, Lewis made an analogy to gasoline prices:

> Between 1975 and 2005 the average cost of journals in chemistry and physics rose from $76.84 to $1,879.56. In the same period, the cost of a gallon of unleaded regular gasoline rose from 55 cents to $1.82. If the gallon of gas had increased in price at the same rate as chemistry and physics journals over this period it would have reached $12.43 in 2005, and would be over $14.50 today. (Lewis, 2008. pg. 271)

In recent years we have recalculated the analogy. In 2013, if gas prices were analogous to the price of Chemistry journals, drivers would have been paying $30.75 per gallon at the pump (Odell, 2014). For 2015, we were was able to add Physics to the analogy (in alignment with Lewis's initial effort in 2008)—looking at Chemistry and Physics together brought the price down a few cents, but it was still unaffordable: $30.61 per gallon (Odell, 2016).

In 2018, the average price for a year's subscription to a Chemistry journal was $4,794.33 (n=124) and the average price for a Physics journal was $4,104.08 (n=148) (Bryans, ed., pg. 356-7). To get an average price for "Chemistry and Physics" journals, we use the mean of the two category samples weighted by the number of journals in each sample: $4,418.75. At this price, U.S. drivers would be paying $31.63 per gallon in 2018 (Figure 1.).

Figure 1. Today's price per gallon if gasoline prices increased at the same rate as Chemistry and Physics journals

The equation that we use for calculating this analogy is probably too simple—it's a ratio: g(y)/z = x when g = the price of gas in 1975 (i.e., .55 per gallon), y = the price of journals today, z = the price of journals in 1975 (i.e., for Chemistry and Physics, $76.84), and x = what an analogous gallon of gas would cost. The calculation is complicated by the fact that the general rate of inflation changes—such that .55 in 1975 is over $2.62 of purchasing power in 2018 USD (U.S. Department of Labor., n.d.). Thus, if we do the math again with prices adjusted to the 2018 Consumer Price Index, the cost of gasoline if drivers were paying with Chemistry and Physics journals would be: $31.67 per gallon (x=$2.62($4,418.75)/$365.57)—that is only a four cent difference, but it is one of several sufficient reminders that the analogy depends on where you start and what you start with. Calculating this analogy is also complicated by the data. As the introduction to the data tables for the "Prices of U.S. and Foreign Published Materials" indicates, prices vary depending on the journal sample (*Bryans, ed., pg. 353-5, 358-9*). The U.S. Periodical Price Index (USPPI) was reestablished by Stephen Bosch in 2014 and uses data provided by EBSCO Information Services--the sample includes "a little more than 5,900 titles" (p. 354). In contrast, a larger, non-static sample of 18,633 journals included in six major indexing services found similar annual price increases (6 - 7%), but a lower average price per title; the average price for a Chemistry journal, for example, was $361.07 less than the Chemistry journals in the USPPI sample (p. 366). The lower average price for the larger, non-static, Select Serials Indexes sample is to be expected because it includes newer, less established journals. The title list of any serials database evolves, sometimes on a daily basis; so, even though it is probable that the journals in these indexes are the journals that many academic libraries will be expected to include in subscription holdings, serials databases cannot be used as a pricing index. In short, the analogy is inexact.

But, as in Lewis's original analogy, the point is not to bill customers in gas-dollars, but rather to demonstrate just how price-insensitive (or even perhaps, price-blind) most "consumers" of scholarly journals have been for more than three decades now. For the purpose of this analogy, we have decided to use the USPPI tables exclusively—in Table 1, we have compiled the average price per subject as reported in the *Library and Book Trade Almanac* from the 59th to the 63rd edition (2014 – 2018).

Subject	**LC Class**	**2014 Average Price (USD)**	**2015 Average Price (USD)**	**2016 Average Price (USD)**	**2017 Average Price (USD)**	**2018 Average Price (USD)**
Average for all journals		*1051.73*	*1114.32*	*1193.10*	*1265.92*	*1337.25*
Agriculture	S	726.67	780.01	978.61	956.8	973.16
Anthropology	GN	453.36	428.52	426.99	525.98	482.18
Arts and architecture	N	130.7	180.35	234.5	195.47	199.56
Astronomy	QB	2186.19	2083.5	2602.51	2393.22	2618.36
Biology	QH	2535.65	2727.29	2655.14	3016.39	3149.59
Botany	QK	1667.34	1646.31	1926.99	1852.98	1886.28
Business and economics	HA-HJ	434.12	480.98	546.45	553.47	565.73
Chemistry	QD	4244.38	4335.51	4465.42	4685.46	4794.33
Education	L	433.05	499.55	585.29	609.83	605.47
Engineering	T	1584.81	1692.44	1716.47	1897.32	1984.29
Food science	TX	439.51	617.45	520.09	767.91	732.37
General science	Q	1218.88	1401.48	1322.2	1617.12	1587.68
General works	A	99.14	106.87	165.98	125.62	125.22
Geography	G-GF	836.61	872.34	806.55	1000.77	1111.72
Geology	QE	1699.34	1648.2	1707.46	1954	1965.73
Health sciences	R	1309.43	1402.65	1557.18	1596.42	1691.69
History	C,D,E,F	245.88	277.95	330.37	334.47	320.06
Language and literature	P	205.49	232.29	258.5	256.95	245.87
Law	K	251.93	297.45	355.43	326.59	344.76
Library science	Z	355.38	376.47	379.89	441.07	424.92
Math and computer science	QA	1480.16	1623.12	1559.12	1785.8	1784.38
Military and naval science	U,V	288.8	276.33	458.94	343.57	447.67
Music	M	95.74	151.67	212.73	164.13	162.24
Philosophy and religion	B-BD, BH-BX	281.45	316.77	362.03	359.03	346.2
Physics	QC	3499.54	3538.93	3537.87	3905.91	4104.08
Political science	J	382.91	562.63	563.12	659.97	680.83
Psychology	BF	828.57	970.19	1049.83	1114.23	1120.07
Recreation	GV	90.2	122.06	176.76	147.49	153.88
Social sciences	HA-HJ	435.17	645.6	753.59	709.57	773.1
Sociology	HM-HX	608.13	717.56	760.32	836.08	871.85

Technology	TA-TT	679	723.65	775.03	843.36	945.19
Zoology	QL	1762.83	1816.13	1655.65	1947.87	2165.66

Table 1. Average Price for Journal Subscriptions in Subject Categories, 2014-2018. (*Library and Book Trade Almanac*).

Using the equation described above (g(y)/z = x), Figure 2 shows the increase in gasoline prices for all journals from 2014 to 2018. In 2018 if gasoline were analogous to average price for all journals in the USPPI, drivers in the United States would be paying $9.57 per gallon. Readers can use the same equation for any year and any subject listed in Table 1.

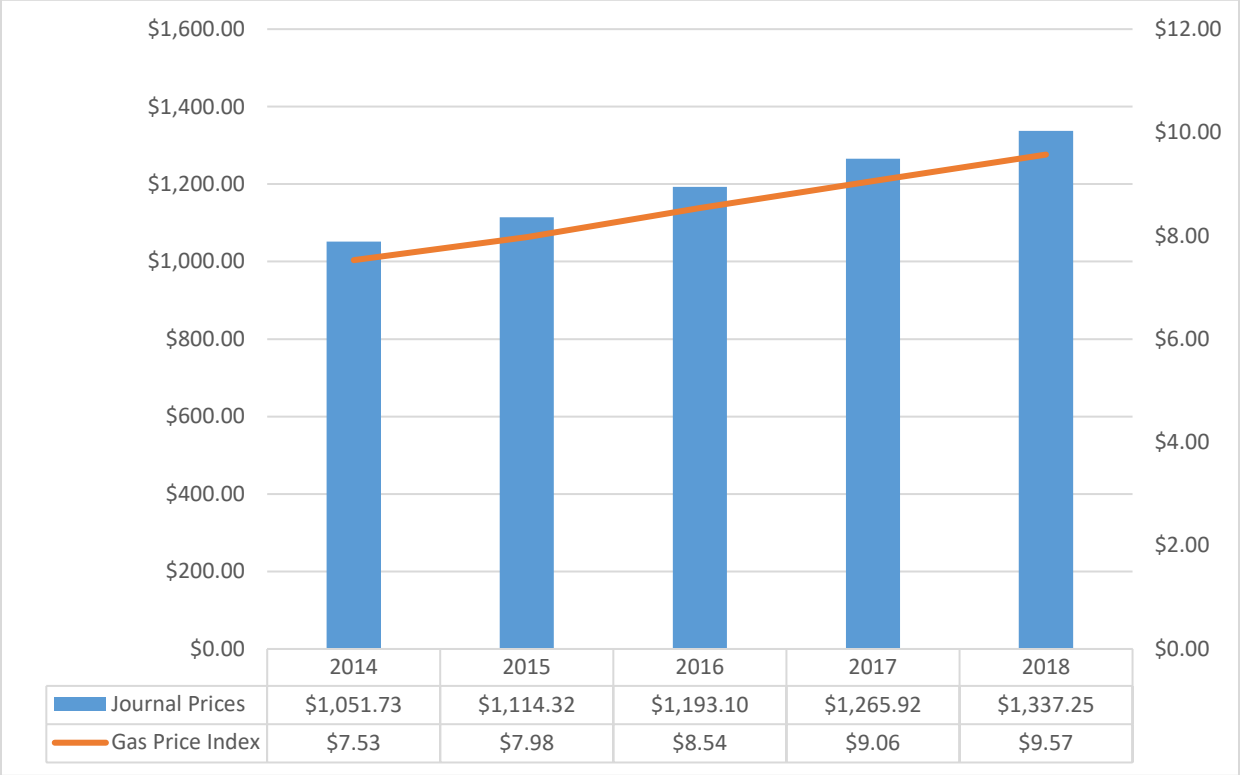

Figure 2. Average journal price indexed to the price for a gallon of gasoline, 2014-2018.

Readers should remember that digital subscriptions are not gasoline—the latter is a commodity that cannot be reused and for which the rules of supply and demand (and government intervention) contribute to changes in price. Electronic versions of scholarly articles, in contrast, can be reused—only the threat of copyright litigation discourages readers from replicating the content on servers around the country and the world. At the same time a digital version of a scholarly work is unique. Customers that need to "purchase" digital access to the work do not really have the option to look for a better price from a different vendor. For example, by design, there is only one journal "Chemical Reviews" (ISSN 0009-2665) and it is available from only one publisher, ACS. Imagining a world in which there were multiple vendors and for essentially the same commodity, the journal "Chemical Reviews" is all but impossible. Yes, customers could decide that a more affordable journal meets the basic needs of most of

the readers at their institution, but that will not change the fact that readers at the institution will not have access to a specific, paywalled article in the exact journal, “Chemical Reviews” (ISSN 0009-2665).

The fact that there is no exact substitute for a subscription to a specific journal is just one reason why publishers can demand a 6% annual price increase. The other is that the consumer is not the customer. Most readers have no clue how much their university pays for subscriptions to digital resources. Even more so, most readers have no clue how much the library is paying for a years’ subscription to any one journal. Furthermore, thanks to the nondisclosure clauses in publisher contracts, most libraries do not know how much other libraries are paying for the same subscriptions. These obscured expenses are a drain on our collective pocketbooks. An academic library’s budget, after all, depends on department, school, and university budgets. We are all in this together—students paying tuition, taxpayers subsidizing public education and research grants, departments creating degrees and hiring faculty, authors looking for articles and reviewing literature, and librarians creating and fostering information skills while building a knowledge base for the future. But, sadly, many individual authors and academic units respond to short-term needs without considering the expense. Authors need to get an article published in a journal and (in a “publish or perish” culture) may be unaware of the price—or perhaps, simply, cannot afford to spend time looking for an option that supports a more equitable scholarly publishing ecosystem. At the same time, many authors have invested a lot of time in an inequitable system; so much so, that they have developed allegiances to a scholarly society that publishes with a large for-profit company—or to the company itself. Not feeling the price, these authors are unlikely to quickly change their habits and values. But imagine how quickly your driving habits would adjust if gasoline prices went up even a few dollars over the current price. And imagine what $31.63 a gallon would do to your community—whether you know it or not, you are paying that right now for journals in Chemistry and Physics. Maybe it is time to stop, think, and invest some of those resources in publishing systems that have more affordable prices and more equitable returns.

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