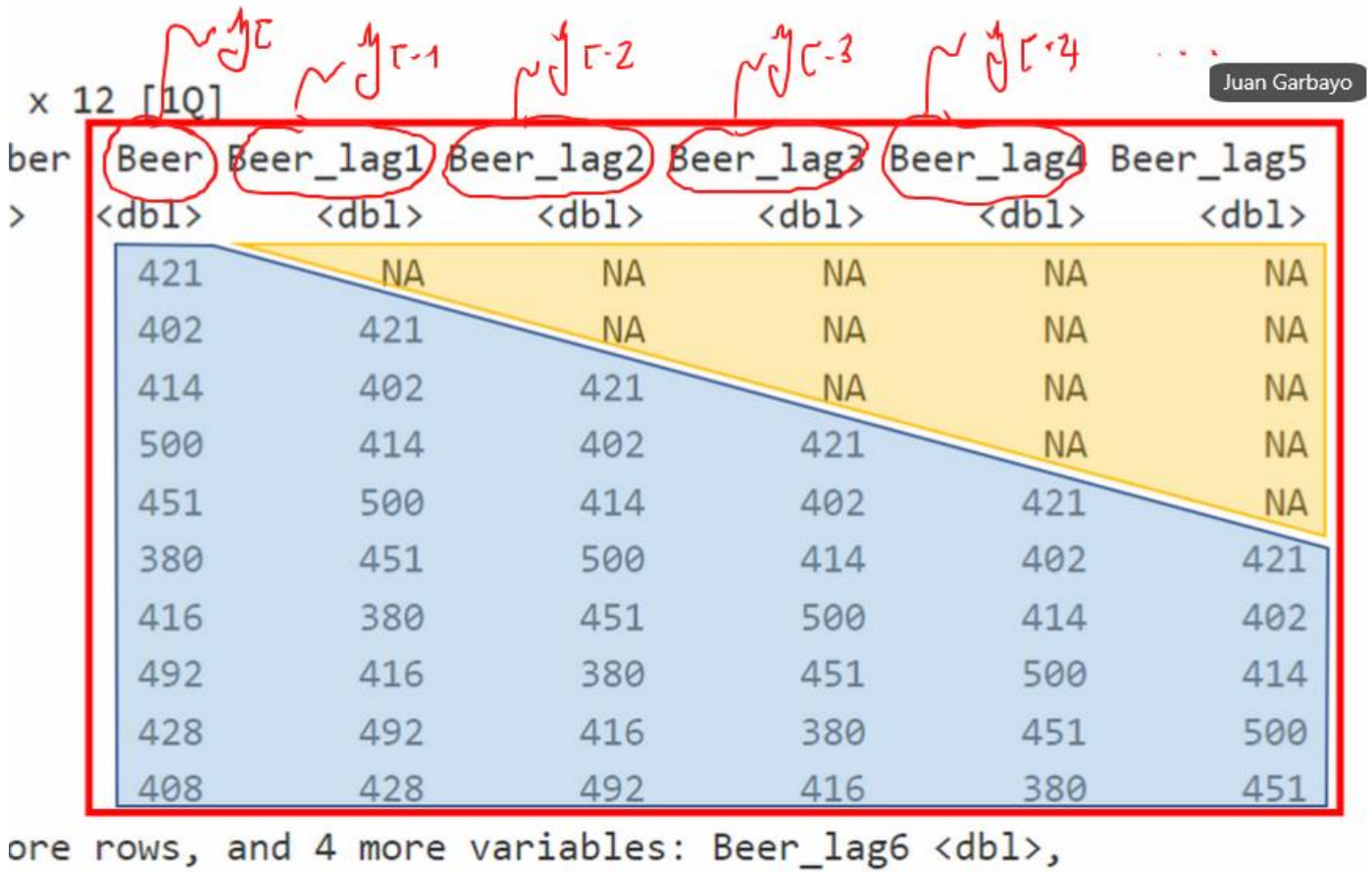
```
recent_beer
```

```
# A tsibble: 42 x 6 [1Q]
   Quarter  Beer Beer_lag1 Beer_lag2 Beer_lag3 Beer_lag4
     <qtr> <dbl>     <dbl>     <dbl>     <dbl>     <dbl>
 1 2000 Q1   421        NA        NA        NA        NA
 2 2000 Q2   402       421        NA        NA        NA
 3 2000 Q3   414       402       421        NA        NA
 4 2000 Q4   500       414       402       421        NA
 5 2001 Q1   451       500       414       402       421
 6 2001 Q2   380       451       500       414       402
 7 2001 Q3   416       380       451       500       414
 8 2001 Q4   492       416       380       451       500
 9 2002 Q1   428       492       416       380       451
10 2002 Q2   408       428       492       416       380
# … with 32 more rows
```

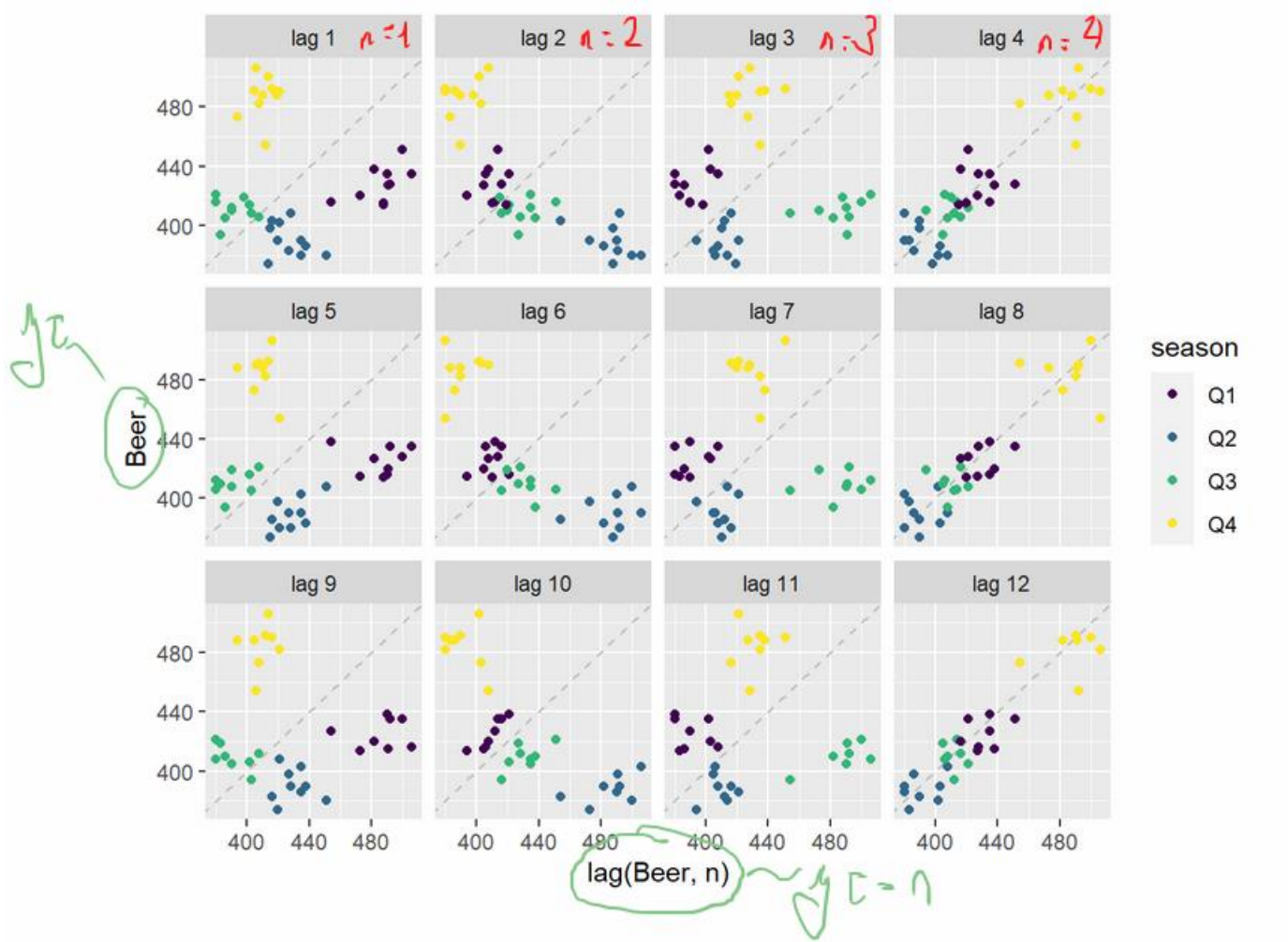
ig structure of NAs as the lag number increases:

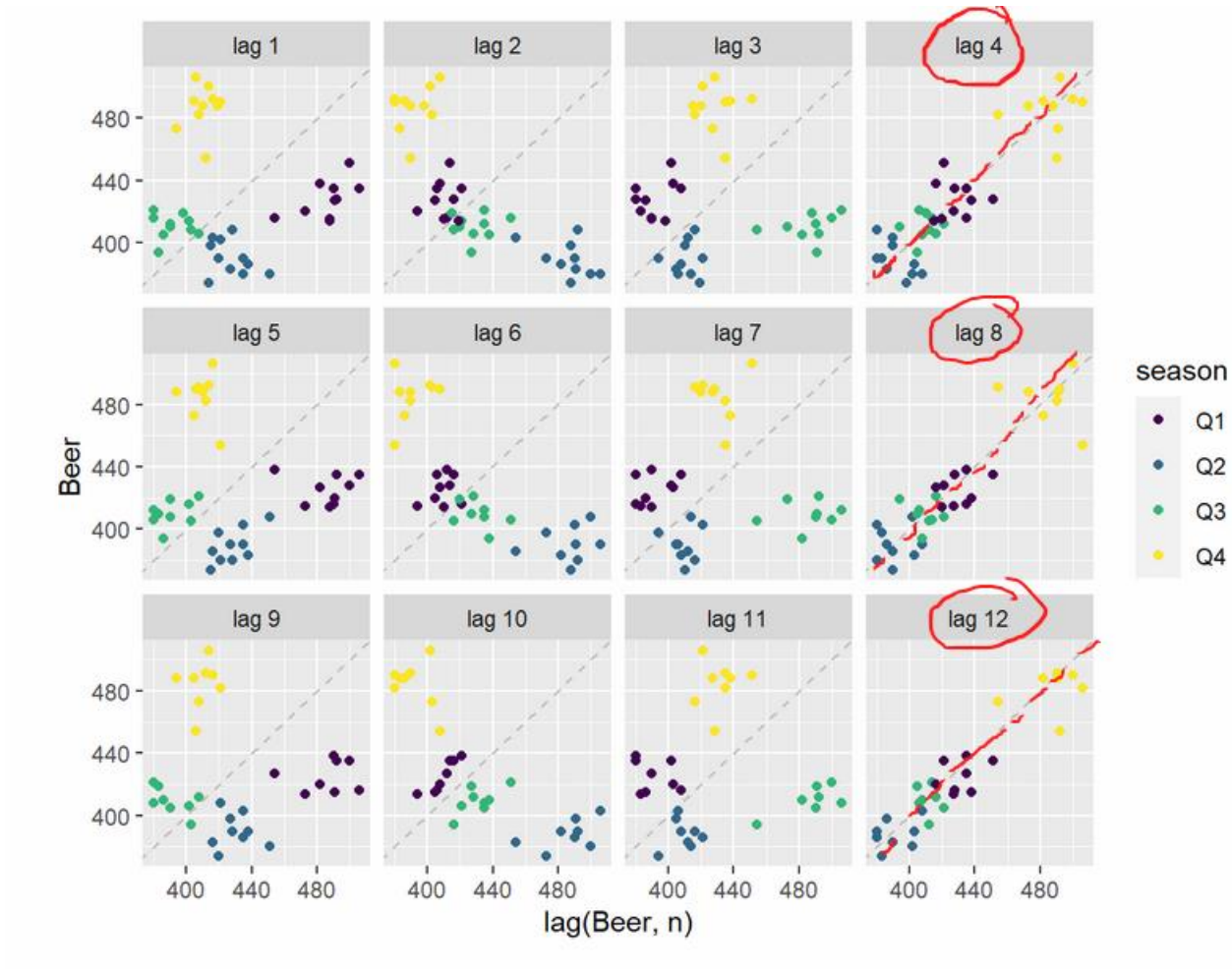


x 12 [1Q]

ber	Beer	Beer_lag1	Beer_lag2	Beer_lag3	Beer_lag4	Beer_lag5
>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>
	421	NA	NA	NA	NA	NA
	402	421	NA	NA	NA	NA
	414	402	421	NA	NA	NA
	500	414	402	421	NA	NA
	451	500	414	402	421	NA
	380	451	500	414	402	421
	416	380	451	500	414	402
	492	416	380	451	500	414
	428	492	416	380	451	500
	408	428	492	416	380	451

ore rows, and 4 more variables: Beer_lag6 <dbl>,


lag 1
lag 2
lag 3
lag 4
lag 5
lag 6
lag 7
lag 8
lag 9
lag 10
lag 11
lag 12
480
440
400
Beer
lag(Beer, n)
season
Q1
Q2
Q3
Q4


lag 1
lag 2
lag 3
lag 4
lag 5
lag 6
lag 7
lag 8
lag 9
lag 10
lag 11
lag 12
Beer
lag(Beer, n)
400
440
480
season
Q1
Q2
Q3
Q4

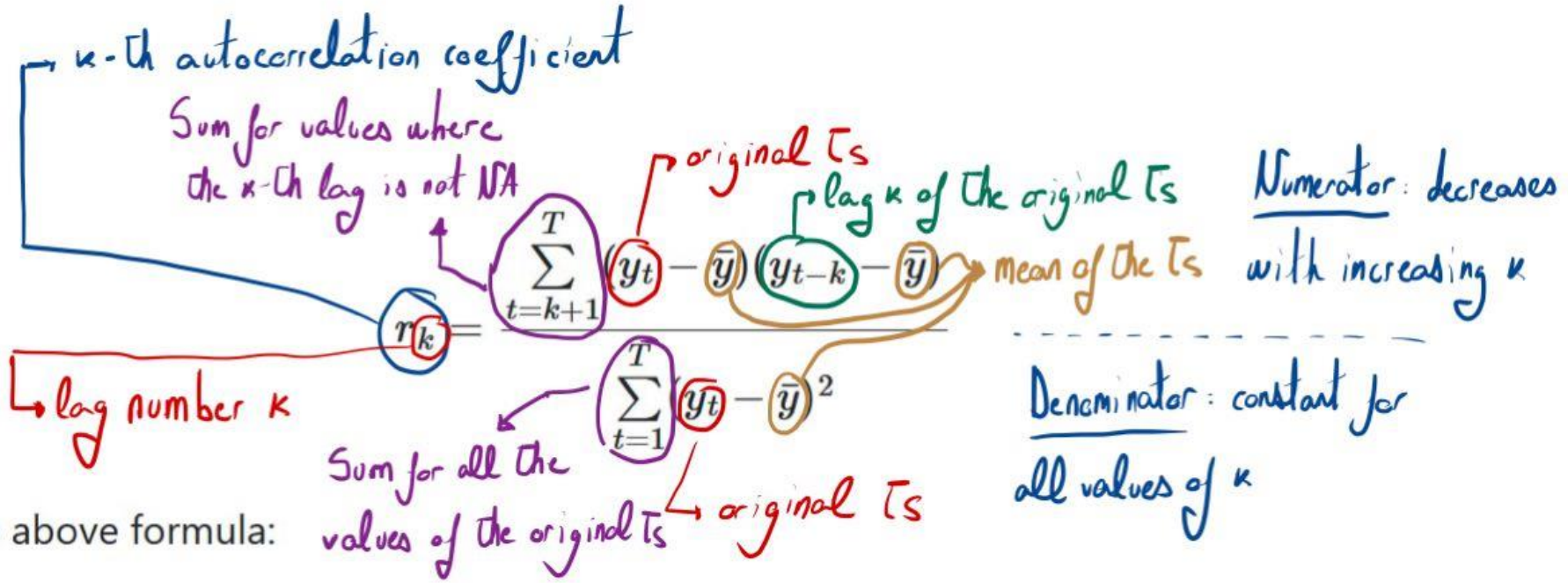
```
# A tsibble: 42 x 3 [1Q]
    Beer Beer_lag4 Quarter
   <dbl>     <dbl>   <qtr>
 1   421        NA 2000 Q1
 2   402        NA 2000 Q2
 3   414        NA 2000 Q3
 4   500        NA 2000 Q4
 5   451       421 2001 Q1
 6   380       402 2001 Q2
 7   416       414 2001 Q3
 8   492       500 2001 Q4
 9   428       451 2002 Q1
10   408       380 2002 Q2
# … with 32 more rows
```

x - y pairs

and forget about time

↳ Scatterplot

Juan Garbayo



In the above formula:

- $t = 1$ is the first point in the time series
- $t = T$ is the last poitn for which we have recorded data
- **The denominator remains the same for the correlation coefficient of every lag**. The sum in the denominator extends over the totality of the original time series (from $t = 1$ to $t = T$).
- **The numerator has a decreasing number of terms as** k (the lag-number) increases. The sum in the numerator extends from $k + 1$ to T.
- **Example:** if $k = 1$ (first lag), the first value of the lagges seris ($t = 1$) is an `NA`. The sum extends therefore from $t = k + 1 = 2$ until the end