

Impacts of a Recession on Owner Expenditures

James F. Hudson, Ph.D.

June 3, 2021

This research paper addresses concerns about whether the Price Index of Operating Costs (PIOC) accurately captures the effect of recessions, during which expenditures made by building owners may be reduced as they respond to economic uncertainty. Since the PIOC is primarily based on the changes of prices (as opposed to costs), it may not capture these reductions in purchases, and thus may overstate the operating and maintenance (O&M) costs paid by owners. Per the National Bureau of Economic Research, a recession began in the U.S. during 2020, a period of time covered by the most recent PIOC study.

The first section presents some theory on how to assess the effects of recessions on expenditures related to the PIOC. Then, I use that approach to calculate a recession-sensitive index for this year for certain components and the overall PIOC. See tables 1-3 at the end of this paper for all the analysis details.

Theory

The PIOC is a price index – it measures changes in prices from one year to the next. We use a market basket of goods and services typically purchased by building owners. If the average quantities of purchased items don't change from year to year, then the PIOC should accurately measure the change in costs.

There are two reasons for using a price index: first, we can collect price data quickly, so that we can measure price changes in the year before the guidelines are issued. In addition, price data is much easier to collect than actual expenditures. It should also be noted that the PIOC was developed prior to the inception of Real Property Income and Expense (RPIE) filings that are submitted annually to the NYC Department of Finance and document operating expenses incurred by owners. Since 1990, this data has been summarized and reported in the RGB's annual Income & Expense (I&E) Study. Prior to the requirement of RPIE filings, there was no mechanism for the collection of actual building owner costs. Even with the I&E data, in which the first year of data represented calendar year 1988, there's at least a year's delay in the availability of that data. The most recent I&E data is from 2019.

So, a price index is our best alternative for collecting data that applies to the most recent year, for use in estimating the change in owner expenses and promulgating rent adjustments. But the PIOC as implemented is actually a hybrid – it uses a sample of actual expenditures (costs) where possible and price changes where actual expenditures are not available. The following items are expenditures (based on tax bills and the owner survey sent to a sample of rent stabilized building owners each January): Taxes; Insurance; and Management Fees. All other items in the PIOC are based on the price change of a fixed quantity of goods (with the exception of fuel items used for heating, for which prices are tracked, but the quantity is flexible, based on the weather).

Which components to analyze: The recession hypothesis that we want to test is:

In times of recession, will owners reduce the quantities they buy in discretionary areas?

This hypothesis assumes that some categories where changes in expenditures are measured by price are not discretionary. That is, building owners are unlikely to be able to make large changes in the quantities they purchase during relatively short periods of economic uncertainty (1-2 years). That list includes:

- Fuel, primarily for heat
- Utilities
- Other administrative costs, primarily accountant and attorney fees

After eliminating the items where the PIOC measures expenditures and the ones that are less likely to be discretionary, the hypothesis is that building owners may reduce expenditures in following PIOC categories when faced with economic uncertainty:

- Labor, where there might be a change in the number of staff or their hours during recessions
- The Maintenance component, including painting, building repairs, and supplies

Those are the two areas analyzed in the remainder of this paper.

What data periods are we analyzing? The Income and Expenditure data, one of our major data sources, is collected by calendar year. The PIOC prices are collected on an annual basis, but slightly offset – originally May-April, more recently April-March. And recessions are defined on a quarterly basis.

We have the PIOC prices from the 1969-2021 PIOC, with data collection providing prices from roughly March-April of the PIOC year (with each year compared to a year earlier, for calculating price changes).

We also have the I&E data on annual expenditures by building owners from 1988-2019, with one missing year (2003). However, the first two years were for small samples, only 500 buildings, which makes the data potentially less reliable. So, this analysis will use data from the 1992 I&E on, which has expenditure data for 1990-2019.

When are the recessions? We also need to define recession years. The National Bureau of Economic Research, the official body designating US recessions, lists three recessions in the 1990-2019 period (the period for which I&E expenditure data is available):

- Q3 1990 through Q1 1991
- Calendar year 2001
- Q4 2007 through Q2 2009

This analysis uses the years 1990, 1991, 2001, 2007, 2008, and 2009 as recession years. That is, if the year included a quarter in recession, it's counted as a "recession year." And it applies the PIOC price changes as if they were for calendar years matching the I&E years.

Constant Dollars: When comparing expenditures in different years, it is useful to convert them into "constant" dollars. After all, the purchasing power of \$1,000 in 1991 is not the same as in 2021. To do that, we need a way to convert the expenditures each year into a comparable set of values. For large-scale economic analyses, this is

typically done using a general inflation rate, for example the consumer price index. But for this analysis, we have much more specific price indices from the PIOC.

For example, let's say the expenditures (per the I&E) on maintenance were \$100 in one year and the PIOC shows a 5% price index from that year to the next. If the building owner spent \$105 in the second year, they would be able to buy the same amount of goods and services.

We can use the PIOC price increases for labor and maintenance to convert the annual expenditures in those components into constant dollar expenditures.

Any "constant dollar" series has to have a year in which those dollars are measured. For this analysis, I used 2020 so everything is in "constant 2020" dollars. This could be any year – it won't affect the analysis.

Data Quality: There is significant uncertainty in all the data used here. The data come from samples of owners and vendors. The methods used in both the I&E and the PIOC have improved over time, which means that the older data are likely to be less accurate than the more recent years. As mentioned above, the analysis "years" do not match up perfectly. Since the data were limited, I stayed with very simple analytical methods; data quality did not support more advanced methods. Therefore, this analysis only provides a limited estimate of the effect of recessions. There is no calculation of statistical significance.

Analysis

For this analysis, we need data on both expenditures (from the I&E data) and prices (from the PIOC).

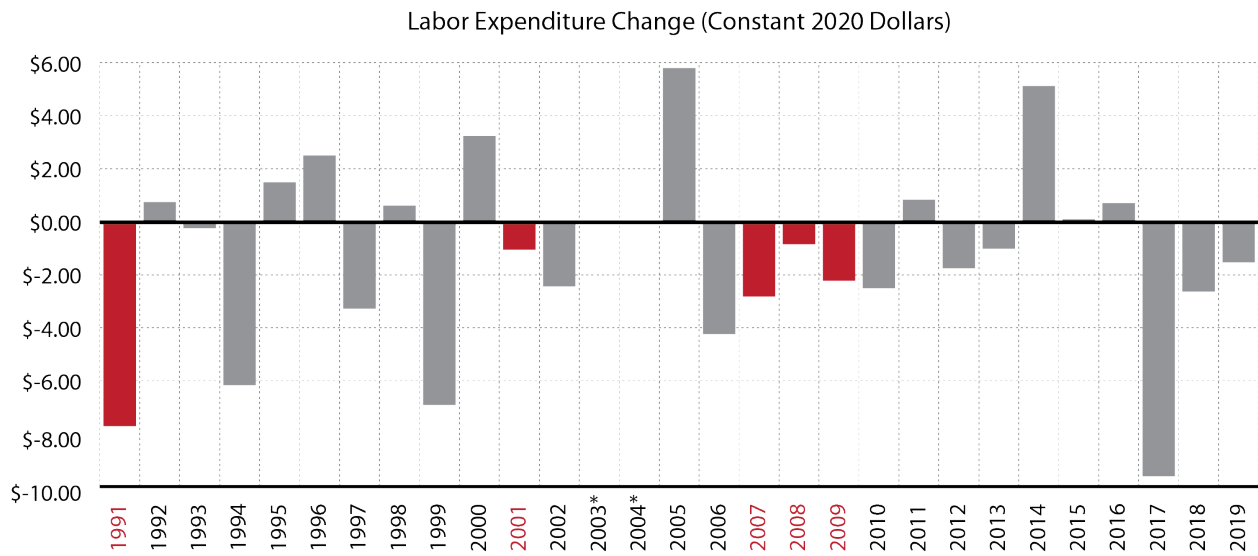
The main data series were:

- the I&E O&M Category Expenses
- the PIOC O&M series for Contractor Services, Maintenance, Parts & Supplies, and Replacement Costs
- the PIOC Labor series
- the weights in 2014 for the three components (prior to 2015) that now constitute the Maintenance component: Contractor Services, Parts & Supplies, and Replacement Costs

Labor: This analysis uses the I&E total labor series and the total labor PIOC index. The first step is to create a cumulative price index. That allows the I&E costs in each year to be converted to constant dollars.

Overall, the constant-dollar labor cost was \$157.49 per unit in 1990 and dropped \$116.56 in 2019 (in "2020 labor dollars").

The graph shows the year-to-year changes in constant dollar labor expenditures. Here, the recession years are shown in red. The first year of usable data was 1990, so the first change in expenditures is from 1990-1991 (labeled as "1991").



*Data Not Available

There are many ways to model the effects of the recessions based on this series of data. The simplest is just to calculate the average cost changes in non-recession years vs. recession years.

For labor, the average change per year in constant-dollar labor costs (base 2020) was:

- -\$0.96 in non-recession years
- -\$2.93 in recession years

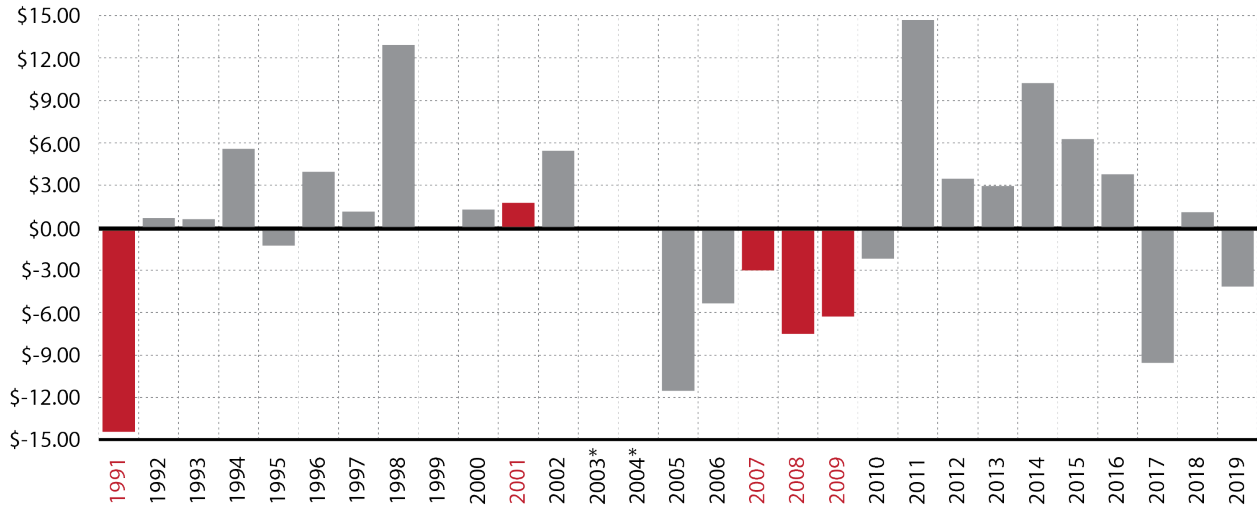
That is, the constant dollar expenditures on labor dropped by an average of 96 cents in non-recession years, but dropped \$2.93 per year in recession years. If you extrapolate inflation-adjusted I&E labor costs from 2019 (the most recent data) to 2020, the expected change in cost would be 1.7% lower in a recession year than a non-recession year.

Maintenance: Maintenance is slightly more complicated. Before 2015, the PIOC items that are now in Maintenance were in three different components – Contractor Services, Parts & Supplies, and Replacement Costs. I combined those into a single price index for all Maintenance by using their relative weights in 2014. These weights did not change much in the preceding decades, so I only used a single set of weights. It would be possible, but time consuming, get the specific component weights from each PIOC report. I don't think it would add any value to the analysis.

Overall, the constant-dollar maintenance cost found in the I&E was \$192.60 per unit in 1990 and \$192.21 in 2019 (in “2020 maintenance dollars”).

Here are the changes in constant-dollar maintenance expenditures, with recession years once again shown in red.

Maintenance Expenditure Change (Constant 2020 Dollars)



*Data Not Available

The average changes in constant-dollar maintenance costs (base 2020) was:

- +\$1.82 in non-recession years
- -\$5.89 in recession years

If you extrapolate inflation-adjusted I&E maintenance costs from 2019 (the most recent data) to 2020, the expected change in cost would be 4.0% lower in a recession year than a non-recession year.

Recession-sensitive PIOC for 2021

Here, we apply the above results to the overall PIOC for 2021, because the National Bureau of Economic Research has designated 2020 as a year of recession. As such, how would the overall PIOC change if there really was a 1.7% drop in the amount of labor purchased and a 4.0% drop in the amount of maintenance purchased?

For Taxes, Insurance, and Management Fees, we assume that the PIOC covers actual changes in expenditures. For the other components and items (Fuel, Utilities, Administrative), we assume no change in the quantities and items purchased, which is the standard assumption for the PIOC.

Labor prices increased by 2.8%. But if we combine that with a 1.7% drop in quantity, the effective labor change is an increase of 1.1%.

Similarly, maintenance prices increased by 2.9%. But, combined with a 4.0% drop in quantity, the effective maintenance change is a decrease of 1.2%.

This leads to a “recession PIOC” of 2.1%, rather than the calculated value of 3.0%.

Once, the 2020 I&E data becomes available in the summer of 2021, it may be possible to start confirming these results. Given the data limitations, these findings are at best preliminary. There is no measure of statistical significance, but there does appear likely to be a drop in owner expenditures in these categories of purchases during recessions.

Table 1: Labor Costs Component Analysis (Recession Years Marked in Red)

Year	% Change in Labor PIOC	Inflation Adjustment (2020 Constant \$)	RPIE Labor Costs	Constant \$ RPIE Labor Costs	RPIE Labor Costs Constant Dollar Change
1990	5.7%	0.330	\$52.00	\$157.49	--
1991	5.2%	0.347	\$52.00	\$149.77	(\$7.71)
1992	5.3%	0.365	\$55.00	\$150.51	\$0.74
1993	5.6%	0.386	\$58.00	\$150.26	(\$0.25)
1994	4.3%	0.403	\$58.00	\$144.10	(\$6.17)
1995	4.1%	0.419	\$61.00	\$145.58	\$1.48
1996	3.2%	0.432	\$64.00	\$148.08	\$2.50
1997	2.3%	0.442	\$64.00	\$144.80	(\$3.27)
1998	2.7%	0.454	\$66.00	\$145.42	\$0.61
1999	3.4%	0.469	\$65.00	\$138.50	(\$6.91)
2000	2.6%	0.482	\$68.26	\$141.74	\$3.23
2001	4.0%	0.501	\$70.43	\$140.69	(\$1.05)
2002	4.0%	0.521	\$72.00	\$138.25	(\$2.44)
2003*	3.5%	0.539	--	--	--
2004	4.5%	0.563	\$75.00	\$133.21	--
2005	3.5%	0.583	\$81.00	\$139.01	\$5.79
2006	2.5%	0.597	\$80.49	\$134.77	(\$4.24)
2007	8.1%	0.646	\$85.18	\$131.94	(\$2.82)
2008	4.0%	0.671	\$88.00	\$131.09	(\$0.85)
2009	2.9%	0.691	\$89.00	\$128.87	(\$2.22)
2010	3.1%	0.712	\$90.00	\$126.36	(\$2.51)
2011	2.7%	0.731	\$93.00	\$127.19	\$0.83
2012	2.5%	0.749	\$94.00	\$125.43	(\$1.76)
2013	3.0%	0.772	\$96.00	\$124.42	(\$1.01)
2014	3.1%	0.795	\$103.00	\$129.54	\$5.12
2015	3.8%	0.825	\$107.00	\$129.63	\$0.09
2016	3.2%	0.852	\$111.00	\$130.33	\$0.70
2017	4.1%	0.886	\$107.00	\$120.74	(\$9.60)
2018	3.2%	0.915	\$108.00	\$118.10	(\$2.64)
2019	6.0%	0.969	\$113.00	\$116.56	(\$1.54)
2020	3.2%	1.000	--	--	--
Average change recession year					(\$2.93)
Average change non-recession year					(\$0.96)
Estimated 2020 Labor Costs (non-recession year)					\$115.59
Estimated 2020 Labor Costs (recession year)					\$113.63
Estimated Change in Labor Costs (recession year)					-1.7%

*2003 RPIE Data Not Available

Table 2: Maintenance Component Analysis (Recession Years Marked in Red)

Year	% Change in Maintenance PIOC	Inflation Adjustment (2020 Constant \$)	RPIE Maintenance Costs	Constant \$ RPIE Maintenance Costs	RPIE Maintenance Constant Dollar Change
1990	6.3%	0.374	\$72.00	\$192.60	--
1991	5.1%	0.393	\$70.00	\$178.17	(\$14.43)
1992	2.5%	0.403	\$72.00	\$178.85	\$0.68
1993	2.4%	0.412	\$74.00	\$179.46	\$0.61
1994	0.9%	0.416	\$77.00	\$185.05	\$5.59
1995	2.0%	0.424	\$78.00	\$183.79	(\$1.26)
1996	1.7%	0.431	\$81.00	\$187.75	\$3.96
1997	3.1%	0.445	\$84.00	\$188.90	\$1.14
1998	2.5%	0.456	\$92.00	\$201.83	\$12.93
1999	3.3%	0.471	\$95.00	\$201.79	(\$0.04)
2000	4.1%	0.490	\$99.57	\$203.09	\$1.30
2001	3.2%	0.506	\$103.67	\$204.86	\$1.77
2002	3.4%	0.523	\$110.00	\$210.31	\$5.45
2003*	4.2%	0.545	--	--	--
2004	3.7%	0.565	\$113.00	\$200.01	--
2005	4.2%	0.589	\$111.00	\$188.47	(\$11.53)
2006	5.8%	0.623	\$114.10	\$183.12	(\$5.35)
2007	5.2%	0.655	\$118.00	\$180.10	(\$3.02)
2008	4.3%	0.684	\$118.00	\$172.60	(\$7.50)
2009	2.9%	0.703	\$117.00	\$166.31	(\$6.29)
2010	2.2%	0.719	\$118.00	\$164.13	(\$2.18)
2011	2.7%	0.738	\$132.00	\$178.82	\$14.69
2012	3.3%	0.762	\$139.00	\$182.30	\$3.47
2013	3.4%	0.788	\$146.00	\$185.25	\$2.95
2014	3.9%	0.819	\$160.00	\$195.47	\$10.23
2015	3.0%	0.843	\$170.00	\$201.74	\$6.27
2016	2.8%	0.866	\$178.00	\$205.52	\$3.78
2017	2.5%	0.888	\$174.00	\$195.96	(\$9.56)
2018	3.4%	0.918	\$181.00	\$197.07	\$1.10
2019	3.9%	0.954	\$184.00	\$192.91	(\$4.16)
2020	4.8%	1.000	--	--	--
Average change non-recession year					\$1.82
Average change recession year					(\$5.89)
Estimated 2020 Maintenance Costs (non-recession year)					\$194.73
Estimated 2020 Maintenance Costs (recession year)					\$187.01
Estimated Change in Maintenance Costs (recession year)					-4.0%

*2003 RPIE Data Not Available

Table 3: 2021 PIOC Components and 2021 Recession-Sensitive PIOC Components

PIOC Component	2021 PIOC Weights	2021 PIOC Change	2021 Recession-Sensitive PIOC Change
Taxes	0.3262	3.9%	3.9%
Labor Costs	0.1108	2.8%	1.1%
Fuel	0.0728	-3.4%	-3.4%
Utilities	0.0981	2.1%	2.1%
Maintenance	0.1800	2.9%	-1.2%
Administrative Costs	0.1560	-0.7%	-0.7%
Insurance Costs	0.0561	18.8%	18.8%
ALL ITEMS	1.0000	3.0%	2.1%