

Covid-19 in Germany

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Explaining the past, projecting the future and
understanding public health measures

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1. Introduction

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- What do we expect for the future?
- What are the effects of public health measures?

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Talk consists of two parts

- Spread up to today
(and what this tells us about public health)
- What we expect for the future
(and what this will tell us about public health)

2. The spread up to today

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- Unrestricted spread before 13 March 2020
- Social restrictions and restrictions on firms as of 16/17 March
- Partial exit as of 20 April
(relatively heterogeneous across Federal States)

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- Unrestricted spread before 13 March 2020
- Social restrictions and restrictions on firms as of 16/17 March
- Partial exit as of 20 April
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Do we see effects of public health measures?

- Purely statistical approach (search for structural breaks)
- Model based approach (extension of epidemiological SIR models)

2. The spread up to today

2.1 Statistical approach

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- Public health measures (regulatory phases)
 - 16 March onwards: no schooling, no major sports events
 - 22 March onwards: no restaurants, theaters, public sports facilities
 - Effects should be visible one week later due to
 - incubation period
 - contacting a doctor and
 - testing

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- Public health measures (regulatory phases)
 - 16 March onwards: no schooling, no major sports events
 - 22 March onwards: no restaurants, theaters, public sports facilities
 - Effects should be visible one week later due to
 - incubation period
 - contacting a doctor and
 - testing
- Hypotheses
 - Hypothesis 1: Measures of 16 March are visible around one week later
 - Hypothesis 2: Measures of 22 March are visible one week later as well

2. The spread up to today

2.1 Statistical approach

- Statistical findings

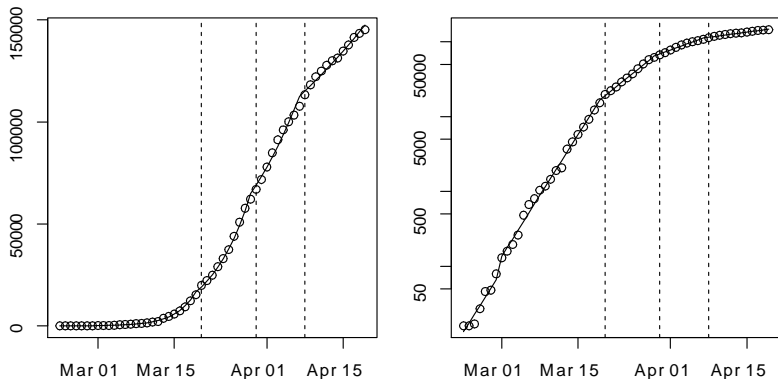


Figure 1: Number of reported infections (logarithmic scale on right)
(Donsimoni et al., 2020, PWP, Hartl et al., 2020, Covid-Econ)

2. The spread up to today

2.1 Statistical approach

● Statistical findings

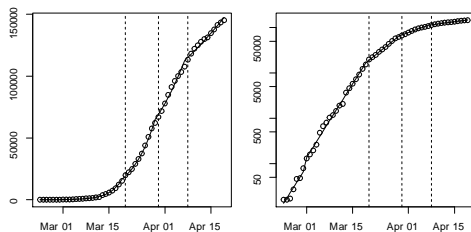


Figure 1: Number of reported infections (logarithmic scale on right) (Donsimoni et al., 2020, PWP, Hartl et al., 2020, Covid-Econ)

- Significant reduction of growth rates on 20. March, 30. March (and 8. April)
- Effects are visible one week after policy measures
- Three to four Covid-19 phases
- Public health measures were successful in reducing the number of reported infections

2. The spread up to today

2.2 Model based approach

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- Extend existing SIR models to cover Covid-19 specificities
- Calibrate/ estimate parameters of model using RKI data
- Two assumptions: share of hidden infections and long-run infection rates

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- Extend existing SIR models to cover Covid-19 specificities
- Calibrate/ estimate parameters of model using RKI data
- Two assumptions: share of hidden infections and long-run infection rates
- The model (graphically speaking)

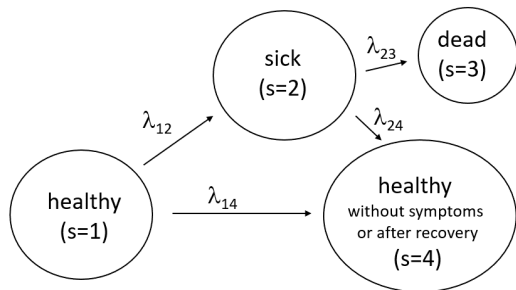


Figure 2: An extended SIR model for Covid-19
(Donsimoni et al., 2020, GER)

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2.2 Model based approach

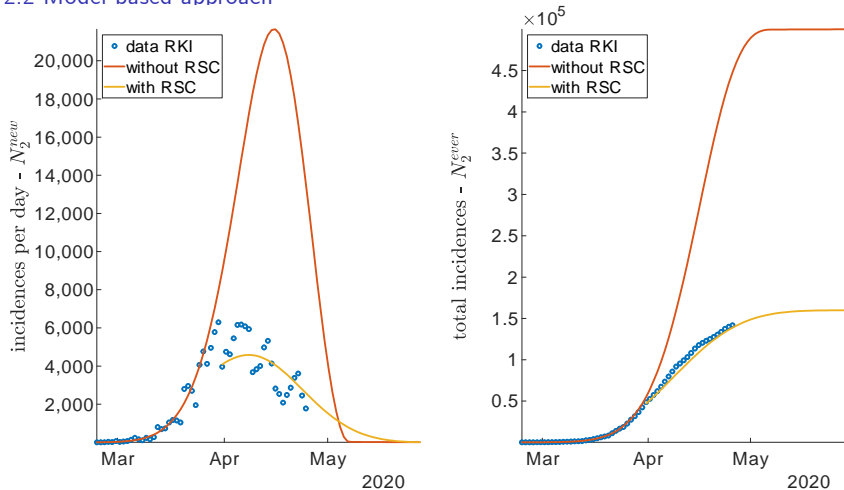


Figure 3: The quality of the fit for incidences (left) and total incidences (right)

(Donsimoni et al., 2020, PWP and submit)

2. The spread up to today

2.3 Summary

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What have we learned?

- Growth rates of number of reported infected has clear kinks
- Kinks can be explained by public health measures
- Public health measures significantly reduced increase in reported infections
- Model based analysis
 - confirms and illustrates more clearly the positive effect of public health measures
 - shows implications of standard assumption in virology and epidemiology
 - illustrates what would have happened without interventions

3. What we expect for the future

3.1 Starting point

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- We are/were/ still are in a relatively stable regime
 - relatively constant rules since 15 March
 - relative acceptance by population
 - purely statistical evidence confirms this
(fewer assumptions than with mathematical model)
- Let us assume we could stay in this regime for another month or two
 - What would happen?
 - This is our reference scenario for evaluating relaxed restrictions of social contacts (RSC)

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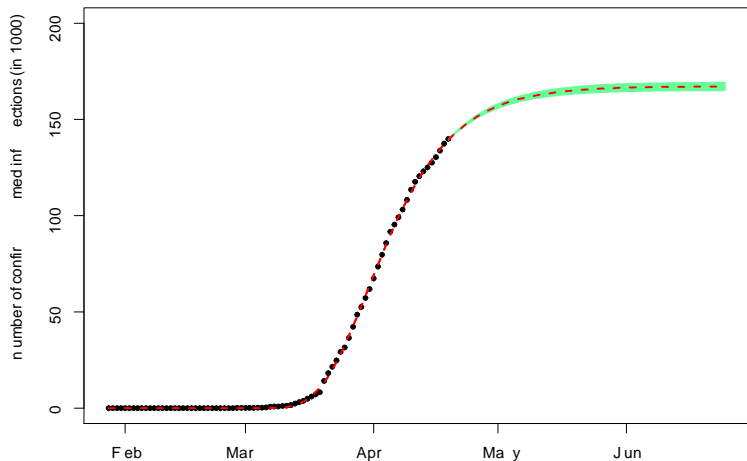


Figure 4: Where Germany would end up if RSC were upheld: Observations (dots), prediction (red) and confidence band (green) (Donsimoni et al., 2020, PWP)

3. What we expect for the future

3.2 Reference scenario

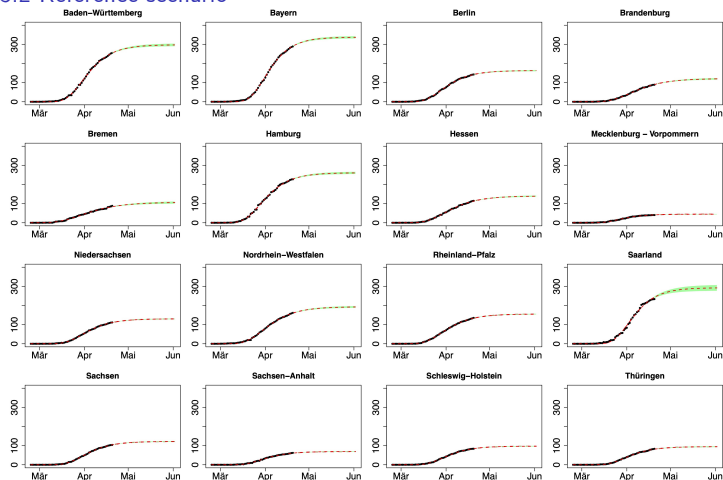


Figure 5: Where Federal States would end up (number of infected per 100,000 inhabitants)

(Donsimoni et al., 2020, PWP)

3. What we expect for the future

3.3 The effect of relaxing restrictions of social contacts

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• A model-based illustration

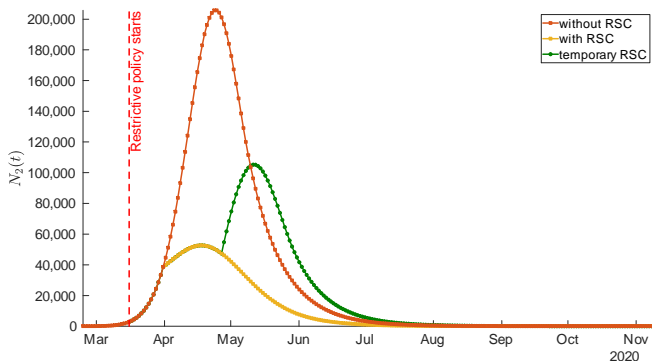


Figure 6: The unrestricted regime (red), restriction of social contacts (RSC) between 15 March and 20 April (yellow) and potential effects as of 27 April (green)

(Donsimoni et al., 2020, PWP and submit)

3. What we expect for the future

3.3 The effect of relaxing restrictions of social contacts

- The econometric approach (future work)
 - Diff-in-diff in spatial regression setup (Prof. Reinhold Kosfeld, Kassel)
 - Learn from differences across Federal States
 - Understand which policy measures (schools, shops, masks ...) are most useful/ most harmful for keeping infection numbers low

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- Picture of the day

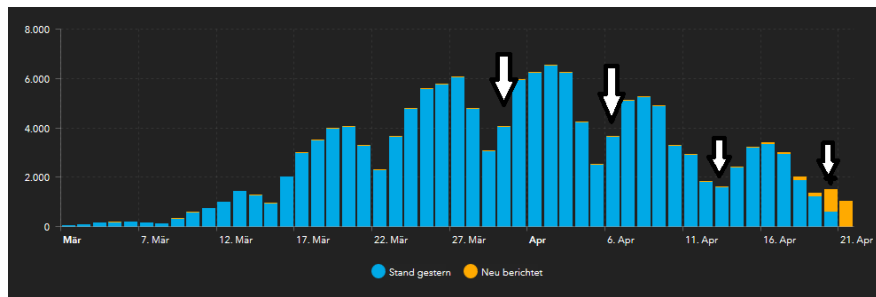


Figure 7: Incidences (by report date) from RKI 22. April 1 p.m.
(last bar Tuesday 21 April, arrows indicate Mondays)

4. Summary

4. Summary

- Quo vadis CoV2?
 - Leaves us alone (simple statistical view based on “picture of the day”)
 - Comes back next week (view based on virologists’ and epidemiologists’ view as captured in model)?

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- Quo vadis CoV2?
 - Leaves us alone (simple statistical view based on “picture of the day”)
 - Comes back next week (view based on virologists’ and epidemiologists’ view as captured in model)?
- We need to wait and see ...

Thank you!

More information on our Covid-19 research is available at

- <https://www.macro.economics.uni-mainz.de/corona-blog/>
(General public / student information in German)
- <https://www.macro.economics.uni-mainz.de/klaus-waelde/ongoing-work-and-publications/>
(Covid-19 research papers)

● even more hope?

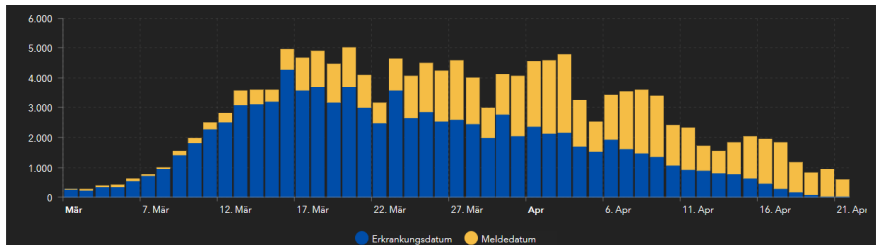


Figure 8: Number of reported sick by RKI (22 April, 5 p.m.) by date of first symptoms