Study of French labour market and inequalities

— Midterm results —

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Objectives

- Structure of French labour market
- Inequalities (in terms of salary):
  - ages
  - gender
  - job categories
  - spatial distribution
- Firms' distribution
- Exploratory analyses

Methodology

INSEE data

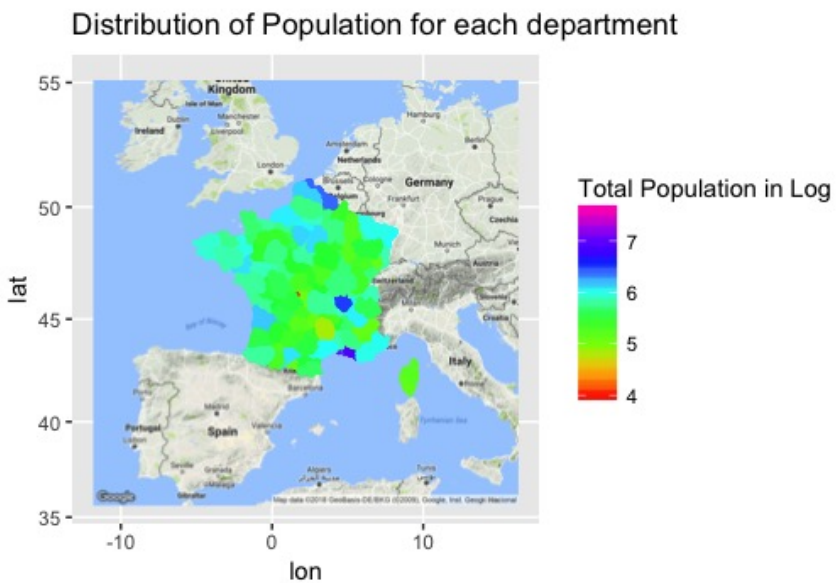
- Population: age, sex and cohabitation mode
- Salary: job categories, age and sex (mean net salary per hour in €)
- Firms: number of firms for each size
- Geography: GPS location

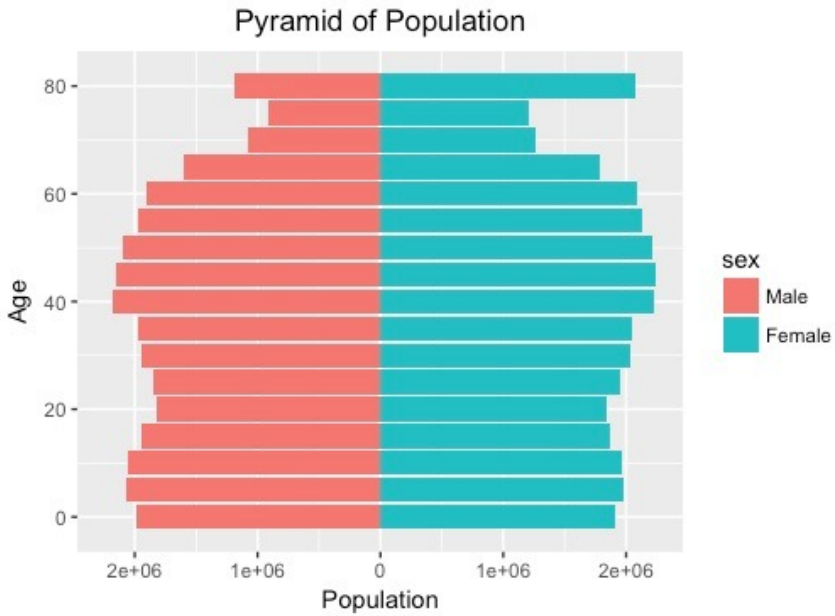
for different geographical levels (communes, departments, towns) in 2014

What has been done so far . . .

Population

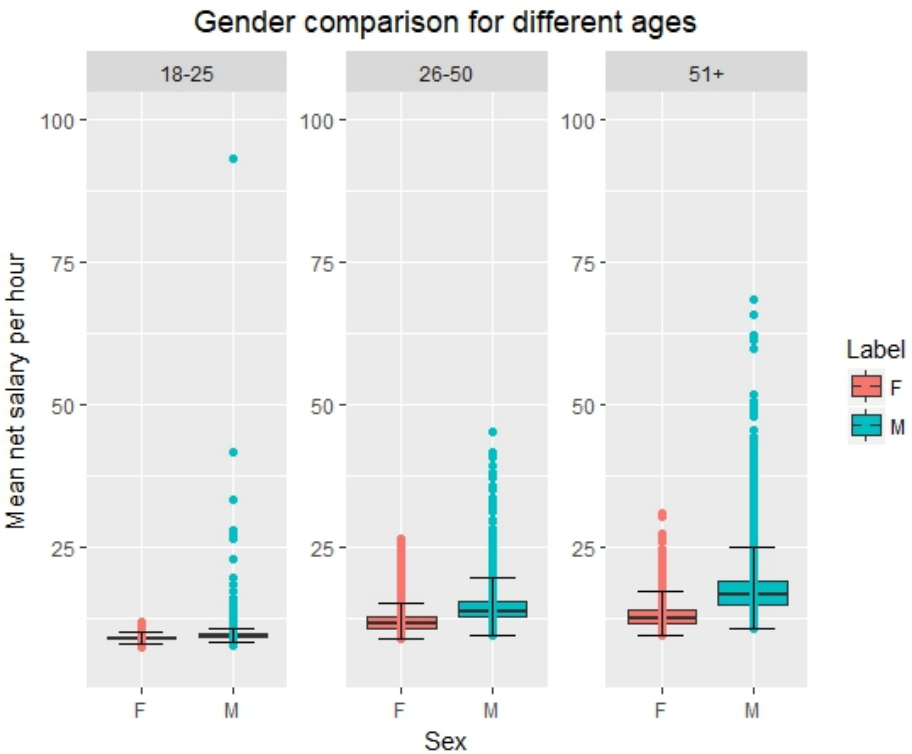
- Created new features
- Insights to demographic profile

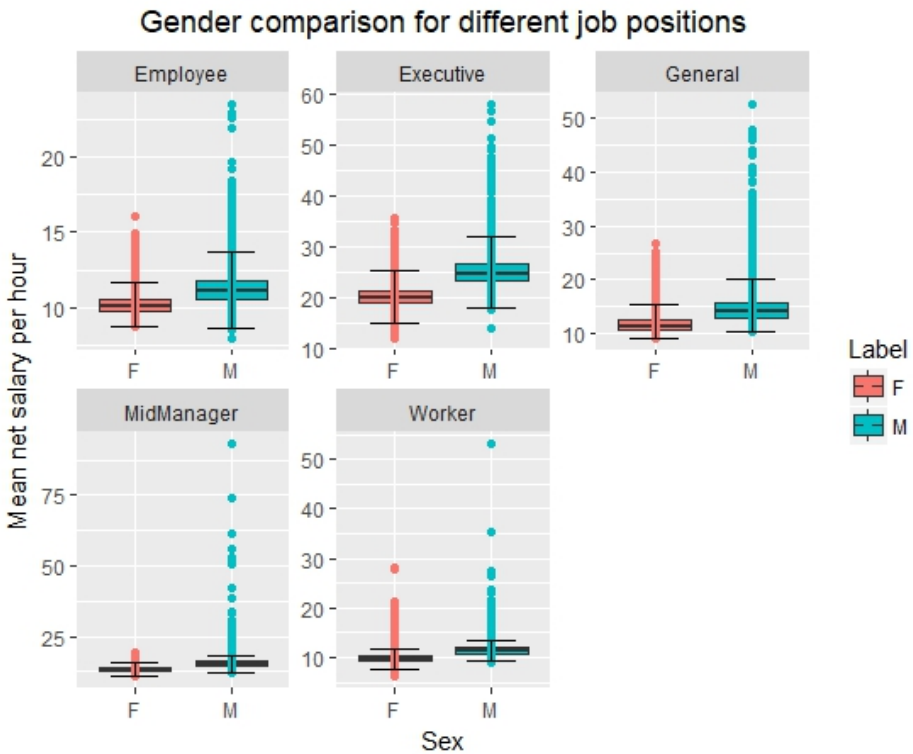




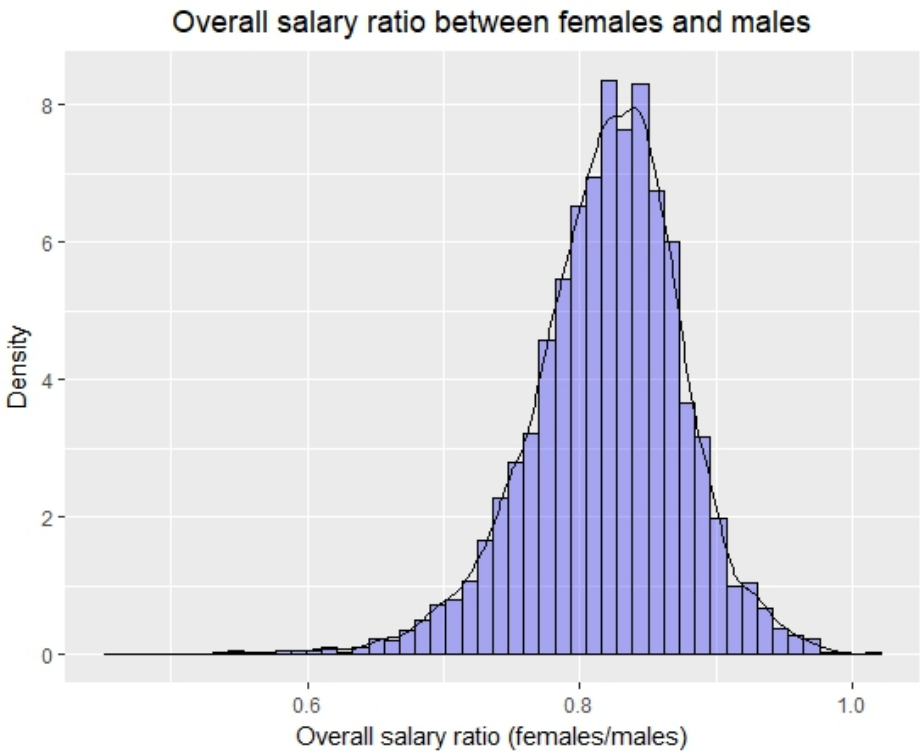
Salary

- Inequality of salary





Salary


Overall salary ratio between females and males
Density
0
2
4
6
8
0.6
0.8
1.0
Overall salary ratio (females/males)


Overall salary ratio between females and males vs. overall salary
Overall salary ratio(females/males)
0.4
0.6
0.8
1.0
10
20
30
40
Overall salary

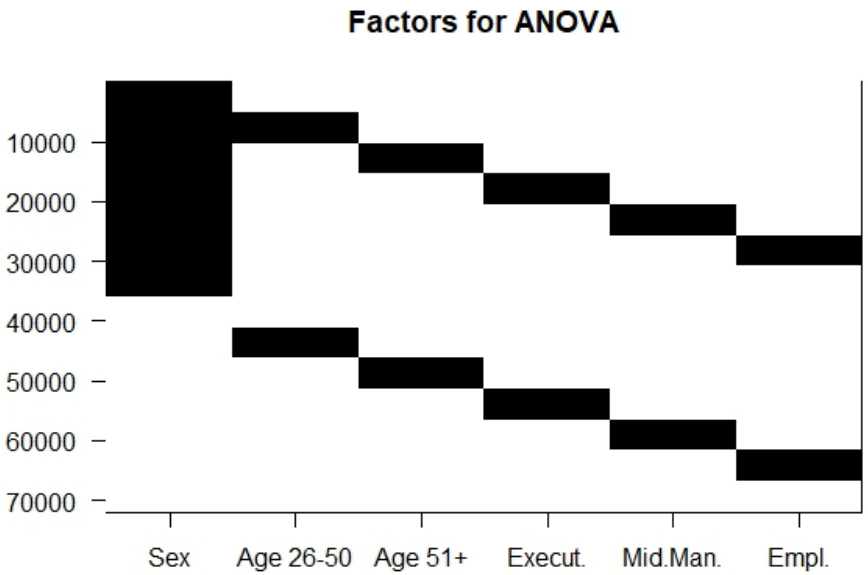
Salary


Executives salary ratio between females and males
Density
0
2
4
0.4
0.8
1.2
1.6
Executives salary ratio (females/males)


Executives salary ratio between females and males
vs. overall executives salary
Executives salary ratio (females/males)
0.6
0.9
1.2
1.5
20
30
40
50
Executives salary

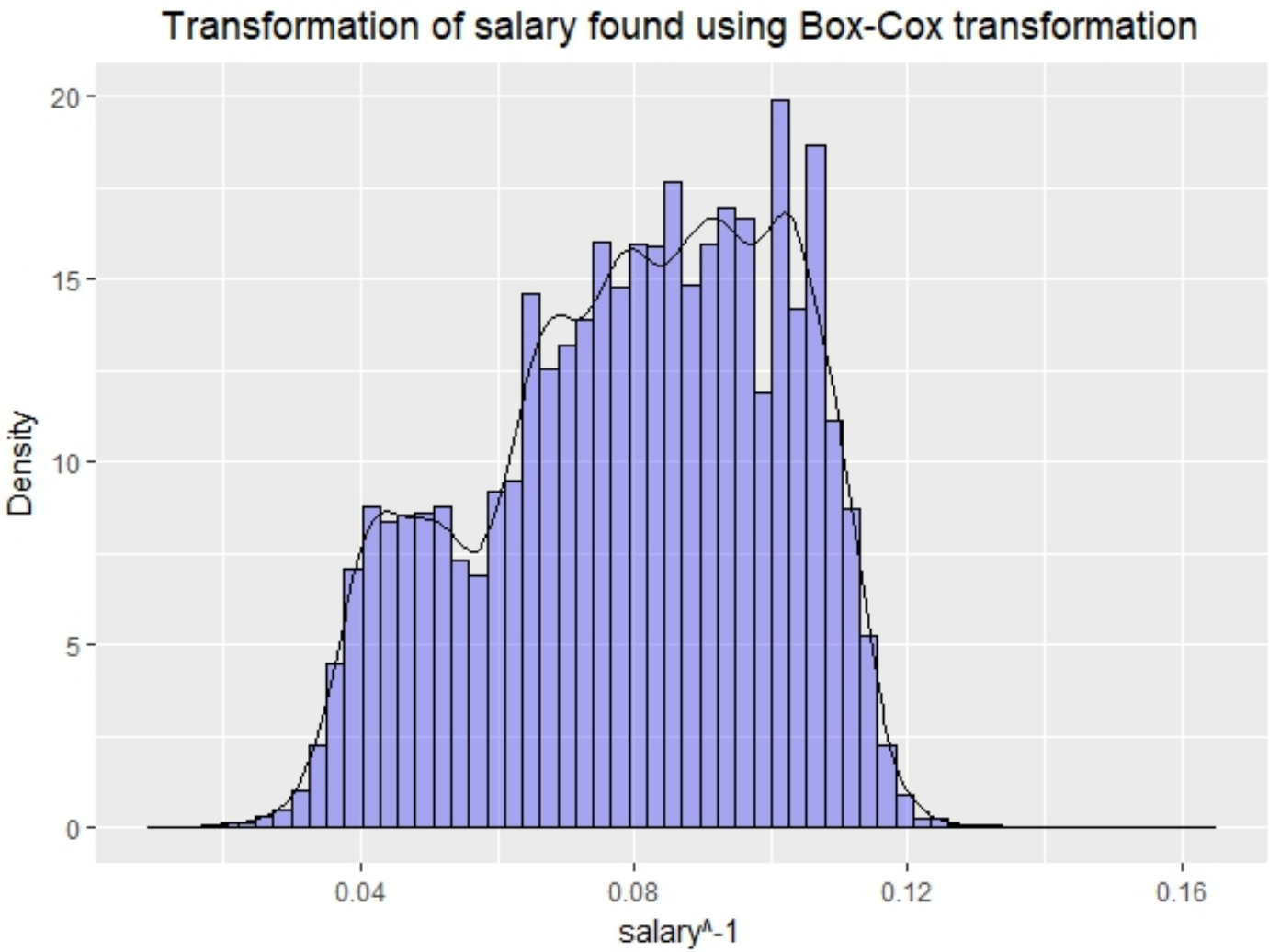
Salary

- ANOVA using sex, job, age and interaction effects



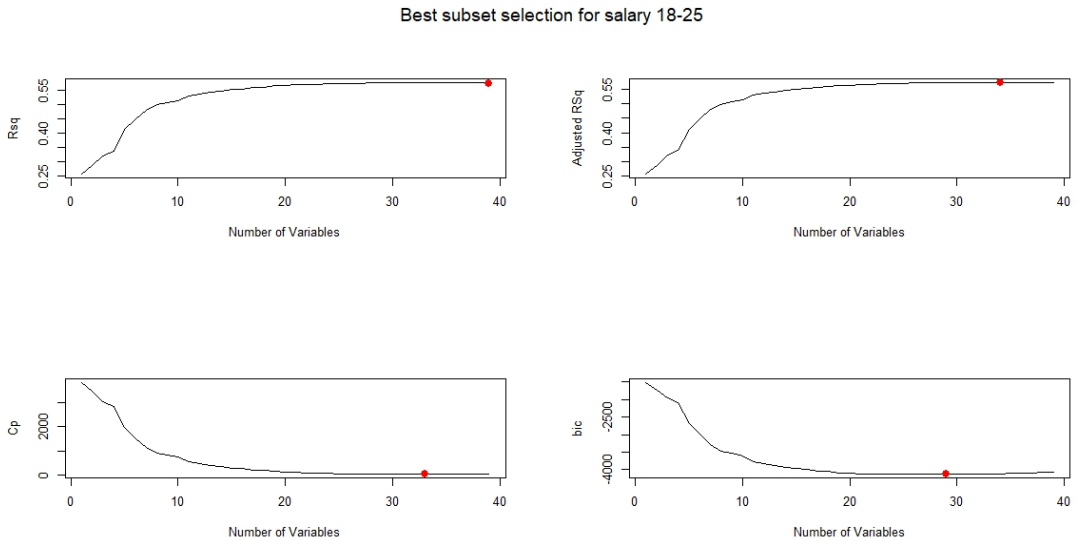

```
Call:
lm(formula = sal_y ~ sal_sex + sal_age + sal_job + sal_sex:sal_age +
    sal_sex:sal_job)

Residuals:
      Min        1Q    Median        3Q       Max
-0.084405 -0.004353  0.000683  0.005477  0.057842

Coefficients:
                  Estimate Std. Error  t value Pr(>|t|)
(Intercept)       1.061e-01  8.471e-05 1252.443  < 2e-16 ***
sal_sex          -1.097e-02  1.198e-04  -91.569  < 2e-16 ***
sal_age1         -2.160e-02  1.467e-04 -147.227  < 2e-16 ***
sal_age2         -2.838e-02  1.467e-04 -193.440  < 2e-16 ***
sal_job1         -5.601e-02  1.467e-04 -381.776  < 2e-16 ***
sal_job2         -3.036e-02  1.467e-04 -206.917  < 2e-16 ***
sal_job3         -8.621e-03  1.467e-04  -58.758  < 2e-16 ***
sal_sex:sal_age1 -2.502e-03  2.075e-04  -12.057  < 2e-16 ***
sal_sex:sal_age2 -7.572e-03  2.075e-04  -36.491  < 2e-16 ***
sal_sex:sal_job1  1.197e-03  2.075e-04    5.770 7.94e-09 ***
sal_sex:sal_job2  4.873e-04  2.075e-04    2.349   0.0188 *
sal_sex:sal_job3  3.059e-03  2.075e-04   14.742  < 2e-16 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.008585 on 71892 degrees of freedom
Multiple R-squared:  0.841,     Adjusted R-squared:  0.841
F-statistic: 3.458e+04 on 11 and 71892 DF,  p-value: < 2.2e-16
```

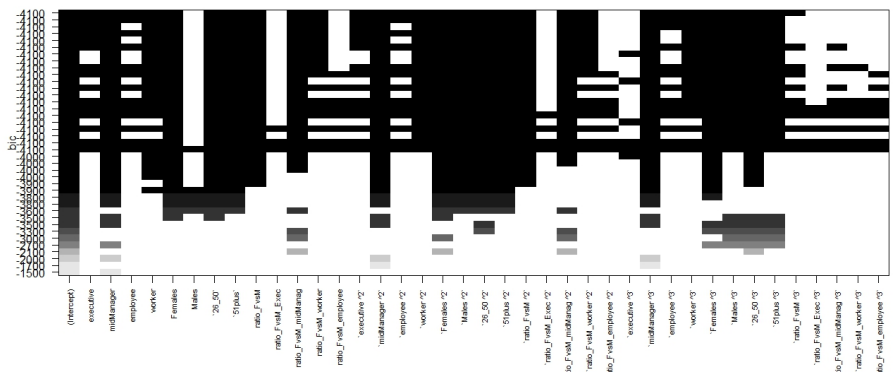
Salary


Transformation of salary found using Box-Cox transformation
Density
20
15
10
5
0
0.04
0.08
0.12
0.16
salary^-1

Salary

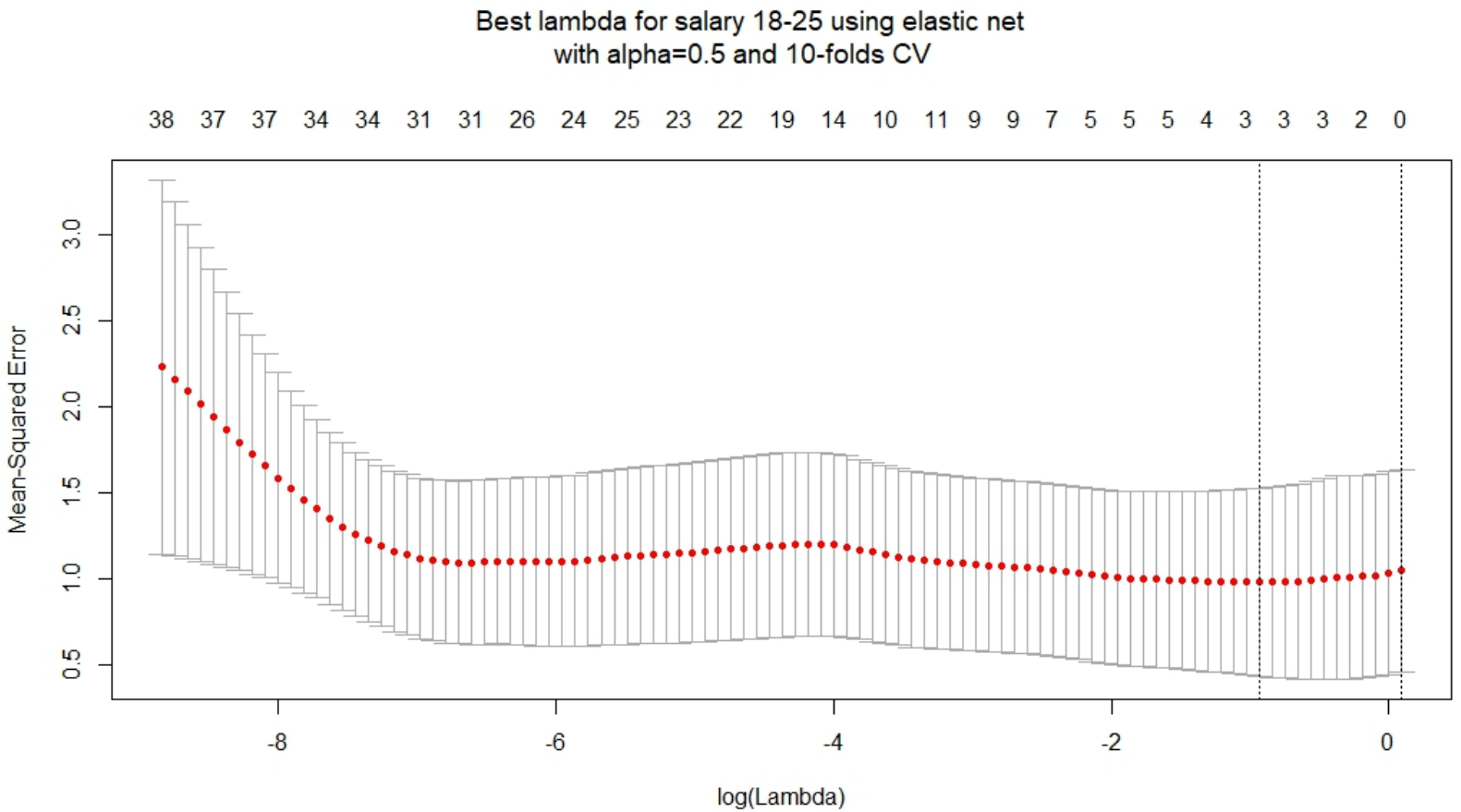
- Prediction for young people using BSS





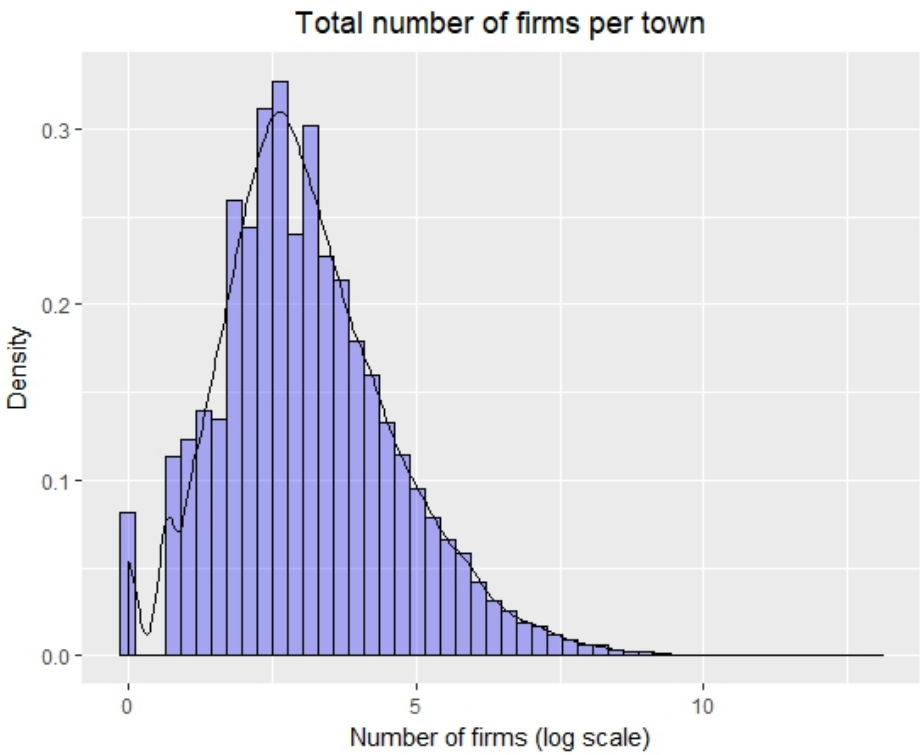
Salary

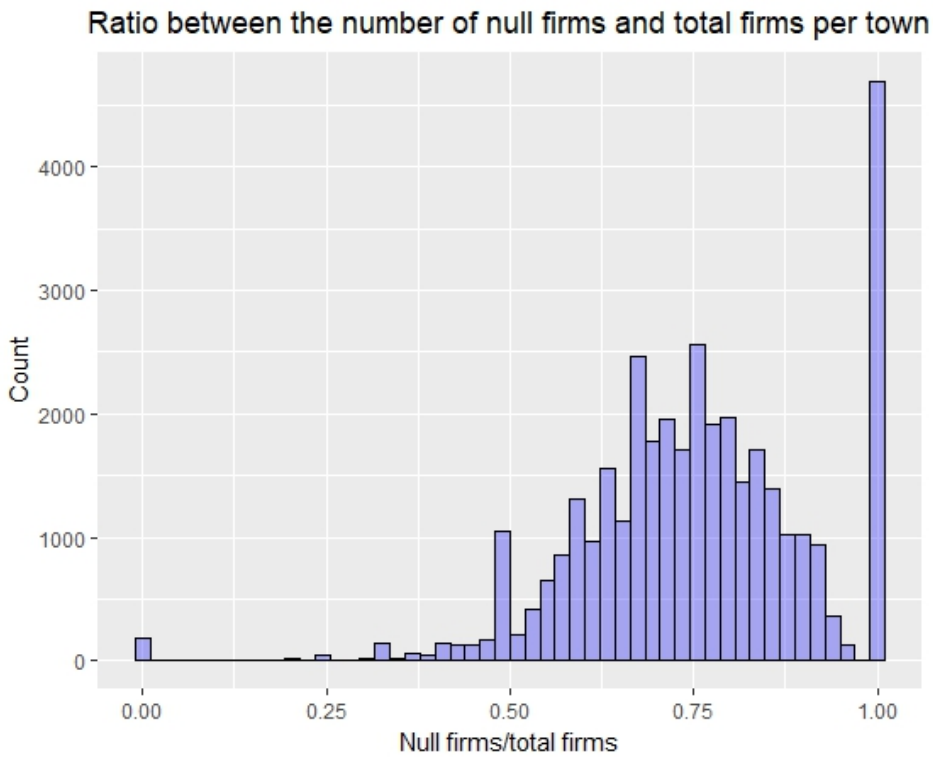
- Prediction for young people using elastic net and and 10-folds CV



Firms

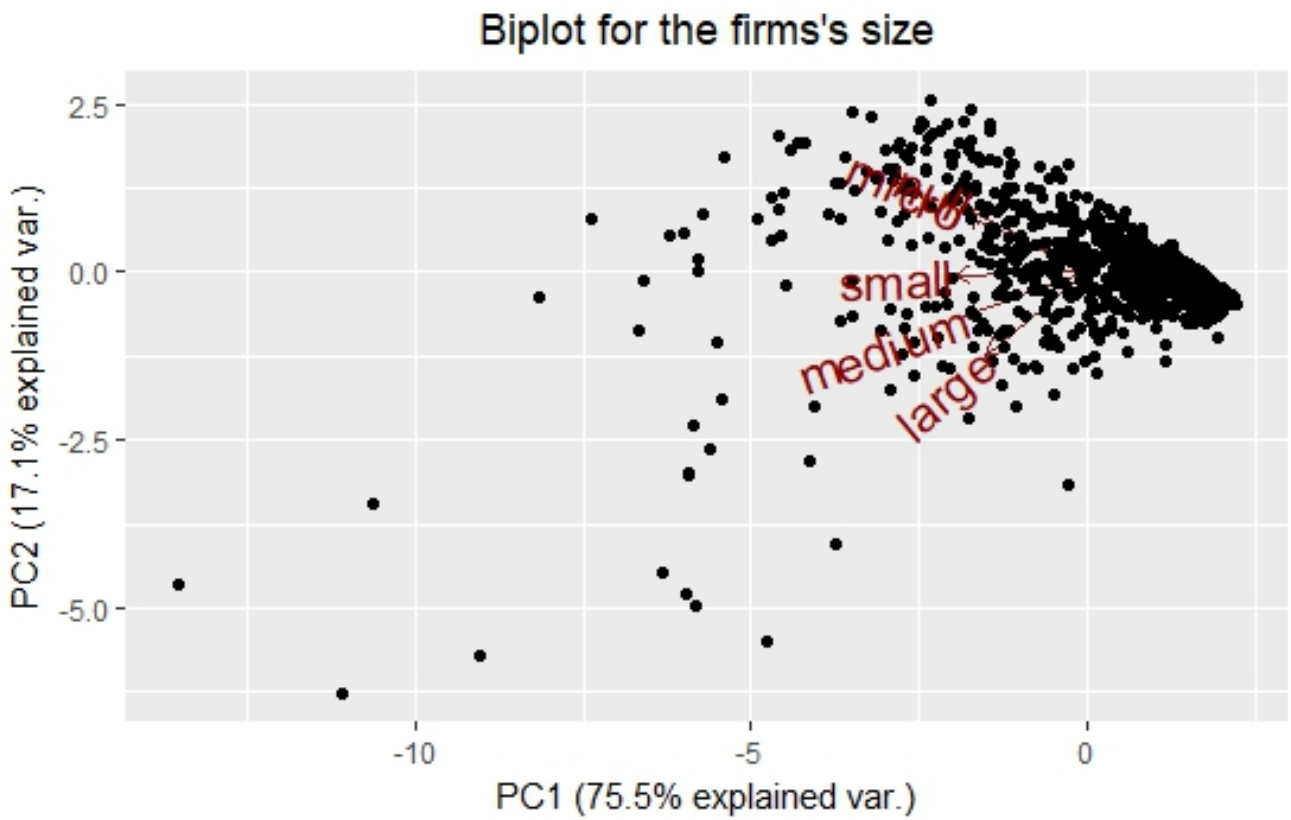
- Distribution of firms per town





Firms

- PCA analysis



Issues

- A lot of NA in geo locations (retrieved from Google API)
- Unique code for salary data 1/7 of the total
- Missing additional information
- French DOM-TOM regions
- Outliers and spatial correlation

Future works

- Combine the separated datasets
- Create meaningful indicators
- Take correlation into account (especially spatial)
- Perform clustering techniques to identify geographical clusters
- Perform groupwise lasso to predict salary data
- Verification/improvement of the obtained results
- Compare the methodologies used with robust ones
- Find complementary datasets

– Thank you –