Exploring Markers of Inequalities between Women and Men in Metropolitan and Overseas France

Phileas Dazeley Gaist – COA Data Science 1 – Fall 2021

Statement on Nomenclature

- Gendered terms
- Age groups
- Socioprofessional designations
- Metropolitan and Overseas France (DOM)

The data:

Institut national de la statistique et des études économiques

Insee

Mesurer pour comprendre

Net wage gap between men and women (2017) (%)

- Formula = (w net hourly salary – m net hourly salary)/m net hourly salary
- by: age groups, socioprofessional groups, total

Total rate of monetary poverty of individuals (2017) (%)

Intensity of poverty (2017) (%)

Differences in rates of employment of women and men in official positions in municipalities (2021) (%)

Differences in rates of average ages at first child between women and men (2019) (%)

region <chr>	wage_gap_pct <dbl>	age_group <chr>	geographic_region_group <chr>

region <chr>	wage_gap_pct <dbl>	socioprofessional_group <chr>	geographic_region_group <chr>

region <chr>	pct_wage_gap <dbl>	monetary_poverty <dbl>	poverty_intensity <dbl>	ofc_employment_gap <dbl>	age_first_child_gap_y <dbl>	geographic_region_group <chr>

Skip tables slide

region	wage_gap_pct	socioprofessional_group	geographic_region_group
<chr>	<dbl>	<chr>	<chr>
Guadeloupe	-18.94	executives	DOM
Martinique	-18.58	executives	DOM
Guyane	-19.00	executives	DOM
La Réunion	-18.70	executives	DOM
Île-de-France	-20.74	executives	Metropolitan France

region	pct_wage_gap	monetary_poverty	poverty_intensity	ofc_employment_gap	age_first_child_gap_y	geographic_region_group
<chr>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<chr>
Guadeloupe	9.52	34.5	24.8	-0.2	3.7	DOM
Martinique	9.08	28.6	23.5	2.0	3.6	DOM
Guyane	8.81	52.9	40.4	3.4	4.5	DOM
La Réunion	6.81	38.3	23.3	0.4	3.3	DOM
Île-de-France	15.85	15.3	22.4	3.8	3.5	Metropolitan France
Centre-Val de Loire	14.97	13.2	19.5	10.4	2.8	Metropolitan France
Bourgogne-Franche-Comté	15.39	12.8	18.4	19.0	2.8	Metropolitan France
Normandie	15.68	13.4	18.7	12.2	2.7	Metropolitan France
Hauts-de-France	14.58	17.9	18.8	15.0	2.8	Metropolitan France
Grand Est	16.74	14.5	19.6	19.4	2.9	Metropolitan France
Pays de la Loire	15.96	10.8	17.9	4.4	2.5	Metropolitan France
Bretagne	15.17	10.9	18.2	3.4	2.4	Metropolitan France
Nouvelle-Aquitaine	14.65	13.5	19.3	10.2	2.7	Metropolitan France
Occitanie	16.28	16.8	20.4	12.6	2.9	Metropolitan France
Auvergne-Rhône-Alpes	17.09	12.5	19.5	9.2	2.8	Metropolitan France
Provence-Alpes-Côte d'Azur	17.23	17.0	21.4	7.4	3.2	Metropolitan France
Corse	13.04	18.7	21.5	20.2	3.6	Metropolitan France

17 rows

Bourgogne-Franche-Comté	-12.51	intermediary positions	Metropolitan France
Normandie	-13.84	intermediary positions	Metropolitan France
Hauts-de-France	-12.48	intermediary positions	Metropolitan France
Grand Est	-13.59	intermediary positions	Metropolitan France
Pays de la Loire	-11.31	intermediary positions	Metropolitan France

1-28 of 68 rows

In summary, this project is an exploration of

Simple questions about my data sets

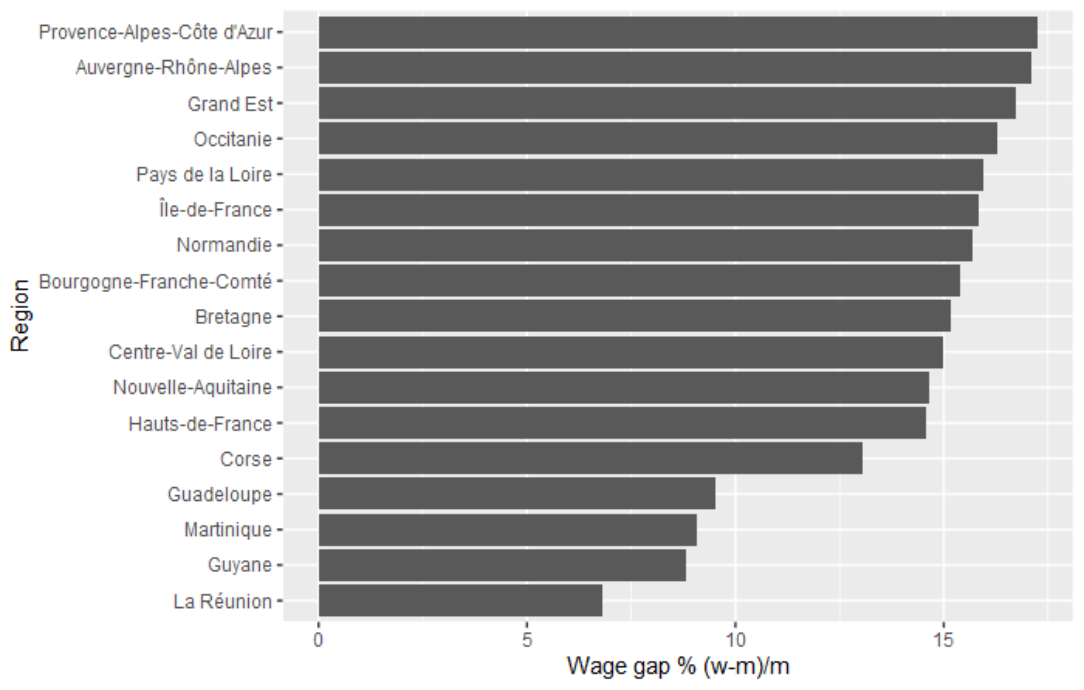
Wage gap by age group and region

Wage gap by socioprofessional group and region

Ordination of observations of inequality-marker variables between women and men

Data exploration:

In what regions of France was the wage gap between women and men the highest in 2017?



Which regions had the highest rates and intensities of poverty combined in 2017?

region <chr>	monetary_poverty <dbl>	poverty_intensity <dbl>
Guyane	52.9	40.4
La Réunion	38.3	23.3
Guadeloupe	34.5	24.8
Martinique	28.6	23.5
Corse	18.7	21.5
Hauts-de-France	17.9	18.8
Provence-Alpes-Côte d'Azur	17.0	21.4
Occitanie	16.8	20.4
Île-de-France	15.3	22.4
Grand Est	14.5	19.6
Nouvelle-Aquitaine	13.5	19.3
Normandie	13.4	18.7
Centre-Val de Loire	13.2	19.5
Bourgogne-Franche-Comté	12.8	18.4
Auvergne-Rhône-Alpes	12.5	19.5
Bretagne	10.9	18.2
Pays de la Loire	10.8	17.9

Two-way ANOVA tests:

Is there a difference in the recorded wage gap between women and men in different age groups in 2017 between metropolitan France and the DOM?

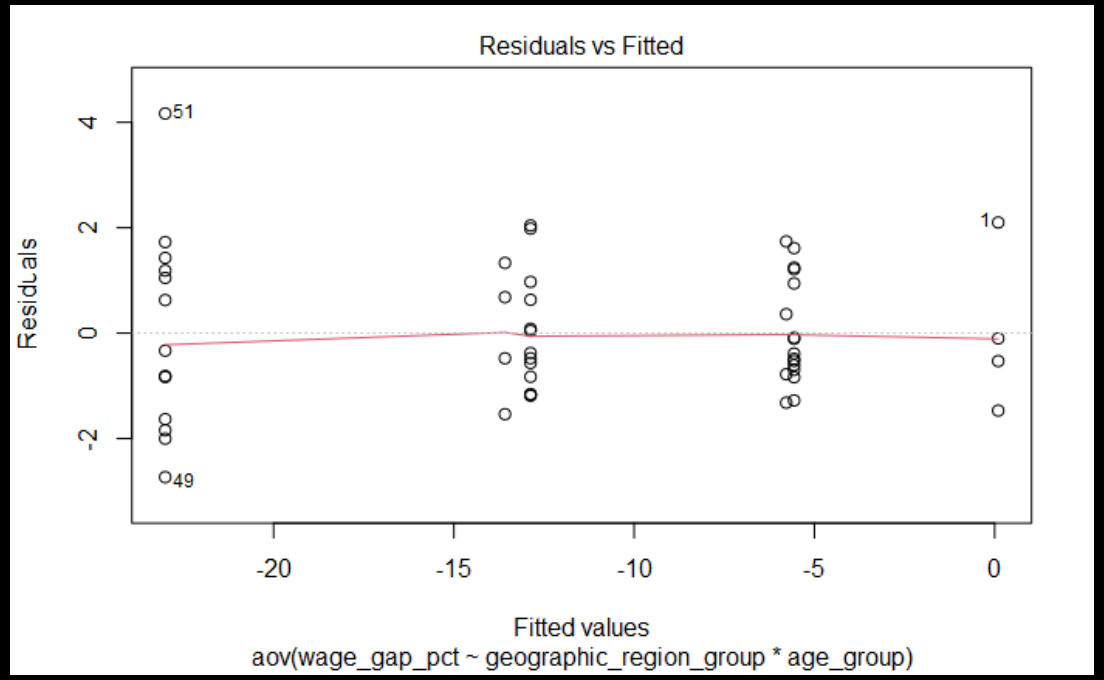
H0_1: there is no main effect of geographic region group

H0_2: there is no main effect of age group

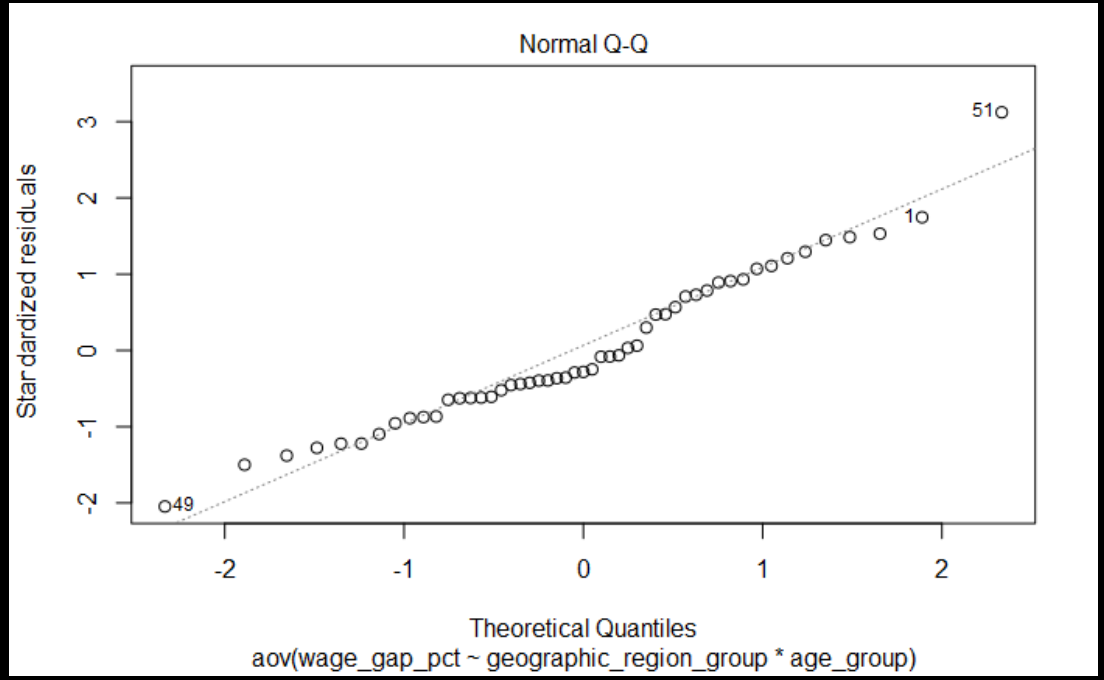
H0_3: there is no interaction between geographic region group and age group

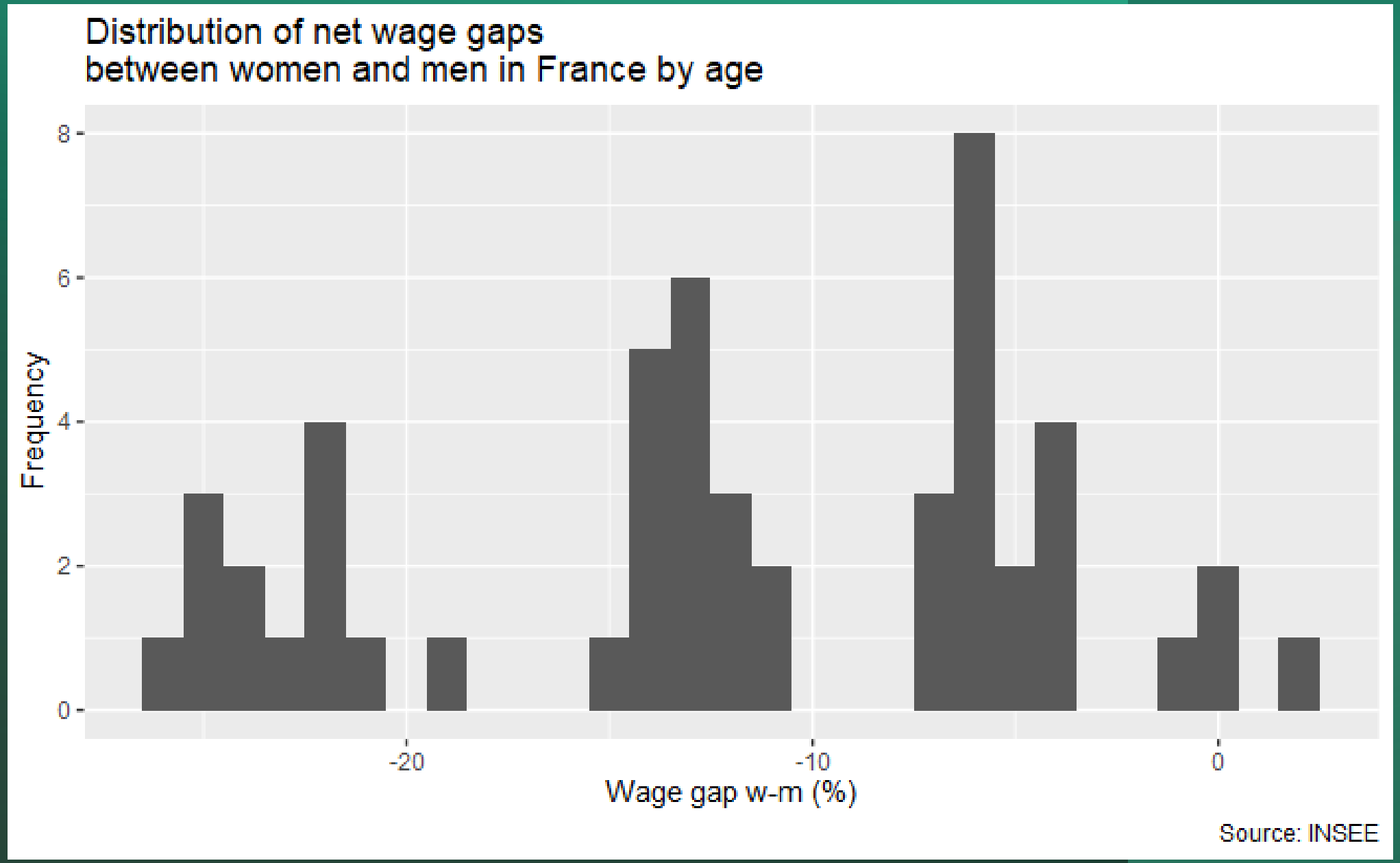
Meeting the assumptions of a two-way ANOVA test

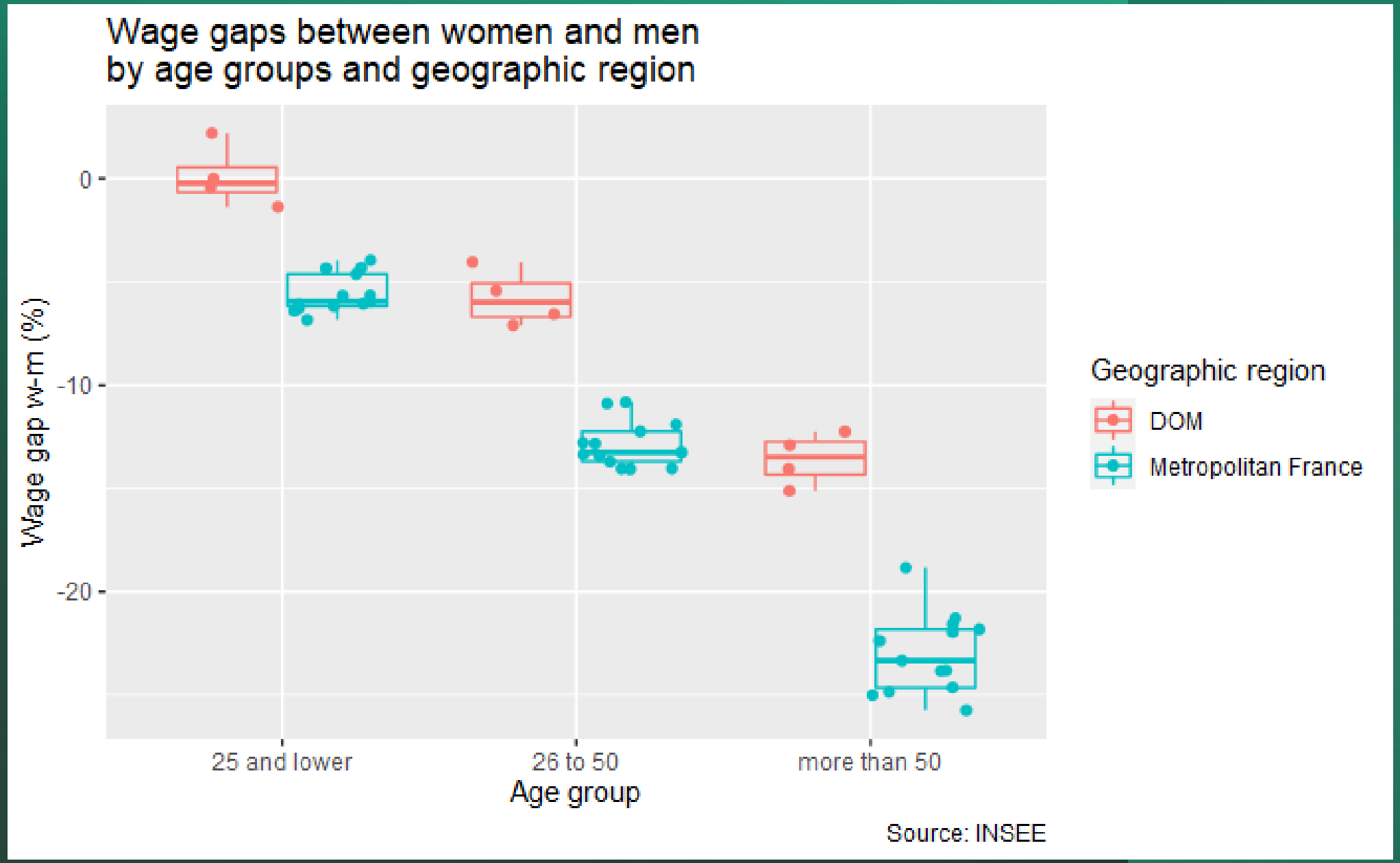
Homogeneity of variance:

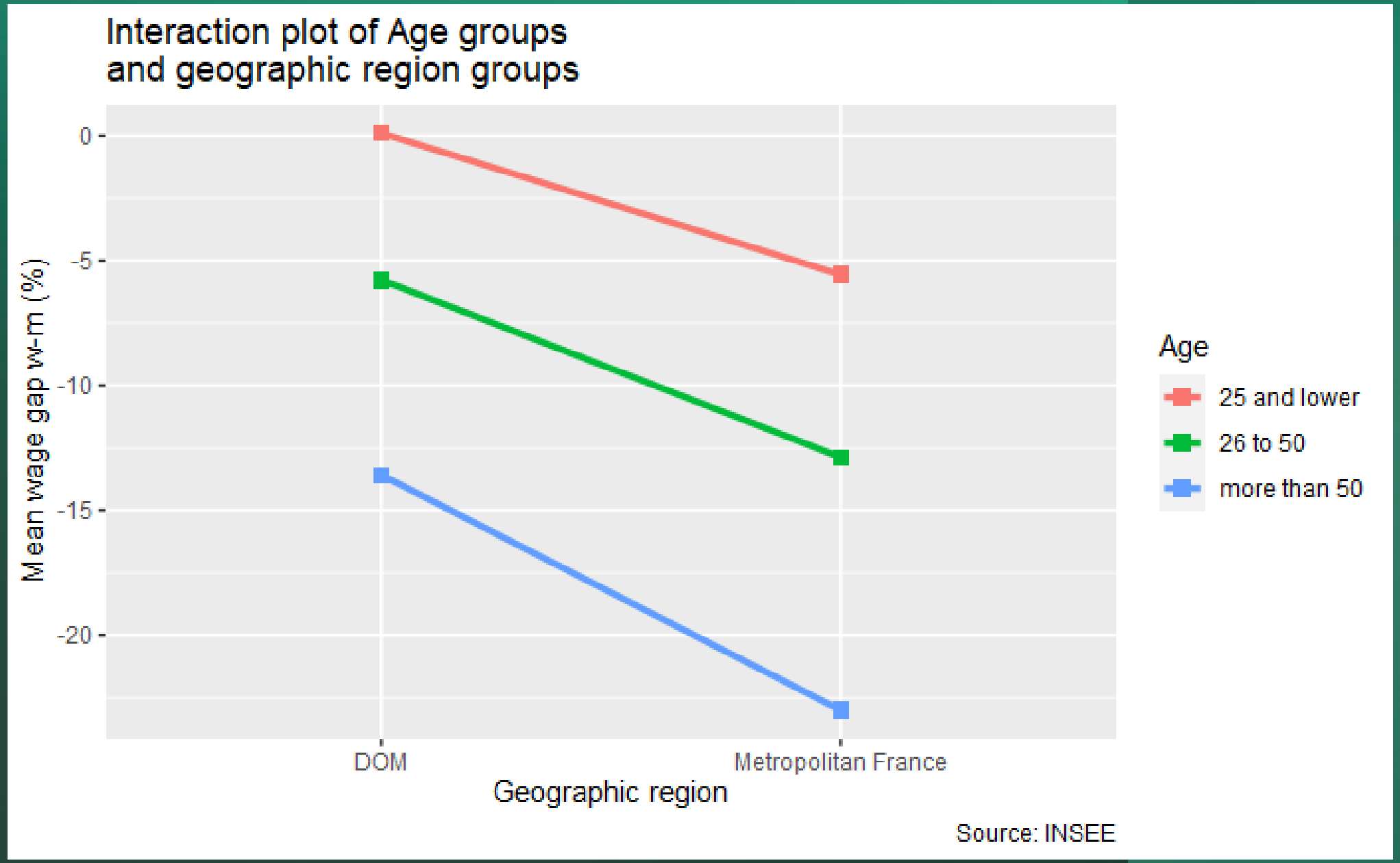


Normality:




Distribution of net wage gaps
between women and men in France by age
Frequency
8
6
4
2
0
-20
-10
0
Wage gap w-m (%)
Source: INSEE


Wage gaps between women and men
by age groups and geographic region
0
-10
-20
Wage gap w-m (%)
25 and lower
26 to 50
more than 50
Age group
Source: INSEE
Geographic region
DOM
Metropolitan France


Interaction plot of Age groups
and geographic region groups
0
-5
-10
-15
-20
Mean wage gap w-m (%)
DOM
Metropolitan France
Geographic region
Age
25 and lower
26 to 50
more than 50
Source: INSEE

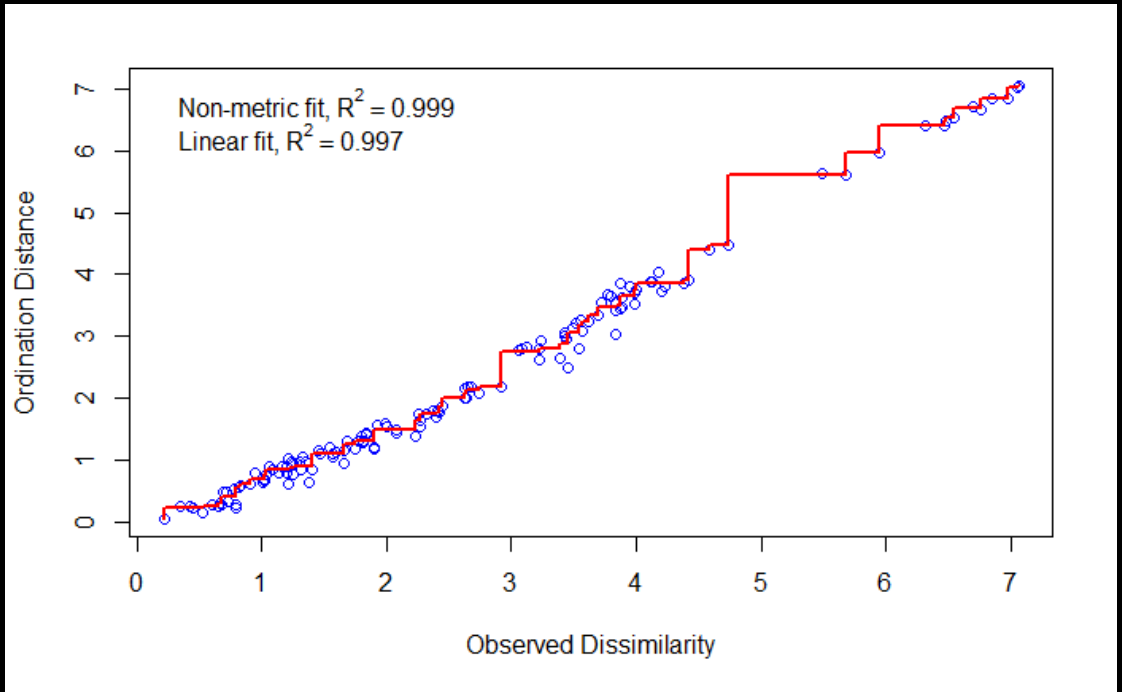
Results:

- A two-way ANOVA (table above) revealed a significant effect of geographic region ($P < 0.01$) and age group ($P < 0.01$) on wage gap % between women and men, but with a significant interaction between geographic region and age group ($P < 0.01$). Observations in age group age>50 in Metropolitan France yielded higher wage gap results than expected when compared to the values found in other age group observations. We can reject H0_3 but require further research in order to support or reject H0_1 and H0_2.

```
                          Df Sum Sq Mean Sq F value  Pr(>F)
geographic.region          1  501.7   501.7 260.023 < 2e-16 ***
age.group                  2 2350.2  1175.1 609.073 < 2e-16 ***
geographic.region:age.group  2   22.1    11.0   5.717 0.00613 **
Residuals                 45   86.8     1.9
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

Ordination of inequality-marker variables between women and men for regional observations in Metropolitan France and the DOM

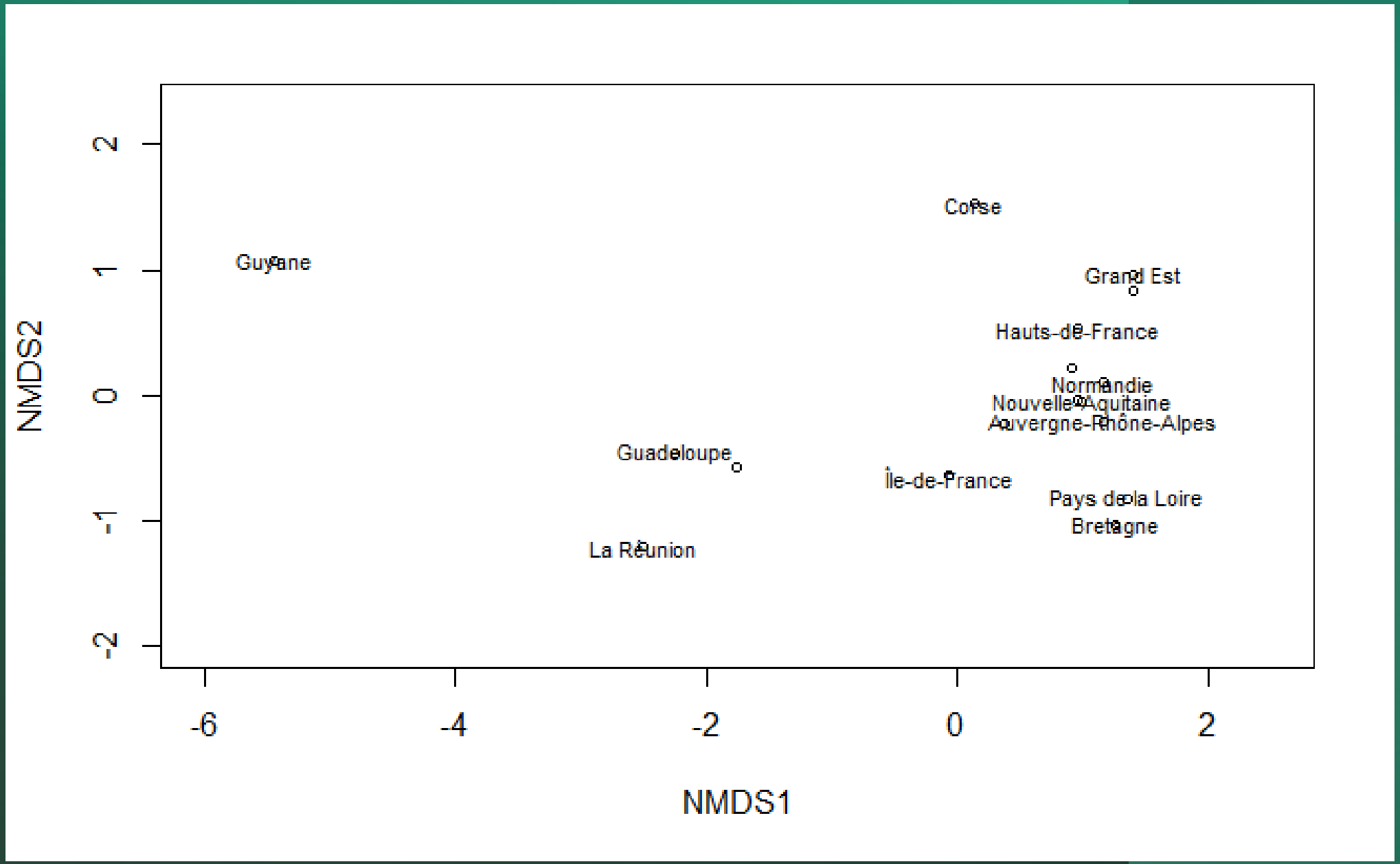
(An NMDS approach)

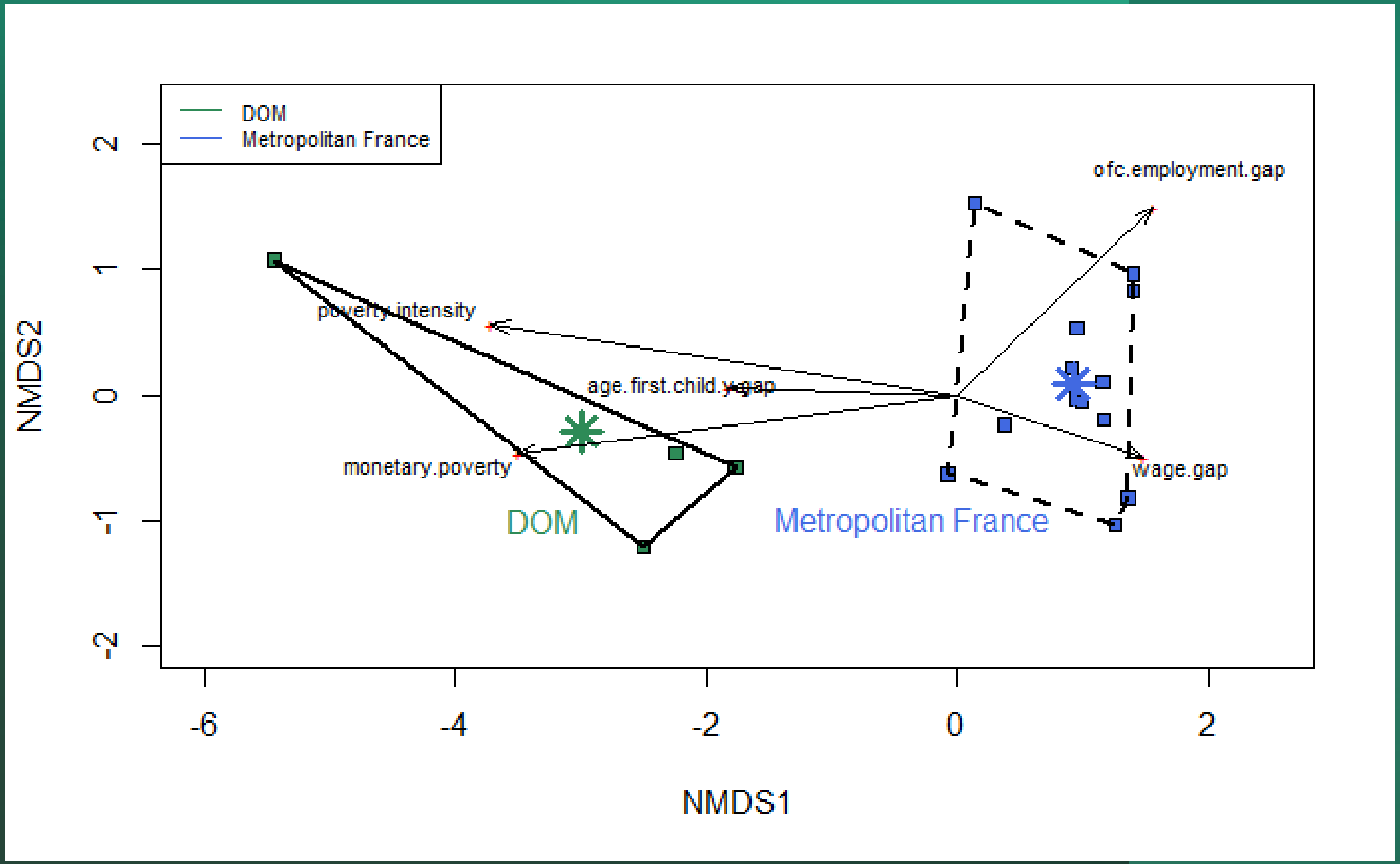



```
Call:
metaMDS(comm = nmdsMatrix, distance = "euclidean", k = 2, trymax = 50)

global Multidimensional Scaling using monoMDS

Data:     nmdsMatrix
Distance: euclidean

Dimensions: 2
Stress:     0.03434292
Stress type 1, weak ties
Two convergent solutions found after 20 tries
Scaling: centring, PC rotation
Species: expanded scores based on ‘nmdsMatrix’
```

	pct_wage_gap <dbl>	monetary_poverty <dbl>	poverty_intensity <dbl>	ofc_employment_gap <dbl>	age_first_child_gap_y <dbl>
Guadeloupe	0.8276808	2.027312717	1.31257455	0.0000000	2.4140394
Martinique	0.6932972	1.522623053	1.06527789	0.3285692	2.2283441
Guyane	0.6108346	3.601260143	4.28013439	0.5376588	3.8996021
La Réunion	0.0000000	2.352367077	1.02723225	0.0896098	1.6712580
Île-de-France	2.7609723	0.384932794	0.85602688	0.5973986	2.0426487
Centre-Val de Loire	2.4922050	0.205297490	0.30436511	1.5831064	0.7427814
Bourgogne-Franche-Comté	2.6204803	0.171081242	0.09511410	2.8675134	0.7427814
Normandie	2.7090513	0.222405615	0.15218256	1.8519358	0.5570860
Hauts-de-France	2.3730923	0.607338409	0.17120538	2.2701148	0.7427814
Grand Est	3.0327936	0.316500298	0.32338793	2.9272533	0.9284767
Pays de la Loire	2.7945682	0.000000000	0.00000000	0.6870084	0.1856953
Bretagne	2.5532885	0.008554062	0.05706846	0.5376588	0.0000000
Nouvelle-Aquitaine	2.3944715	0.230959677	0.26631947	1.5532364	0.5570860
Occitanie	2.8923017	0.513243726	0.47557049	1.9116756	0.9284767
Auvergne-Rhône-Alpes	3.1396897	0.145419056	0.30436511	1.4038868	0.7427814
Provence-Alpes-Côte d'Azur	3.1824481	0.530351850	0.66579868	1.1350574	1.4855627
Corse	1.9027497	0.675770906	0.68482150	3.0467330	2.2283441

17 rows


NMDS2
2
1
0
-1
-2
-6
-4
-2
0
2
NMDS1
Corse
Guyane
Grand Est
Hauts-de-France
Normandie
Nouvelle-Aquitaine
Auvergne-Rhône-Alpes
Guadeloupe
Île-de-France
Pays de la Loire
Bretagne
La Réunion


DOM
Metropolitan France
ofc.employment.gap
poverty.intensity
age.first.child.y.gap
monetary.poverty
wage.gap
DOM
Metropolitan France
NMDS2
NMDS1
2
1
0
-1
-2
-6
-4
-2
0
2

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- Plot and GGPlot in R | Applied Math Bytes says. “Plot Ranges of Data in R.” Burns Statistics, February 21, 2013. https://www.burns-stat.com/plot-ranges-of-data-in-r/.
- R packages used: tidyverse, broom, PerformanceAnalytics, Hmisc, ggpubr, vegan, robustHD