FGV IIU Flash Notes

The 19th Week Effect: Prospects for Flexibilization in Six European Countries

FGV IIU International Intelligence Unit

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1. Statistics to support flexibilization policies.

A stylised fact in European health statistics is that, from the 19th week of the year onwards, with spring already in full, the incidence of many seasonal respiratory diseases, like all kinds of flu, begins to significantly decrease. The better climate works as a powerful aid in lowering the strength and spread of such diseases.

This year, the 19th week has just ended on May 5, and it is perhaps no wonder that, around this very date, many Western European countries are starting more flexible policies towards their respective Covid-19 lockdowns. Of course, the domestic statistics on the pandemic, in each of these countries, had been signalling, since mid-April, approximately, that the curve of the infection, notwithstanding its several data problems, had entered its decreasing side.

Beyond all precautionary cares, flexibilization must be closely monitored, in order to immediately trigger the return to stricter policies, successfully avoiding a re-emergence of the epidemic, as unfortunately happened during the Spanish flu crisis, in the beginning of the last century. Continued use of evaluation statistics, in a daily and weekly basis, is mandatory, besides other measures and cautions, in order to avert an undesirable collapse or reversal in the process. Together with a wise, as-pervasive-as-possible testing policy, preferably through random sampling methods combined with universal testing of specific target groups, they are indeed essential in this second phase of the epidemics.

In this Note we examine the situation in six EU countries -Belgium, France, Germany, Italy, Portugal and Spain- just before the beginning of the 19th week, and further validate two proposals -put forward in Flôres (2020)[1]- for monitoring statistics to be used during the flexibilization period. They refer to the ratios of new daily cases, discussed in section 2, and to simple regressions using recent data on daily deaths, discussed in section 3. All data come from the *worldometers.info* public site.

As summed up in section 4, the results are reasonably auspicious and should be updated in a weekly basis. In the absence of an unexpected problem, the "19th Week Effect" seems capable of helping to bring steady good news to the six countries.

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[1] *Corona Data Analyses: Looking for Signs of Recovery in Italy and Spain*, FGV IIU Discussion Papers DP 02/20, R. G. Flôres Jr., with the assistance of L. Garnitskiy, 2020; Rio de Janeiro: FGV International Intelligence Unit.

2. Evidences from ratios of new daily cases.

As widely known today, the number of infected people, in all its modalities, is prone to error, especially under-estimation, as it only counts people who have been tested[2]. Despite this, these data, in a daily basis, can provide signals on the evolution of the fight against the epidemic.

As discussed elsewhere[3], the ratio of these numbers, at a *basic evolution period of the epidemic*, may be assumed to be a function of two parameters deeply related to the dynamics of the process within the given community: the average number of people infected by a person with the virus at the start of the period, and a synthetic measure of the proportion of infected people who, for a variety of reasons, may be considered outside the contagion group, at the end of the period.

A key problem for computing such ratios is what precisely is "a basic evolution period of the epidemic"? Given knowledge gathered up to now, and after experimenting with different possibilities, this time length has been chosen as 14 days. During this period, *in the average*, infected people at the beginning can either be cured, or hospitalised, or die, new contagions reveal themselves, and precautionary measures have a minimum time for being effective.

The ratios should (and must) change along the evolution of the epidemic, hopefully lowering; signalling how positive, or not, is being the policy package that has been implemented. They must reach values lower than 1 and then, ideally, steadily decrease; unfortunately, they will be affected by noise from various sources[4].

In order to achieve some stability in the process, in a given country, and to diminish somewhat the unavoidable underreporting inherent in any new cases data, six EU countries, where the disease is quite advanced and has -according to a reasonable consensus- passed its peak moment, have been chosen: Belgium, France, Germany, Italy, Portugal and Spain. Notwithstanding, an additional warning on data applies: being

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[2] See, for instance, *Corona-numbers and Policies: some Reflections*, FGV IIU Flash Notes, March 25; Rio de Janeiro: FGV International Intelligence Unit.
[3] See footnote 1.
[4] It is neither the case nor the object of this Note to dwell on these sources here, some has been said on them in the two works previously cited.

exactly countries where flexibilization started to be considered by mid-April, a more encompassing testing policy has then been applied, in order to better check its feasibility. This reduces underreporting though, ironically, inserting 'newcomers' uncovered by the new identification dynamics, different from the one prevailing beforehand[5].

Exhibit 1 shows the ratios for the six countries, for the period from March 20 to April 26. The six *series of daily (two-weeks) ratios*, with a last observation on April 12 (two weeks more, one arrives at April 26, the last observation), have different volatilities and average levels. The graphs display the daily variation of the ratios together with that of a five-days moving median, a convenient way to filter the noise in the original series.

The six graphs can be grouped into three categories, analysed below. The analyses usually refer to the smoothed, moving medians series; when a needed reference to the original ratios may cause confusion, the qualification 'crude ratios' is used.

The first includes France and Germany (Exhibits 1.a) and 1.b)), countries in which the policy package seems to be working quite well. The ratios are reasonably below 1, and slightly decreasing in the case of France.

It is important to notice how, once reaching a "stable low level", decrease is much slower, signalling that, for the corresponding extent of time, the policies, though well sustained, do not achieve to significantly change the two parameters responsible for the value of the ratios. Further improvements, if no extra measures or protocols are introduced, thus take their own epidemiological speed. Germany is an emblematic case, with the ratios, since the end of March, oscillating between 0.41 and 0.48.

A rough idea of when things may be closer to normality may be obtained by counting the periods needed to reduce a given number of cases to 1/10, supposing the last observed ratio is kept constant. This gives about 3 periods for Germany (0.48) and a bit more than 2 for France (0.39)[6]. Starting in April 10, and remembering that periods have 14 days, by the end of May both countries may be close to normal conditions.

The second (1.c) and 1.d)) may be considered a transition group, comprising Belgium and Italy. Both display last ratios steadily lower than 1, but higher than those of

[5] This is of course positive, adjusting the data to values closer to reality. It however (unavoidably) introduces peaks in the series of ratios, as will be seen in the text.
[6] This calculation assumes a simplified model described in the text in footnote 1, and amounts to a division of two logarithms (in the case of Germany, for instance, ln 0.10/ln 0.48).

the previous group: around 0.76. The peaks at the end of the period (since around April 5), where in Belgium the ratios surpassed 1 and in Italy nearly so, seem to be due to more widespread testing, as signalled at the beginning of this section (see also footnote 5). Again, flat intervals are evident showing, from one side, the stability of the situation, but on the other how slow is the improvement.

While in Italy, nearly during the whole time, the ratios have been within variations of the second decimal in 0.70, in Belgium, for a long period (March 28 to April 5) they have remained dangerously close to 1.

The ratio 0.76 has been used, in both cases, to determine "the time length till normality", which will then be during the second half of August.

The third group (1.e) and 1.f)) is a bit more problematic and comprises the Iberian Peninsula. The two countries present however different realities, with Portugal having coped reasonably well with the epidemic and enjoying, today, a comfortable situation as regards the number of available beds in intensive care units. Its ratios have roughly been stable around 0.78 -still a high ratio- since March 28.

Spain has been severely hit by the virus, shows an oscillating behaviour hard to fully explain, and a sequence of last observations where a significant surge takes place, surpassing 1 (crude ratios) on April 10. This last peak is likely explained by a more intensive testing policy, what may also account for the "cyclical pattern" starting on March 31, and moving upwards the ratios, from a platform with values in the range 0.54 – 0.64, to a higher one, now at 0.84.

Roughly, despite the confounding introduced by testing effect, the epidemic does seem to be in the beginning of its decrease. Be it from 0.84 or even 0.79, the expected period of normality is still far, lying after summer.

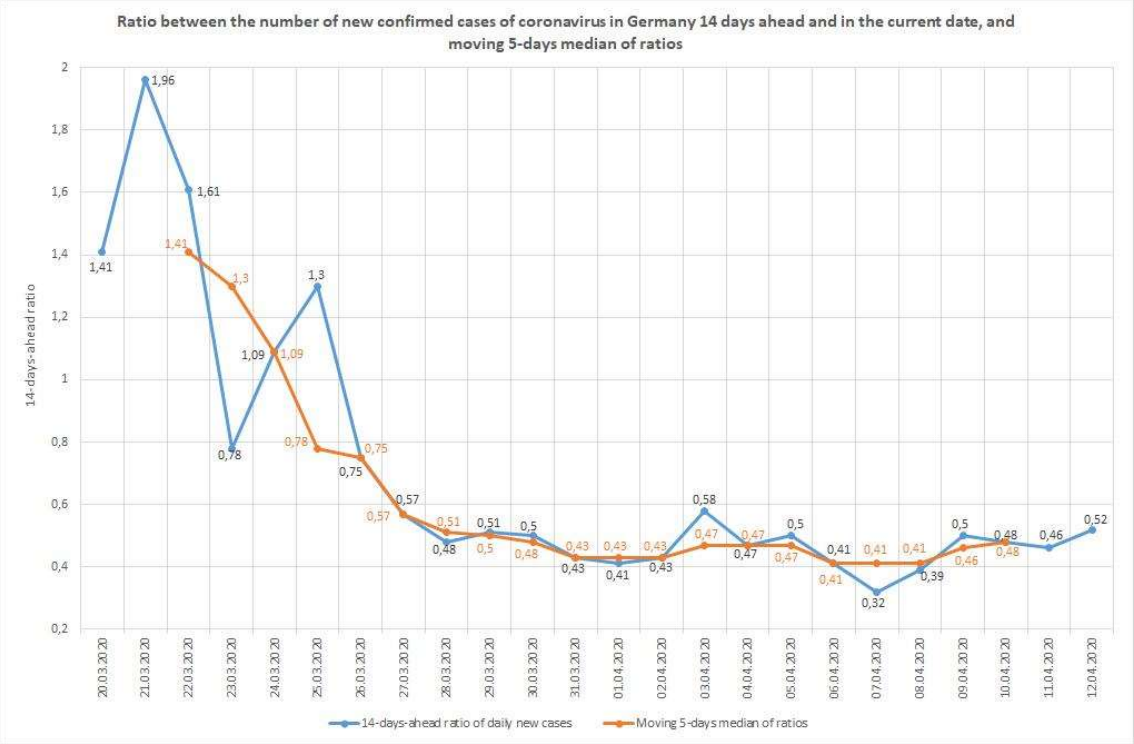
It is worth reminding that this is a partial analysis based on one single indicator. Nevertheless, if for France and Germany flexibilization poses less concern, it must be closely watched in Portugal and Spain. The smaller Portuguese population, producing much lower absolute figures than those for Italy and Spain, for instance, may sometimes -even if one duly takes into account relative performances- give the illusion that things are better than they are.

Notwithstanding, even for the two "worse cases", this is no excuse for aborting flexibilization. On the contrary, together with the (hopefully) auspicious '19th Week

Effect', it will help the unavoidable spread of the virus -now under reasonable control, less fear and improved *infection awareness*[7]- in order to achieve percentages as close as possible to herd immunity; something that in the case of an aggressive specimen like Covid-19 is assumed to be when 80 per cent of the population have got the virus. Though a target impossible to be achieved till autumn, a high percentage of infected individuals is important to minimise a pretty sure "autumn revival"[8], besides other peaks, without having to revert to lockdowns or stricter measures.

Exhibit 1: Ratio between the number of new confirmed cases of coronavirus 14 days ahead and in the shown date, starting on March 20, 2020 (actual values and five-days moving medians).

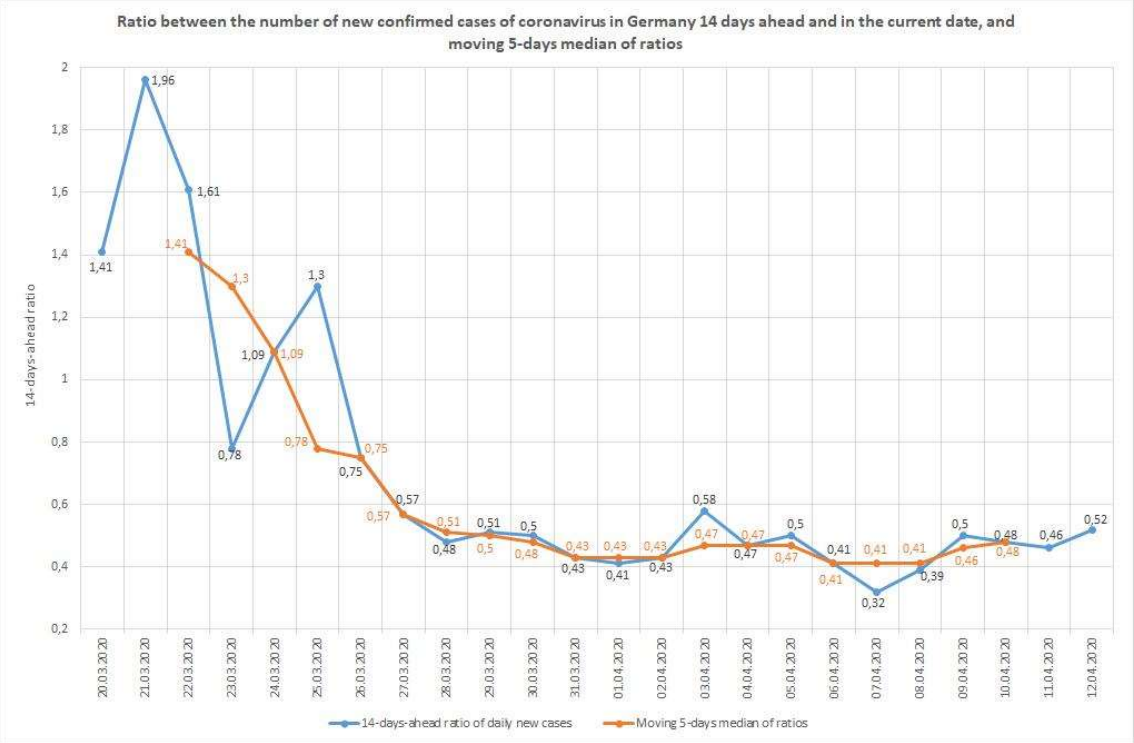
1.a) France



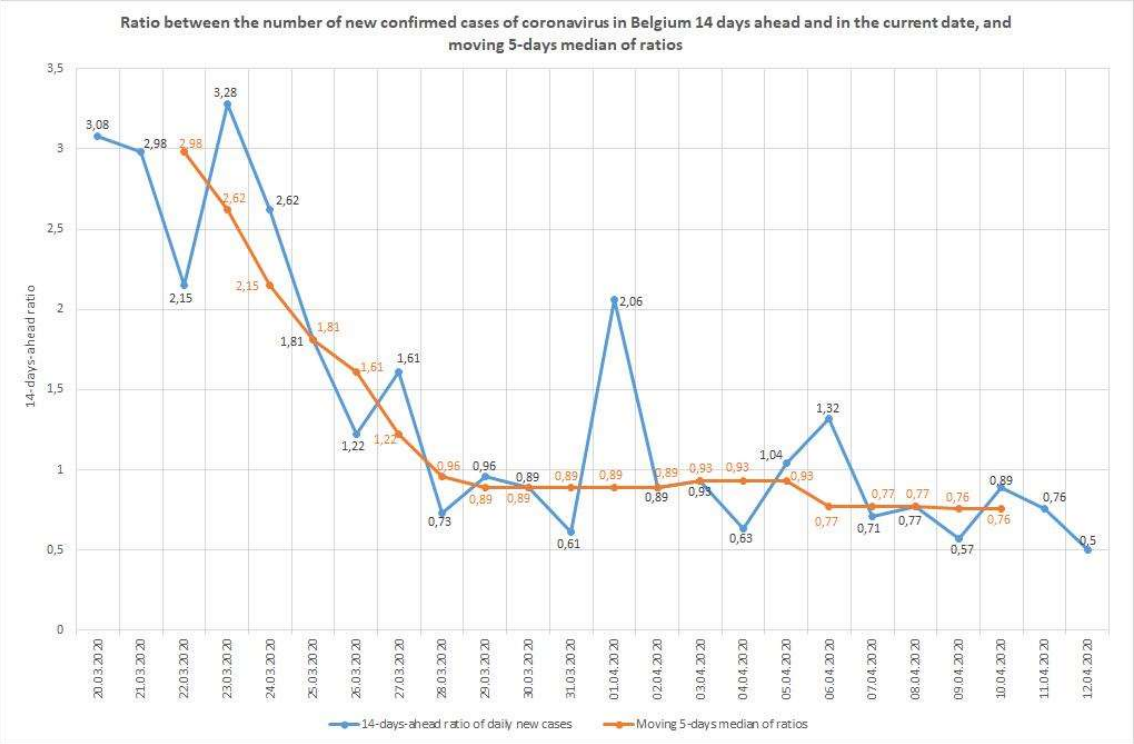
[7] An important concept, encompassing daily personal and public practices to be incorporated during flexibilization -and maybe even beyond-, like select use of masks, keeping social distance, avoiding agglomerations and holding events with no more than 50-100 people.

[8] Moreover, it is not known yet for how long a cured or asymptomatic (infected) individual remains immune to a second round of the disease.

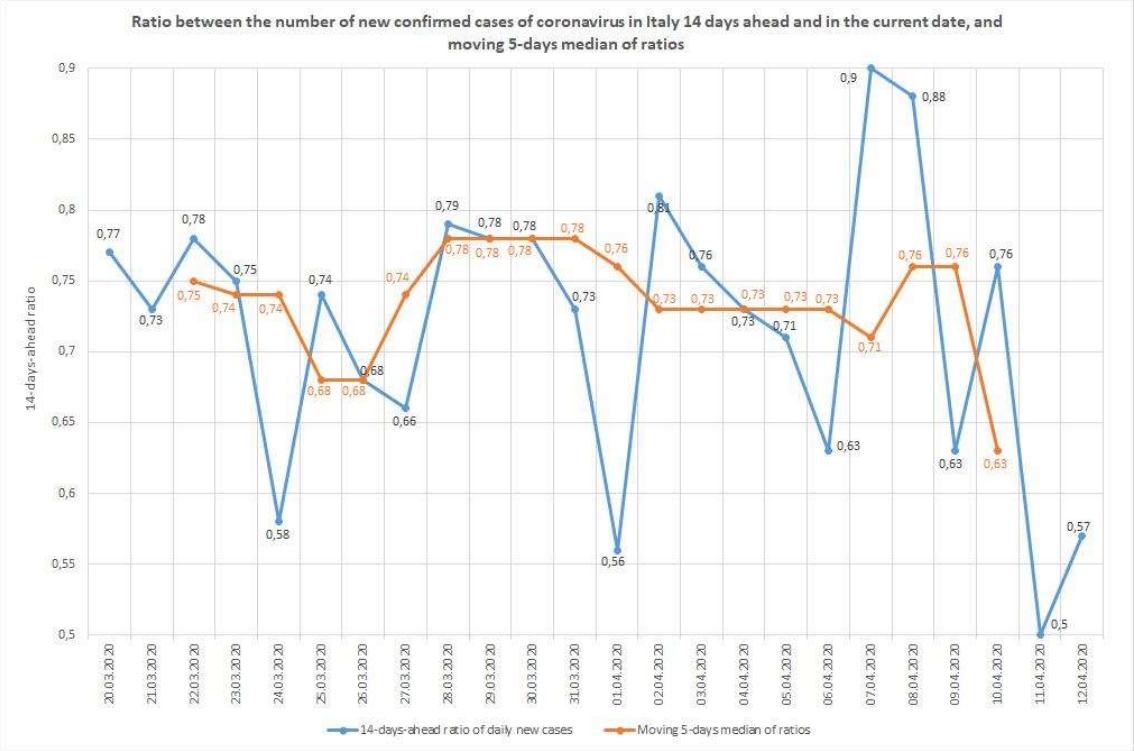
1.b) Germany



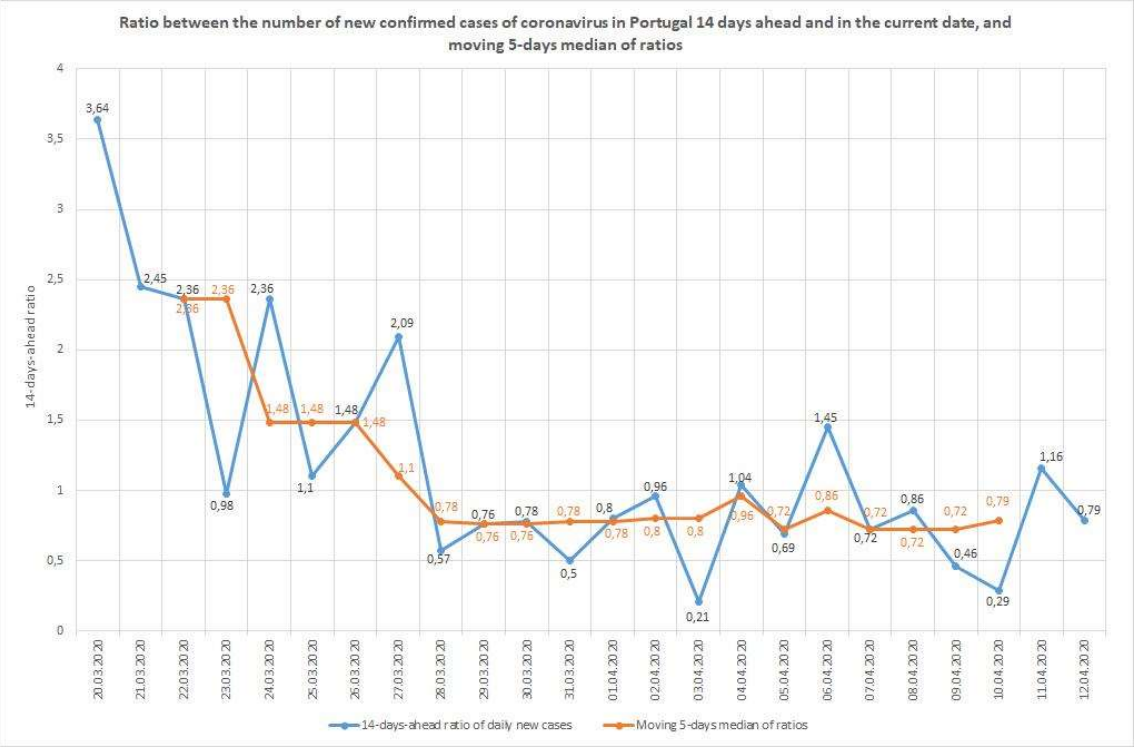
1.c) Belgium



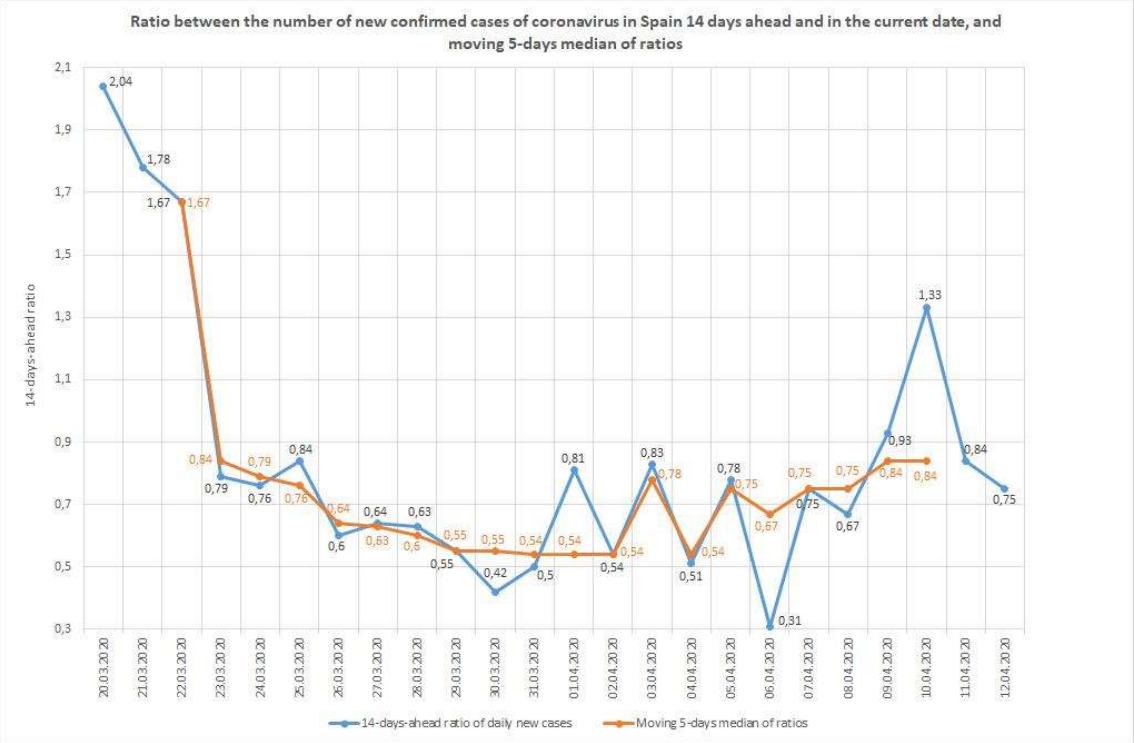
1.d) Italy



1.e) Portugal



1.f) Spain



3. Data on daily deaths.

Data on deaths, though also not without measurement problems[9], are less unreliable than those related to new cases. Only when they clearly start to fall, pointing that the cumulated deaths curve has changed concavity, one can gain assurance that the enforced measures are being effective.

The second tool -partial and approximate like the first one- is to try to perceive a trend in the decrease of daily deaths -again, inevitably full of noise. The question of the number of observations to be used applies. Based on empirical tests with Italian and Spanish data, the 21 more recent observations are used.

Another question relates to which curve to fit. A straight line is the first and more natural candidate, however, as will be seen below, this not always proves to be a good

[9] Two big problems are: confounding – the patient was infected and died, but his death was actually due to another cause; under-reporting – many countries were until recently, and quite a few until today, only reporting those deaths that had taken place in a hospital, those occurred at home, for instance, going unregistered.

choice, revealing a peculiar behaviour for the last 21values. Though a purely data analysis exercise, the regressions must fulfil minimal goodness-of-fit criteria. Two simple ones have been chosen: a R^2 of at least 0.45, and coefficients significant at least at 5 per cent.

Exhibit 2 shows the straight-line results for France, Belgium, Italy and Spain. The four regressions, for these countries, fulfilled the above criteria (basic statistics on their results are shown in the Annex).

For each country, the so-called pessimistic line is also shown; obtained by subtracting two standard-errors to the intercept and adding two to the angular coefficient. The point this line cuts the horizontal axis gives an approximate idea of a notional day when zero deaths will be observed[10].

In a rough synthesis, during the 21 days, the number of daily deaths approximately halved for all countries at stake. The daily speed of decrease, given by the angular coefficient, follows the categories defined in the previous section. It is higher in France (more than 34/day), then being quite lower for the other three countries: about 11/day for Belgium and 14/day for Italy and Spain.

The notional zero-deaths date reveals a good consistency with the ratios' analysis for France, being around May 21-22, while "normality"[11] was also expected by this time. It is more optimistic for Belgium and Italy -May 22-23 and June 3-4, respectively- whereas "normality" was expected for the second half of August, and even somewhat more for Spain, when it is forecasted as June 13/14. This effect is common, given the differences between the two approaches, and the "zero-deaths day" should usually be taken as a lower bound for the beginning of better times.

The regressions presented poor fits for Germany and Portugal, which demand more careful consideration.

In the case of Portugal, though the coefficients were significant, the explained variance, in the case of a straight line, remains low. The pessimistic line is nearly parallel to the horizontal axis, around the value of deaths. Fitting an equilateral hyperbola, asymptotic to the vertical axis and to a horizontal at the level of 20 deaths (19.5 precisely)

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[10] For more on this idea see the reference in footnote 1. The adjective 'notional' is very important, because this is a mere extrapolation from the curve, a "zero-deaths day" seeming not feasible yet. Nevertheless, as "the period till 0.10" in section 2, it provides an idea of a date when things will be better.

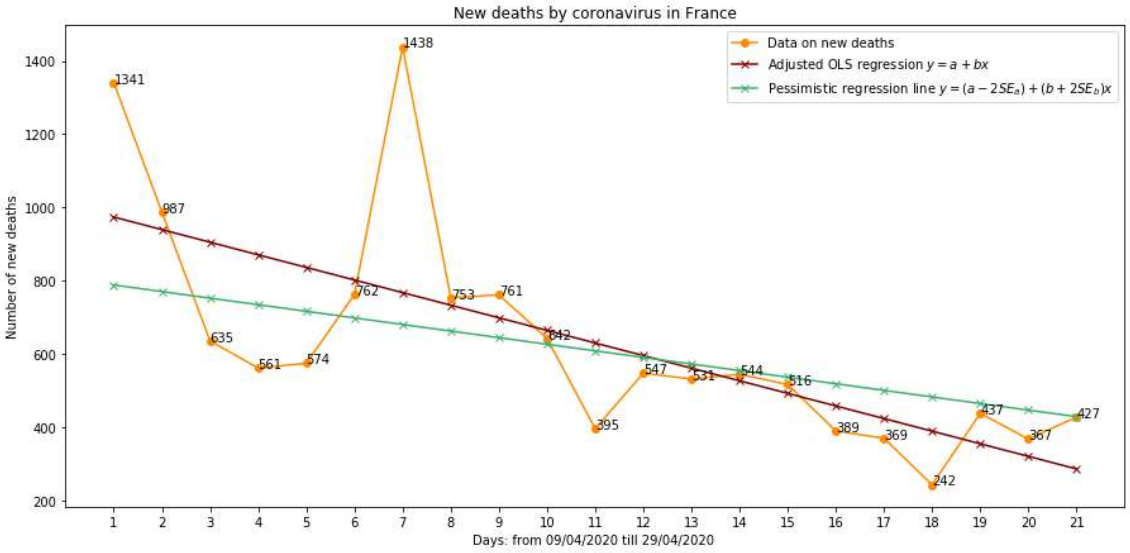
[11] According to the concept in Section 2.

also produces a borderline result. Exhibit 3 shows the straight line, and the corresponding regression outputs are found in the Annex.

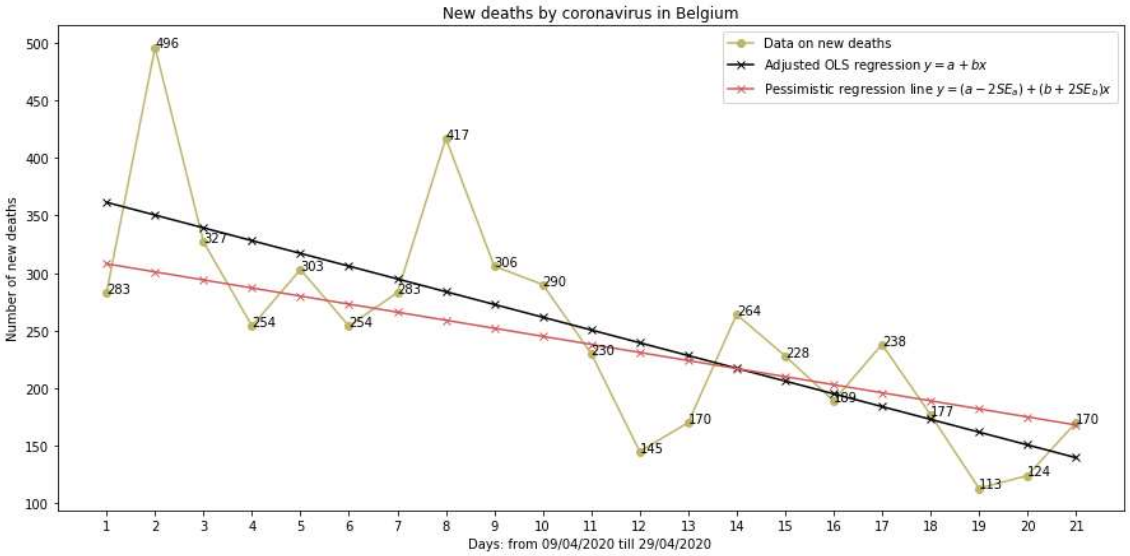
Combination of the two results signals -at the moment- that the number of daily deaths in Portugal may remain around 20-28, for quite some time.

Exhibit 2: The regression lines for France, Belgium, Italy and Spain, using daily deaths data from April 9 to April 29. The pessimistic line is also shown in each graph

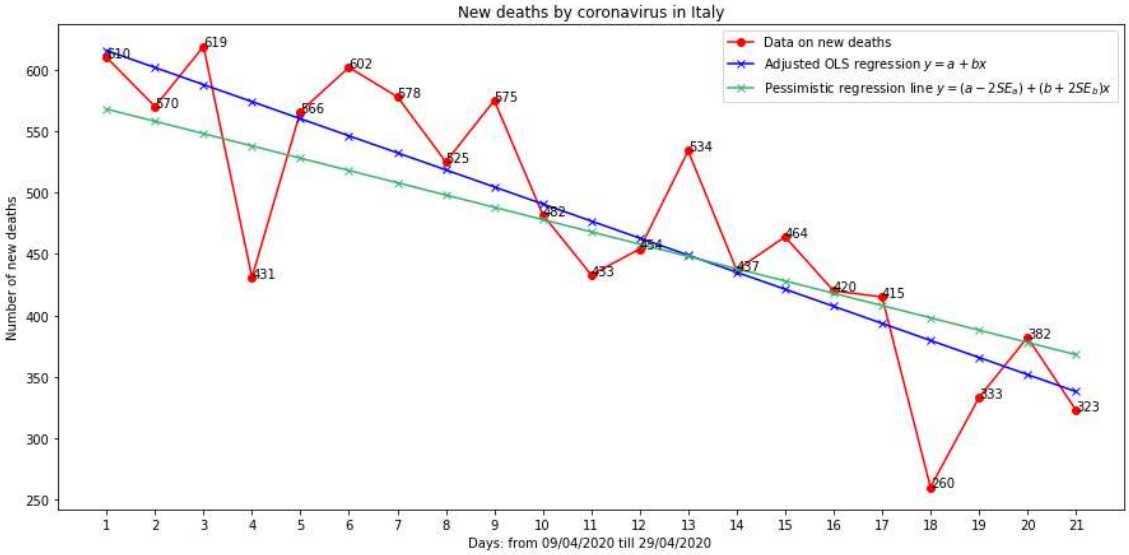
2.a) France



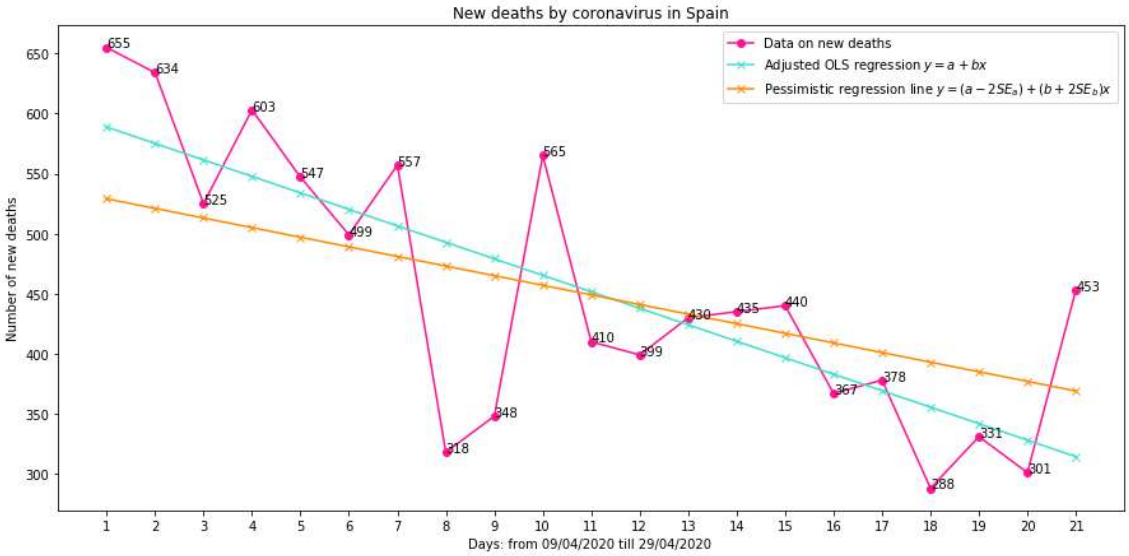
2.b) Belgium



2.c) Italy



2.d) Spain



In Germany, the picture is also close to a constant behaviour. The fits of both curves are very poor and it seems that the number of daily deaths will oscillate with a lower bound of around 100 deaths, a figure still high. Exhibit 4 shows the graph of the hyperbola (not significant) and statistics related to the adjustment are found in the Annex.

Exhibit 3: Portugal – fitting a straight line to 21 observations related to daily number of deaths.

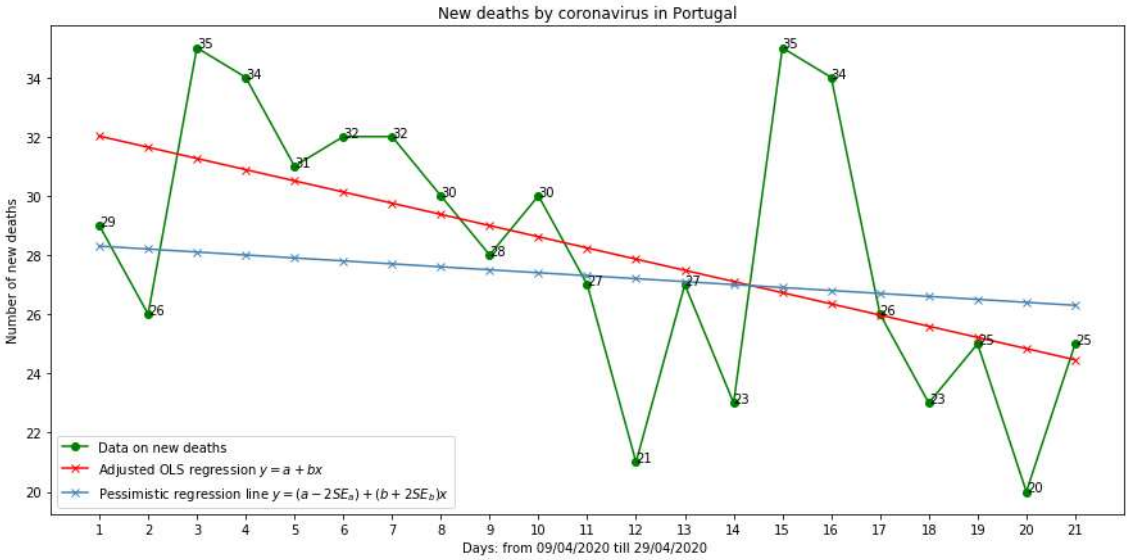
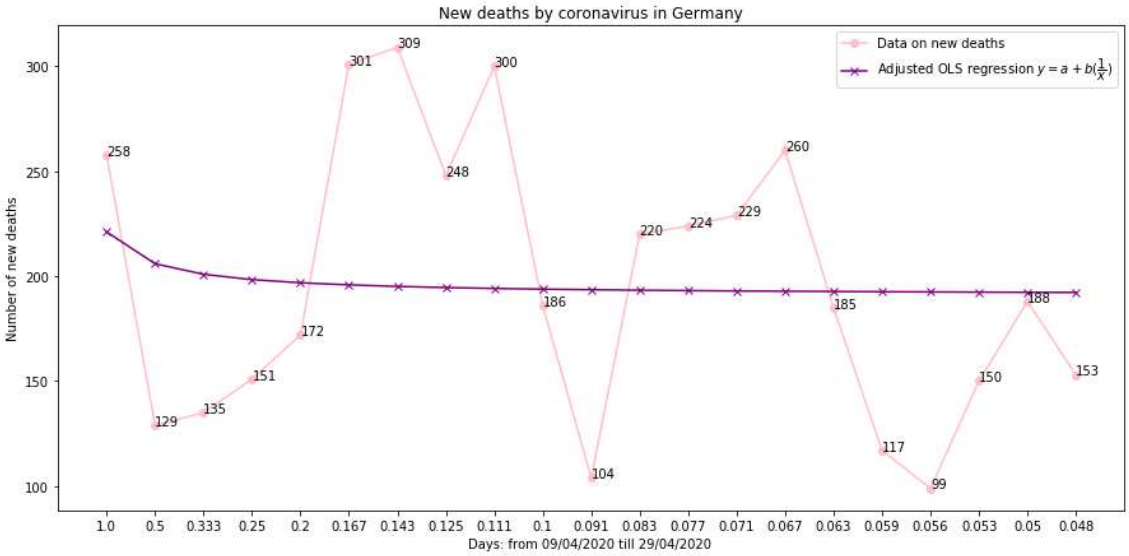


Exhibit 4: Germany – fitting a hyperbola (not significant) to 21 observations related to daily number of deaths.



As updating of these two cases -stable, at the moment- progresses, it is likely that a clearer and minimally significant decreasing trend will show up.

4. Conclusions.

The performance of two naïve, ancillary indicators has been analysed -for six Western European countries- during the period preceding the 19th week of the year, reputed to be a turning point in Europe for all statistics regarding the incidence of respiratory diseases, influenza included.

The indicators show that, broadly, the Covid-19 situation seems to be entering under control in Belgium, France, Germany, Italy, Portugal and Spain. However, important nuances apply: they usually point out to the persistence of the epidemic and the slow move to more positive levels, even in this declining phase, evident, at different levels, in all six countries.

France and Germany seem to be better positioned, with prospects of a better environment by the end of May. However, daily deaths in Germany show a moderate resilience to decrease below a threshold around 100, and this may still persist.

The other four countries show also mixed evidences, with Belgium and Italy probably better than the Iberic ones, though contagion is still relatively active in all of them. Similar to what happens in Germany, daily deaths in Portugal are in a plateau -even if a low one, in relative terms- and may stay for an undetermined time.

The above findings must be updated in a weekly basis, in order to produce a picture of the evolution of the indicators under the more normal daily living conditions. Other derived statistics must also be used, and the aggressive testing policy -that may have biased some of the recent data- must continue.

In the hope that the '19th Week Effect' applies to Covid-19, extra good news may come up in the near future.

Annex: Statistical Results of the Regressions

Straight lines.

France

```
                            OLS Regression Results
==============================================================================
Dep. Variable:       newdeaths_France   R-squared:                       0.490
Model:                            OLS   Adj. R-squared:                  0.464
Method:                 Least Squares   F-statistic:                     18.28
Date:                Tue, 05 May 2020   Prob (F-statistic):           0.000409
Time:                        23:41:31   Log-Likelihood:                -142.33
No. Observations:                  21   AIC:                             288.7
Df Residuals:                      19   BIC:                             290.8
Df Model:                           1
Covariance Type:            nonrobust
==============================================================================
                 coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
date         -34.4182      8.050     -4.275      0.000     -51.268     -17.569
const       1008.0286    101.084      9.972      0.000     796.457    1219.600
==============================================================================
Omnibus:                       13.466   Durbin-Watson:                   1.430
Prob(Omnibus):                  0.001   Jarque-Bera (JB):               12.734
Skew:                           1.348   Prob(JB):                      0.00172
Kurtosis:                       5.699   Cond. No.                         26.2
==============================================================================
```

Belgium

```
                            OLS Regression Results
==============================================================================
Dep. Variable:      newdeaths_Belgium   R-squared:                       0.548
Model:                            OLS   Adj. R-squared:                  0.524
Method:                 Least Squares   F-statistic:                     23.04
Date:                Wed, 06 May 2020   Prob (F-statistic):           0.000124
Time:                        00:05:17   Log-Likelihood:                -116.12
No. Observations:                  21   AIC:                             236.2
Df Residuals:                      19   BIC:                             238.3
Df Model:                           1
Covariance Type:            nonrobust
==============================================================================
                 coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
date         -11.0909      2.311     -4.800      0.000     -15.927      -6.255
const        372.5238     29.014     12.840      0.000     311.797     433.250
==============================================================================
Omnibus:                        3.510   Durbin-Watson:                   1.932
Prob(Omnibus):                  0.173   Jarque-Bera (JB):                2.058
Skew:                           0.754   Prob(JB):                        0.357
Kurtosis:                       3.284   Cond. No.                         26.2
==============================================================================
```

Italy

```
                            OLS Regression Results
==============================================================================
Dep. Variable:        newdeaths_Italy   R-squared:                       0.709
Model:                            OLS   Adj. R-squared:                  0.694
Method:                 Least Squares   F-statistic:                     46.29
Date:                Tue, 05 May 2020   Prob (F-statistic):           1.70e-06
Time:                        20:12:48   Log-Likelihood:                -113.52
No. Observations:                  21   AIC:                             231.0
Df Residuals:                      19   BIC:                             233.1
Df Model:                           1
Covariance Type:            nonrobust
==============================================================================
                 coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
date         -13.8870      2.041     -6.804      0.000     -18.159      -9.615
const        629.5667     25.628     24.565      0.000     575.926     683.207
==============================================================================
Omnibus:                        7.322   Durbin-Watson:                   2.065
Prob(Omnibus):                  0.026   Jarque-Bera (JB):                4.839
Skew:                          -1.040   Prob(JB):                       0.0890
Kurtosis:                       4.099   Cond. No.                         26.2
==============================================================================
```

Spain

```
                            OLS Regression Results
==============================================================================
Dep. Variable:        newdeaths_Spain   R-squared:                       0.583
Model:                            OLS   Adj. R-squared:                  0.561
Method:                 Least Squares   F-statistic:                     26.55
Date:                Tue, 05 May 2020   Prob (F-statistic):           5.66e-05
Time:                        23:27:29   Log-Likelihood:                -119.10
No. Observations:                  21   AIC:                             242.2
Df Residuals:                      19   BIC:                             244.3
Df Model:                           1
Covariance Type:            nonrobust
==============================================================================
                 coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
date         -13.7234      2.663     -5.153      0.000     -19.298      -8.149
const        602.5286     33.442     18.017      0.000     532.534     672.524
==============================================================================
Omnibus:                        2.377   Durbin-Watson:                   1.880
Prob(Omnibus):                  0.305   Jarque-Bera (JB):                1.018
Skew:                          -0.487   Prob(JB):                        0.601
Kurtosis:                       3.462   Cond. No.                         26.2
==============================================================================
```

Portugal

```
                            OLS Regression Results
==============================================================================
Dep. Variable:     newdeaths_Portugal   R-squared:                       0.268
Model:                            OLS   Adj. R-squared:                  0.230
Method:                 Least Squares   F-statistic:                     6.969
Date:                Tue, 05 May 2020   Prob (F-statistic):             0.0161
Time:                        23:56:05   Log-Likelihood:                -57.714
No. Observations:                  21   AIC:                             119.4
Df Residuals:                      19   BIC:                             121.5
Df Model:                           1
Covariance Type:            nonrobust
==============================================================================
                 coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
date          -0.3779      0.143     -2.640      0.016      -0.678      -0.078
const         32.3952      1.798     18.022      0.000      28.633      36.158
==============================================================================
Omnibus:                        0.878   Durbin-Watson:                   1.607
Prob(Omnibus):                  0.645   Jarque-Bera (JB):                0.407
Skew:                           0.340   Prob(JB):                        0.816
Kurtosis:                       2.951   Cond. No.                         26.2
==============================================================================
```

Hyperbola.

Germany

```
                            OLS Regression Results
==============================================================================
Dep. Variable:      newdeaths_Germany   R-squared:                       0.010
Model:                            OLS   Adj. R-squared:                 -0.042
Method:                 Least Squares   F-statistic:                    0.1958
Date:                Tue, 05 May 2020   Prob (F-statistic):              0.663
Time:                        11:05:50   Log-Likelihood:                -117.13
No. Observations:                  21   AIC:                             238.3
Df Residuals:                      19   BIC:                             240.4
Df Model:                           1
Covariance Type:            nonrobust
==============================================================================
                 coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
date          30.3031     68.479      0.443      0.663    -113.025     173.631
const        190.8326     18.893     10.101      0.000     151.289     230.376
==============================================================================
Omnibus:                        2.039   Durbin-Watson:                   1.015
Prob(Omnibus):                  0.361   Jarque-Bera (JB):                1.203
Skew:                           0.263   Prob(JB):                        0.548
Kurtosis:                       1.952   Cond. No.                         4.81
==============================================================================
```