# M6L6c. Seasonal Analysis

## Slide #1Seasonal Analysis (Part C)

## Slide #2Seasonal Indices

We built a seasonal forecasting model with Microsoft Excel. This is the interface of Excel.

Column A is the month of the year, column B is the month label, and column C is the monthly sale. The units are in thousands of dollars.

Column D is the annual trend that we got from the linear regression, and column E is the seasonal index of each month. It is calculated in the table at the right side. The table in columns H through J is the seasonal index table.

Column I is the 12-month moving average for each month, and column J includes the seasonal index of each month.

The formulas of those cells in column I and J are shown at the right side. For example, row 14 represents the month of January. The formula of I14 is the average number of two 12 month moving windows.

The seasonal index of January is calculated with the formula in J14. The formula is the seasonal index equals to the actual sale in January divided by the 12-month moving average number.

## Slide #3Seasonal model demo

This video clip shows how you can build the seasonal forecasting model with Microsoft Excel.

You can find the model in the resource folder on Canvas.

Again, I do not expect you to build a model from scratch.

I expect you to understand how to build a model and how to use the model to do the seasonal forecasting.

Seasonal Business Forecasting Model.

We start with the trend analysis, like what we discussed in the previous lecture.

So we use the linear regression function of Excel to calculate the trend line. Seasonal Column D is the number of the trendline analysis.

The trendline analysis tells us the long-term performance of the product, the annual growth rate of the sale of the OCT machine.

After that, we're going to calculate the seasonal index of each month, and this table shows the calculation of the seasonal index.

Let's look at January, and see that this column captures the moving average of a 12 month window.

We use the average of two windows to calculate the January moving average sale because there are 12 months and January is not in the exact middle.

So one window is between July 2016 and June 2017. The other window is between August 2016 and July 2017.

The average of the two moving average windows is the denominator of the index calculation and the seasonal index calculation is the actual sale in January divided by the moving average of those two 12 month windows.

We use the same formula to calculate the seasonal index of each month.

This chart shows the seasonal index.

Clearly it shows that in August and September, the sale is more than the index number in other months.

So this seasonal index reflects the fluctuation of monthly sale on top of the general long term trend.

Now let's put the seasonal index and the long-term trend together.

So this column shows the seasonal index of each month.

We use the VLOOKUP table function to load the seasonal index into this table for each month.

Then, we use the multiplication of the long-term trend by the seasonal index to forecast the seasonal performance of the OCT machine.

This chart shows the forecast results.

The solid lines are the monthly sales in the past two years, and this dotted line is the annual growth trend, which tells us the long-term performance of the product.

And those are the forecasted numbers in the next year.

So clearly, the pattern of each month's sale is very similar to the pattern in previous months.

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So clearly, the pattern of each month's sale is very similar to the pattern in previous months.

So this method can tell us the long term trend and also the short term fluctuation of the sale.

This Excel table is how we do the forecast.

It's very simple but it creates a lot of business insight from this forecasting.

And that is what we want you to learn, the practical use of a tool, and also how to use the forecast to generate the business insights, in addition to how to predict the performance in the future.