

Seasonal Adjustment

This discussion is an overview of the process conducting quarterly adjustments. A more complete coverage is handled with video and exercise #5.

Suppose a business starts a marketing plan and it seems to work because there is a measurable increase of cashflow. However, the correlation coefficient is always in the moderate range. The problem is the regression model may need additional information.

Many Small businesses, such as retail outlets, experience cashflow seasonal fluctuations. With the bivariate prediction model the next month will always be higher than the previous month. But business activity does have seasonal fluctuations. The fourth quarter of the year and its increased commercial activity will always be higher than the first quarter of the following year. The regression model so far model does not allow for this fluctuation.

What is needed is a multiple regression model with predictor variables to quarterly adjust the monthly model. To the new forecasting model are added quarterly variable inputs. The model will now conduct forecasts that adjust for seasonal fluctuations.

We suggest to use Excel for the expansion of the Pro 7 basic model. You may ask, why? As one proceeds from auditing and forecasting to market research, there are many options other than seasonal fluctuation that has to be taken into account. In building a measurable outcome marketing plan, it is best to work with multi-potential AI tools such as Copilot and a broader use of Excel Toolpak. Regular AI auditing and forecasting efficiently and cost effectively help maintain account integrity. Data for actionable market research decision-making can incur many different situational factors. Flexibility and comfort with expanded multi-potential resources is essential.

Auditmetrics generated Random Sample that was used for an audit

	A	B	C	D	E	F
1	Transaction_ID	Revenue	TxDate	Strata	Year	Month
2	3505	\$18.22	1/1/2022	1	2022	1
3	3451	\$79.02	1/1/2022	2	2022	1
4	15818	\$92.42	1/1/2022	2	2022	1
5	14484	\$180.00	1/1/2022	3	2022	1
6	18375	\$189.94	1/1/2022	3	2022	1
7	3558	\$260.00	1/1/2022	3	2022	1
8	11679	\$384.00	1/1/2022	3	2022	1
9	14554	\$403.77	1/1/2022	4	2022	1
10	"	"	"	"	"	"
	"	"	"	"	"	"
25	25427	\$2,087.09	6/1/2024	6	2024	6
26	24146	\$2,100.00	6/1/2024	6	2024	6
27	15380	\$2,130.84	6/1/2024	6	2024	6
28	3191	\$2,150.00	6/1/2024	6	2024	6
29	11587	\$2,160.00	6/1/2024	6	2024	6
30	24154	\$2,229.00	6/1/2024	6	2024	6
	3314	\$2,422.00	6/1/2024	6	2024	6

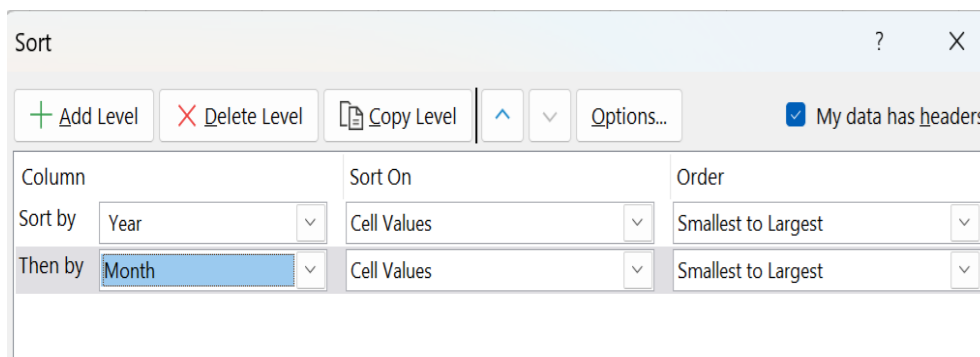
The table is a condensed exhibit of the sample (n= 1,158) using a 3% margin of error.

In preparing the sample for forecasting, two new variables are needed. In the first row the new cells are:

Year - Excel function: =**Year**(C2)

Month- Excel function: =**Month**(C2)

The Excel sample represents 30 months of data over a 2 ½ year period. First sort by Year and Month. Go to "Data" on Excel's top menu and then select "Sort". In the following exhibit are the sort inputs:



The next step is to create a summary dataset in Excel that lists total revenue by month for the 2 ½ years. The Excel tool to use is the Pivot Table. Select the dataset of interest and then select insert and then Pivot Table.

The pivot table set up and results

Row Labels	Sum of Revenue
2022	\$362,416.03
1	\$21,947.06
2	\$14,997.64
3	\$21,232.97
4	\$23,586.42
5	\$25,857.31
6	\$26,728.03
7	\$30,129.32
8	\$28,814.79
9	\$44,438.70
10	\$45,279.88
11	\$22,068.96
12	\$57,334.95
2023	\$554,446.95
1	\$27,883.43
2	\$36,325.70
3	\$34,066.74
4	\$28,233.78
5	\$48,148.29
6	\$52,775.44
7	\$35,373.46
8	\$31,454.22
9	\$51,021.78
10	\$54,747.63
11	\$48,434.77
12	\$105,981.71
2024	\$314,071.78
1	\$45,122.21
2	\$62,668.42
3	\$69,020.90
4	\$37,287.72
5	\$45,483.47
6	\$54,489.06

PivotTable Fields

Choose fields to add to report:

Search

VENDOR_NUMBER

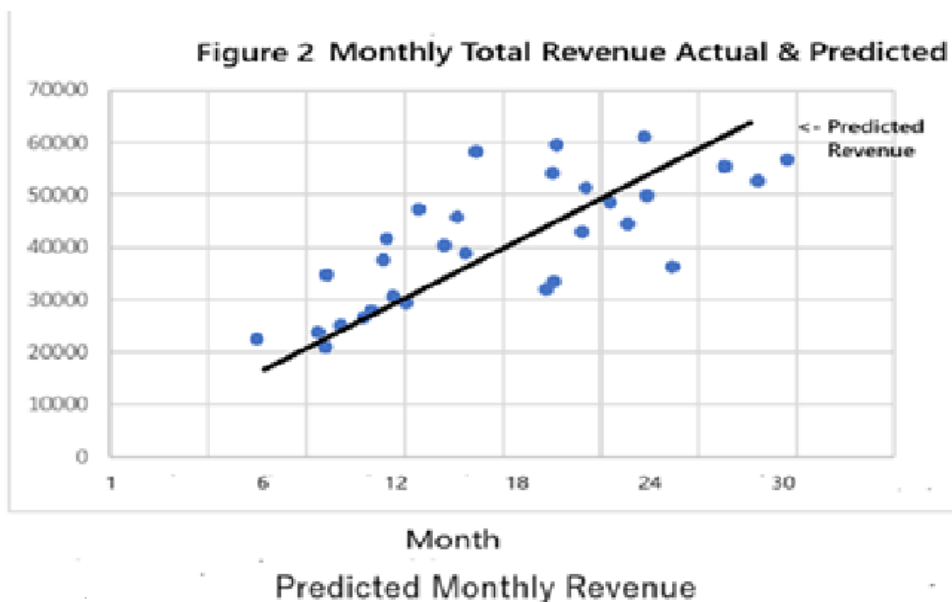
- Revenue
- absamt
- TxDate
- ACCOUNT
- DataSet
- ZipCode
- CustomerID
- Strata
- Year
- Month

More Tables...

Rows: Year, Month

Values: Sum of Revenue

A full discussion of regression modeling is in Springer Appendix I (pp. 107-111). The details of how to use Excel's ToolPak for Regression is on (pp. 60-67)



R= .65

Quarterly Variable Added

Month	Revenue	Month_Count	Quarter
1	\$21,947	1	1
2	\$14,998	2	1
3	\$21,233	3	1
4	\$23,586	4	2
"	"	"	"
1	\$45,122	25	1
2	\$62,668	26	1
3	\$69,021	27	1
4	\$37,288	28	2
5	\$45,483	29	2
6	\$54,489	30	2

Table 5 indicates the quarterly value for each month. Jan Feb March are the first quarter of the year. Month 4 or April starts the second quarter.

The multiple regression dataset below takes into account seasonal fluctuations.

First Year Dataset with Quarterly Variables:

Month	Revenue	Month_Count	Quarter	Q1	Q2	Q3
1	\$21,947	1	1	1	0	0
2	\$14,998	2	1	1	0	0
3	\$21,233	3	1	1	0	0
4	\$23,586	4	2	0	1	0
5	\$25,857	5	2	0	1	0
6	\$26,728	6	2	0	1	0
7	\$30,129	7	3	0	0	1
8	\$28,815	8	3	0	0	1
9	\$44,439	9	3	0	0	1
10	\$45,280	10	4	0	0	0
11	\$22,069	11	4	0	0	0
12	\$57,335	12	4	0	0	0

The rationale and details of introducing quarterly adjustment inputs, sometimes called dummy variables, (Q1, Q2, Q3) is on [pp 64-67](#) in the Springer Book.

The model as reported by Excel's Toolpak regression analysis is:

<i>Coefficients</i>	
Intercept	28404.26
Month_Count	1210.023
Q1	-8315.13
Q2	-10909.1
Q3	-8472.54

This model has a correlation of **R = .78** which is a marked improvement of the previous model's value of .65. It would be very useful to review again Springer *Appendix I (pp 107-111)* regarding the concept of goodness of fit of the model.