# Econometrics Project
# Why do people vote Front National?

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# Table of contents

# Objectives

- Identify pertinent parameters which could have made people vote for the FN in 2015
- Collect the data on serious website (e.g Insee website)
- Build a representative model

# Table of contents

# Obtaining data: on the Internet

- 96 departments
- Insee for data about departments
- Government for data about votes

# Table of contents

# Choice of variables

Number of variables: k=15

| **Explanatory variables** | **Details** | **Expectations** |
|---|---|---|
| Density | hab/km | ? |
| Retirement | % of retired people | + |
| Immigration | % of immigrate | + |
| GDP | per habitant in 2015 | - |
| Salary | per habitant in euros in 2015 | - |
| Unemployment | % of unemployed people | + |
| Expenses | per habitant in euros in 2015 | - |
| Debt | per habitant in euros in 2015 | + |
| Students | % of students in university | - |
| Criminality | ratio habitants per crime | + |

# Choice of variables

| Explanatory variables | Details | Expectations |
|---|---|---|
| FN15 | % of votes for FN in 2015 first round | |
| UMP15 | % of votes for UMP in 2015 first round | - |
| PS15 | % of votes for PS in 2015 first round | - |
| FN10 | % of votes for FN in 2010 first round | + |
| UMP10 | % of votes for UMP in 2010 first round | - |
| PS10 | % of votes for PS in 2010 first round | - |

# Table of contents

# Expression

Our model is estimated with the following equation for a linear regression:

$$FN_{15} = \beta.\mathbf{X} + \mathbf{u}$$

$FN_{15}$ % of votes for FN in 2015 first round
$\mathbf{X}$ is the matrix of our **14 variables** defined during our study (FN10 is out here)
$\beta$ is the vector of coefficients
$\mathbf{u}$ is the vector of unobservable parameters

# First Linear Regression

We perform a first linear regression:

$$FN_{15} = \beta_0 + \beta_1.\text{Density} + \beta_2.\text{Retirement} + \beta_3.\text{Immigration} + \beta_4.\text{GDP} + \beta_5.\text{Salary} + \beta_6.\text{Unemployment} + \beta_7.\text{Expenses} + \beta_8.\text{Debt} + \beta_9.\text{Students} + \beta_{10}.\text{Criminality} + \beta_{11}.UMP_{15} + \beta_{12}.PS_{15} + \beta_{13}.UMP_{10} + \beta_{14}.PS_{10} + u$$

# EViews Results

| Variable | Coeff | Std. errors | t-Stat | Prob |
|---|---|---|---|---|
| C | -2.3927 | 19.975 | -0.1197 | 0.9050 |
| Density | -0.0011 | 0.0004 | -2.6345 | 0.0101 |
| %pensioners | 0.4346 | 0.3591 | 1.2102 | 0.2297 |
| %students | -0.4865 | 0.3807 | -1.2778 | 0.2050 |
| %immigrant | -0.0091 | 0.2508 | -0.0363 | 0.9712 |
| GDP | 0.0004 | 0.0001 | 2.9334 | 0.0044 |
| Average wage | 0.0005 | 0.0005 | 0.9224 | 0.3591 |
| Unemployment | 2.5011 | 0.5037 | 4.9661 | 0.0000 |
| Expenses per hab | -0.0114 | 0.0046 | -2.4783 | 0.0153 |
| Debt per hab | 0.0023 | 0.0027 | 0.8379 | 0.4045 |
| Hab per crime | -0.0007 | 0.0015 | -0.4744 | 0.6365 |
| UMP 2015 | -0.3367 | 0.1399 | -2.4064 | 0.0184 |
| PS 2015 | -0.3108 | 0.1677 | -1.8534 | 0.0675 |
| UMP 2010 | 0.3351 | 0.1894 | 1.7692 | 0.0806 |
| PS2010 | 0.0524 | 0.1574 | 0.3329 | 0.7401 |

# Table of contents

# Analysis of the model

## Significance

Number of variables insignificant at the usual levels (immigration, salary, criminality ..)

## R-squared value

- R-squared=57.8 %
- Adjusted R-squared=50.5 %
- Comparison later with our second model

# Table of contents

# Positive marginal effects

- CHO raises by 1% $\longrightarrow$ $FN_{15}$ raises by 2,5%
- GDP raises by 1000E $\longrightarrow$ $FN_{15}$ raises by 0,3%

# Negative marginal effects

- DEP raises by 100E $\longrightarrow$ $FN_{15}$ decreases by 1,15%
- Immigration is insignificant

# Table of contents

# Correlation

- Immigration not correlated to crime : coefficient = 5%
- Immigration not correlated to unemployment : coefficient = 9%

$\rightarrow$ False affirmations of FN during its campaign

| | IMM | CHO | CRI |
|---|---|---|---|
| IMM | 1.000000 | 0.091579 | 0.053167 |
| CHO | 0.091579 | 1.000000 | -0.209484 |
| CRI | 0.053167 | -0.209484 | 1.000000 |

# Table of contents

# Residuals

- Corsica : important overestimation
- Independant party

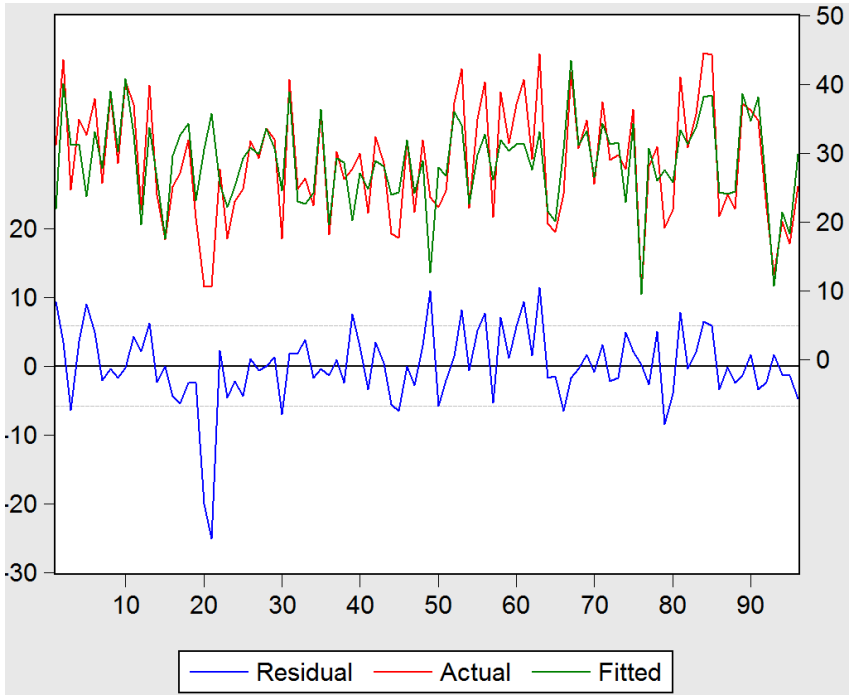


Figure: residuals eq01

# Table of contents

# Second Equation

Coefficient correlation $FN_{10}/FN_{15}$ : 87%

We add the % of votes for FN in 2010 first round :

$$FN_{15} = \beta_0 + \beta_1.\text{Density} + \beta_2.\text{Retirement} + \beta_3.\text{Immigration} + \beta_4.\text{GDP} + \beta_5.\text{Salary} + \beta_6.\text{Unemployment} + \beta_7.\text{Expenses} + \beta_8.\text{Debt} + \beta_9.\text{Students} + \beta_{10}.\text{Criminality} + \beta_{11}.UMP_{15} + \beta_{12}.PS_{15} + \beta_{13}.UMP_{10} + \beta_{14}.PS_{10} + \beta_{15}.FN_{10} + u$$

# EViews Results

Dependent Variable: FN15
Method: Least Squares
Date: 03/23/16 Time: 16:46
Sample: 1 96
Included observations: 96

| | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -5.721545 | 9.251952 | -0.618415 | 0.5381 |
| DEN | -0.000392 | 0.000214 | -1.829203 | 0.0711 |
| RET | -0.070100 | 0.168835 | -0.415198 | 0.6791 |
| IMM | -0.265517 | 0.117074 | -2.267946 | 0.0260 |
| PIB | 0.000228 | 5.61E-05 | 4.070985 | 0.0001 |
| SAL | 2.51E-05 | 0.000244 | 0.102969 | 0.9182 |
| CHO | 0.611828 | 0.257642 | 2.374720 | 0.0200 |
| DEP | -1.32E-05 | 0.002244 | -0.005897 | 0.9953 |
| END | -0.000532 | 0.001255 | -0.423649 | 0.6730 |
| ETU | -0.338726 | 0.176490 | -1.919236 | 0.0585 |
| CRI | 0.000130 | 0.000707 | 0.183485 | 0.8549 |
| UMP15 | -0.313314 | 0.064802 | -4.834943 | 0.0000 |
| PS15 | -0.106779 | 0.078553 | -1.359329 | 0.1779 |
| FN10 | 1.676208 | 0.097139 | 17.25574 | 0.0000 |
| UMP10 | 0.340186 | 0.087700 | 3.878971 | 0.0002 |
| PS10 | 0.316037 | 0.074468 | 4.243937 | 0.0001 |

| | | | |
|---|---|---|---|
| R-squared | 0.910602 | Mean dependent var | 28.60750 |
| Adjusted R-squared | 0.893840 | S.D. dependent var | 8.375771 |
| S.E. of regression | 2.729009 | Akaike info criterion | 4.996766 |
| Sum squared resid | 595.7990 | Schwarz criterion | 5.424157 |
| Log likelihood | -223.8447 | Hannan-Quinn criter. | 5.169524 |
| F-statistic | 54.32514 | Durbin-Watson stat | 1.909859 |

# Table of contents

# Comparison with our first model

- R-squared= 91%
- Adjusted R-squared=89%
- Better adjusted R-squared than the first model

# Table of contents

# Positive marginal effects

- $FN_{1O}$ raises by 1% $\longrightarrow$ $FN_{15}$ raises by 1.68% $\rightarrow$ growth of power

- CHO raises by 1% $\longrightarrow$ $FN_{15}$ raises by 0.61%

# Negative marginal effects

- IMM raises by 1% $\longrightarrow$ $FN_{15}$ decreases by 0.27%
  $\rightarrow$ contrary as we expected

- ETU raises by 1% $\longrightarrow$ $FN_{15}$ decreases by 0.34%

# Table of contents

# Residuals

- Better residuals as for eq01
- Amplitude for corsica lower than the first model

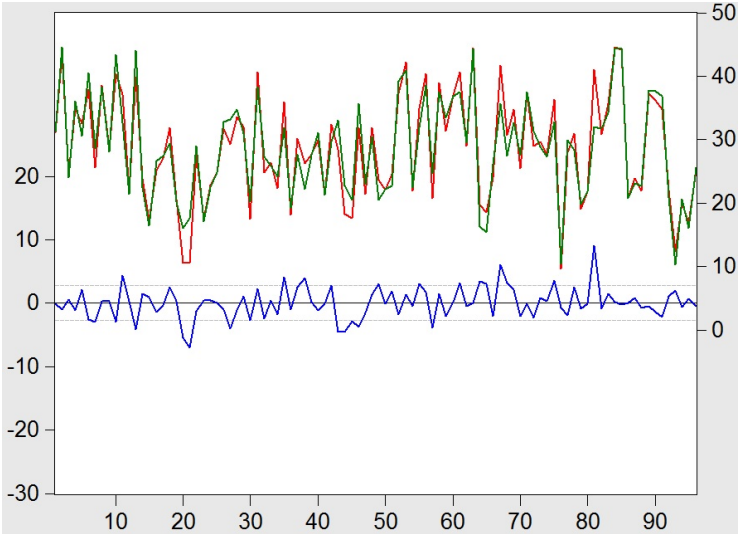


Figure: residuals eq02

# Table of contents

# Linearity

- Adjusted R-squared=89%
- The regression line fits really correctly the datas

# Table of contents

# Normality of the errors

- Jarque-Bera test
- Reject of the normality of the errors

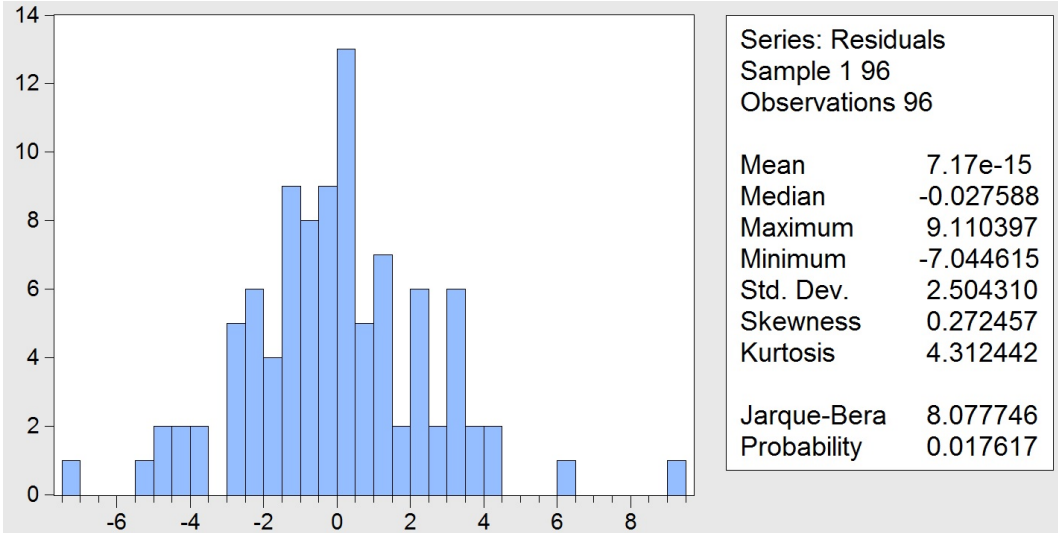


Figure: Normality test

# Table of contents

# Homoscedasticity

- White's test
- Reject homoscedasticity

Heteroskedasticity Test: White

| | | | |
|---|---|---|---|
| F-statistic | 3.230178 | Prob. F(15,80) | 0.0003 |
| Obs*R-squared | 36.21144 | Prob. Chi-Square(15) | 0.0016 |
| Scaled explained SS | 41.64872 | Prob. Chi-Square(15) | 0.0003 |

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 04/06/16 Time: 13:38
Sample: 1 96
Included observations: 96

Figure: Homoscedasticity test

# Table of contents

# Conclusion of the study

- Two models
- The second one seems better
- But two different things modelized

# Table of contents

# Questions

- Thank you for your attention
- Questions ?