

# Modèles Linéaires Appliqués

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Automne 2Q20

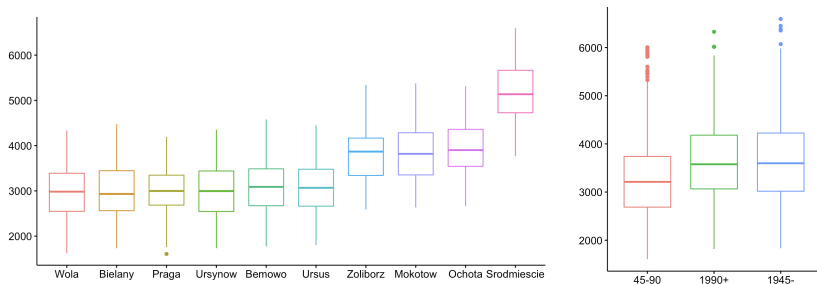
OLS #21 (ANOVA avec R)

# ANOVA

```
1 > library(DALEX)
2 > base = with(apartments, data.frame(y=m2.price, x1=
    district, x2=cut(construction.year,c
    (1900,1945,1990,2010))))
3 > levels(base$x2)=c("1945-", "45-90", "1990+")
4 > str(base)
5 'data.frame': 1000 obs. of 3 variables:
6 $ y : num 5897 1818 3643 3517 3013 ...
7 $ x1: Factor w/ 10 levels "Zoliborz","Wola",...
8 $ x2: Factor w/ 3 levels "1945-", "45-90", ..
```

# One Way ANOVA

```
1 > boxplot(y ~ x1, data = base)
2 > boxplot(y ~ x2, data = base)
```



# One Way ANOVA

```
1 > res.aov1 <- aov(y ~ x1, data = base)
2 > summary(res.aov1)
3           Df      Sum Sq   Mean Sq F value Pr(>F)
4 x1           9 467998459 51999829   145.7  <2e-16 ***
5 Residuals    990 353269202   356838
6
7 > res.aov2 <- aov(y ~ x2, data = base)
8 > summary(res.aov2)
9           Df      Sum Sq   Mean Sq F value Pr(>F)
10 x2           2  37839643 18919821   24.08  6e-11 ***
11 Residuals    997 783428018   785785
```

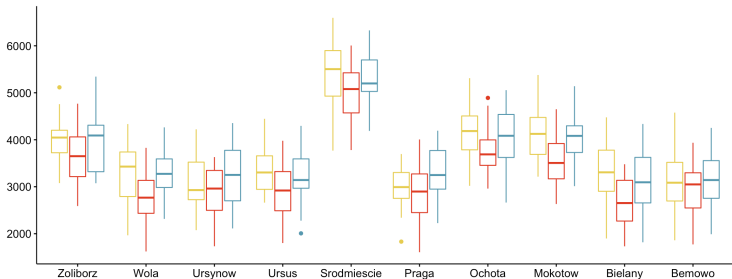
# One Way ANOVA

One can look at  $p$ -values of pairwise  $t$ -tests,

```
1 > pairwise.t.test(base$y, base$x1, p.adjust.method = "
  BH")
2
3 Pairwise comparisons using t tests with pooled SD
4
5      Zoli Wola Ursy Ursu Srod Prag Ocho Moko Biel
6 Wola 0.00
7 Ursy 0.00 0.72
8 Ursu 0.00 0.33 0.60
9 Srod 0.00 0.00 0.00 0.00
10 Prag 0.00 0.85 0.88 0.50 0.00
11 Ocho 0.11 0.00 0.00 0.00 0.00 0.00
12 Moko 0.62 0.00 0.00 0.00 0.00 0.00 0.35
13 Biel 0.00 0.88 0.85 0.46 0.00 0.92 0.00 0.00
14 Bemo 0.00 0.48 0.75 0.85 0.00 0.65 0.00 0.00 0.60
```

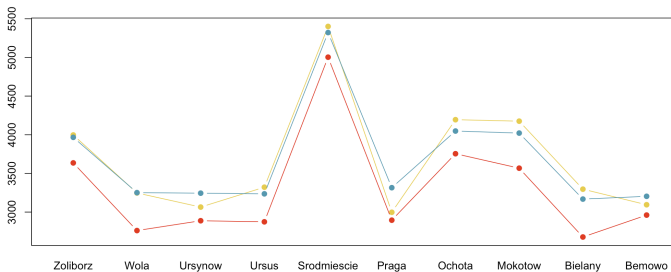
# Two Way ANOVA

```
1 > boxplot(y ~ x1 * x2, data=base)
```



# Two Way ANOVA

```
1 > interaction.plot(x.factor = base$x1, trace.factor =  
  base$x2, response = base$y, fun = mean)
```



## Two Way ANOVA

```
1 > res.aov12 = aov(y ~ x1 * x2, data = base)
2 > summary(res.aov12)
```

	Df	Sum Sq	Mean Sq	F value	Pr(>F)	
x1	9	467998459	51999829	161.547	<2e-16	***
x2	2	34636240	17318120	53.802	<2e-16	***
x1:x2	18	6402676	355704	1.105	0.341	
Residuals	970	312230287	321887			