Absences from work and climate change: an empirical analysis

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Climate change: an serious problem.

The literature on climate and work is different for the less and the more developed counties.

- In less developed countries, literature focuses on the decrease in production caused by extreme climatic events.
- In the more developed countries, literature focuses on the worsening of the health conditions of workers caused by climate change.

In Italy, global warming causes a decrease in GDP.

Research questions:

- Which are the Italian regions in which workers are absent more?
- Is there a relationship between absences and climate change?

Data

It was used:

- INPS data on employees, years 2009-2018 (they contain between 19 and 15 million observations per year).
- Meteorological data of ECMWF (they contain daily weather observations of the individual municipalities)

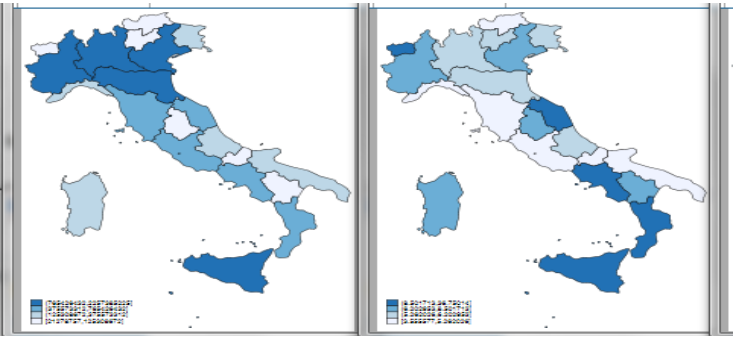
Statistics

On average, males of Italian nationality are absent more.

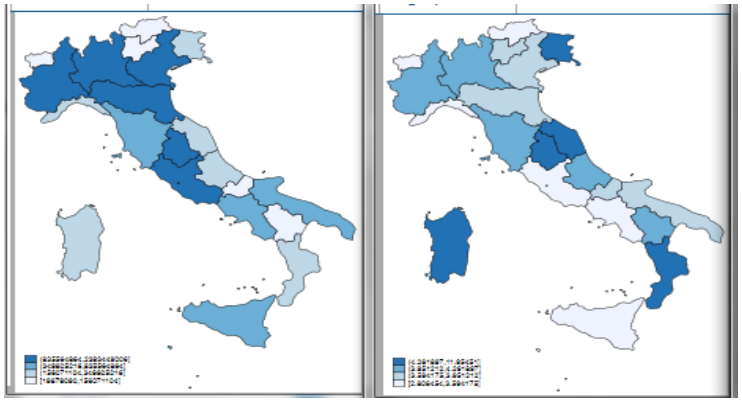
It was take into consideration the variable percentage credit difference, it is a measure of absence that is the percentage of total wage no perceived by the worker due absence from work.

It was used “grmap” command in Stata.

2010



In North of Italy there is a greater number of workers and higher wages.



2012

2018

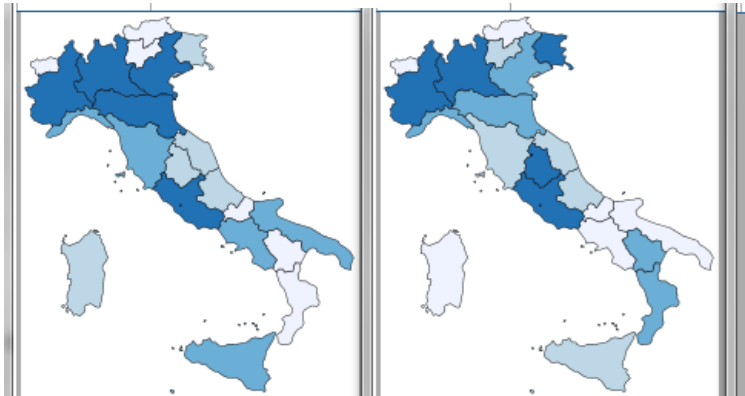
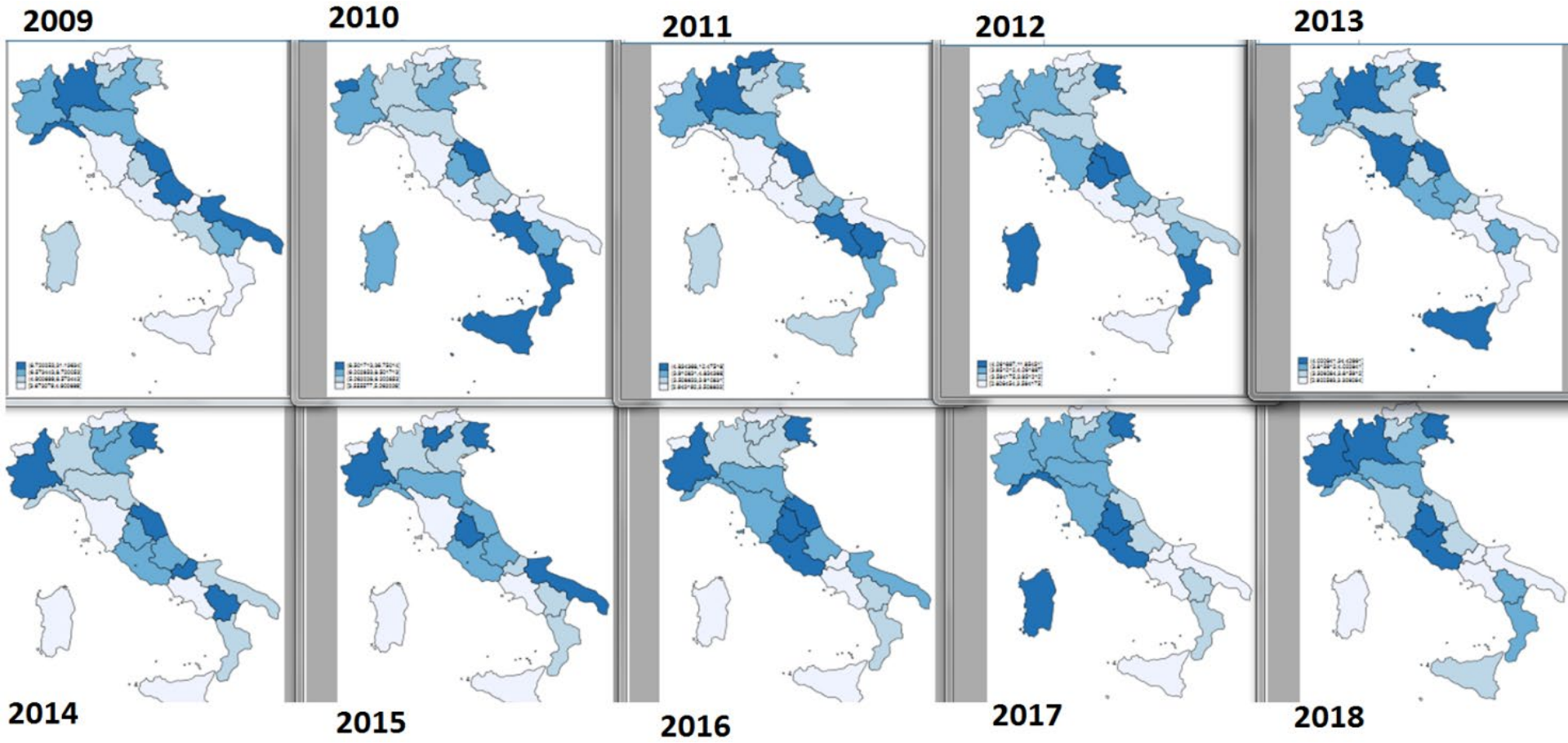


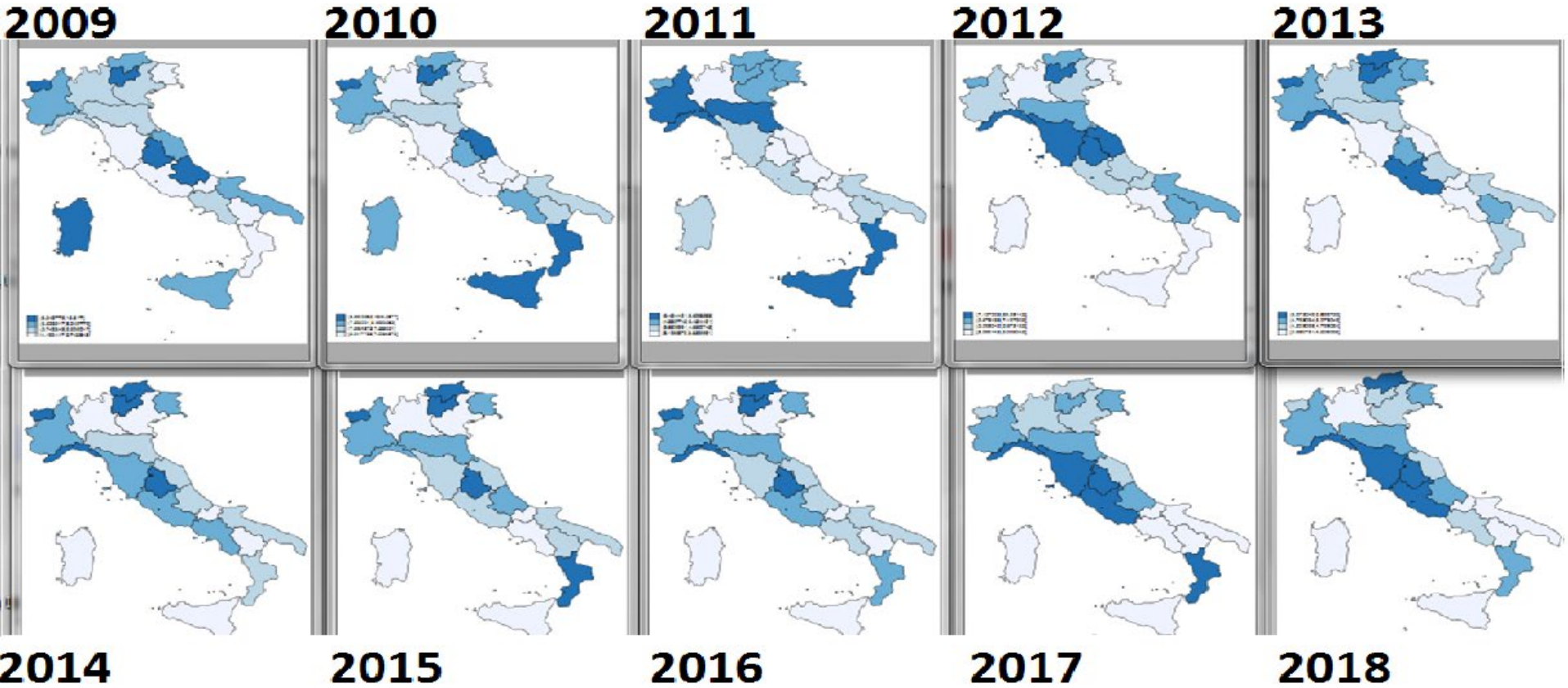
Figure n.1: Credit difference percentage maps, annual datasets from 2009 to 2018.



Source: own processing INPS data, employees and non-agricultural workers, annual data, years 2009-2018.

Workers are absent more in Umbria, Marche, Friuli Venezia-Giulia.

Figure n.4: credit difference percentage maps, sectors affected by climate change, annual datasets from 2009 to 2018.

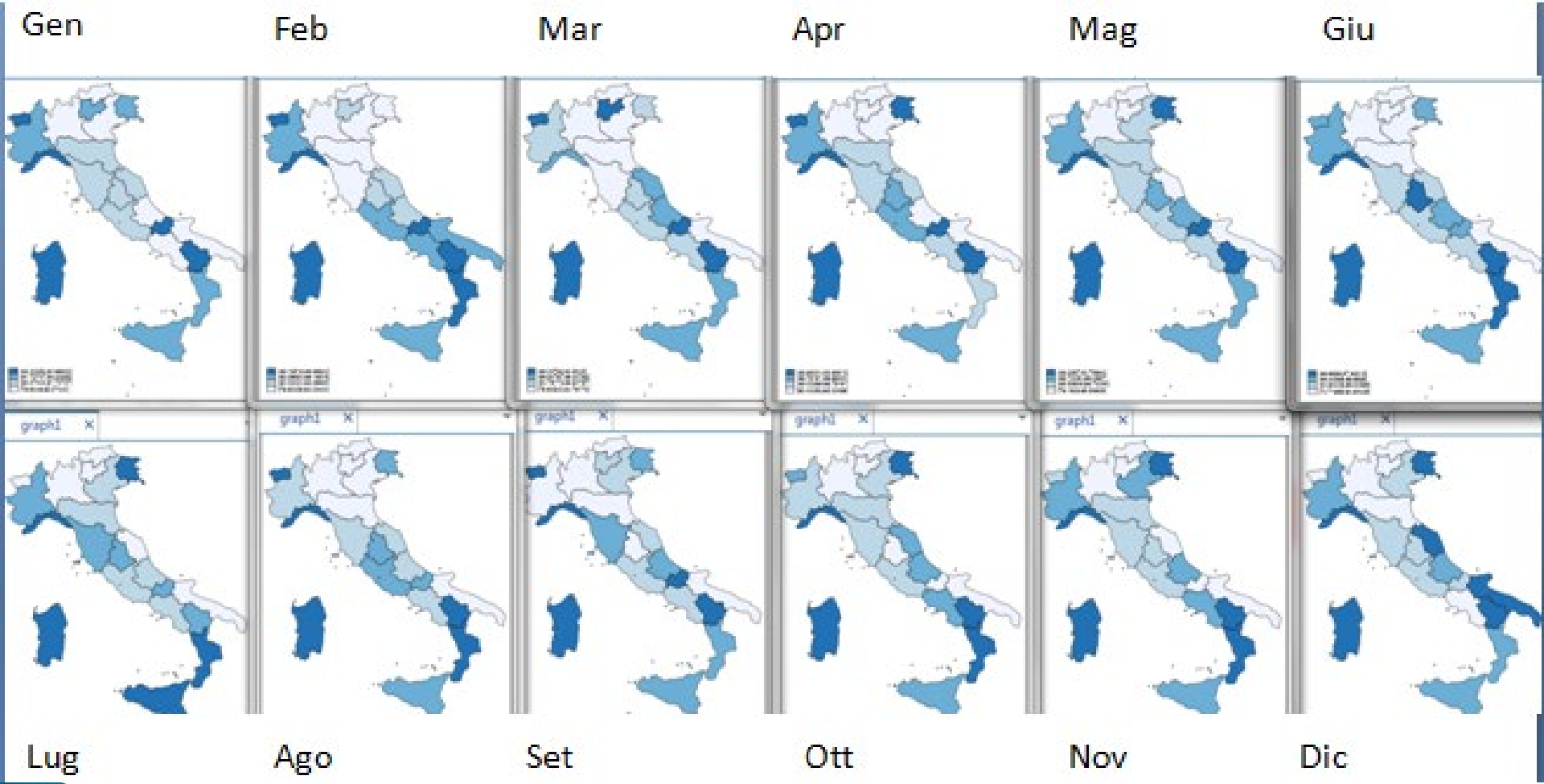


Source: own processing of INPS data, employees and non-agricultural workers, annual data, years 2009-2018.

Considering only the sectors affected by climate change, workers are absent more in Val D'Aosta, Trentino Alto-Adige, Umbria and Liguria.

In 2018 the most extreme temperatures are recorded: 45 and -30 degrees centigrade.

Figure n.3: Percentage maps for the difference in credit for the year 2018, monthly.



Source: own processing of INPS data, employees and non-agricultural workers, monthly, year 2018.

Extreme meteorological events, links with workers absences (2018):

- Maximum peak of 45 ° C, in August in Sicily.
- Minimum peak -30 ° C, in October, caused by Vaia storm that hit the regions: Veneto, Trentino Alto Adige, Lombardy and Friuli Venezia Giulia.
- In Liguria the months of January and February were extremely rainy.
- In Sardinia and Molise during the year it rained a lot.

Looking at the maps, it can be seen that workers are absent a lot in the regions and in the months where extreme weather events were recorded (Sicily in August, Friuli Venezia Giulia in October, Liguria in January and February, Sardinia and Molise).

Econometric models

$$Y = \alpha + \beta TM + \gamma Tm + \delta\, Ta + \eta P + \theta W + \epsilon \quad (1)$$

$$\text{Log}\,(Y) = \alpha + \text{Log}\,(\beta TM) + \text{Log}\,(\gamma Tm) + \text{Log}\,(\delta\, Ta) + \log\,(\eta\, P) + \epsilon \quad (2)$$

Y = percentage of wages not received due to absences from work;
α = fixed effects;
TM = average maximum temperatures;
Tm = average minimum temperatures;
Ta = average temperatures;
P = total rainfall;
W = wind speed;
ϵ = standard error.

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. xtreg logpercent_differenza_accredito logtemperature_max logtemperature_min logtemperature_avg logprecipitation , fe

Fixed-effects (within) regression               Number of obs      =       200
Group variable: FID2                            Number of groups   =        20

R-squared:                                      Obs per group:
     Within  = 0.3174                                         min =        10
     Between = 0.0598                                         avg =      10.0
     Overall = 0.0018                                         max =        10

                                                F(4,176)           =     20.46
corr(u_i, Xb) = -0.9829                         Prob > F           =    0.0000
```

logpercent_diffe~o	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
logtemperature_max	21.36145	4.427004	4.83	0.000	12.62461	30.0983
logtemperature_min	4.706927	1.012372	4.65	0.000	2.708976	6.704878
logtemperature_avg	-30.70238	5.121169	-6.00	0.000	-40.80918	-20.59558
logprecipitation	.8091619	.2065523	3.92	0.000	.4015237	1.2168
_cons	-.5048414	5.387001	-0.09	0.925	-11.13627	10.12659
sigma_u	1.9134091					
sigma_e	.50015118					
rho	.93604374	(fraction of variance due to u_i)				

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F test that all u_i=0: F(19, 176) = 4.62                     Prob > F = 0.0000
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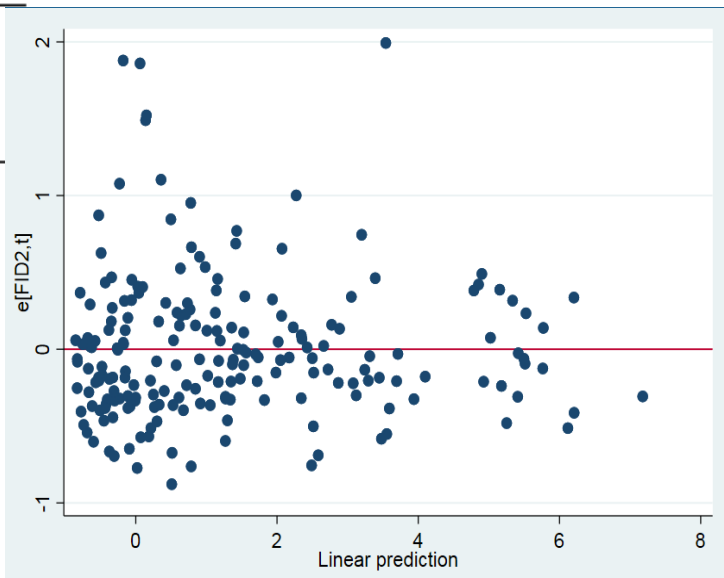
The model (2) is significant.

Map of residuals, they are no correlate.



Conclusions

- The level of temperatures and rainfall influence the absences of workers.
- In the central-north regions, workers are absent more.
- In the years 2010, 2012 and 2018 the climate was very variable.
- In the north regions, there are higher wages and a greater concentration of firms.
- The elasticity of absences with respect to temperatures and rainfall is <1.
- This research has limitations as the absence climate connection has to be demonstrated with more complex models.

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