Mathematical modeling and prediction of COVID-19 cases, hospitalisation (including intensive care and ventilation units) and deaths in the German states

Christiane Dings[1], Katharina Götz[1], Katharina Och[1], Iryna Sihinevich[1], Dr. Dominik Selzer[1], Quirin Werthner[1], Lukas Kovar[1], Fatima Marok[1], Christina Schräpel[1], Laura Fuhr[1], Denise Türk[1], Hannah Britz[1], Professor Dr. Sigrun Smola[2], Professor Dr. Thomas Volk[3], Professor Dr. Sascha Kreuer[3], Dr. Jürgen Rissland[2], Professor Dr. Thorsten Lehr[1]

[1]Clinical Pharmacy, Saarland University
[2]Institute of Virology, Saarland University Medical Center
[3]Clinic for Anaesthesiology, Intensive Care Medicine and Pain Therapy, Saarland University Medical Center

Report dated 13 August 2020
Model status of 13 August 2020
Data as of 12 August 2020

Lead:
Professor Dr. Thorsten Lehr
Clinical Pharmacy, Saarland University
Campus C2 2, 66123 Saarbrücken
thorsten.lehr@mx.uni-saarland.de
www.clinicalpharmacy.me
www.covid-simulator.com

Summary

Aims

- The aim of this project is to develop a mechanistic mathematical model to predict COVID-19 infections including hospital bed occupancy, intensive care units (ICU), ventilation and death rates in the individual German federal states and to estimate non-pharmaceutical interventions (NPI, e.g. school closure) over time.
- The model will be used to predict the further course of infections (including hospital occupancy, ICU, ventilation, death rates) and to simulate various possible scenarios (e.g. lifting of lockdown).
- The model and the predictions will be adjusted with new data at regular intervals (every 2 weeks). New predictions for all federal states will be made available initially as a PDF report and in the medium term in web format. The website www.covid-simulator.com is intended as an online platform for the transmission of information and for the provision of an online simulator.

Results

- A modified infection model (Susceptible - Exposed - Infectious - Recovered - Death; SEIRD) has been developed and adapted to the respective situation of each federal state. The model shows an excellent descriptive characteristic of COVID-19 case numbers, occupancy of inpatient beds, intensive care beds (ventilated and non-ventilated), deaths and recoveries in all 16 German federal states.
- The influence of non-pharmaceutical interventions (NPI) on R(t) was investigated:
  - At the beginning of the infection the R(t) value in Germany lies on average at 2.78.
  - School closure, lockdown (on 23.03.2020) and a subsequent lockdown (on 01.04.2020) have a significant effect ($p<0.001$) on the reduction of R(t). Due to the close alignment of NPIs, it cannot be ruled out that the effect of another NPI is overlapped. The reproduction number R(t) decreases from the initial value of $R(t) = 2.78$ to $R(t) = 0.636$ on the national average on 01.04.2020.
  - Subsequently, in April, even slighter but statistically significant ($p<0.001$) changes of R(t) occurred. On 25.04.2020, 5 days after opening of shops (20.04.2020), state specific R(t) changes were observed.
  - On 06.05.2020 (two days after school reopening on 04.05.2020), there was a small increase of R(t) by 12.5% on average to 0.716. After 05.06.2020, there was a further increase of R(t) by approx. 51% from 0.716 to 1.08 in the national average with subsequent reduction of R(t) after 17.06.2020 by about 23% from 1.08 to 0.834.
  - On 09.07.2020, a new increase of R(t) by approx. 56% from 0.834 to 1.3 on average can be observed.
  - The R(t) changes in June seem to depict emergence of the local "corona hotspots" in some federal states (e.g. North Rhine-Westphalia, Berlin, Brandenburg, Saxony-Anhalt) followed by containment of this local outbreaks.
  - The current R(t) values are estimated at 1.3 in the national average and show above all the increase in infection following the relaxation of NPIs nationwide.

- Forecasts with different assumptions of R0, including the lifting of intervention measures, are presented for each state.
  - Assuming that the reproduction rate (R(t)) in the federal states adopts a value below 1, the bed capacity of the hospitals appears to be sufficient in all federal states.
  - If the reproduction number stays constant at R(t) around 1.3, a further increase in bed occupancy can be expected in the next six to twelve weeks in some federal states. If the R(t) value was to rise more sharply to, for example, 1.8, it would be expected that the increase would be expected earlier and steeper.
- The Robert Koch Institute (RKI) publishes regular updates on the current R0 figures in Germany and the federal states. The method of calculating the R0 number of the RKI differs significantly from our model approach. The RKI only considers new infections in the last 8 days, whereas our model considers the complete data set (extent and also other data, such as hospital stays, deceased, convalescence). Due to the short time period of the RKI data considered, their R0 value is more susceptible to changes and fluctuations in reporting and also sensitive in the range of small numbers of new infections. The R0 value of the RKI therefore fluctuates more over time compared to the R(t) value calculated by our model. Still by comparing the R0 values calculated by the RKI and our calculated R(t) values, a large agreement could be found over a long period of time (results on demand).

Changes in the document

Changes compared to the report of 30.07.2020

Compared to the last report, the database has been expanded and the model has been estimated with new data up to 12.08.2020. No further effect on R(t) was estimated.

Changes compared to the report of 16.07.2020

Compared to the last report, the database has been expanded and the model has been estimated with new data up to 29.07.2020.A further effect on R(t) on 08.07 was estimated (p-value < 0.001).

Changes compared to the report of 02.07.2020

Compared to the last report, the database has been expanded and the model has been estimated with new data up to 15.07.2020.

Changes compared to the report of 25.06.2020

Compared to the last report, the database has been expanded and the model has been estimated with new data up to 01.07.2020.

Changes compared to the report of 18.06.2020

Compared to the last report, the database has been expanded and the model has been estimated with new data up to 24.06.2020.

Changes compared to the report of 11.06.2020

Compared to the last report, the database has been expanded and the model has been estimated with new data up to 17.06.2020.

Changes compared to the report of 04.06.2020

Compared to the last report, the database has been expanded and the model has been estimated with new data up to 09.06.2020.

Changes compared to the report dated 28.05.2020

Compared to the last report, the database has been expanded and the model of new data has been estimated up to 03.06.2020.

Changes compared to the report dated 19.05.2020

The model was estimated with new data up to and including 26.05.2020.

Changes compared to the report dated 08.05.2020

To increase the model stability, some structural model optimizations were carried out. These allow a better estimation of changes in the R(t) number. The model was estimated with new data up to and including 17.05.2020.

Changes compared to the report dated 05.05.2020

Compared to the last report, the data basis has been expanded and the model of new data has been estimated up to and including 07.05.2020.

Changes compared to the report dated 24.04.2020

Compared to the last report, the database has been expanded. Inpatient hospital data from different federal states were collected and entered into the model. The new model was estimated with new data up to and including 04.05.2020.

Changes compared to the report dated 21.04.2020

The model structure of the hospital and intensive care beds was fundamentally changed. The lengths of stay of about 3000 hospitalized COVID-19 patients were calculated from existing billing data and integrated into the model. Furthermore, the mortality rates were transferred from this data and implemented in the model. In addition, the observed data of the convalesced patients were incorporated into the model. The new model was estimated with new data up to and including 23.04.2020. Due to the changed structure, some estimated model parameters have changed slightly.

Changes in comparison to the report from 15.04.2020

The model was updated with new data up to and including 20.04.2020. A German overview has been added to the report. The effect of the Easter holidays has been changed into a static effect, which starts on 02.04.2020 and is to be considered as "2nd stage of the contact ban".

Changes compared to the report of 11.04.2020

The model was updated with new data up to and including 14.04.2020. Based on available data, the lengths of stay in hospital and ICU were adjusted and reduced for COVID patients (hospital 5-10 days, ICU 5 days). This was also necessary, as otherwise the hospital and ICU beds would be overestimated. Here, the data show a saturation. Easter holidays were detected as another effect on R0. Since the beginning of the holidays, R0 has decreased by a further ~35% and is now below 1 in all federal states (average 0.69). The other effect sizes remain unaffected by this.

Contents

1 Overview of the modeling

1.1 Question

Infections of humans with the SARS coronavirus-2 (the resulting disease is known as "COVID-19") are increasing rapidly in Germany and the world. This results in rising hospitalisation rates and also an increased occupancy of intensive care beds (ICU) as well as the use of ventilation capacities. In the course of the pandemic, various non-pharmaceutical interventions (NPI) were introduced (e.g. school closure) in order to delay the spread of the pandemic and not to exceed the stress limits of the health care system. Unfortunately, predicting the further course of infection, the workload of the health care system and the influence of NPIs on the course of the disease is a difficult task. This can only be achieved by mathematical modeling and simulation. Several epidemiological models already exist to predict the course of COVID-19. However, these are either not adapted to the German situation, but often to the USA or UK, or, if models exist for Germany, they do not take into account any characteristics specific to the federal states. Furthermore, to the best of our knowledge, effects of NPIs have only been assumed, but never estimated.

1.2 Objectives

- The aim of this project is to develop a mechanistic mathematical model to predict COVID-19 infections including hospital bed occupancy, intensive care units (ICU), ventilation and death rates in the individual German states and to estimate non-pharmaceutical interventions (NPI, e.g. school closure) over time.
- The model will be used to predict the further course of infections (including hospital occupancy, ICU, ventilation, death rates) and to simulate various possible scenarios (e.g. lifting of lockdown).
- The model and the predictions will be adjusted with new data at regular intervals (every 2 weeks). New predictions for all federal states will be made available initially as a PDF report and in the medium term in web format. The website www.covid-simulator.com is intended to be and online platform for the transmission of information and for the provision of an online simulator.

1.3 Target group

- The model is intended to help authorities, politicians and the health care system to better estimate the course of the current SARS coronavirus-2 pandemic in the short and medium term and to plan capacities. Furthermore, the influence of NPIs (e.g. lockdown) can be estimated by these groups of people, either justifying them or justifying their lifting.
- On the other hand, the model presented can be used to illustrate to the population the influence of interventions on the course of infection, thereby encouraging them to abide the NPIs.

1.4 Methods

- The following data sources serve as a basis:
  - Database Berliner Morgenpost: (www.morgenpost.de)
    - Data sources from the Morgenpost: Johns Hopkins University CSSE (international data from WHO, CDC (USA), ECDC (Europe), NHC, DXY (China) and reports from the German authorities (Robert Koch Institute and district and state health authorities)
  - MetaKIS: Documentation of anonymized billing data from more than 250 hospitals throughout Germany
  - Information from the Saarland and other health ministries
  - Results of literature search on intervention measures in the federal states
  - DIVI Intensive Care Register

- The modeling is done using the Non-Linear Mixed Effects (NLME) approach and is performed in the software NONMEM® (Version 7.4.3)
- Statistical analysis, graphical display and report generation were performed with R® (version 3.6.3) and R-Studio® (version 1.2.5033)
- An approved ethics application of the ethics committee of the medical association of the Saarland has been submitted
- A detailed description of the model structure and the parameterization will be available in the forthcoming publication

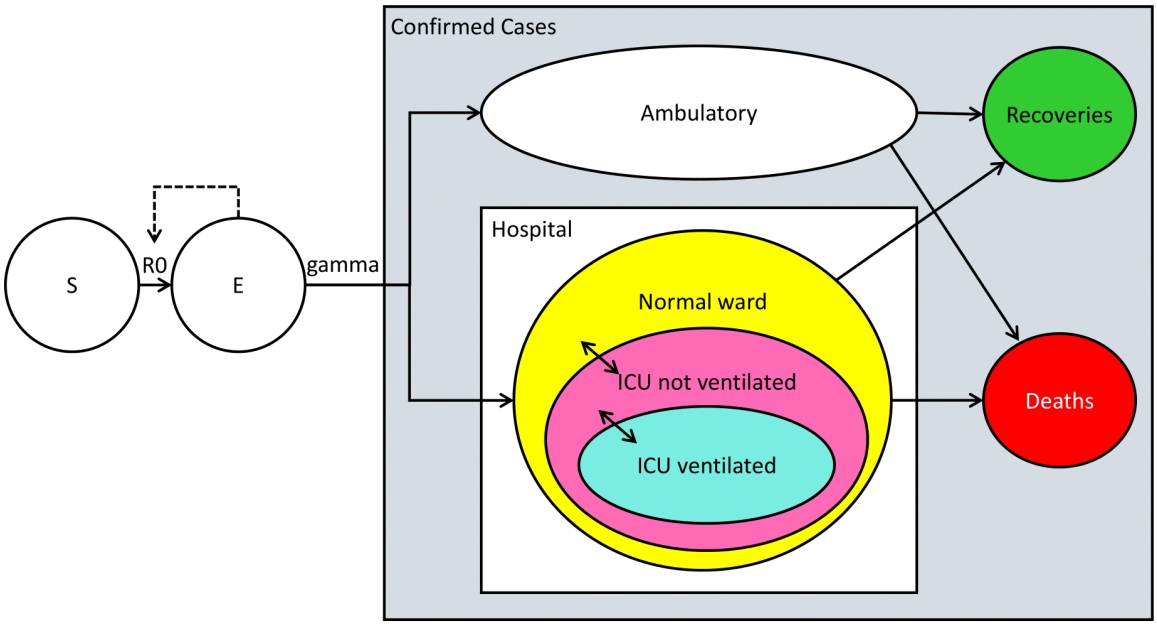
1.5 Model structure

The developed model is based on a classical SEIR model, which in mathematical epidemiology describes the spread of infections within a population. In this classical model, an individual can pass through four disease-relevant stages: *Stage S:* People who can be infected, *Stage E:* People who are infected, can be infectious, but are not yet identified as infected, *Stage I:* Infected people, *Stage R:* Cured people.

The more advanced SEIR/D model describes more complex relationships. In addition to the stages S, E and R, a distinction is made for infected people between *stage C:* Infected people who remain outpatients, *stage CH:* Infected in hospital, *stage ICU:* Infected in intensive care unit and *stage ICU ventilated:* Infected people requiring mechanical ventilation. In addition, the model was extended to include *stage D:* Infected people who have died. Likewise to stage C, *stage R* was divided into *stage KH R:* patients recovered during the hospital stay, and *stage R:* people recovered outside the hospital.

People from *stage E* infect people from *stage S*. The factor *R0 or R(t) (basic reproduction number)* indicates how many people from stage S are infected on average by a single person from stage E. Infected people in stage E are only identified as infected after a certain time (*gamma*) and thus reach stage C (C: Cases = confirmed cases). Infected persons (C) can either be recovered on an outpatient basis (R) or admitted to hospital as inpatients (KH). Inpatients can recover in hospital (KH R), die in hospital (D: Death) or be transferred to intensive care (ICU). Infected patients in intensive care units (ICU) can also recover (KH R), die (D) or require mechanical ventilation (ICU ventilated).

The model structure with the different stages and their transitions is shown in Fig.1. The given data (duration of hospitalization, percentage of patients, ventilation, etc.) are taken from hospital data of more than 3000 German COVID-19 patients from more than 250 hospitals, which were derived anonymously from the MetaKIS system.



	Distribution [%]		Ratio [%]	Duration [days]	ICU [% Duration]	Ventilation [% Duration]
Normal ward	80.1	recovered	84.5	12	-	-
		deceased	15.5	8.8	-	-
ICU not ventilated	5.0	recovered	79.6	19	34	-
		deceased	20.4	13	57	-
ICU ventilated	14.9	recovered	48.6	35	75	49
		deceased	51.4	13	88	76

Figure 1: SEIR/D Model - Model structure

1.6 Model results

1.6.1 Description of the data

Using the SEIR/D model developed in Section 1.5 Model Structure, the COVID-19 case numbers for infections, hospital bed occupancy (acute and cumulative hospital beds), ICU occupancy (acute and cumulative), recovery and deaths can be described in the Federal Republic of Germany and separately for each federal state.

Fig. 2 shows the model description of the case numbers (line) and the reported case numbers (dots) for each federal state over time for infection numbers (blue), recovery numbers (green), deaths (red), occupied hospital beds acute and cumulative (magenta), occupied ICU beds acute (yellow) and cumulative (orange), and number of ventilated intensive care patients (cyan).

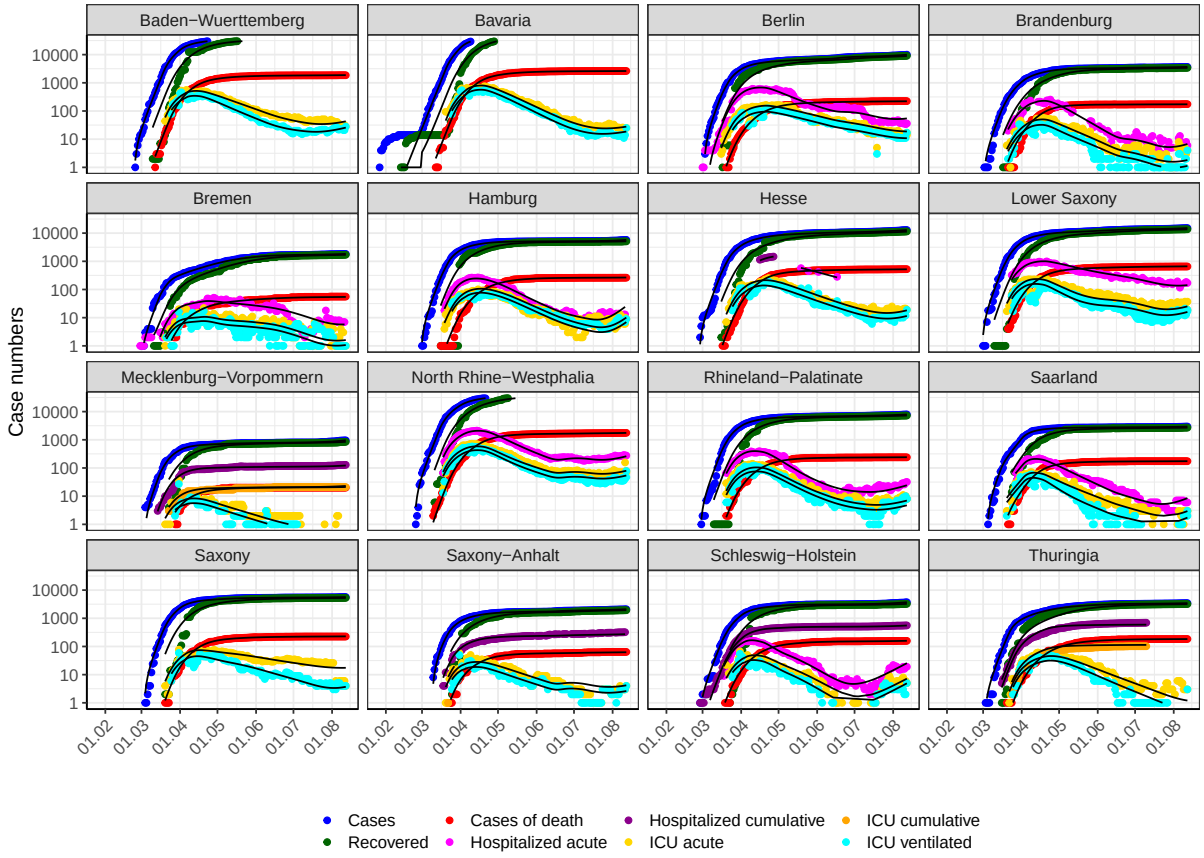


Figure 2: Germany by federal states - model description of case numbers.
Points: Reported case numbers - Lines: Model description

Fig. 3 and 4 show the model description of the infection numbers (line) and the reported infection numbers (points) for each state over time in linear (3) and semi-logarithmic (4) representation.

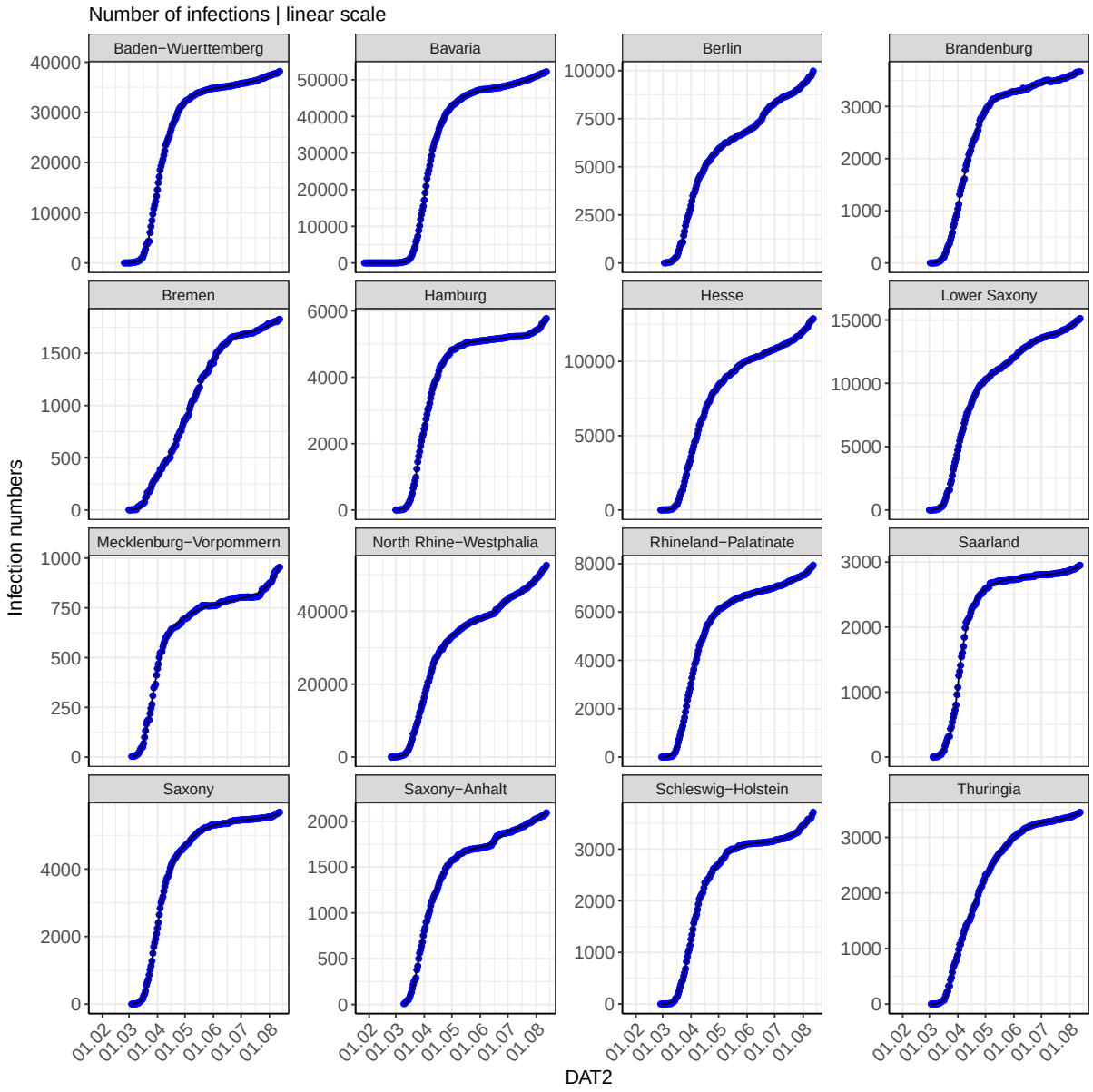


Figure 3: Germany by federal states - model description of the infection cases.
Points: Reported cases of infection - Lines: Model description

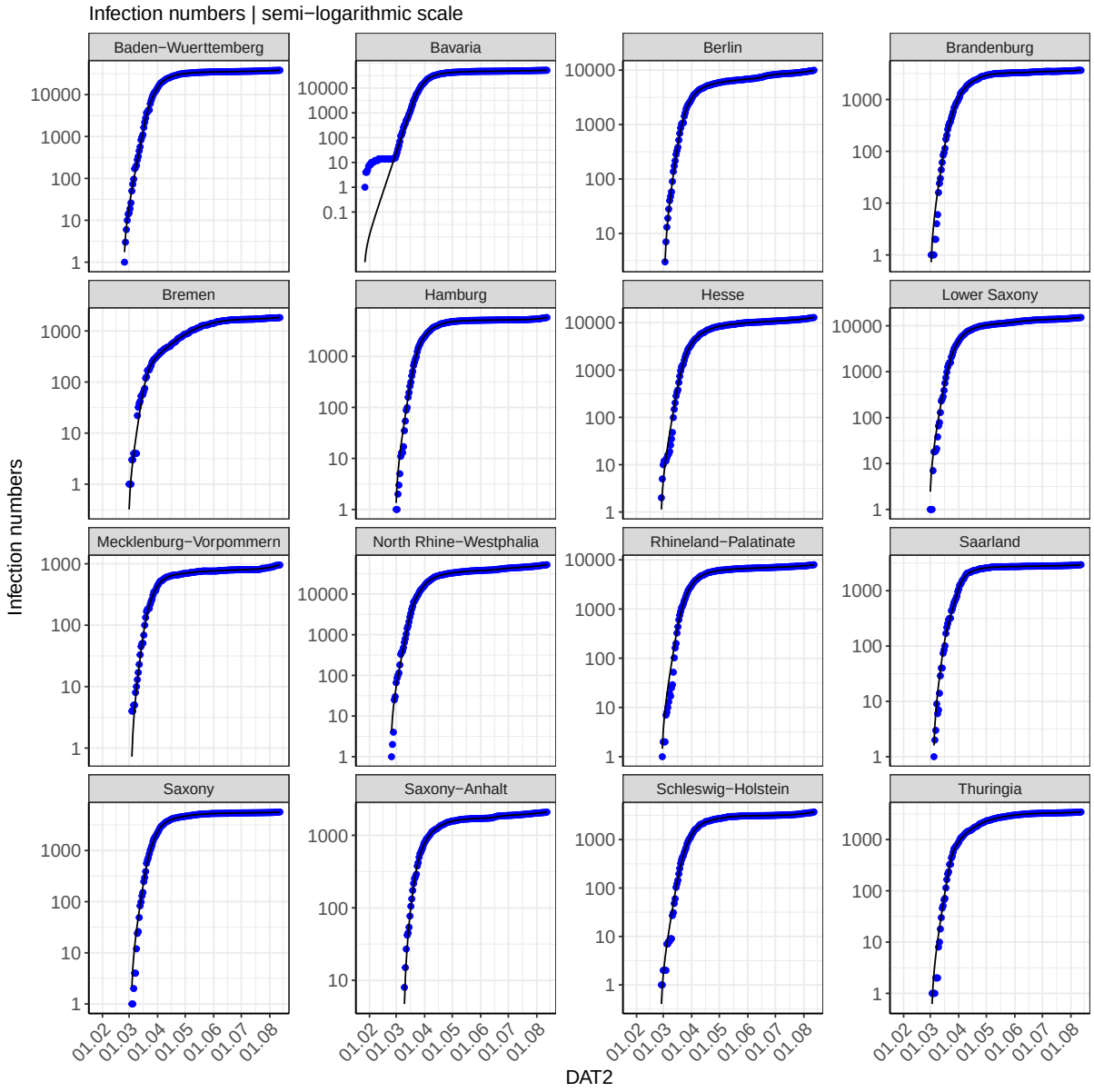


Figure 4: Germany by federal states - model description of infection cases.
Points: Reported cases of infection - Lines: Model description

Fig. 5 shows the model description of the occupied beds and ventilated patients (line) and the reported occupancy of the hospital and ICU beds and ventilated patients (dots) for each federal state over time. The occupancy of the hospital and ICU beds is shown acutely and/or cumulatively.

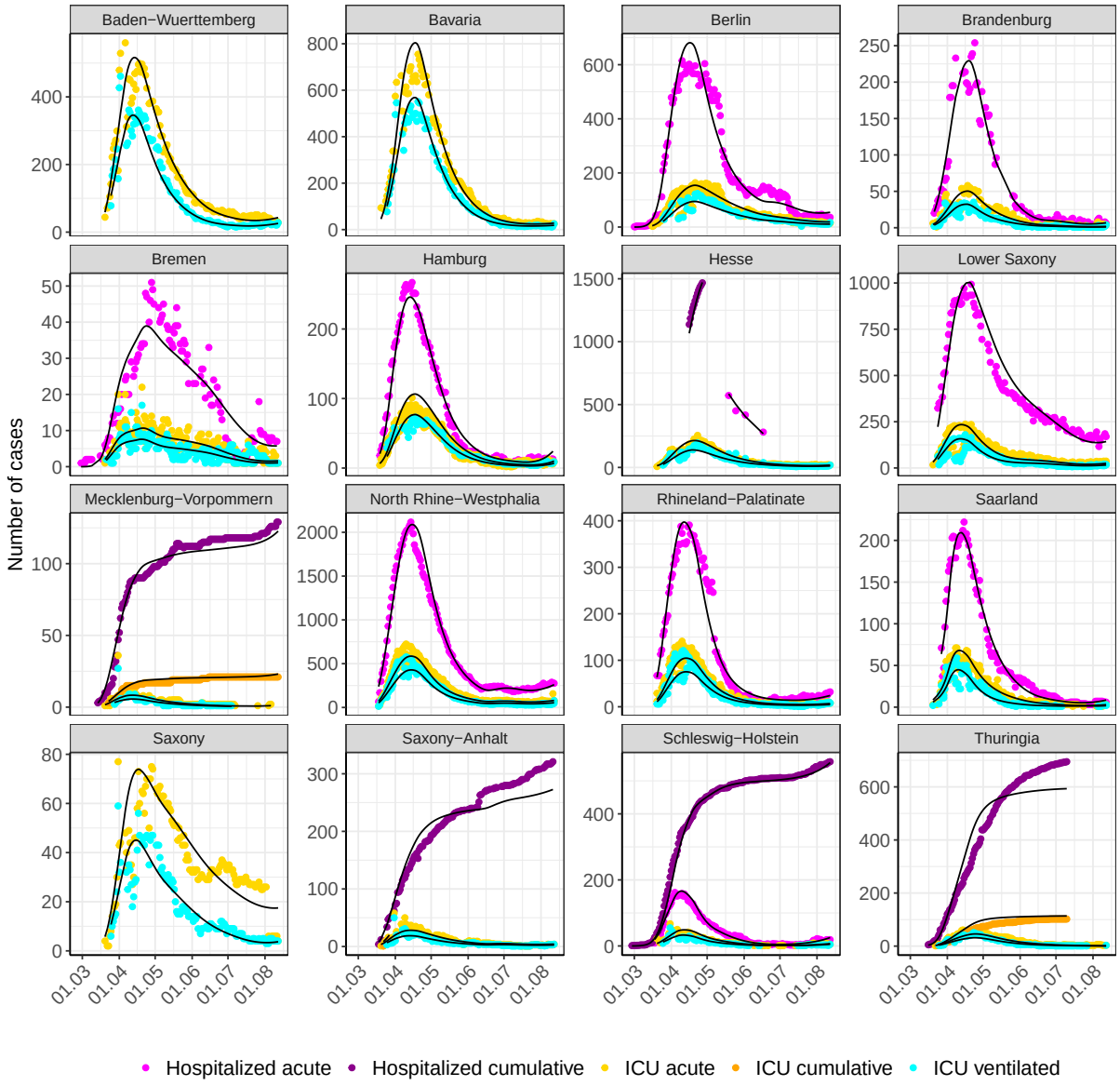


Figure 5: Germany by federal states - model description of the hospital and ICU occupancy. Points: Reported occupancy - Lines: Model description

Fig. 6 shows the model description of the patients recovered from COVID-19 (line) as well as the reported cases of recovered patients (points) for each federal state over time.

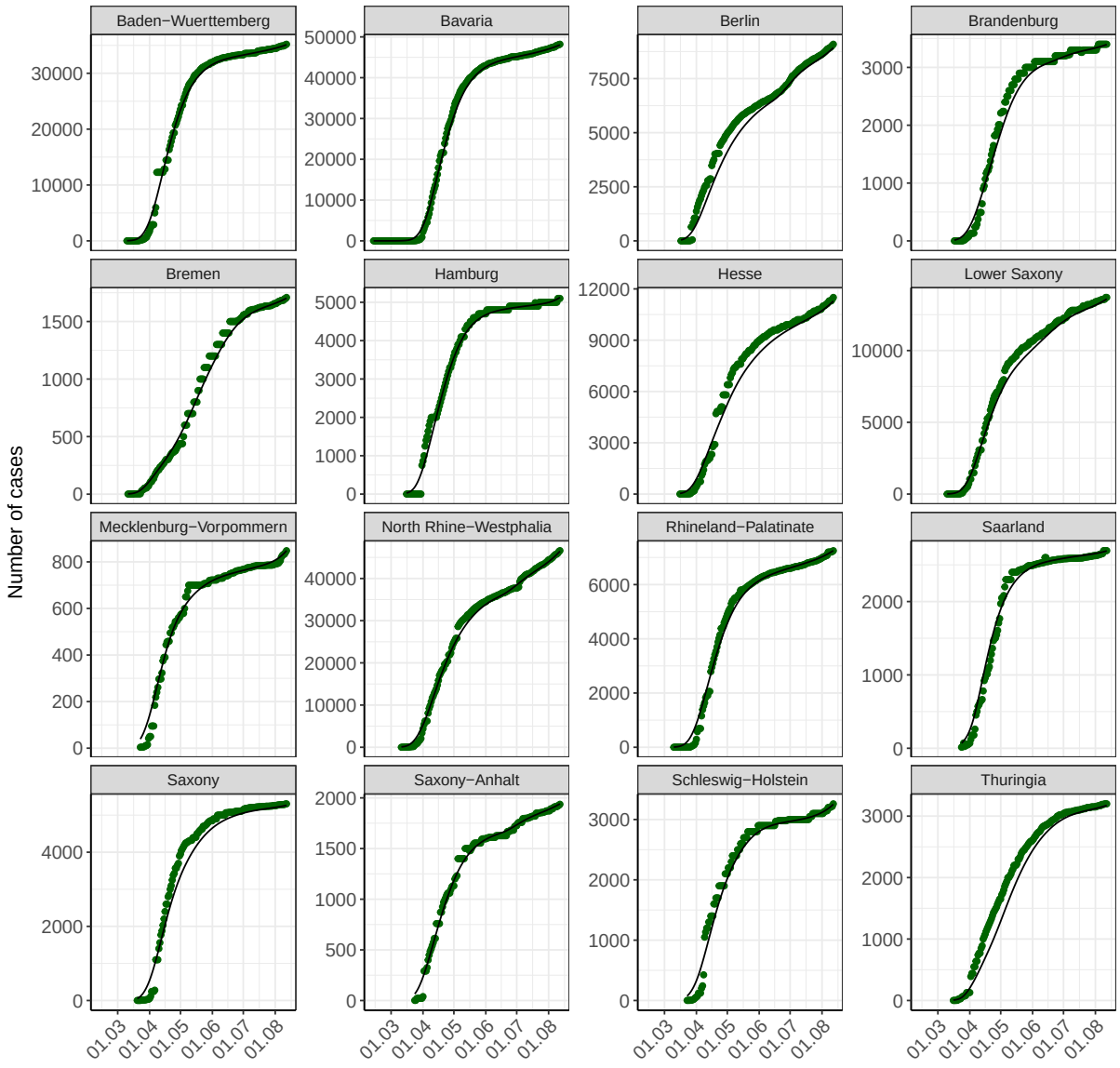


Figure 6: Germany by federal states - model description of patients recovered from COVID-19.
Points: Reported numbers - Lines: Model description

Fig. 7 shows the model description of the patients who died of COVID-19 (line) and the reported death numbers (points) for each state over time.

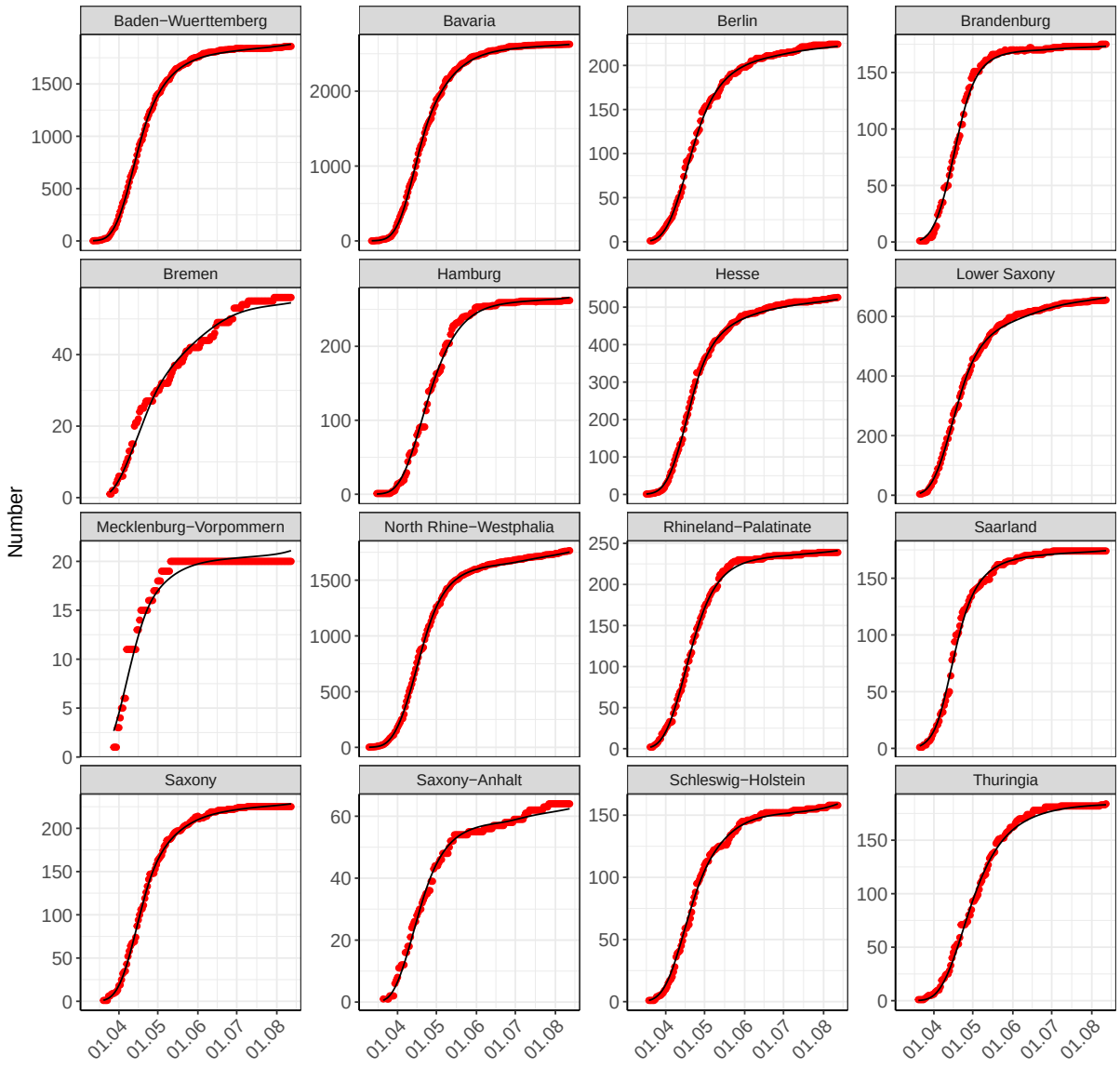


Figure 7: Germany by federal states - model description of deaths.
Points: Reported deaths - Lines: Model description

Fig. 8 shows a goodness-of-fit (GOF) plot, the graphical representation of the goodness-of-fit of the model. The values calculated by the model are plotted against the raw data. If the pairs of values were 100% identical, all data points would be located on the identity line. The points are distributed evenly around the identity line. This reflects the good descriptive performance of the model.

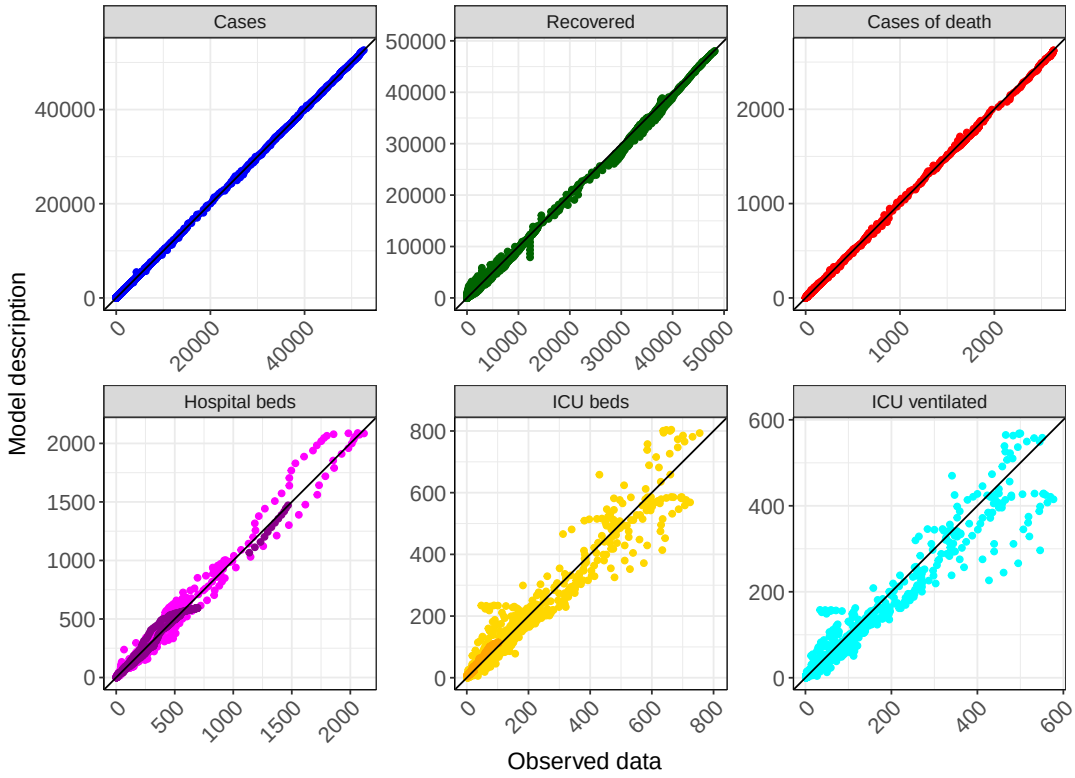


Figure 8: Germany - Goodness-of-fit plot: reported data vs. model description

1.6.2 Influence of non-pharmaceutical interventions (NPI) and other structural changes

The influences of NPIs and other events were systematically investigated and incorporated into the model. Investigations of influencing factors on R(t) revealed the following statistically significant effects: school closure, lockdown, a "2nd stage" of the lockdown since 01.04.2020 and changes on 25.04.2020, 06.05.2020, 05.06.2020, 17.06.2020 and 09.07.2020. The effects vary slightly in each federal state (see Table 1, figures [9] and [10]), while the exact causes are not clear. It can be assumed that the geographical situation of the federal states ("rural" states vs. "urban" states, border region, mentality) as well as local policies play a role. Two days after the school reopening on 04.05.2020, the R(t) value increased by approx. 13% to 0.716 on a national average. In general, the safety measures taken appear to be effective in keeping R(t) at a stable level below 1, with the exception of the federal states with known "corona hotspots". Since the beginning of the easing of the NPIs and especially since the beginning of the current holiday season a new increase of the R(t) value is observed. The factors influencing R(t) are listed in detail below:

- School closures: Reduction of R(t) on average by approx. 31% from 2.78 to 1.92 (p-value < 0.001)
- Lockdown (on 23.03.2020): Further reduction of R(t) on average by approx. 43% from 1.92 to 1.1 (p-value < 0.001)
- "2nd stage" of the lockdown (on 01.04.2020): Further reduction R(t) on average by approx. 42% from 1.1 to 0.636 (p-value < 0.001)
- From 06.05.2020: A slight increase of R(t) by about 13% to 0.716 (p-value < 0.001).
- From 05.06.2020: A further increase of R(t) by approx. 51% from 0.716 to 1.08 (p-value < 0.001).
- From 17.06.2020: Reduction of R(t) by approx. 23% from 1.08 to 0.834 (p-value < 0.001).
- From 09.07.2020: A new increase of R(t) by approx. 56% from 0.834 to 1.3 (p-value < 0.001).

Table 1 lists the R(t) values after the introduction of the individual NPIs for each federal state. The values for Germany may differ slightly in this table due to different calculation methods.

Table 1: R(t) value before and after the NPIs

Federal state	Initial value	School closures	Lockdown	From 01.04.	From 25.04.	From 06.05.	From 05.06.	From 17.06.	From 09.07.
Baden-Wuerttemberg	2.78	1.71	1.31	0.58	0.56	0.60	1.16	1.04	1.22
Bavaria	2.78	2.77	1.52	0.57	0.57	0.66	0.96	1.12	1.18
Berlin	2.78	1.98	1.02	0.62	0.79	0.89	1.81	0.55	1.27
Brandenburg	2.78	1.91	1.39	0.78	0.44	0.54	1.78	0.62	1.29
Bremen	2.78	1.46	0.70	1.13	1.04	0.88	0.56	0.64	1.28
Hamburg	2.78	2.15	0.93	0.65	0.30	0.60	1.16	0.96	1.61
Hesse	2.78	2.09	1.08	0.77	0.60	0.85	0.86	1.02	1.28
Mecklenburg-Vorpommern	2.78	1.67	0.93	0.42	1.02	0.72	1.05	1.06	1.48
Lower Saxony	2.78	2.05	1.18	0.66	0.51	1.07	0.85	0.70	1.29
North Rhine-Westphalia	2.78	1.39	1.13	0.66	0.75	0.76	1.77	0.79	1.24
Rhineland-Palatinate	2.78	1.91	1.07	0.62	0.51	0.80	1.02	1.05	1.23
Saarland	2.78	1.52	1.83	0.41	0.51	0.59	1.30	0.87	1.36
Saxony	2.78	1.94	1.25	0.51	0.94	0.64	0.88	0.74	1.36
Saxony-Anhalt	2.78	2.00	0.94	0.69	0.47	0.69	2.02	0.62	1.23
Schleswig-Holstein	2.78	1.94	1.29	0.59	0.91	0.51	0.86	1.32	1.38
Thuringia	2.78	2.50	0.81	0.93	0.78	0.81	0.70	0.63	1.27
Germany	2.78	2.26	1.27	0.63	0.62	0.76	1.33	0.85	1.25

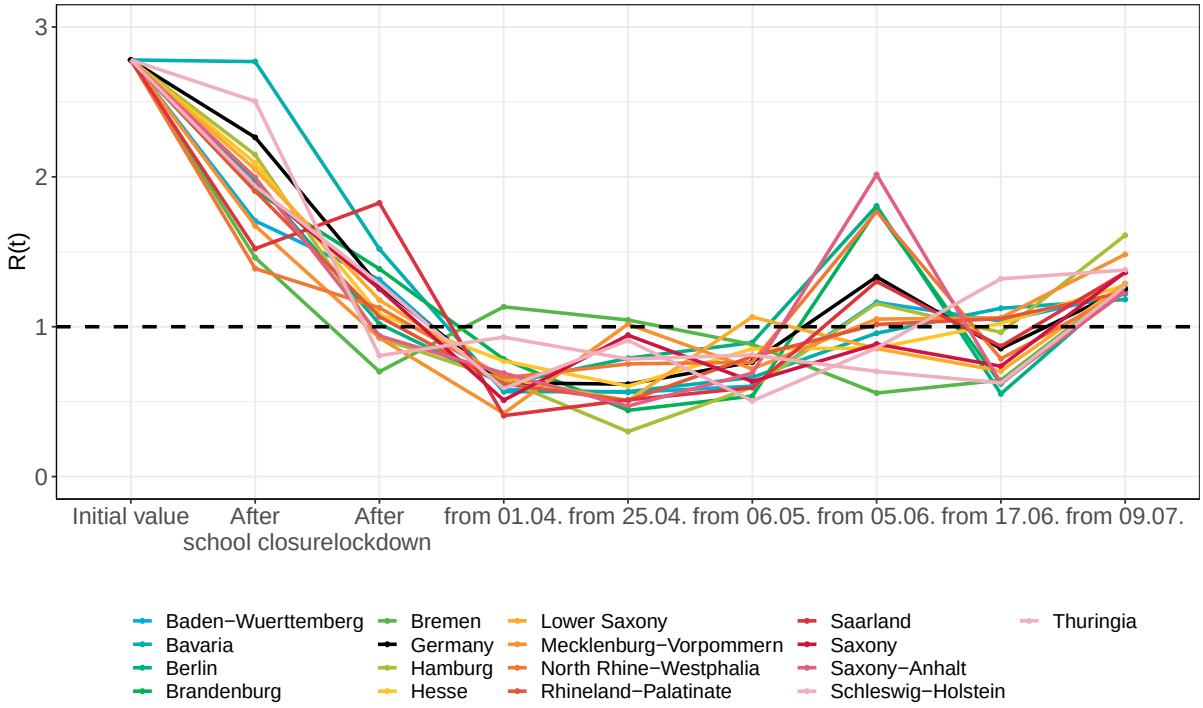


Figure 9: R(t) distribution before and after NPIs

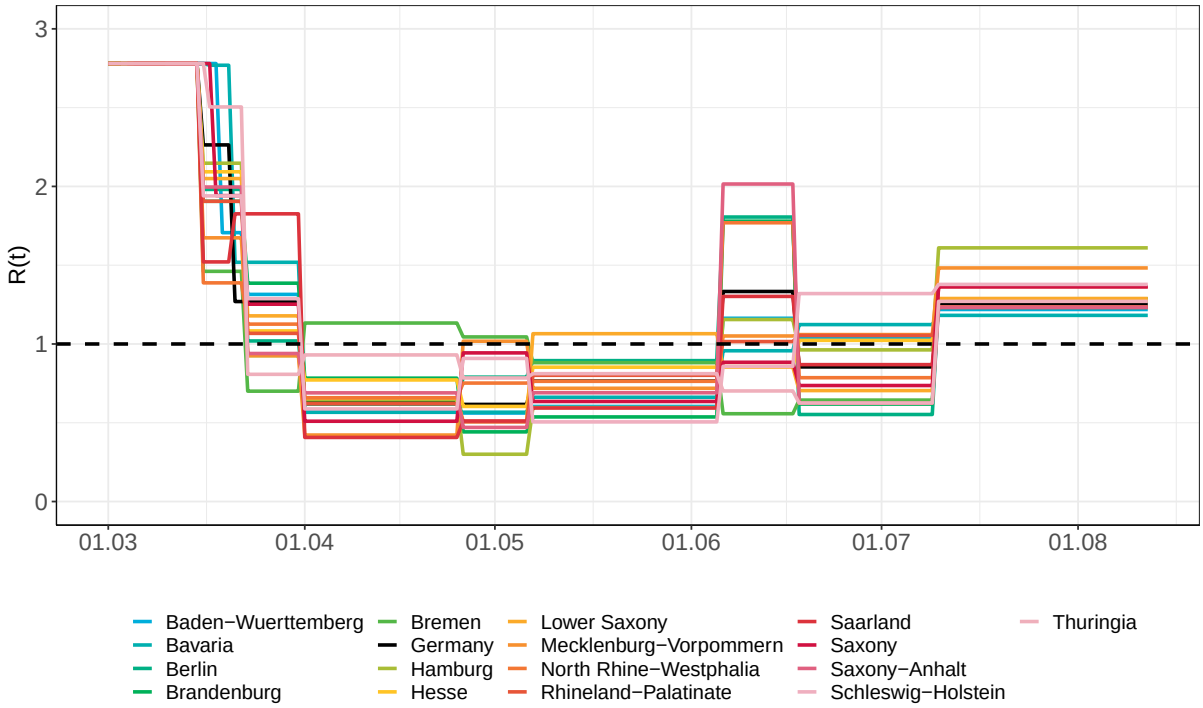


Figure 10: R(t) over time

2 Baden-Wuerttemberg

2.1 Model description

Fig. 11 depicts the results of the modeling (lines) compared to the observed data (points) for Baden-Wuerttemberg on a linear (A) and semi-logarithmic (B) scale.

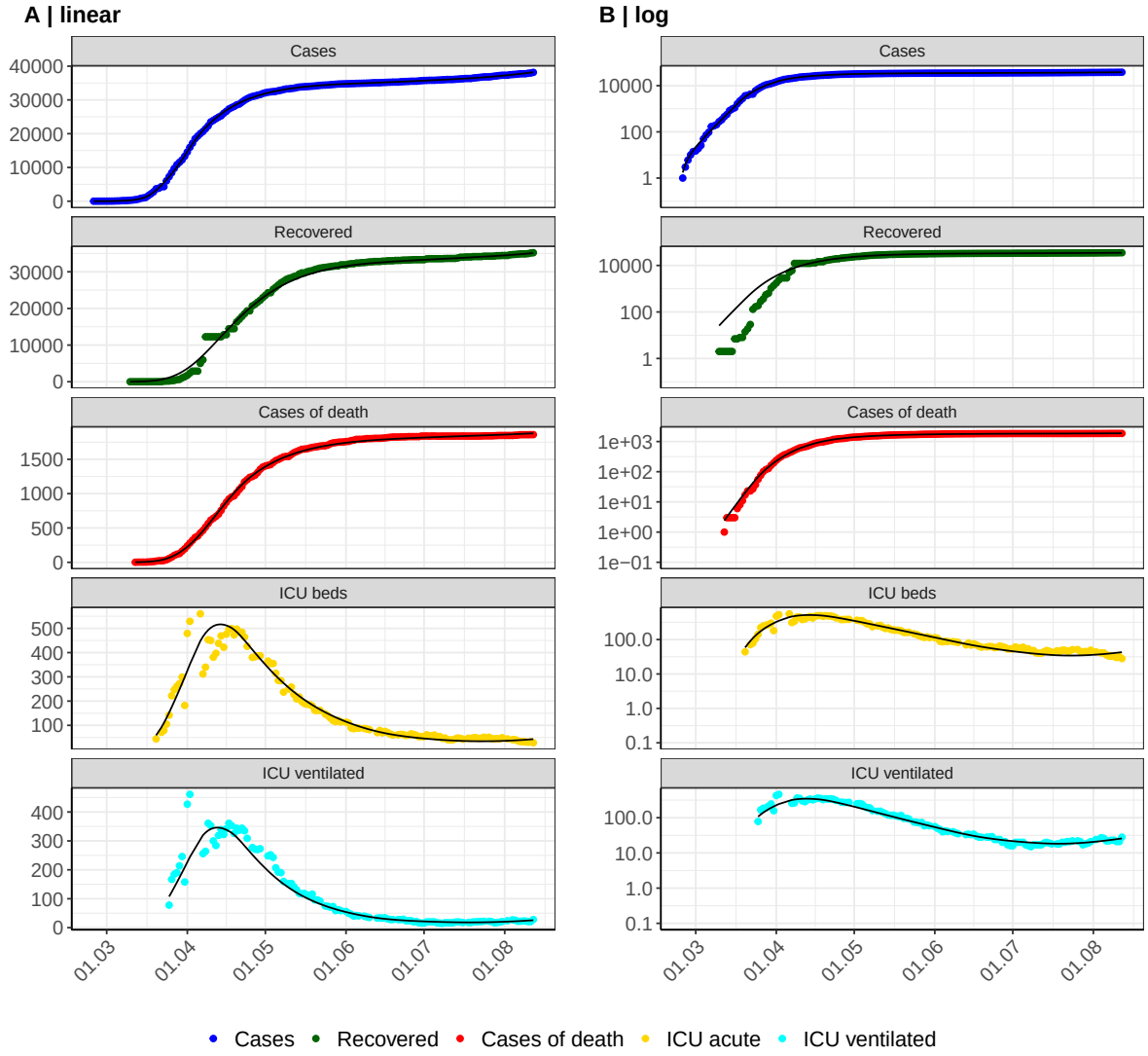


Figure 11: Model description of the reported case numbers, occupancy of hospital beds, recovery and deaths in Baden-Wuerttemberg. Points: reported data; lines: model description.

Fig. 12 shows the goodness-of-fit for Baden-Wuerttemberg. The values calculated by the model are plotted against the observed data. If the model fit is good, the points scatter randomly along the lines of identity.

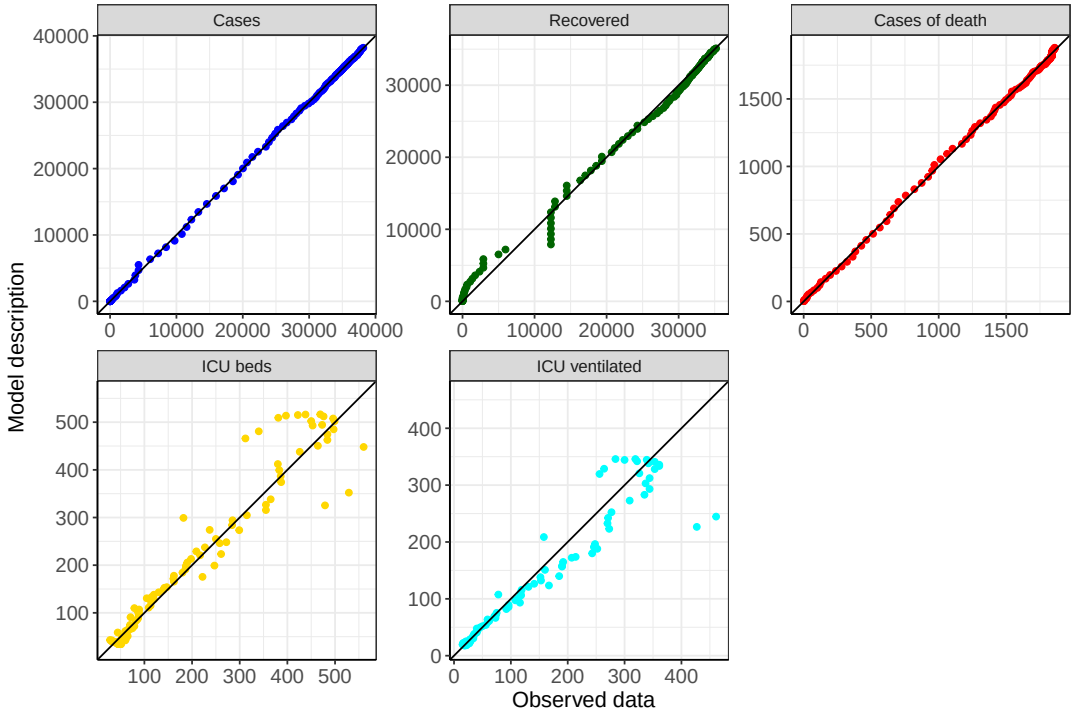


Figure 12: Goodness-of-fit plots for Baden-Wuerttemberg. Lines: lines of identity.

Fig. 13 shows the influence of non-pharmaceutical interventions (NPI) on R(t) for Baden-Wuerttemberg (red line) in comparison with the other federal states (grey lines).

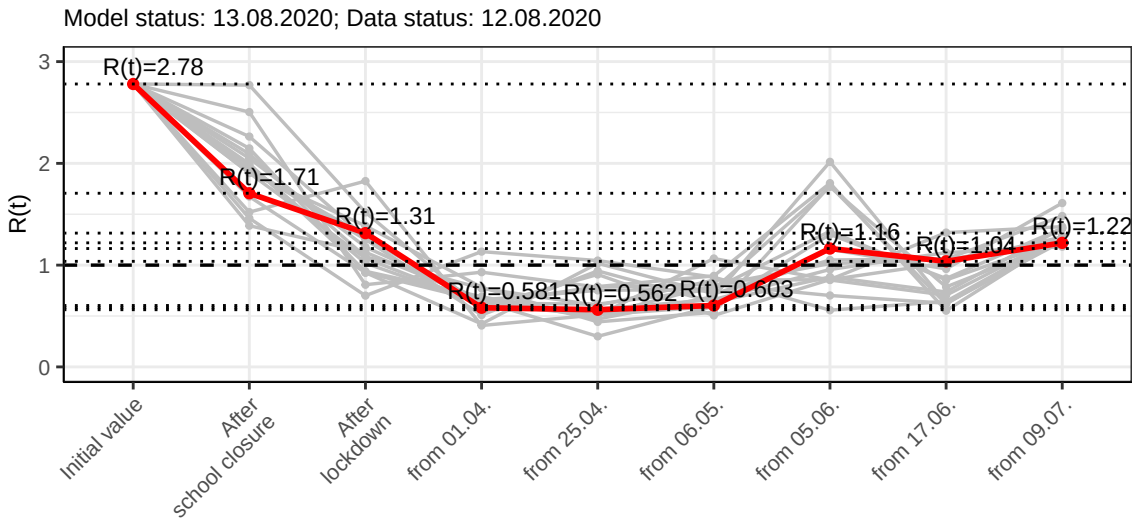


Figure 13: R(t) values before and after the NPIs for Baden-Wuerttemberg

Fig. 14 shows the R(t) estimated value for Baden-Wuerttemberg (red line) over time in comparison with the other federal states (grey lines).

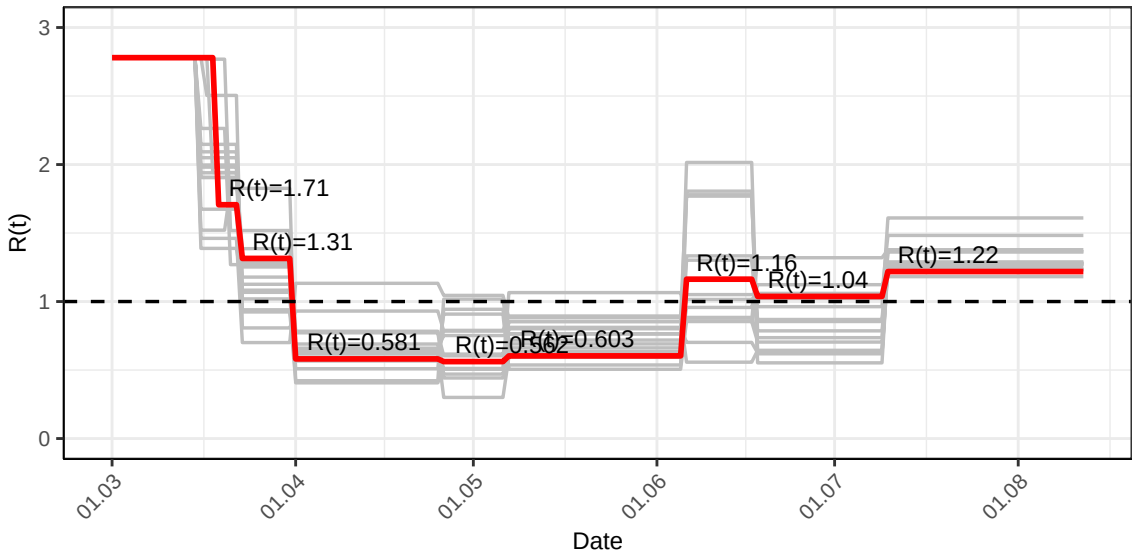


Figure 14: R(t) values over time for Baden-Wuerttemberg

2.2 Model predictions

2.2.1 Prediction for the next 4 weeks assuming that R(t) estimate will not change (R(t) = 1.22)

Fig. 15 and 16 depict the the model predictions for the next 4 weeks for Baden-Wuerttemberg on a linear (15) and a semi-logarithmic (16) scale. The modeling was carried out under the assumption that the R(t) estimated value would remain the same.

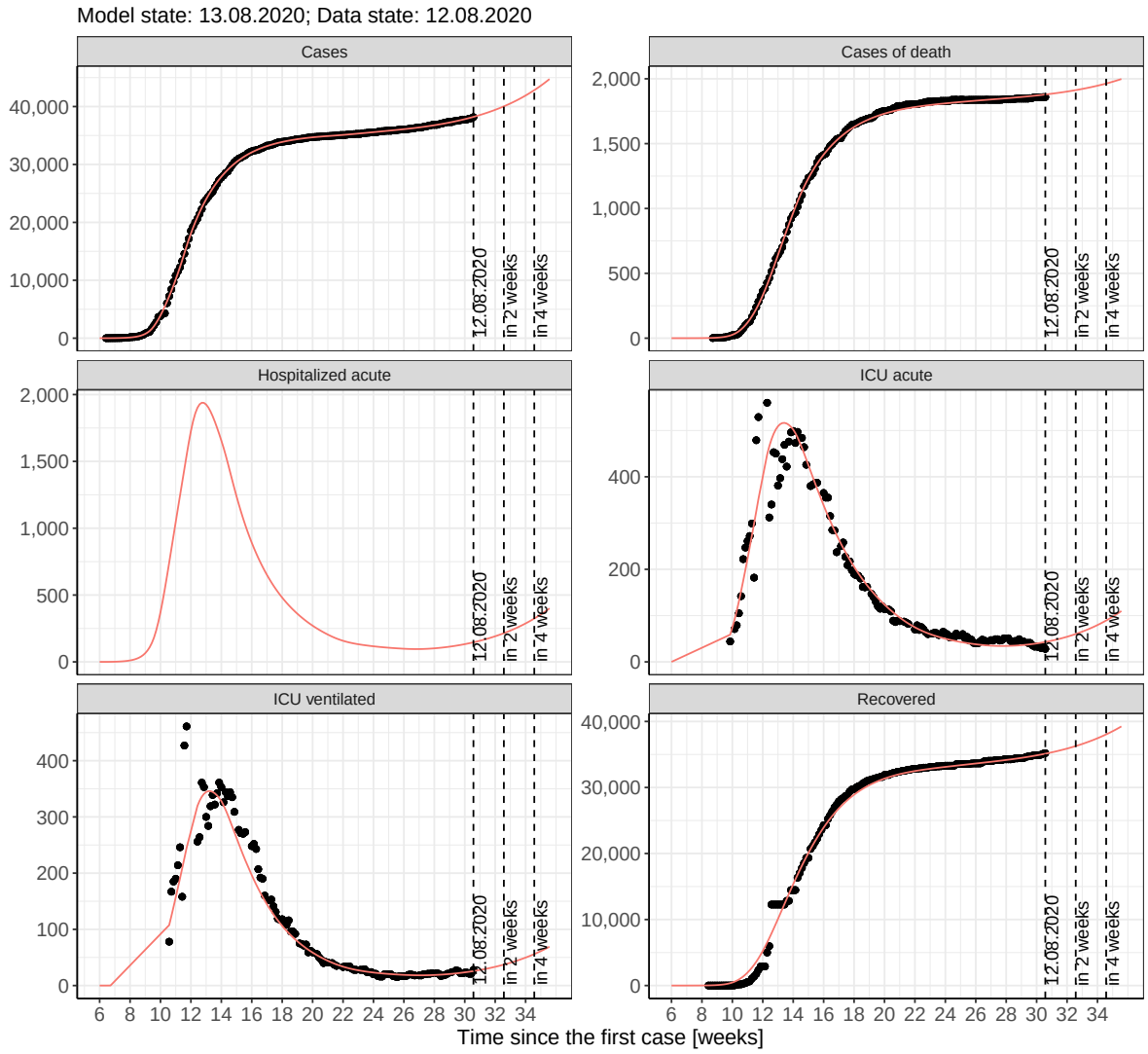


Figure 15: Representation of the model predictions for Baden-Wuerttemberg for the next 4 weeks under the assumption that the R(t) estimate remains the same on linear scale (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths). Points: Reported case numbers; Red lines: Model predictions.

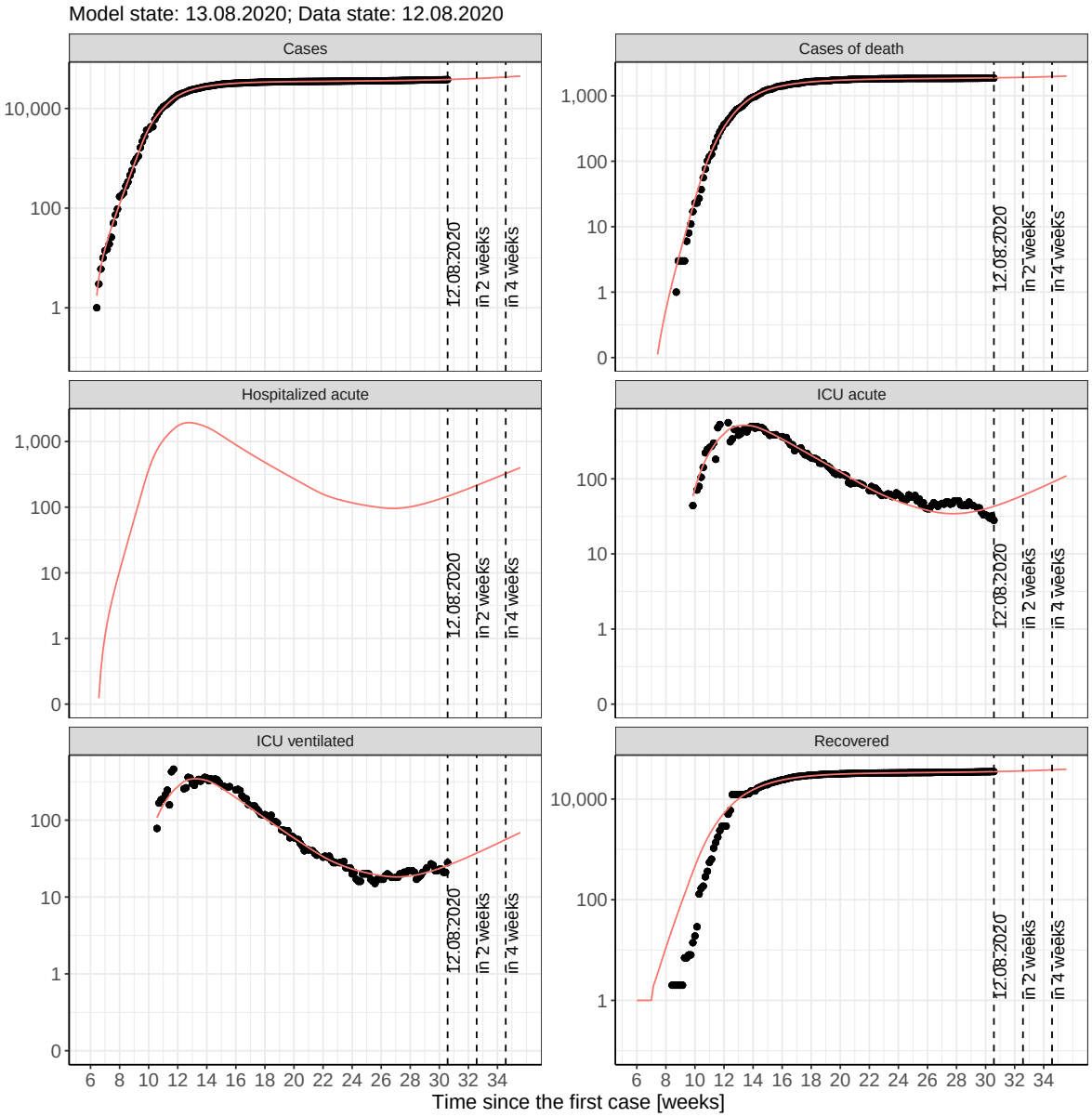


Figure 16: Semi-logarithmic representation of the model prediction (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Baden-Wuerttemberg for the next 4 weeks under the assumption that the R(t) estimate remains the same. Points: Reported case numbers; Red lines: Model predictions.

2.2.2 Predictions for the next 4 weeks assuming different scenarios (with the R(t) value above 1.2) from 13.08.2020

Fig. 17 and 18 represent the model prediction for the next 4 weeks for Baden-Wuerttemberg on a linear (17) and a semi-logarithmic (18) scale. In this simulation different scenarios of the possible development (R(t) = 1.4, 1.6, 1.8 and staying the same) from 13.08.2020 were tested.

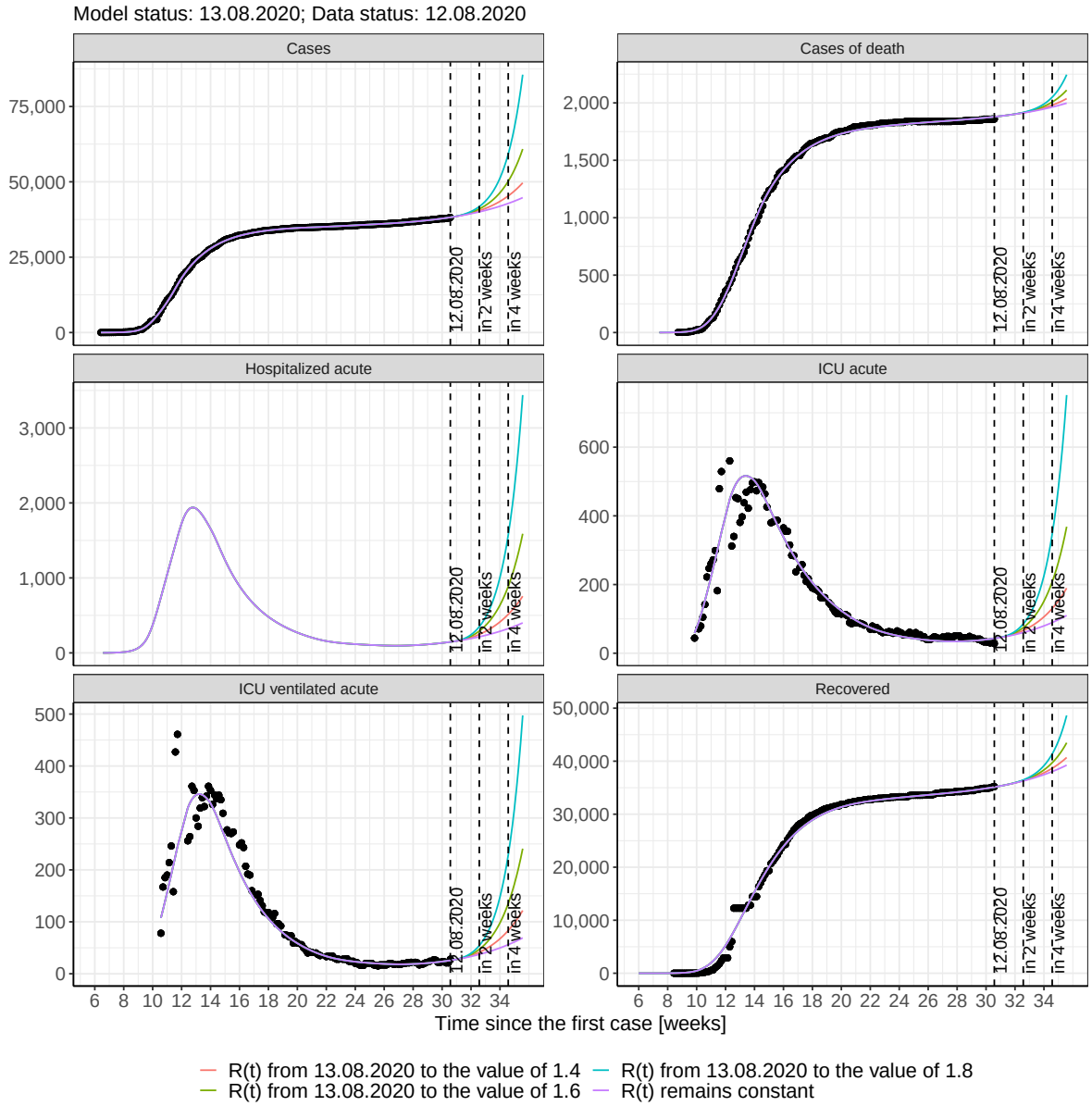


Figure 17: Linear representation of model prediction (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Baden-Wuerttemberg assuming various scenarios from the 13.08.2020. Points: Reported case numbers; Lines: Model predictions.

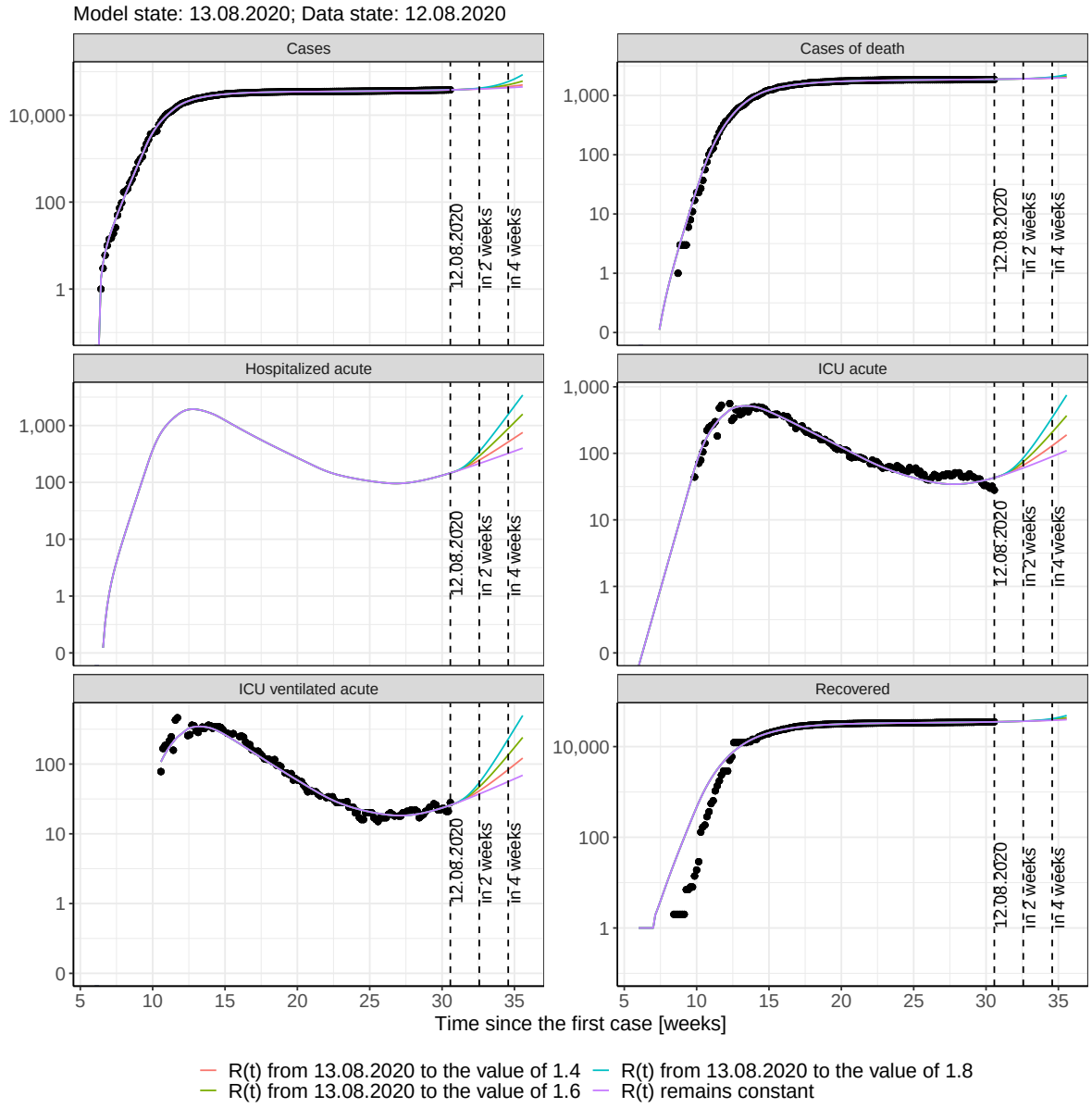


Figure 18: Semi-logarithmic representation of model predictions (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Baden-Wuerttemberg assuming various scenarios from the 13.08.2020. Points: Reported case numbers; Lines: Model predictions.

Fig. 19 and 20 represent the model prediction for the next 16 weeks for Baden-Wuerttemberg on a linear (19) and a semi-logarithmic (20) scale. In this simulation different scenarios of the possible course from the 13.08.2020 were tested.

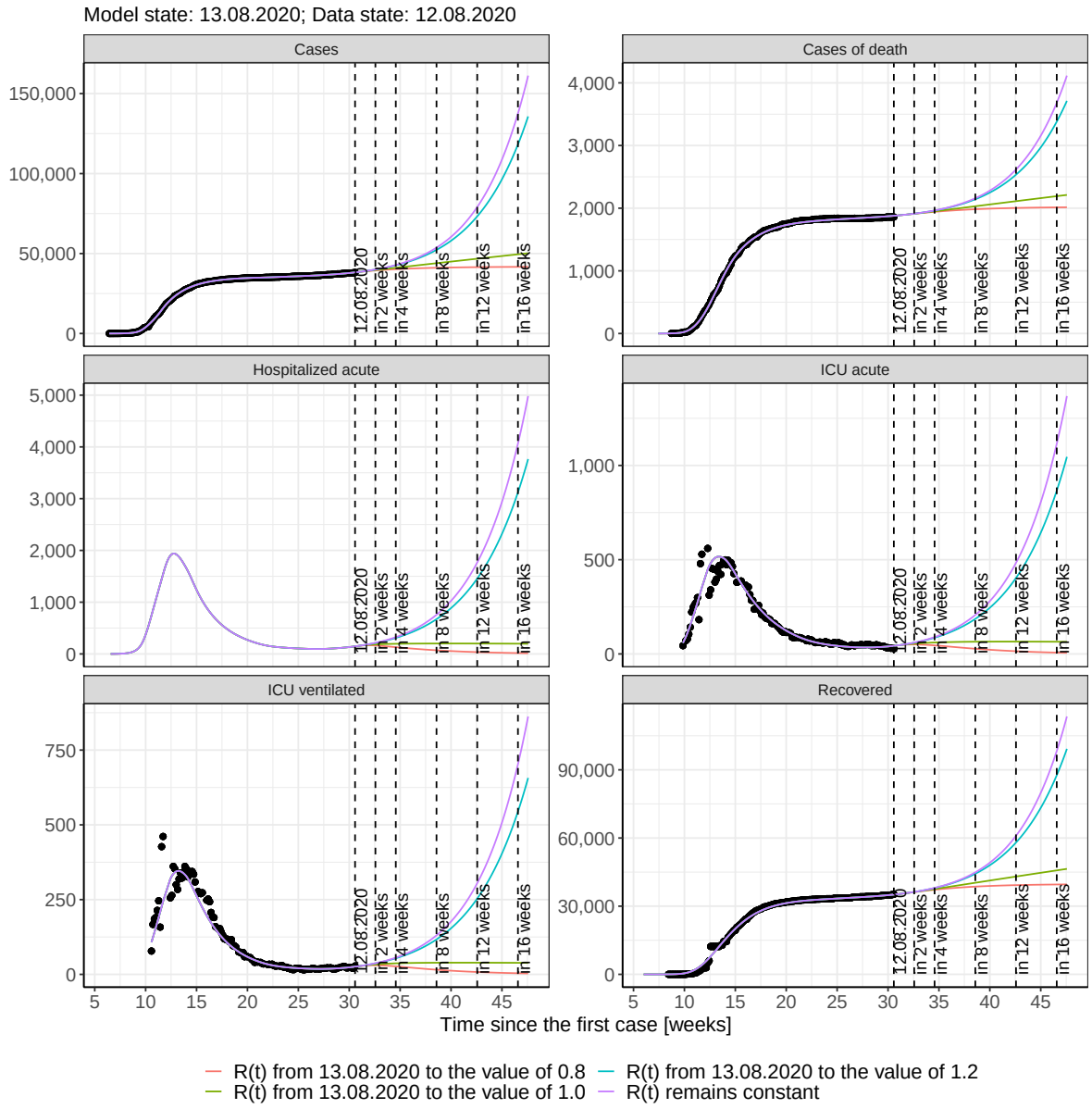


Figure 19: Linear representation of model predictions (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Baden-Wuerttemberg assuming various scenarios from the 13.08.2020. Points: reported case numbers; lines: model prediction.

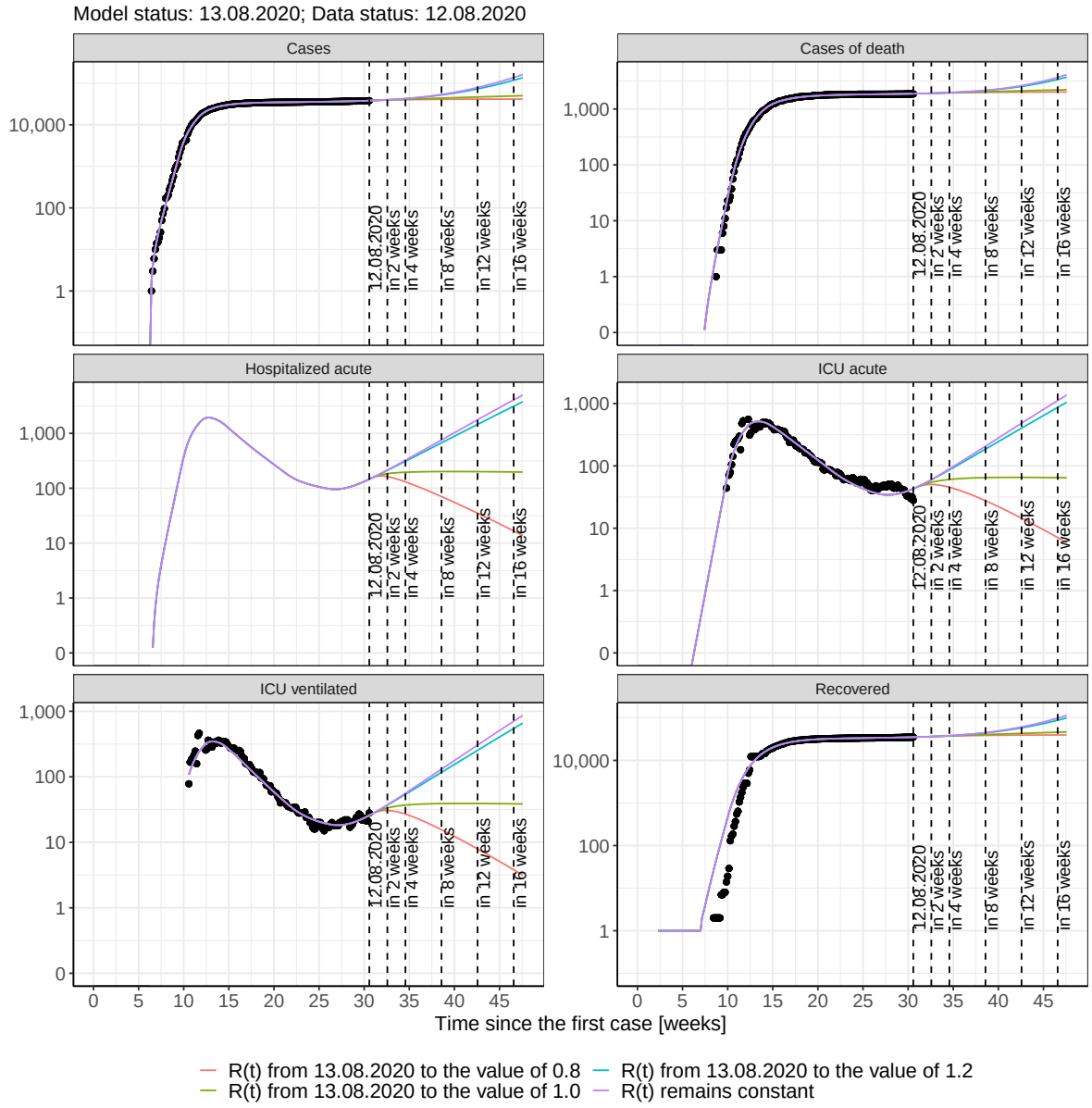


Figure 20: Semi-logarithmic depiction of the model prediction (cases, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Baden-Wuerttemberg assuming various scenarios after 13.08.2020. Points: reported case numbers;lines: model predictions.

The tables show the modeling results for four conceivable scenarios: Scenario 1: The R(t) estimated value after 13.08.2020 remains the same as today's value (Tab. 2); Scenario 2: The R(t) estimated value after 13.08.2020 takes the value of 0.8 (Tab. 3); Scenario 3: The R(t) estimated value takes the value of 1 after the 13.08.2020 (Tab. 4); Scenario 4: The R(t) estimated value takes the value of 1.2 after the 13.08.2020 (Tab. 5) Model status from 13.08.2020; Data status: 12.08.2020.

Table 2: Baden-Wuerttemberg - R(t) remains unchanged after the 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	38319	1881	35184	150	44	26
14.08.2020	38428	1883	35254	154	45	27
15.08.2020	38540	1885	35326	158	46	28
16.08.2020	38656	1887	35399	162	47	28
17.08.2020	38776	1890	35475	167	48	29
18.08.2020	38899	1892	35554	171	49	30
19.08.2020	39026	1894	35635	176	50	31
20.08.2020	39157	1896	35718	181	52	32
21.08.2020	39292	1899	35804	186	53	32
22.08.2020	39432	1902	35892	192	54	33
23.08.2020	39576	1904	35983	197	56	34
24.08.2020	39724	1907	36077	203	57	35
25.08.2020	39877	1910	36174	209	59	36
26.08.2020	40034	1913	36273	215	60	37
27.08.2020	40197	1916	36376	221	62	38
28.08.2020	40364	1919	36482	227	64	39
29.08.2020	40537	1922	36591	234	65	41
30.08.2020	40715	1925	36704	241	67	42
31.08.2020	40899	1928	36820	248	69	43
01.09.2020	41088	1932	36939	256	71	44
02.09.2020	41283	1935	37063	263	73	46
03.09.2020	41484	1939	37190	271	75	47
04.09.2020	41692	1943	37321	279	77	48
05.09.2020	41906	1947	37456	288	80	50
06.09.2020	42127	1951	37595	296	82	51
07.09.2020	42354	1955	37739	305	84	53
08.09.2020	42589	1959	37887	315	87	54
09.09.2020	42831	1963	38039	324	89	56

Table 3: Baden-Wuerttemberg - R(t) takes on the value of 0.8 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	38315	1881	35184	150	44	26
14.08.2020	38415	1883	35254	154	45	27
15.08.2020	38512	1885	35325	157	46	28
16.08.2020	38606	1887	35398	160	47	28
17.08.2020	38698	1889	35473	163	47	29
18.08.2020	38786	1892	35550	165	48	29
19.08.2020	38873	1894	35627	166	49	30
20.08.2020	38956	1896	35706	167	49	30
21.08.2020	39038	1899	35785	167	50	30
22.08.2020	39117	1901	35865	167	50	30
23.08.2020	39194	1904	35946	167	50	31
24.08.2020	39268	1906	36027	166	50	31
25.08.2020	39341	1908	36108	165	50	31
26.08.2020	39411	1911	36188	163	50	31
27.08.2020	39480	1913	36269	161	50	31
28.08.2020	39546	1915	36349	160	50	30
29.08.2020	39611	1918	36428	158	50	30
30.08.2020	39673	1920	36507	155	50	30
31.08.2020	39734	1922	36586	153	50	30
01.09.2020	39793	1925	36663	151	49	30
02.09.2020	39851	1927	36739	148	49	29
03.09.2020	39907	1929	36814	146	48	29
04.09.2020	39961	1931	36888	143	48	29
05.09.2020	40014	1934	36961	141	47	28
06.09.2020	40065	1936	37033	138	47	28
07.09.2020	40115	1938	37104	136	46	28
08.09.2020	40163	1940	37173	133	46	27
09.09.2020	40210	1942	37241	131	45	27

Table 4: Baden-Wuerttemberg - R(t) takes on the value of 1.0 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	38317	1881	35184	150	44	26
14.08.2020	38421	1883	35254	154	45	27
15.08.2020	38525	1885	35325	158	46	28
16.08.2020	38629	1887	35399	161	47	28
17.08.2020	38733	1889	35474	165	48	29
18.08.2020	38837	1892	35552	168	49	30
19.08.2020	38940	1894	35631	171	49	30
20.08.2020	39044	1896	35711	173	50	31
21.08.2020	39148	1899	35793	176	51	31
22.08.2020	39252	1901	35877	178	52	32
23.08.2020	39355	1904	35962	180	53	32
24.08.2020	39459	1906	36049	182	53	33
25.08.2020	39562	1909	36136	183	54	33
26.08.2020	39666	1912	36225	184	54	33
27.08.2020	39769	1914	36314	186	55	34
28.08.2020	39872	1917	36405	187	56	34
29.08.2020	39975	1920	36497	188	56	34
30.08.2020	40079	1922	36589	189	57	35
31.08.2020	40182	1925	36682	190	57	35
01.09.2020	40285	1928	36776	191	58	35
02.09.2020	40388	1930	36870	191	58	36
03.09.2020	40491	1933	36965	192	58	36
04.09.2020	40594	1936	37060	193	59	36
05.09.2020	40697	1939	37156	193	59	36
06.09.2020	40800	1942	37252	194	60	36
07.09.2020	40902	1944	37349	195	60	37
08.09.2020	41005	1947	37445	195	60	37
09.09.2020	41108	1950	37542	195	61	37

Table 5: Baden-Wuerttemberg - R(t) takes on the value of 1.2 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	38318	1881	35184	150	44	26
14.08.2020	38427	1883	35254	154	45	27
15.08.2020	38539	1885	35325	158	46	28
16.08.2020	38654	1887	35399	162	47	28
17.08.2020	38772	1889	35475	167	48	29
18.08.2020	38893	1892	35554	171	49	30
19.08.2020	39018	1894	35634	176	50	31
20.08.2020	39147	1896	35717	180	51	32
21.08.2020	39279	1899	35803	185	53	32
22.08.2020	39415	1902	35891	190	54	33
23.08.2020	39554	1904	35981	195	55	34
24.08.2020	39698	1907	36074	201	57	35
25.08.2020	39846	1910	36170	206	58	36
26.08.2020	39998	1913	36269	212	60	37
27.08.2020	40154	1916	36370	217	61	38
28.08.2020	40315	1918	36474	223	63	39
29.08.2020	40480	1922	36582	229	64	40
30.08.2020	40650	1925	36692	236	66	41
31.08.2020	40824	1928	36806	242	68	42
01.09.2020	41004	1931	36923	249	70	43
02.09.2020	41189	1935	37043	256	71	45
03.09.2020	41379	1938	37167	263	73	46
04.09.2020	41574	1942	37294	270	75	47
05.09.2020	41775	1946	37425	277	77	48
06.09.2020	41981	1950	37560	285	79	50
07.09.2020	42194	1954	37698	293	82	51
08.09.2020	42412	1958	37840	301	84	52
09.09.2020	42637	1962	37987	310	86	54

2.2.3 Prediction for the next 4 weeks under the assumption of different scenarios from 13.08.2020

Fig. 21 shows the absolute changes in case numbers compared to the previous day for the next 4 weeks for different R(t) values. If no bars are shown on the plot it means that the number of cases has not changed compared to the previous day.

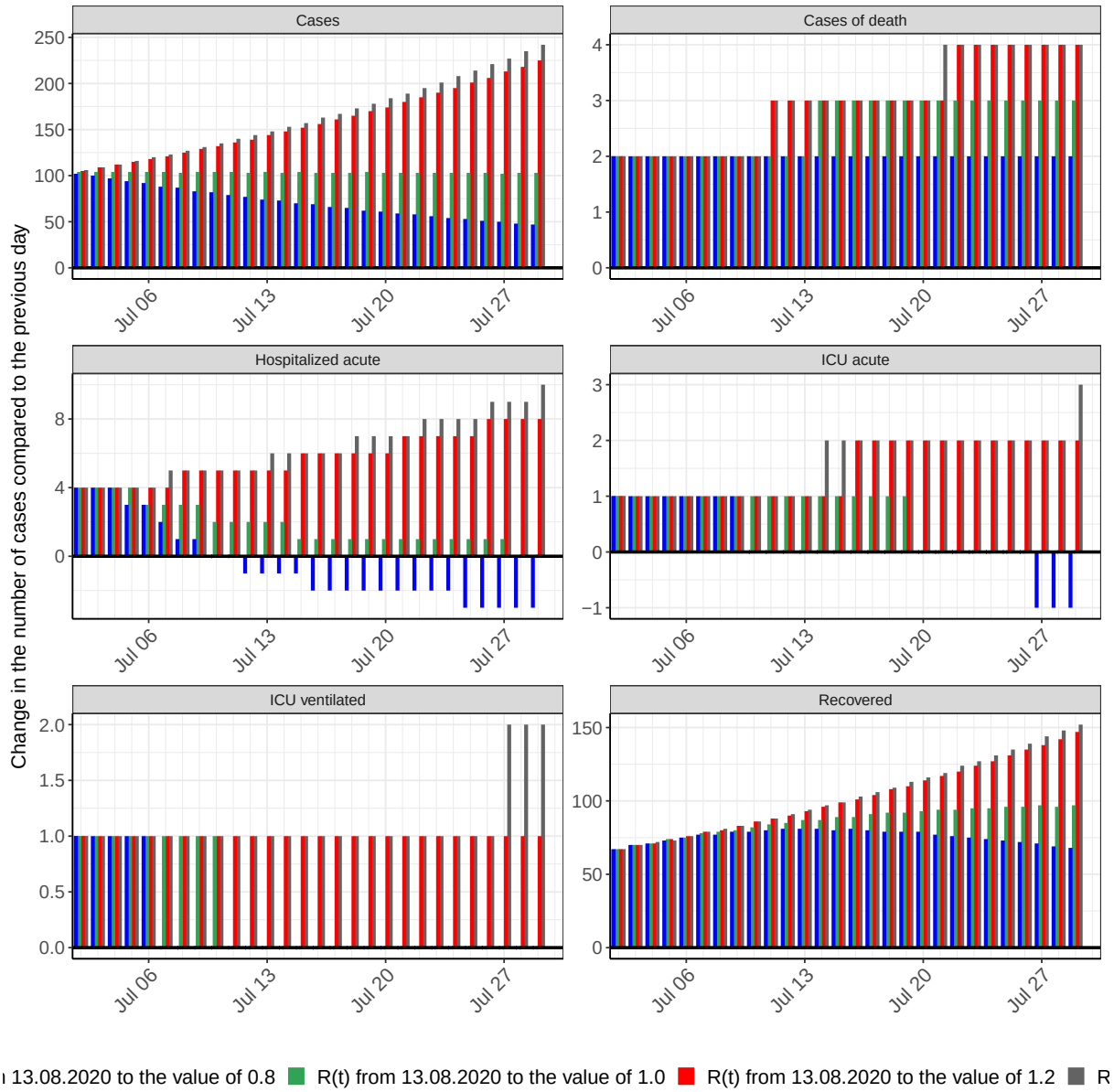


Figure 21: Simulation of daily new cases for the next 4 weeks - Baden-Wuerttemberg

3 Bavaria

3.1 Model description

Fig. 22 depicts the results of the modeling (lines) compared to the observed data (points) for Bavaria on a linear (A) and semi-logarithmic (B) scale.

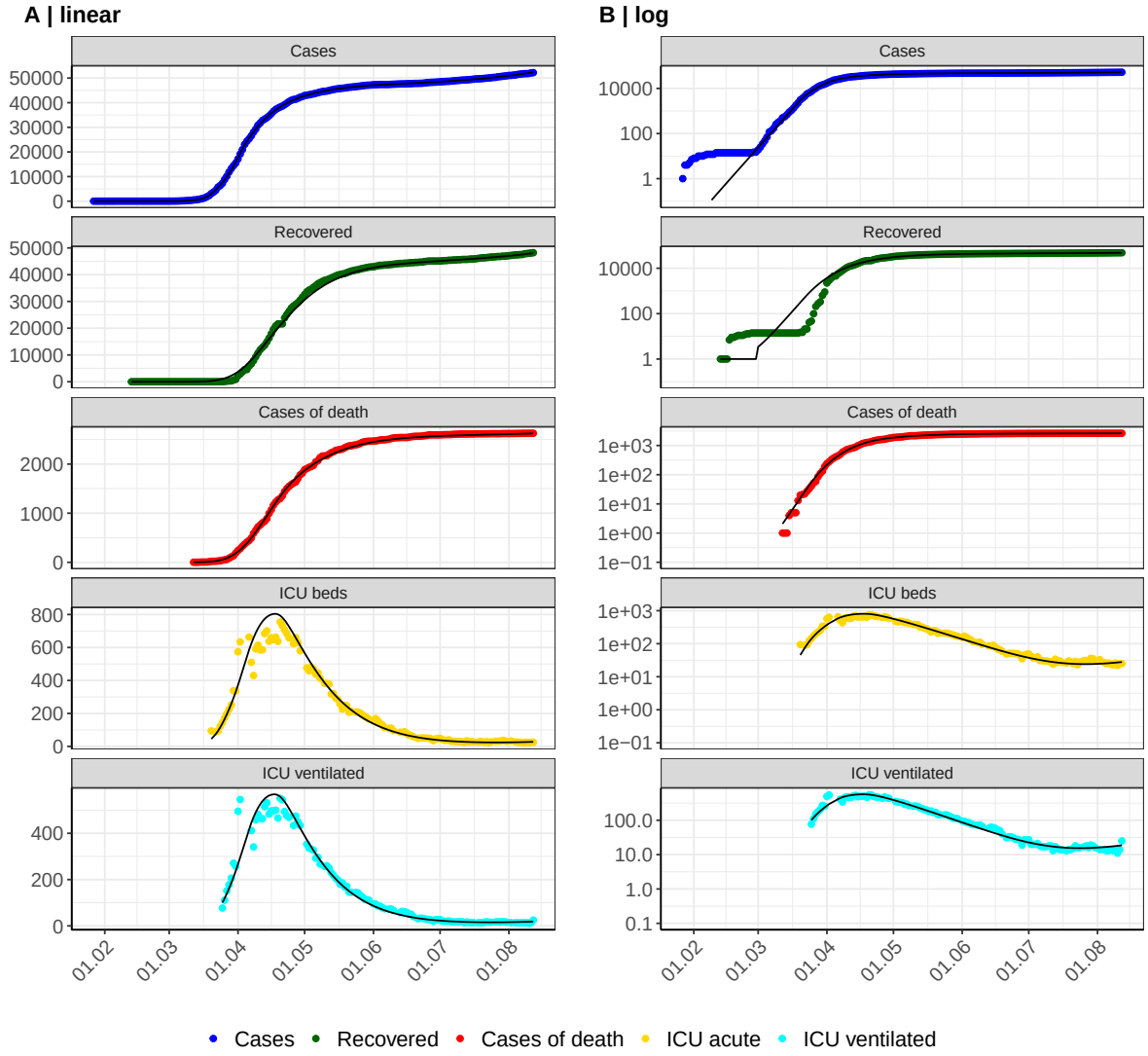


Figure 22: Model description of the reported case numbers, occupancy of hospital beds, recovery and deaths in Bavaria. Points: reported data; lines: model description.

Fig. 23 shows the goodness-of-fit for Bavaria. The values calculated by the model are plotted against the observed data. If the model fit is good, the points scatter randomly along the lines of identity.

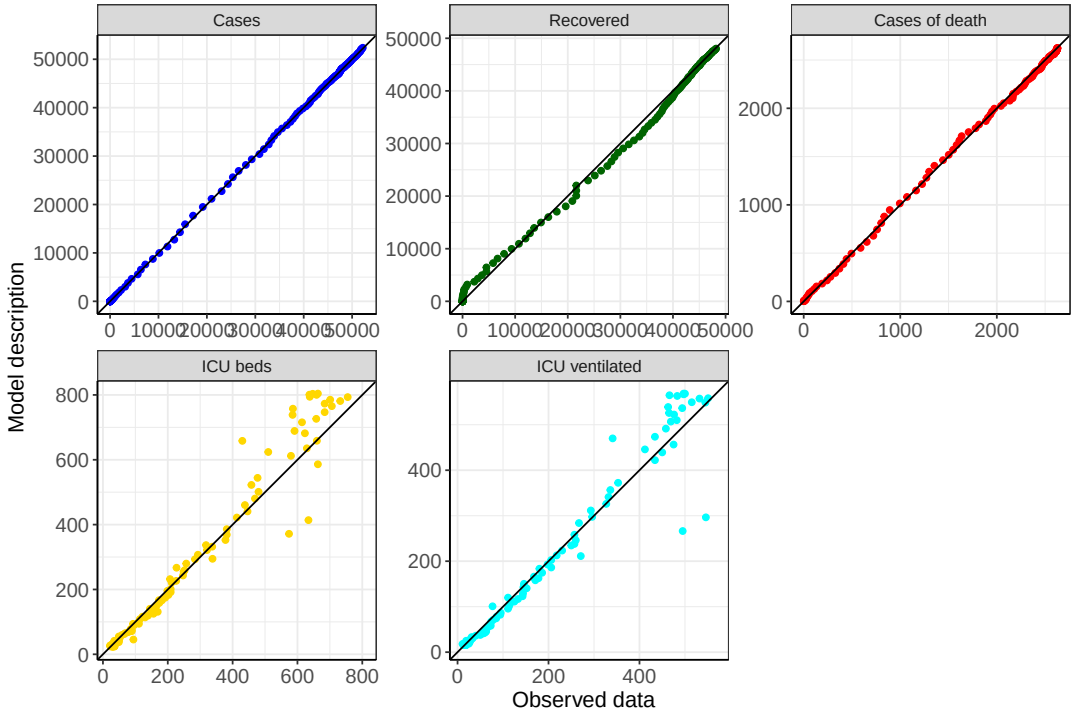


Figure 23: Goodness-of-fit plots for Bavaria. Lines: lines of identity.

Fig. 24 shows the influence of non-pharmaceutical interventions (NPI) on R(t) for Bavaria (red line) in comparison with the other federal states (grey lines).

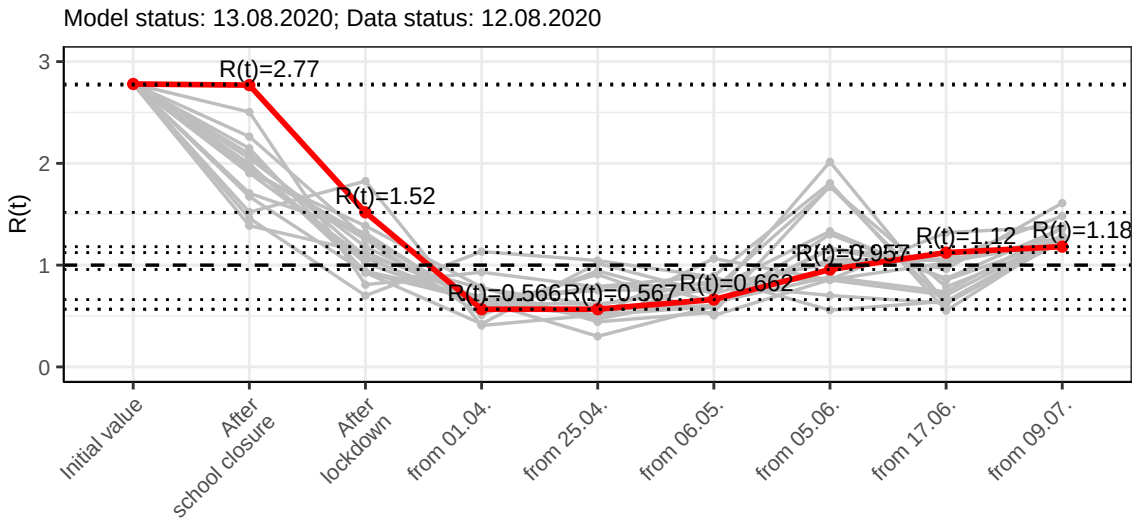


Figure 24: R(t) values before and after the NPIs for Bavaria

Fig. 25 shows the R(t) estimated value for Bavaria (red line) over time in comparison with the other federal states (grey lines).

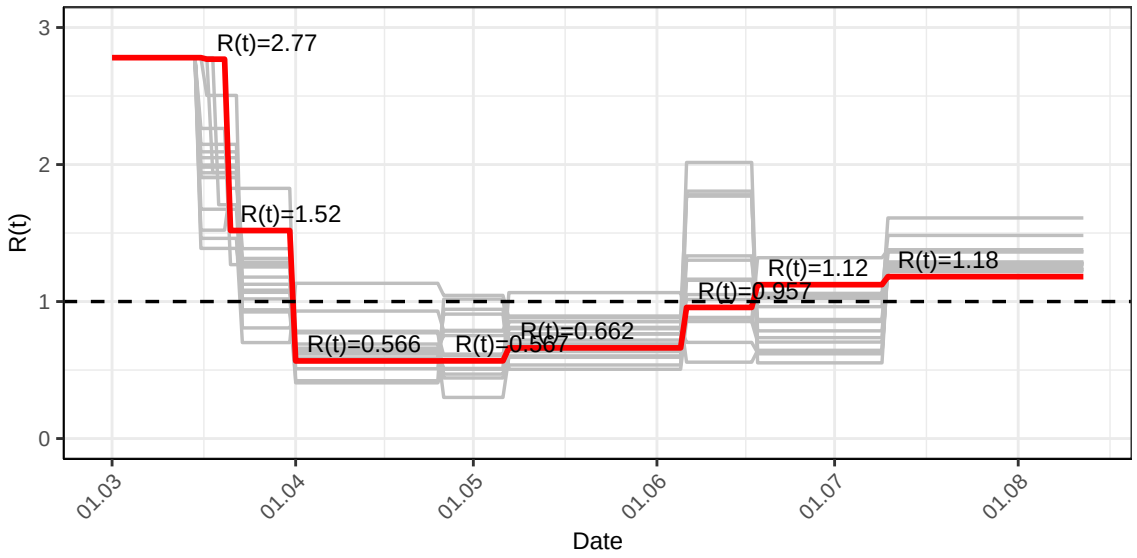


Figure 25: R(t) values over time for Bavaria

3.2 Model predictions

3.2.1 Prediction for the next 4 weeks assuming that R(t) estimate will not change (R(t) = 1.18)

Fig. 26 and 27 depict the the model predictions for the next 4 weeks for Bavaria on a linear (26) and a semi-logarithmic (27) scale. The modeling was carried out under the assumption that the R(t) estimated value would remain the same.

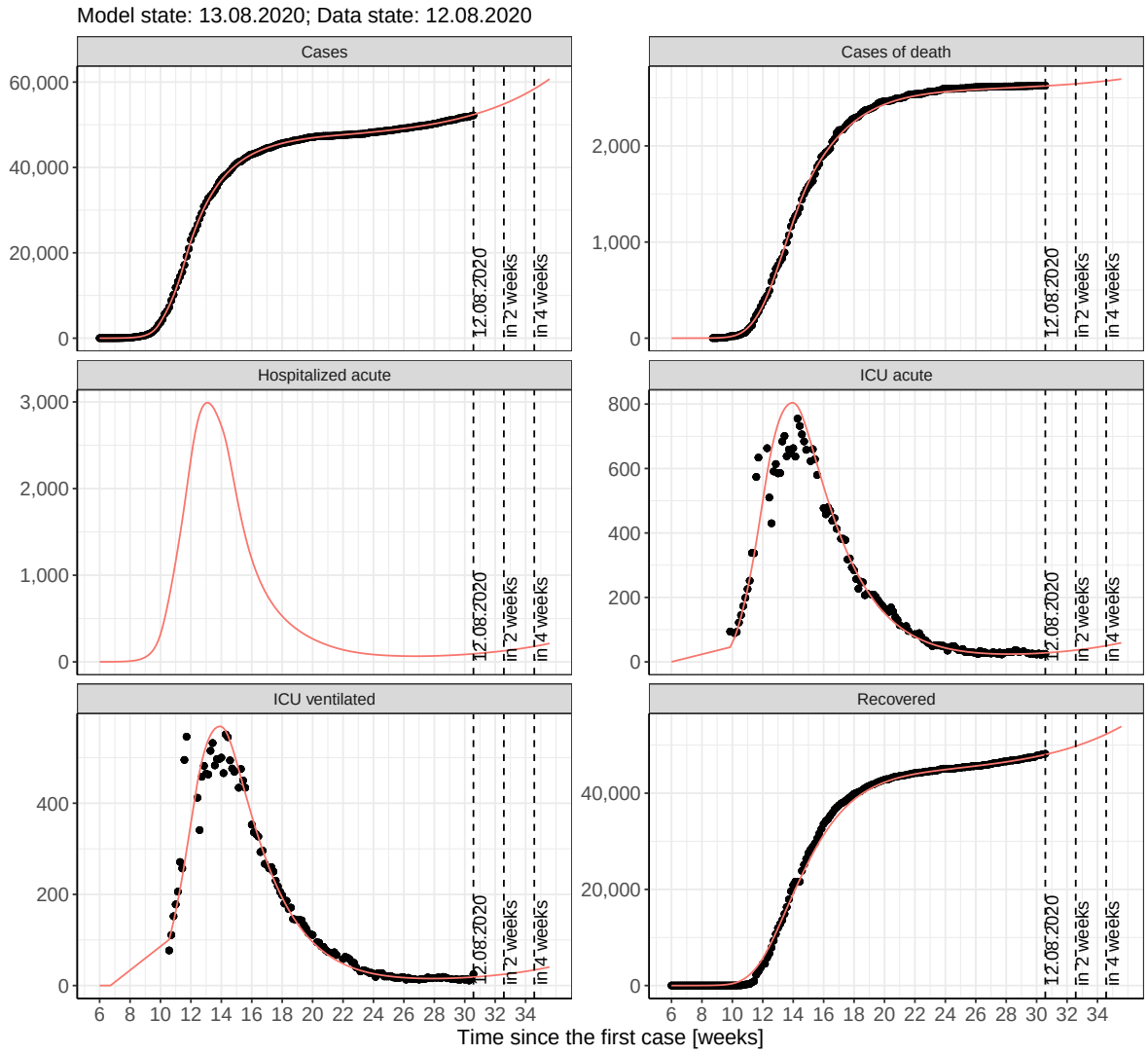


Figure 26: Representation of the model predictions for Bavaria for the next 4 weeks under the assumption that the R(t) estimate remains the same on linear scale (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths). Points: Reported case numbers; Red lines: Model predictions.

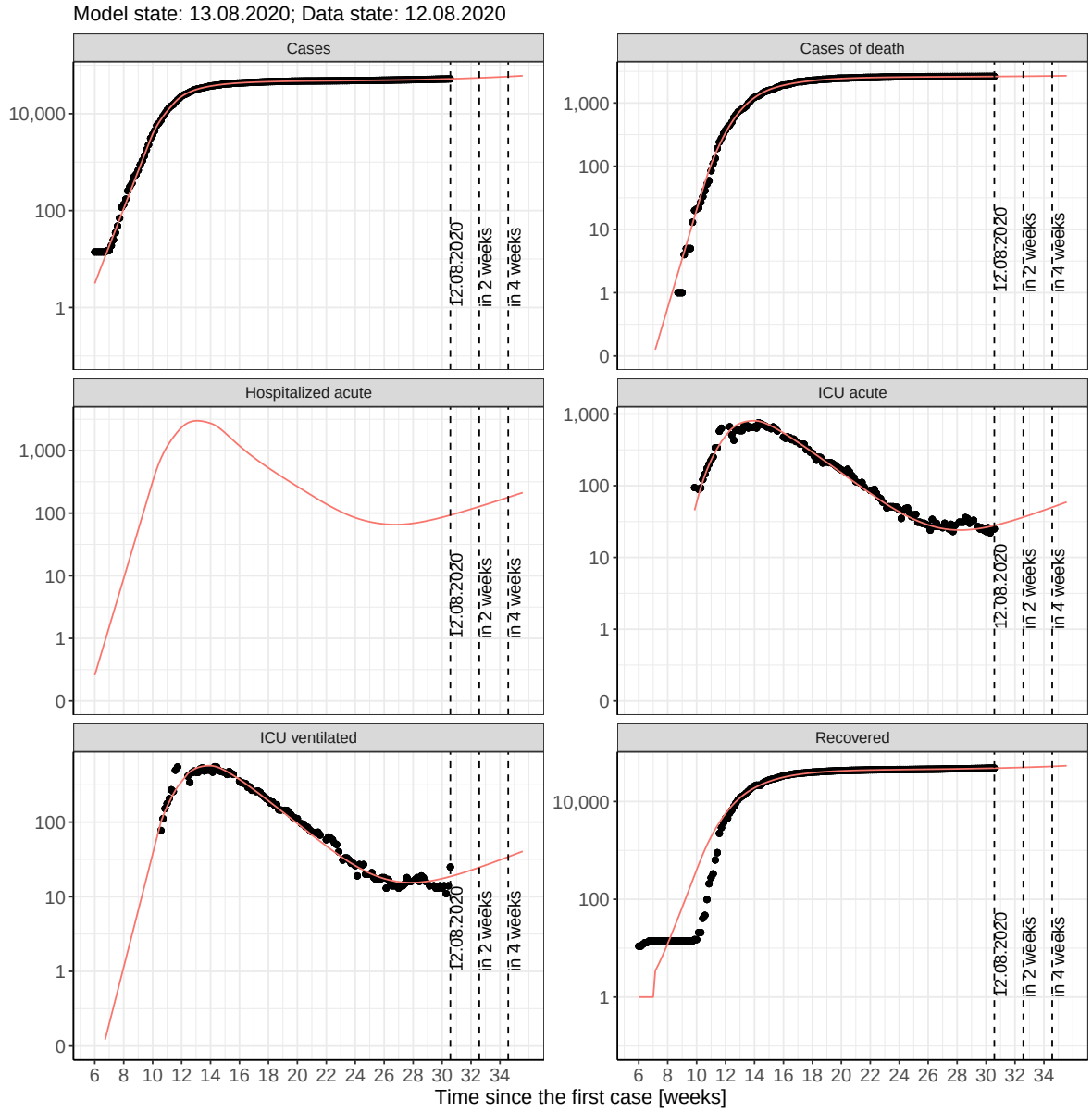


Figure 27: Semi-logarithmic representation of the model prediction (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Bavaria for the next 4 weeks under the assumption that the R(t) estimate remains the same. Points: Reported case numbers; Red lines: Model predictions.

3.2.2 Predictions for the next 4 weeks assuming different scenarios (with the R(t) value above 1.2) from 13.08.2020

Fig. 28 and 29 represent the model prediction for the next 4 weeks for Bavaria on a linear (28) and a semi-logarithmic (29) scale. In this simulation different scenarios of the possible development (R(t) = 1.4, 1.6, 1.8 and staying the same) from 13.08.2020 were tested.

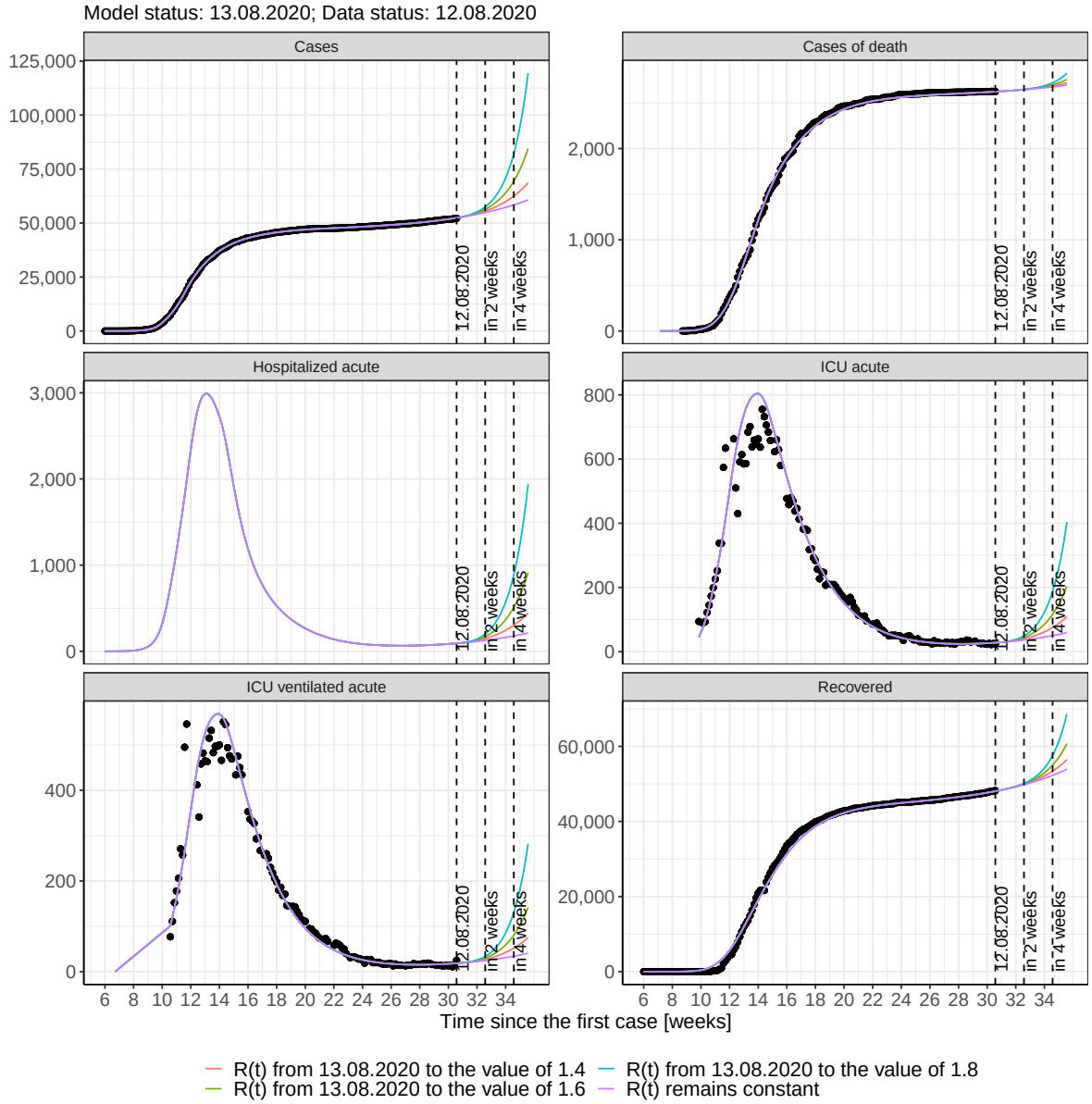


Figure 28: Linear representation of model prediction (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Bavaria assuming various scenarios from the 13.08.2020. Points: Reported case numbers; Lines: Model predictions.

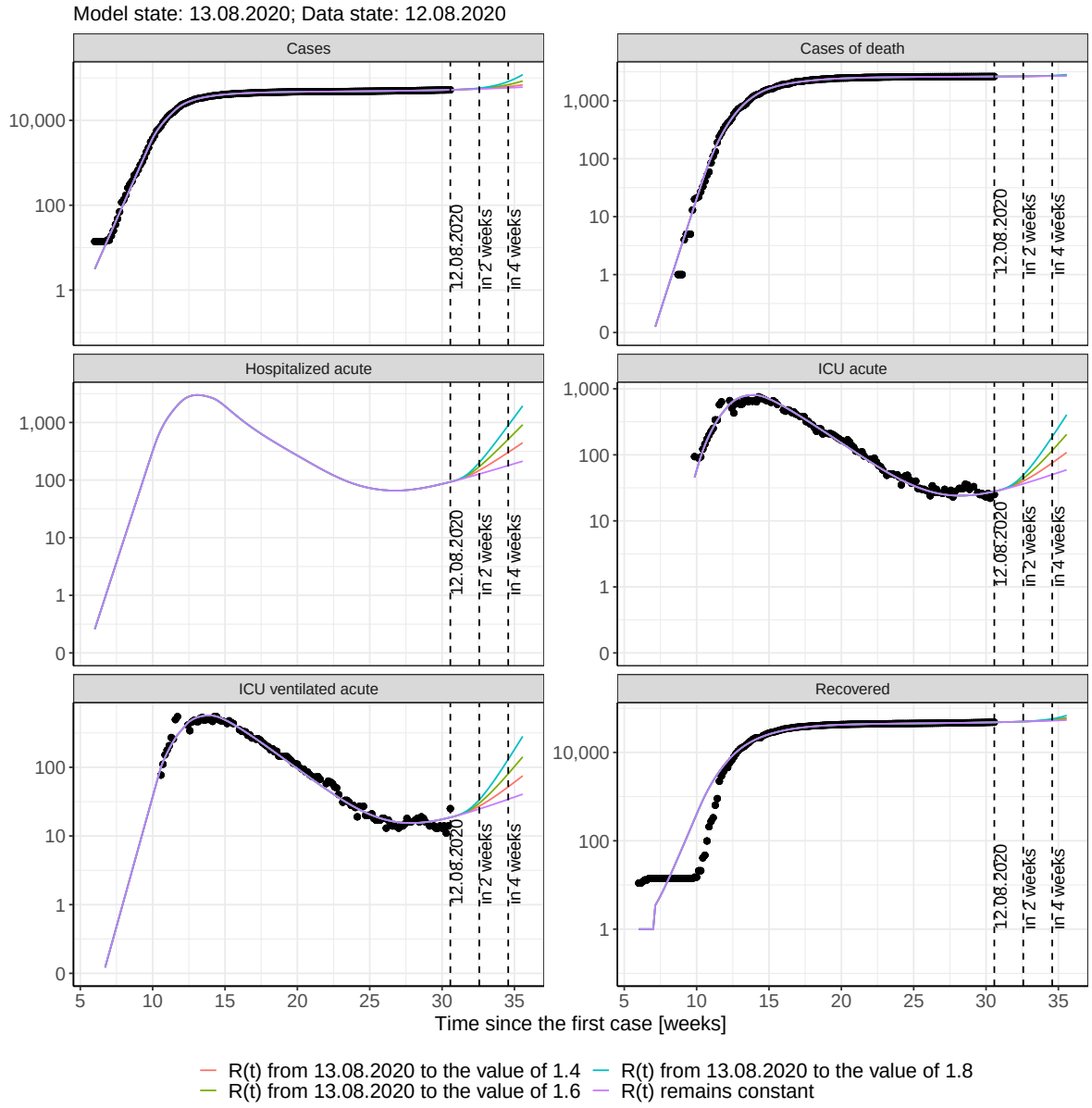


Figure 29: Semi-logarithmic representation of model predictions (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Bavaria assuming various scenarios from the 13.08.2020. Points: Reported case numbers; Lines: Model predictions.

Fig. 30 and 31 represent the model prediction for the next 16 weeks for Bavaria on a linear (30) and a semi-logarithmic (31) scale. In this simulation different scenarios of the possible course from the 13.08.2020 were tested.

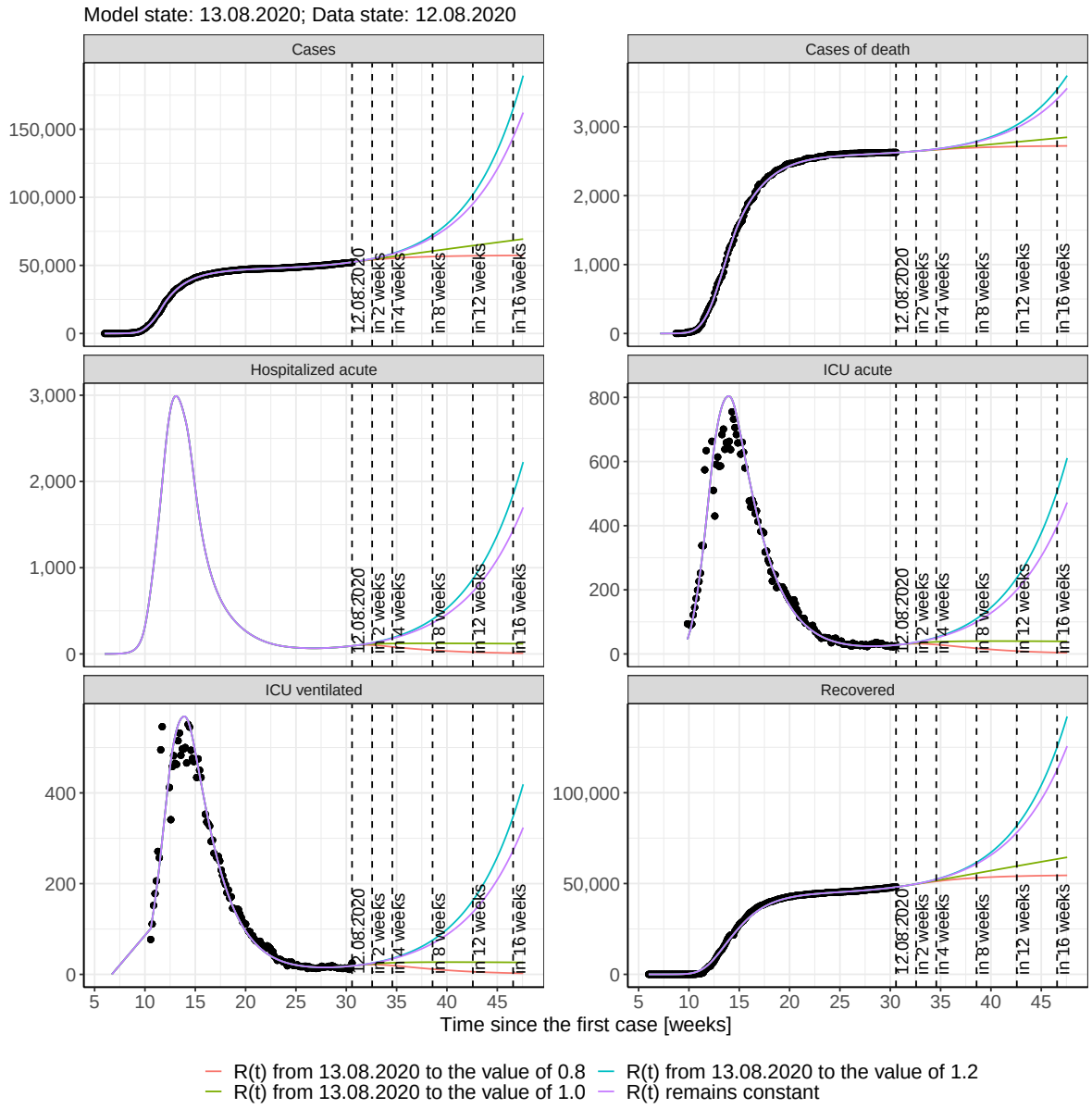


Figure 30: Linear representation of model predictions (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Bavaria assuming various scenarios from the 13.08.2020. Points: reported case numbers; lines: model prediction.

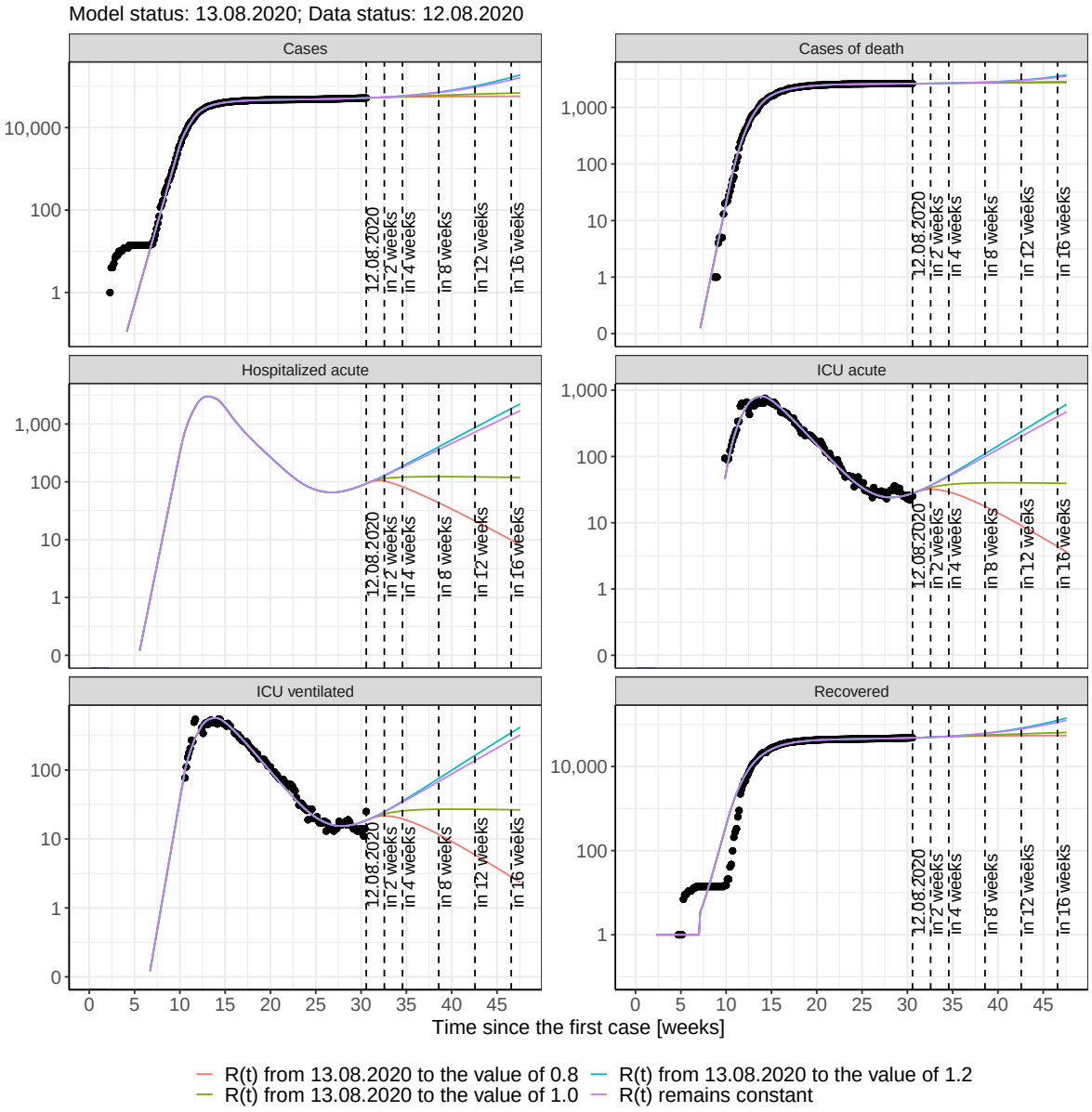


Figure 31: Semi-logarithmic depiction of the model prediction (cases, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Bavaria assuming various scenarios after 13.08.2020. Points: reported case numbers;lines: model predictions.

The tables show the modeling results for four conceivable scenarios: Scenario 1: The R(t) estimated value after 13.08.2020 remains the same as today's value (Tab. 6); Scenario 2: The R(t) estimated value after 13.08.2020 takes the value of 0.8 (Tab. 7); Scenario 3: The R(t) estimated value takes the value of 1 after the 13.08.2020 (Tab. 8); Scenario 4: The R(t) estimated value takes the value of 1.2 after the 13.08.2020 (Tab. 9) Model status from 13.08.2020; Data status: 12.08.2020.

Table 6: Bavaria - R(t) remains unchanged after the 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	52528	2626	48144	95	28	19
14.08.2020	52682	2627	48252	97	29	19
15.08.2020	52840	2628	48363	99	29	20
16.08.2020	53002	2630	48477	101	30	20
17.08.2020	53168	2631	48594	104	30	20
18.08.2020	53338	2633	48714	106	31	21
19.08.2020	53513	2634	48837	108	32	21
20.08.2020	53692	2636	48963	111	32	22
21.08.2020	53876	2638	49092	113	33	22
22.08.2020	54064	2639	49224	116	33	23
23.08.2020	54258	2641	49360	119	34	23
24.08.2020	54456	2643	49499	122	35	24
25.08.2020	54659	2644	49642	124	36	24
26.08.2020	54867	2646	49788	127	36	25
27.08.2020	55081	2648	49938	130	37	25
28.08.2020	55300	2650	50092	134	38	26
29.08.2020	55525	2652	50250	137	39	26
30.08.2020	55756	2654	50412	140	40	27
31.08.2020	55992	2656	50577	144	41	28
01.09.2020	56234	2658	50748	147	42	28
02.09.2020	56483	2660	50922	151	43	29
03.09.2020	56738	2662	51101	154	44	30
04.09.2020	57000	2664	51285	158	45	30
05.09.2020	57268	2667	51473	162	46	31
06.09.2020	57543	2669	51666	166	47	32
07.09.2020	57825	2671	51864	170	48	33
08.09.2020	58114	2674	52067	174	49	33
09.09.2020	58410	2676	52275	179	50	34

Table 7: Bavaria - R(t) takes on the value of 0.8 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	52524	2626	48144	95	28	19
14.08.2020	52666	2627	48252	97	29	19
15.08.2020	52804	2628	48363	99	29	20
16.08.2020	52938	2630	48476	101	30	20
17.08.2020	53068	2631	48591	102	30	20
18.08.2020	53194	2633	48708	103	31	21
19.08.2020	53317	2634	48826	104	31	21
20.08.2020	53436	2636	48946	105	31	21
21.08.2020	53552	2637	49066	105	31	21
22.08.2020	53664	2639	49187	105	32	21
23.08.2020	53774	2641	49308	105	32	21
24.08.2020	53880	2642	49429	104	32	22
25.08.2020	53983	2644	49549	103	32	22
26.08.2020	54083	2645	49669	103	32	22
27.08.2020	54180	2647	49789	102	32	22
28.08.2020	54275	2648	49907	100	32	22
29.08.2020	54366	2650	50024	99	32	22
30.08.2020	54455	2652	50140	98	32	21
31.08.2020	54542	2653	50255	96	32	21
01.09.2020	54626	2655	50368	95	31	21
02.09.2020	54708	2656	50479	93	31	21
03.09.2020	54787	2658	50588	92	31	21
04.09.2020	54864	2659	50696	90	31	21
05.09.2020	54939	2661	50802	89	30	21
06.09.2020	55012	2662	50905	87	30	20
07.09.2020	55083	2664	51007	85	30	20
08.09.2020	55151	2665	51107	84	30	20
09.09.2020	55218	2666	51204	82	29	20

Table 8: Bavaria - R(t) takes on the value of 1.0 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	52526	2626	48144	95	28	19
14.08.2020	52674	2627	48252	97	29	19
15.08.2020	52822	2628	48363	99	29	20
16.08.2020	52970	2630	48477	101	30	20
17.08.2020	53118	2631	48593	103	30	20
18.08.2020	53266	2633	48711	105	31	21
19.08.2020	53413	2634	48831	106	31	21
20.08.2020	53561	2636	48954	108	32	21
21.08.2020	53708	2638	49079	109	32	22
22.08.2020	53856	2639	49205	110	33	22
23.08.2020	54003	2641	49333	111	33	22
24.08.2020	54150	2642	49463	112	33	23
25.08.2020	54297	2644	49594	113	34	23
26.08.2020	54444	2646	49726	114	34	23
27.08.2020	54591	2647	49860	115	34	23
28.08.2020	54738	2649	49995	116	35	24
29.08.2020	54885	2651	50130	116	35	24
30.08.2020	55032	2653	50267	117	35	24
31.08.2020	55178	2654	50405	117	36	24
01.09.2020	55325	2656	50543	118	36	24
02.09.2020	55471	2658	50682	118	36	25
03.09.2020	55617	2660	50821	119	36	25
04.09.2020	55763	2662	50961	119	37	25
05.09.2020	55910	2663	51101	119	37	25
06.09.2020	56056	2665	51242	120	37	25
07.09.2020	56202	2667	51384	120	37	25
08.09.2020	56347	2669	51525	120	38	25
09.09.2020	56493	2671	51667	120	38	26

Table 9: Bavaria - R(t) takes on the value of 1.2 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	52528	2626	48144	95	28	19
14.08.2020	52683	2627	48252	97	29	19
15.08.2020	52842	2628	48363	99	29	20
16.08.2020	53005	2630	48477	101	30	20
17.08.2020	53173	2631	48594	104	30	20
18.08.2020	53346	2633	48714	106	31	21
19.08.2020	53524	2634	48837	109	32	21
20.08.2020	53707	2636	48964	111	32	22
21.08.2020	53894	2638	49093	114	33	22
22.08.2020	54088	2639	49226	117	34	23
23.08.2020	54286	2641	49363	120	34	23
24.08.2020	54490	2643	49503	123	35	24
25.08.2020	54700	2644	49647	126	36	24
26.08.2020	54916	2646	49795	129	37	25
27.08.2020	55138	2648	49947	132	38	25
28.08.2020	55367	2650	50103	136	38	26
29.08.2020	55601	2652	50263	139	39	27
30.08.2020	55843	2654	50428	143	40	27
31.08.2020	56091	2656	50597	147	41	28
01.09.2020	56346	2658	50772	151	42	29
02.09.2020	56608	2660	50950	155	43	30
03.09.2020	56878	2662	51134	159	44	30
04.09.2020	57156	2665	51323	163	46	31
05.09.2020	57441	2667	51517	168	47	32
06.09.2020	57734	2669	51717	172	48	33
07.09.2020	58035	2672	51922	177	49	34
08.09.2020	58345	2674	52133	182	50	34
09.09.2020	58664	2677	52350	187	52	35

3.2.3 Prediction for the next 4 weeks under the assumption of different scenarios from 13.08.2020

Fig. 32 shows the absolute changes in case numbers compared to the previous day for the next 4 weeks for different R(t) values. If no bars are shown on the plot it means that the number of cases has not changed compared to the previous day.

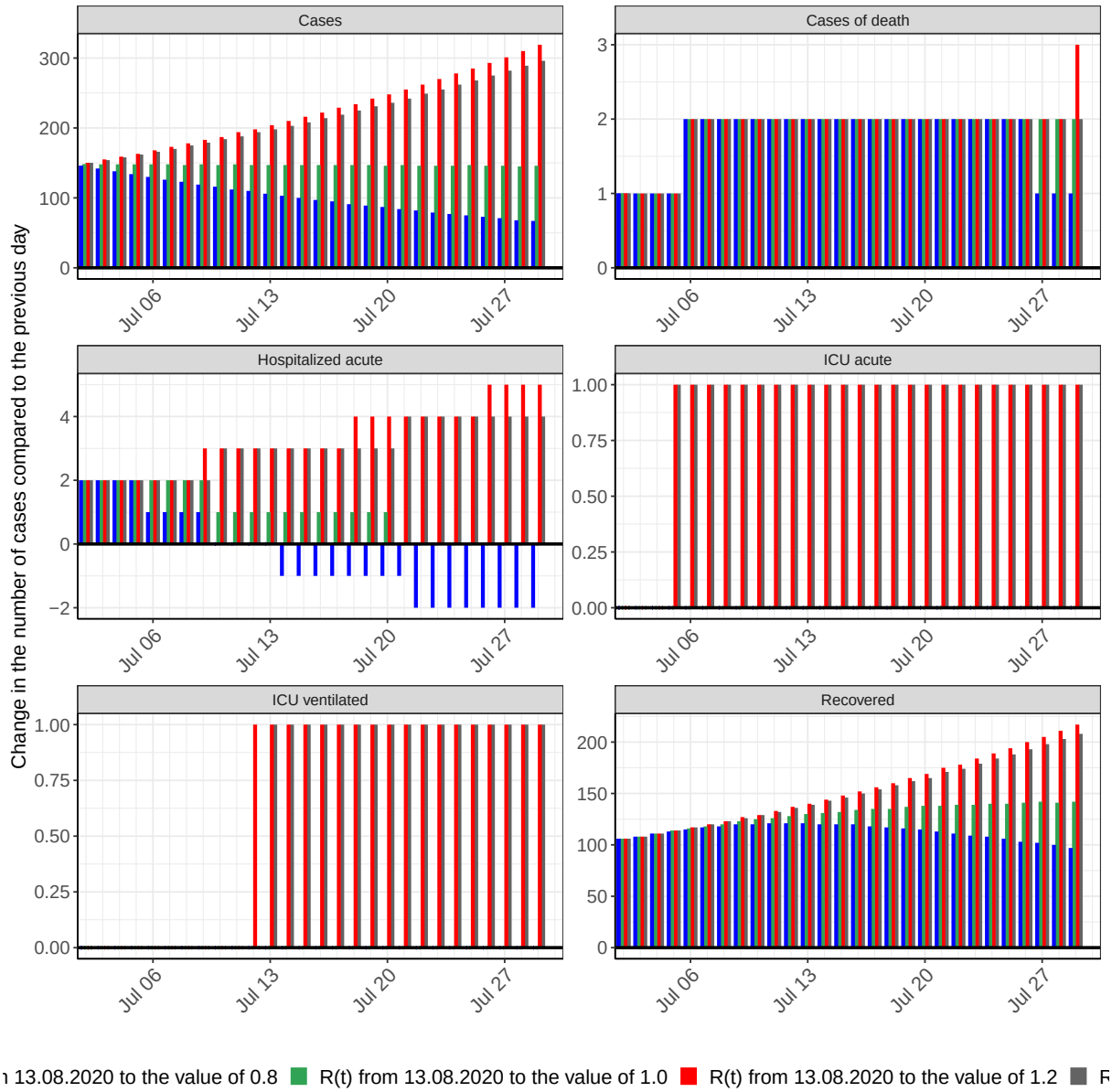


Figure 32: Simulation of daily new cases for the next 4 weeks - Bavaria

4 Berlin

4.1 Model description

Fig. 33 depicts the results of the modeling (lines) compared to the observed data (points) for Berlin on a linear (A) and semi-logarithmic (B) scale.

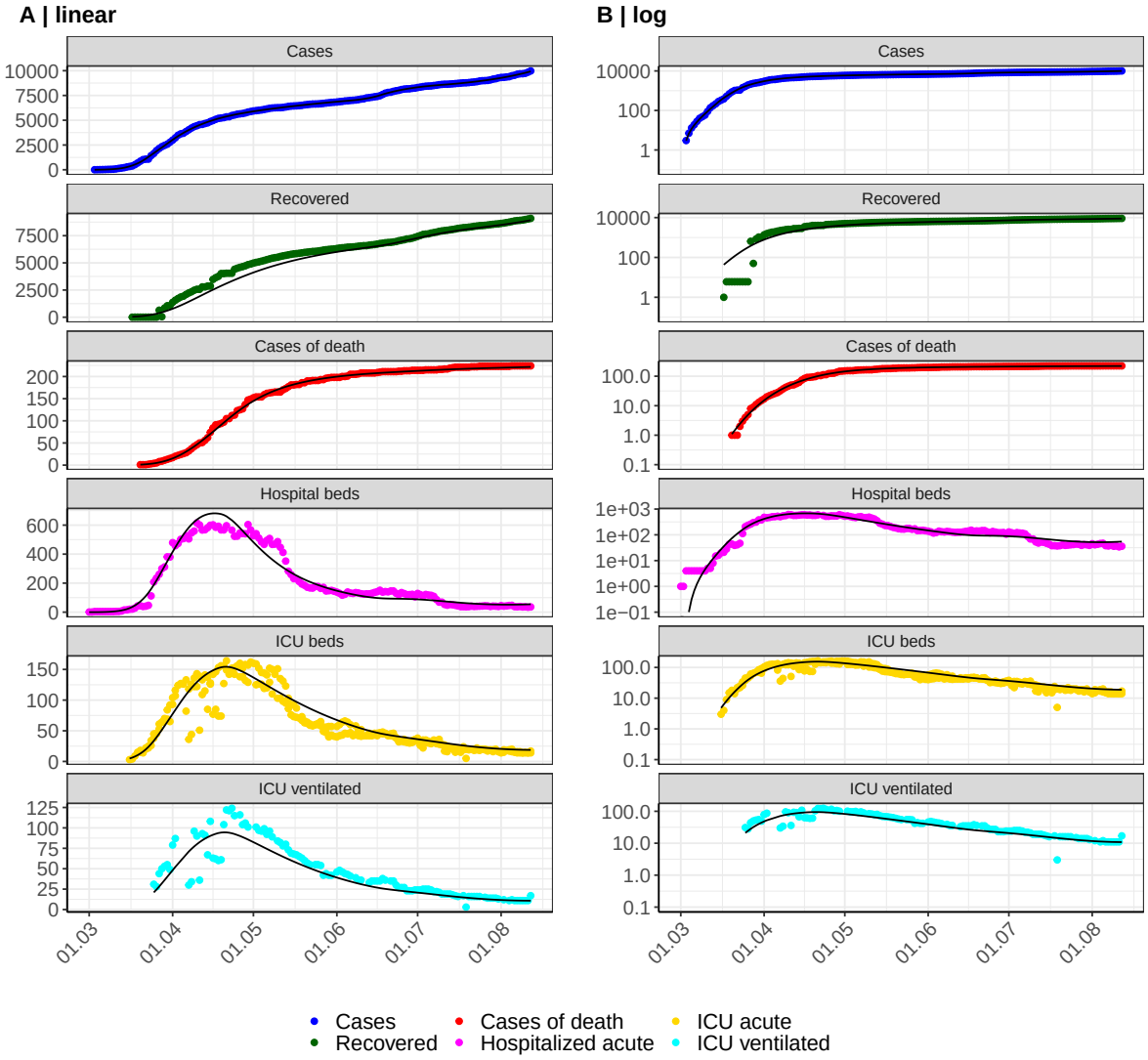


Figure 33: Model description of the reported case numbers, occupancy of hospital beds, recovery and deaths in Berlin. Points: reported data; lines: model description.

Fig. 34 shows the goodness-of-fit for Berlin. The values calculated by the model are plotted against the observed data. If the model fit is good, the points scatter randomly along the lines of identity.

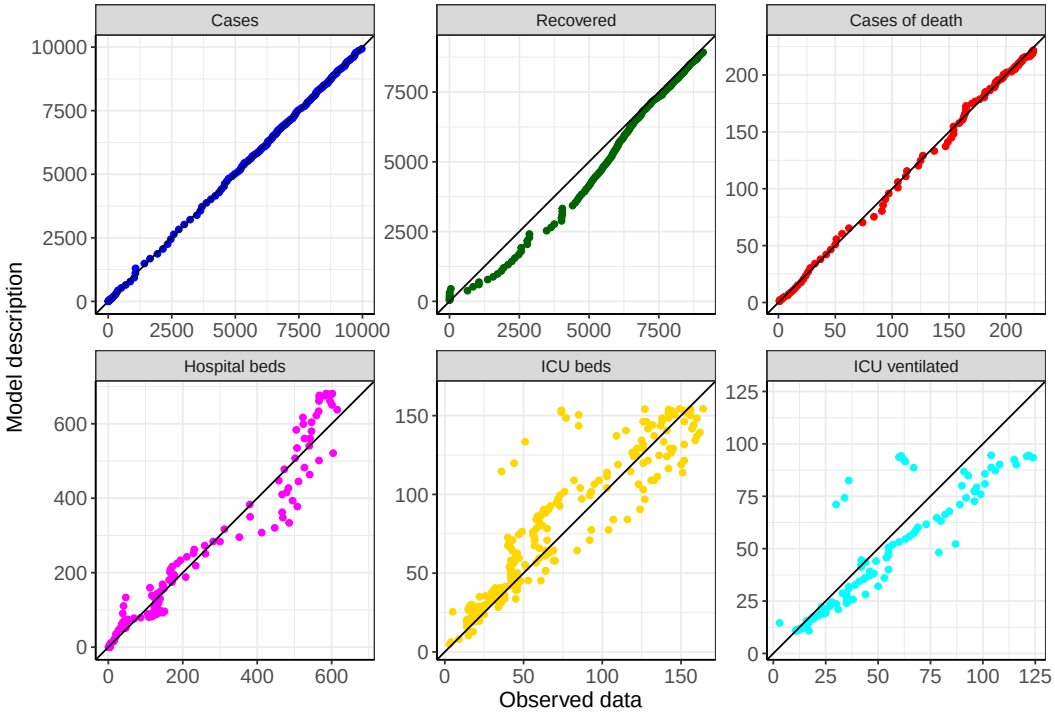


Figure 34: Goodness-of-fit plots for Berlin. Lines: lines of identity.

Fig. 35 shows the influence of non-pharmaceutical interventions (NPI) on R(t) for Berlin (red line) in comparison with the other federal states (grey lines).

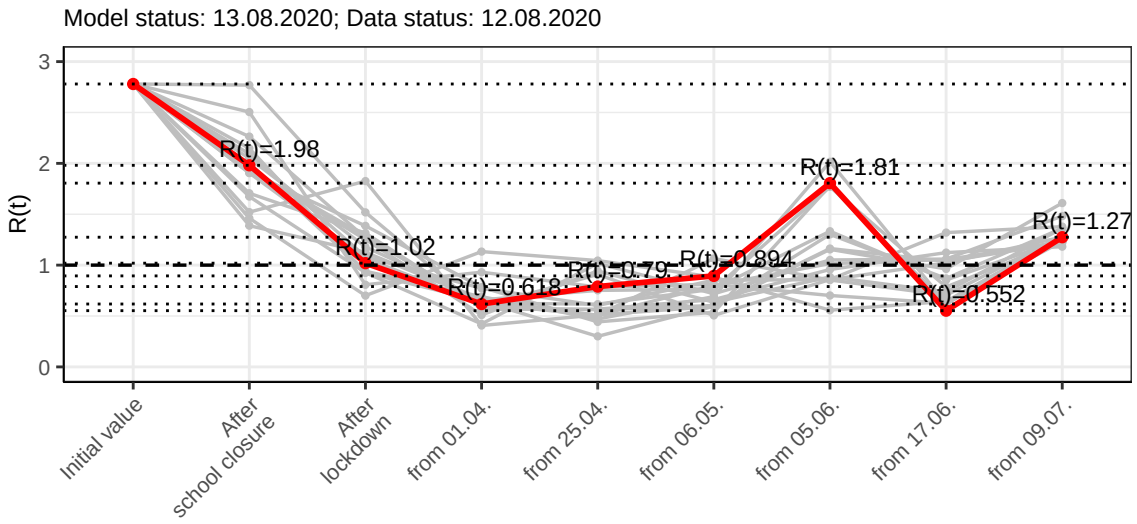


Figure 35: R(t) values before and after the NPIs for Berlin

Fig. 36 shows the R(t) estimated value for Berlin (red line) over time in comparison with the other federal states (grey lines).

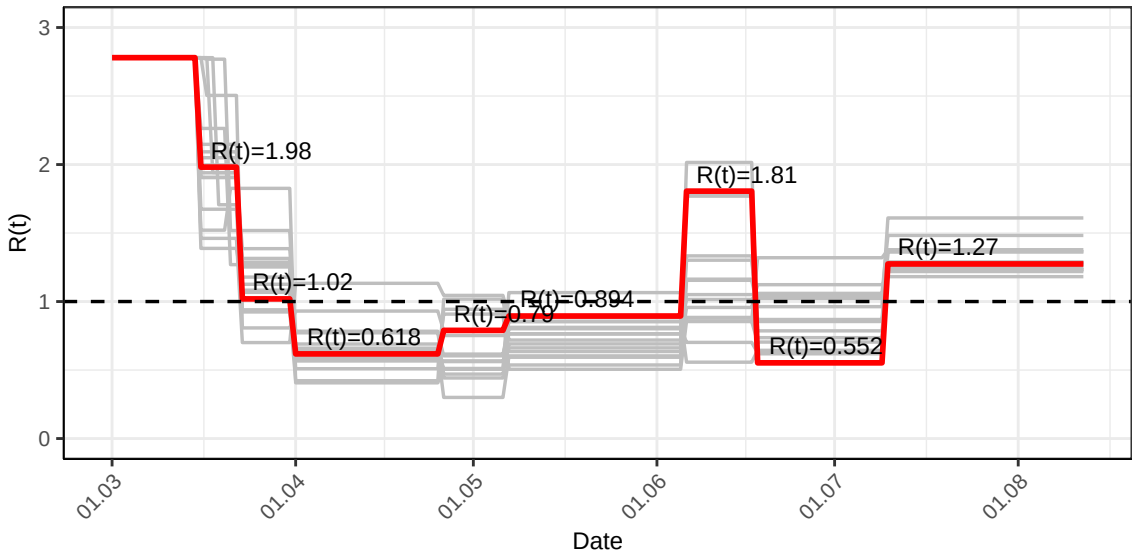


Figure 36: R(t) values over time for Berlin

4.2 Model predictions

4.2.1 Prediction for the next 4 weeks assuming that R(t) estimate will not change (R(t) = 1.27)

Fig. 37 and 38 depict the the model predictions for the next 4 weeks for Berlin on a linear (37) and a semi-logarithmic (38) scale. The modeling was carried out under the assumption that the R(t) estimated value would remain the same.

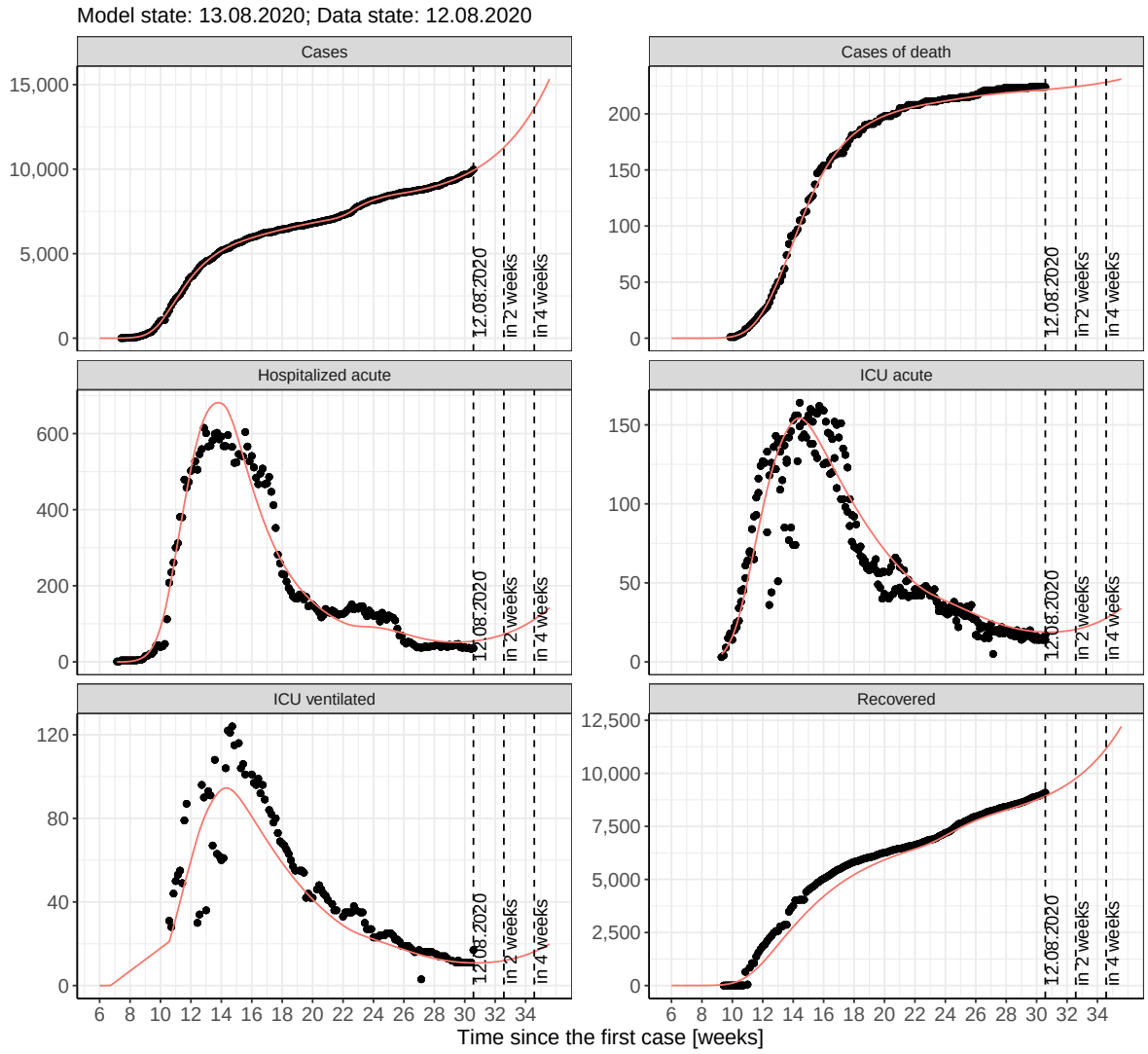


Figure 37: Representation of the model predictions for Berlin for the next 4 weeks under the assumption that the R(t) estimate remains the same on linear scale (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths). Points: Reported case numbers; Red lines: Model predictions.

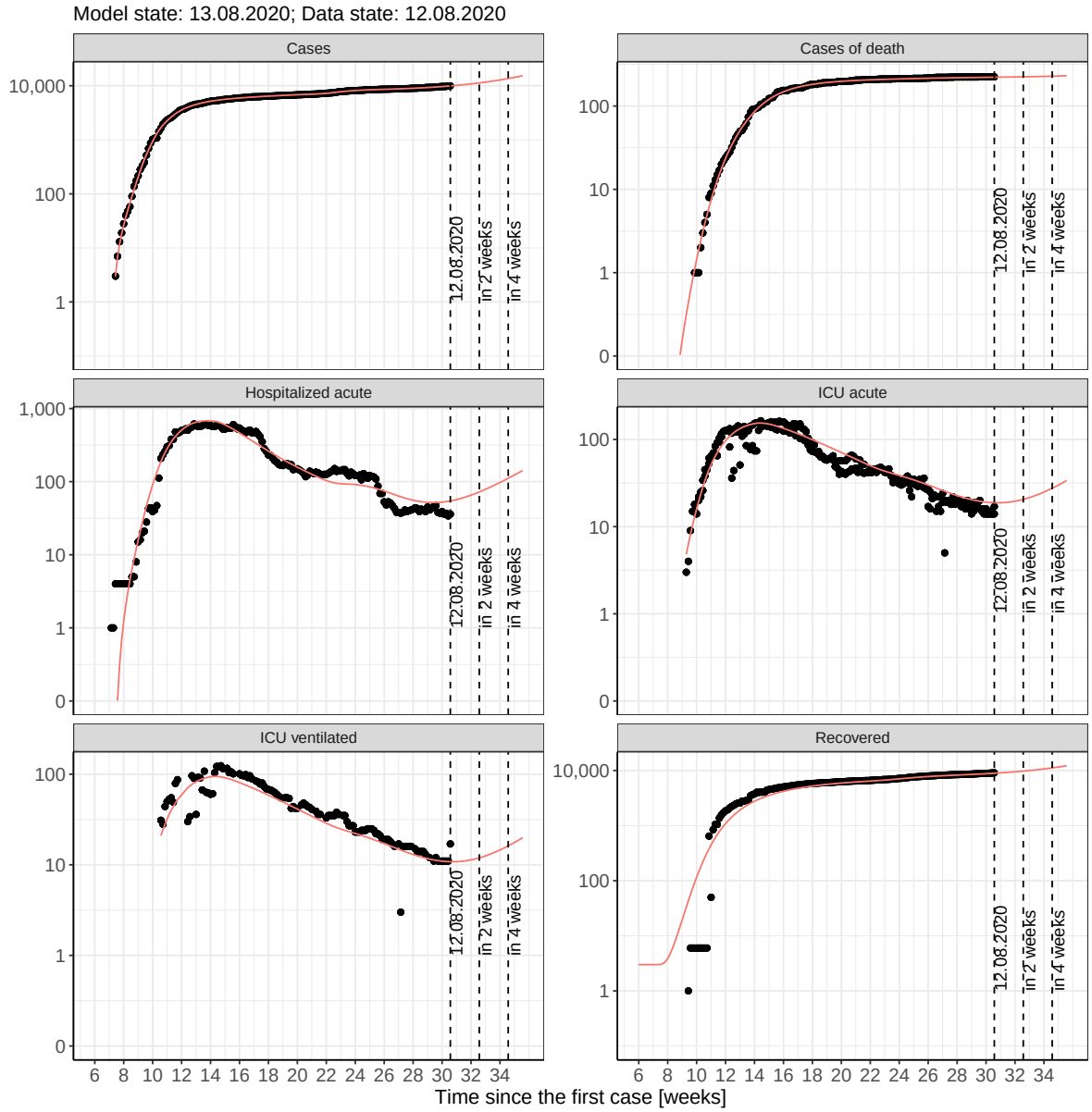


Figure 38: Semi-logarithmic representation of the model prediction (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Berlin for the next 4 weeks under the assumption that the R(t) estimate remains the same. Points: Reported case numbers; Red lines: Model predictions.

4.2.2 Predictions for the next 4 weeks assuming different scenarios (with the R(t) value above 1.2) from 13.08.2020

Fig. 39 and 40 represent the model prediction for the next 4 weeks for Berlin on a linear (39) and a semi-logarithmic (40) scale. In this simulation different scenarios of the possible development (R(t) = 1.4, 1.6, 1.8 and staying the same) from 13.08.2020 were tested.

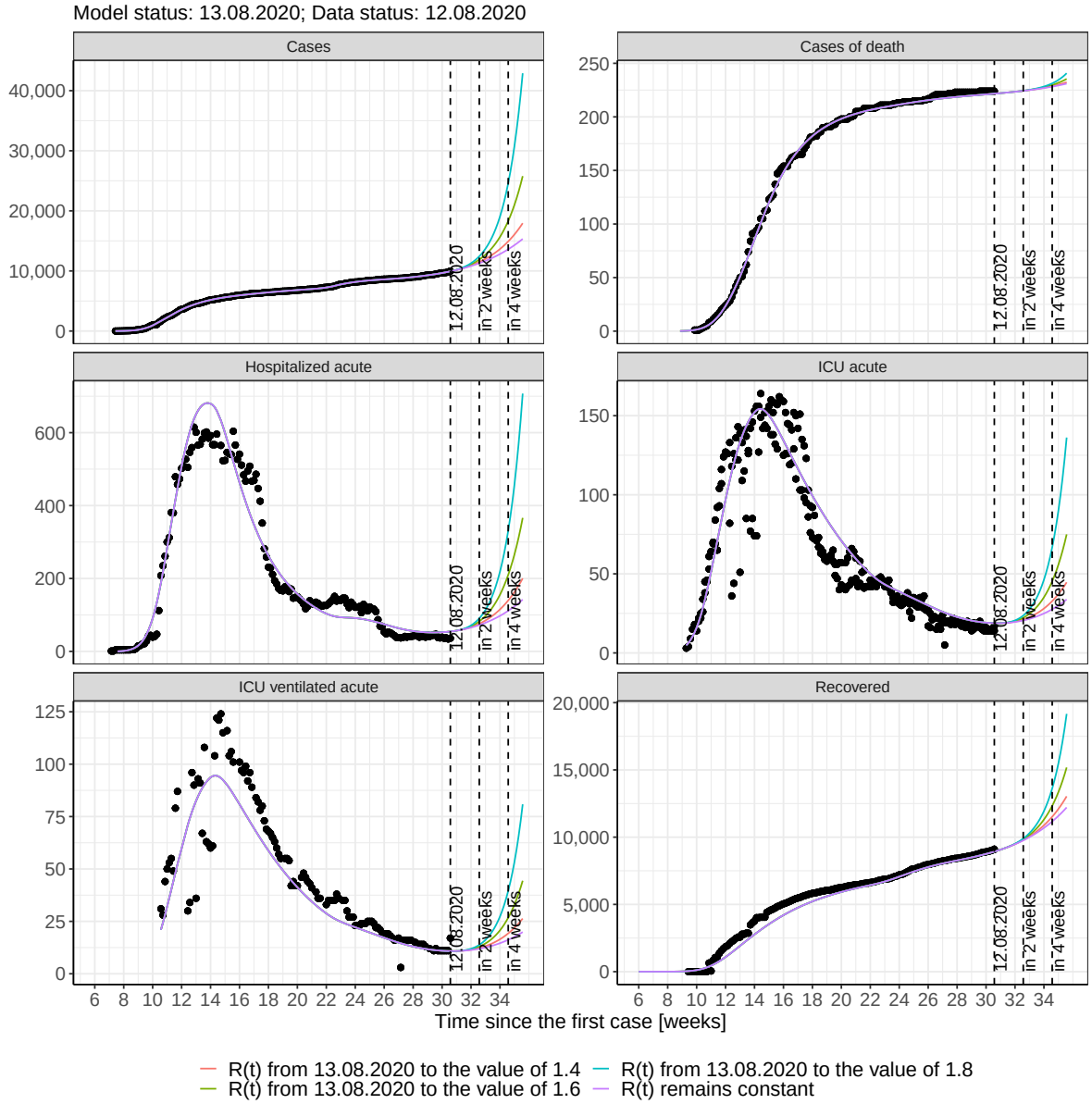


Figure 39: Linear representation of model prediction (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Berlin assuming various scenarios from the 13.08.2020. Points: Reported case numbers; Lines: Model predictions.

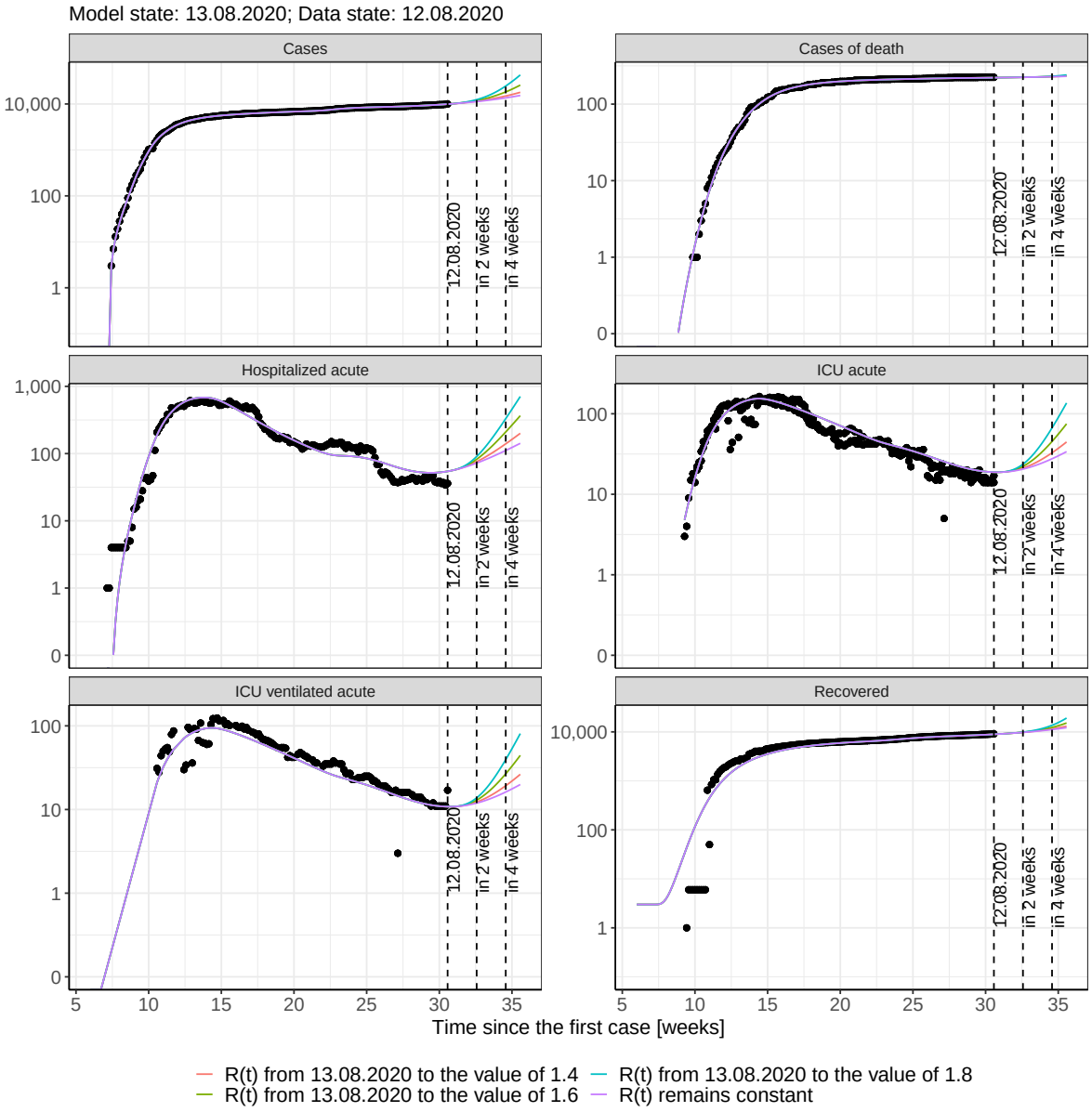


Figure 40: Semi-logarithmic representation of model predictions (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Berlin assuming various scenarios from the 13.08.2020. Points: Reported case numbers; Lines: Model predictions.

Fig. 41 and 42 represent the model prediction for the next 16 weeks for Berlin on a linear (41) and a semi-logarithmic (42) scale. In this simulation different scenarios of the possible course from the 13.08.2020 were tested.

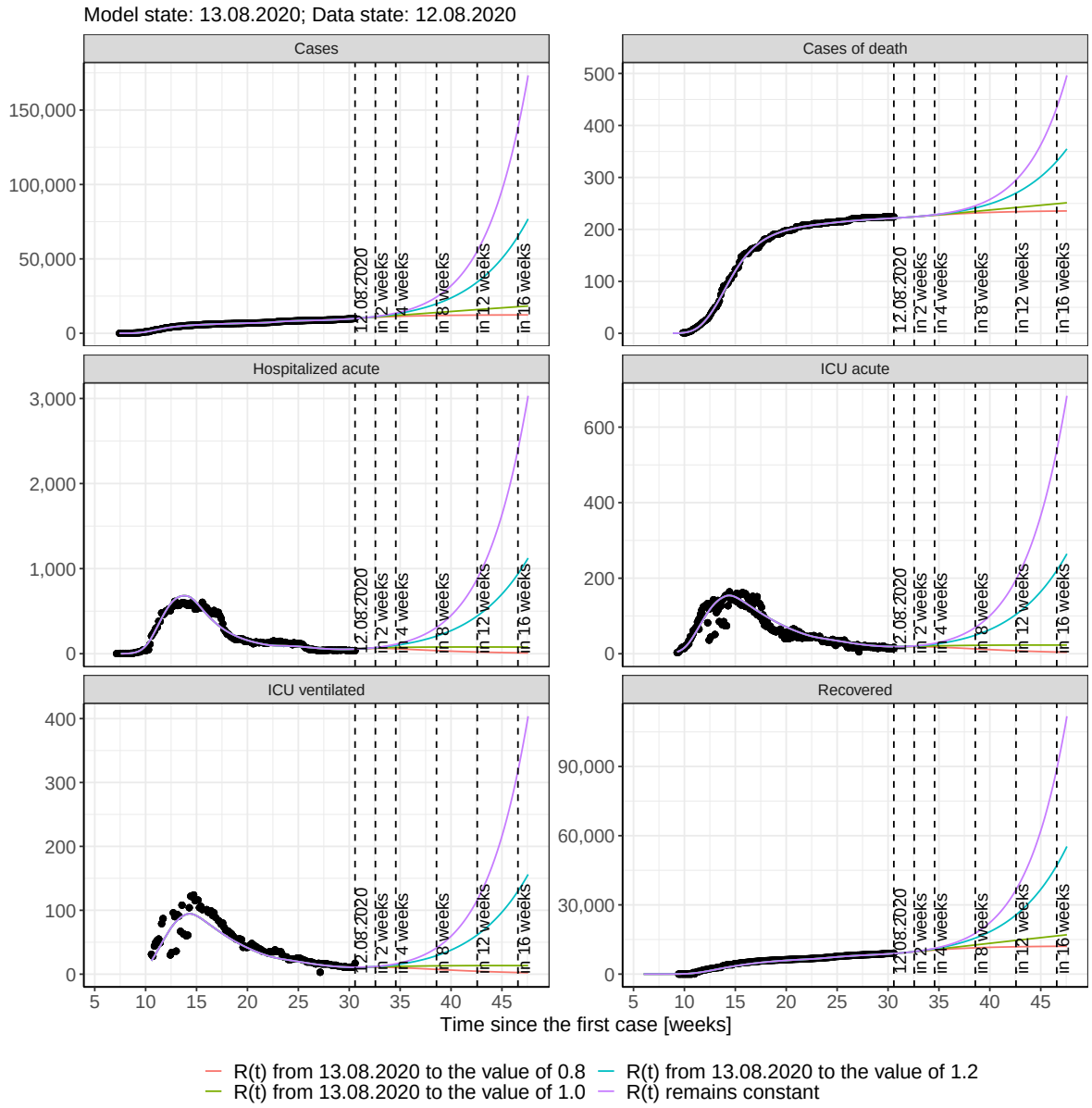


Figure 41: Linear representation of model predictions (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Berlin assuming various scenarios from the 13.08.2020. Points: reported case numbers; lines: model prediction.

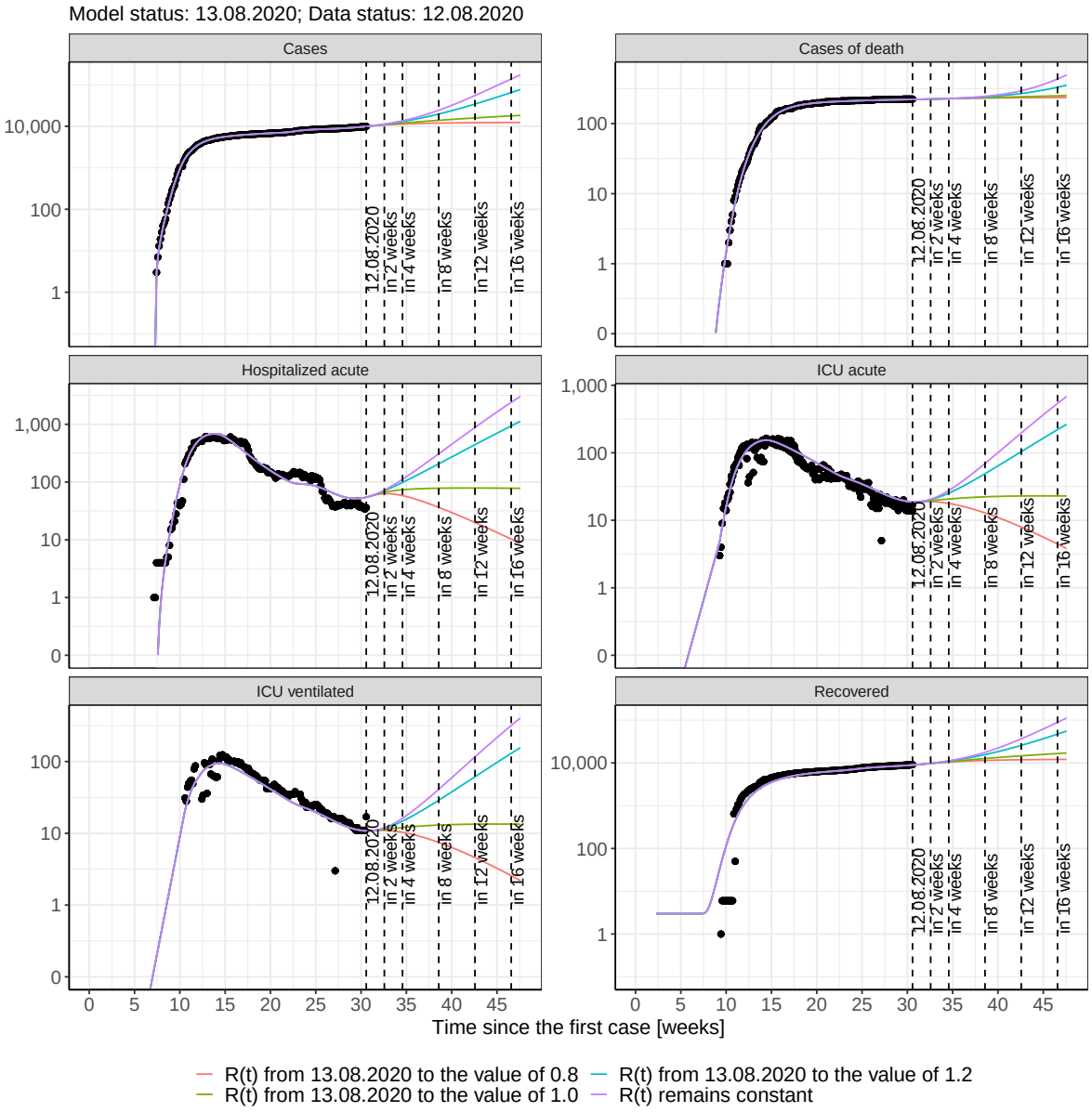


Figure 42: Semi-logarithmic depiction of the model prediction (cases, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Berlin assuming various scenarios after 13.08.2020. Points: reported case numbers;lines: model predictions.

The tables show the modeling results for four conceivable scenarios: Scenario 1: The R(t) estimated value after 13.08.2020 remains the same as today's value (Tab. 10); Scenario 2: The R(t) estimated value after 13.08.2020 takes the value of 0.8 (Tab. 11); Scenario 3: The R(t) estimated value takes the value of 1 after the 13.08.2020 (Tab. 12); Scenario 4: The R(t) estimated value takes the value of 1.2 after the 13.08.2020 (Tab. 13) Model status from 13.08.2020; Data status: 12.08.2020.

Table 10: Berlin - R(t) remains unchanged after the 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	10004	222	8970	55	19	11
14.08.2020	10081	222	9019	56	19	11
15.08.2020	10162	222	9069	57	19	11
16.08.2020	10245	222	9121	58	19	11
17.08.2020	10332	222	9174	59	19	11
18.08.2020	10422	223	9230	60	19	11
19.08.2020	10516	223	9288	61	19	11
20.08.2020	10613	223	9348	62	19	11
21.08.2020	10714	223	9410	64	19	11
22.08.2020	10819	223	9474	65	20	11
23.08.2020	10929	224	9542	67	20	11
24.08.2020	11042	224	9611	69	20	12
25.08.2020	11160	224	9683	70	20	12
26.08.2020	11283	224	9758	72	21	12
27.08.2020	11411	225	9836	74	21	12
28.08.2020	11543	225	9916	76	21	12
29.08.2020	11681	225	10000	79	22	13
30.08.2020	11825	225	10087	81	22	13
31.08.2020	11974	226	10178	83	22	13
01.09.2020	12128	226	10272	86	23	13
02.09.2020	12289	226	10369	89	23	14
03.09.2020	12456	226	10471	91	24	14
04.09.2020	12630	227	10576	94	24	14
05.09.2020	12811	227	10685	98	25	15
06.09.2020	12998	227	10799	101	26	15
07.09.2020	13193	228	10917	104	26	15
08.09.2020	13396	228	11040	108	27	16
09.09.2020	13607	228	11167	111	28	16

Table 11: Berlin - R(t) takes on the value of 0.8 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	10002	222	8970	55	19	11
14.08.2020	10071	222	9019	56	19	11
15.08.2020	10139	222	9068	57	19	11
16.08.2020	10205	222	9120	58	19	11
17.08.2020	10269	222	9172	58	19	11
18.08.2020	10331	223	9226	59	19	11
19.08.2020	10391	223	9281	60	19	11
20.08.2020	10450	223	9337	61	19	11
21.08.2020	10507	223	9393	61	19	11
22.08.2020	10562	223	9450	62	19	11
23.08.2020	10616	224	9508	62	19	11
24.08.2020	10668	224	9565	62	19	11
25.08.2020	10719	224	9623	63	19	11
26.08.2020	10768	224	9680	63	19	11
27.08.2020	10816	224	9737	63	19	11
28.08.2020	10863	225	9794	63	19	11
29.08.2020	10908	225	9851	63	19	11
30.08.2020	10952	225	9907	63	19	11
31.08.2020	10995	225	9962	62	19	11
01.09.2020	11036	225	10017	62	19	11
02.09.2020	11076	226	10071	62	19	11
03.09.2020	11115	226	10124	61	18	11
04.09.2020	11153	226	10176	61	18	11
05.09.2020	11190	226	10228	60	18	11
06.09.2020	11226	226	10278	60	18	11
07.09.2020	11261	227	10328	59	18	10
08.09.2020	11295	227	10377	59	18	10
09.09.2020	11328	227	10424	58	18	10

Table 12: Berlin - R(t) takes on the value of 1.0 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	10003	222	8970	55	19	11
14.08.2020	10075	222	9019	56	19	11
15.08.2020	10148	222	9069	57	19	11
16.08.2020	10221	222	9120	58	19	11
17.08.2020	10294	222	9173	59	19	11
18.08.2020	10366	223	9228	59	19	11
19.08.2020	10439	223	9284	60	19	11
20.08.2020	10512	223	9341	61	19	11
21.08.2020	10584	223	9400	62	19	11
22.08.2020	10657	223	9460	63	19	11
23.08.2020	10729	224	9520	64	19	11
24.08.2020	10802	224	9582	65	19	11
25.08.2020	10874	224	9645	65	19	11
26.08.2020	10947	224	9709	66	20	11
27.08.2020	11019	224	9773	67	20	11
28.08.2020	11091	225	9838	68	20	11
29.08.2020	11164	225	9904	68	20	11
30.08.2020	11236	225	9970	69	20	12
31.08.2020	11308	225	10037	69	20	12
01.09.2020	11380	226	10105	70	20	12
02.09.2020	11453	226	10173	71	20	12
03.09.2020	11525	226	10241	71	20	12
04.09.2020	11597	226	10309	71	20	12
05.09.2020	11669	227	10378	72	20	12
06.09.2020	11741	227	10447	72	20	12
07.09.2020	11813	227	10517	73	20	12
08.09.2020	11885	227	10586	73	21	12
09.09.2020	11957	227	10656	73	21	12

Table 13: Berlin - R(t) takes on the value of 1.2 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	10004	222	8970	55	19	11
14.08.2020	10080	222	9019	56	19	11
15.08.2020	10158	222	9069	57	19	11
16.08.2020	10238	222	9120	58	19	11
17.08.2020	10321	222	9174	59	19	11
18.08.2020	10406	223	9230	60	19	11
19.08.2020	10493	223	9287	61	19	11
20.08.2020	10583	223	9346	62	19	11
21.08.2020	10676	223	9407	63	19	11
22.08.2020	10771	223	9470	65	19	11
23.08.2020	10869	224	9535	66	20	11
24.08.2020	10969	224	9603	67	20	11
25.08.2020	11073	224	9672	69	20	12
26.08.2020	11179	224	9743	70	20	12
27.08.2020	11289	224	9817	72	20	12
28.08.2020	11401	225	9893	74	21	12
29.08.2020	11517	225	9971	75	21	12
30.08.2020	11636	225	10052	77	21	12
31.08.2020	11758	225	10135	79	22	13
01.09.2020	11884	226	10220	81	22	13
02.09.2020	12014	226	10308	83	22	13
03.09.2020	12147	226	10398	85	23	13
04.09.2020	12284	227	10491	87	23	13
05.09.2020	12425	227	10587	89	23	14
06.09.2020	12569	227	10686	91	24	14
07.09.2020	12718	227	10787	94	24	14
08.09.2020	12871	228	10892	96	25	14
09.09.2020	13029	228	10999	98	25	15

4.2.3 Prediction for the next 4 weeks under the assumption of different scenarios from 13.08.2020

Fig. 43 shows the absolute changes in case numbers compared to the previous day for the next 4 weeks for different R(t) values. If no bars are shown on the plot it means that the number of cases has not changed compared to the previous day.

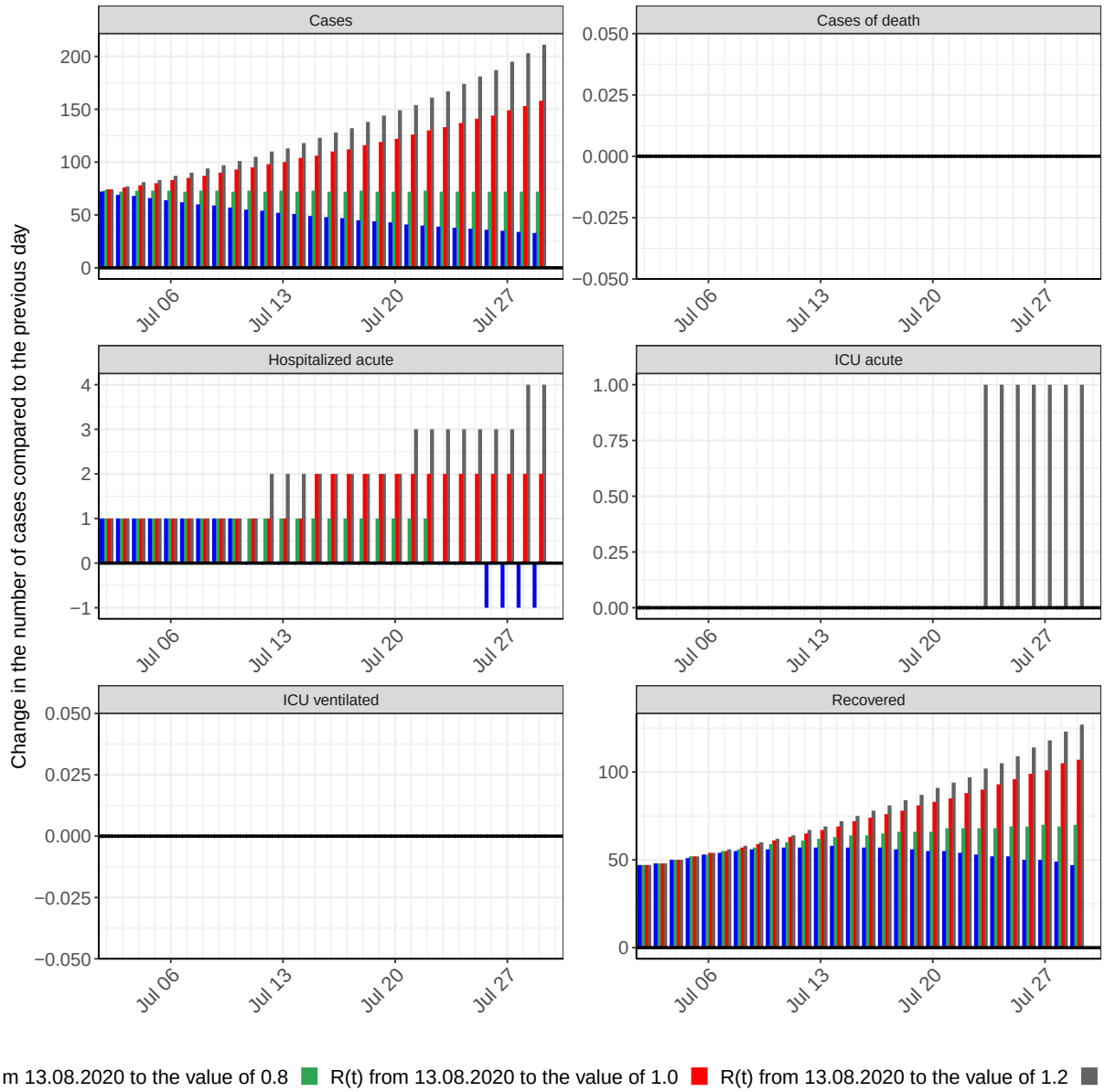


Figure 43: Simulation of daily new cases for the next 4 weeks - Berlin

5 Brandenburg

5.1 Model description

Fig. 44 depicts the results of the modeling (lines) compared to the observed data (points) for Brandenburg on a linear (A) and semi-logarithmic (B) scale.

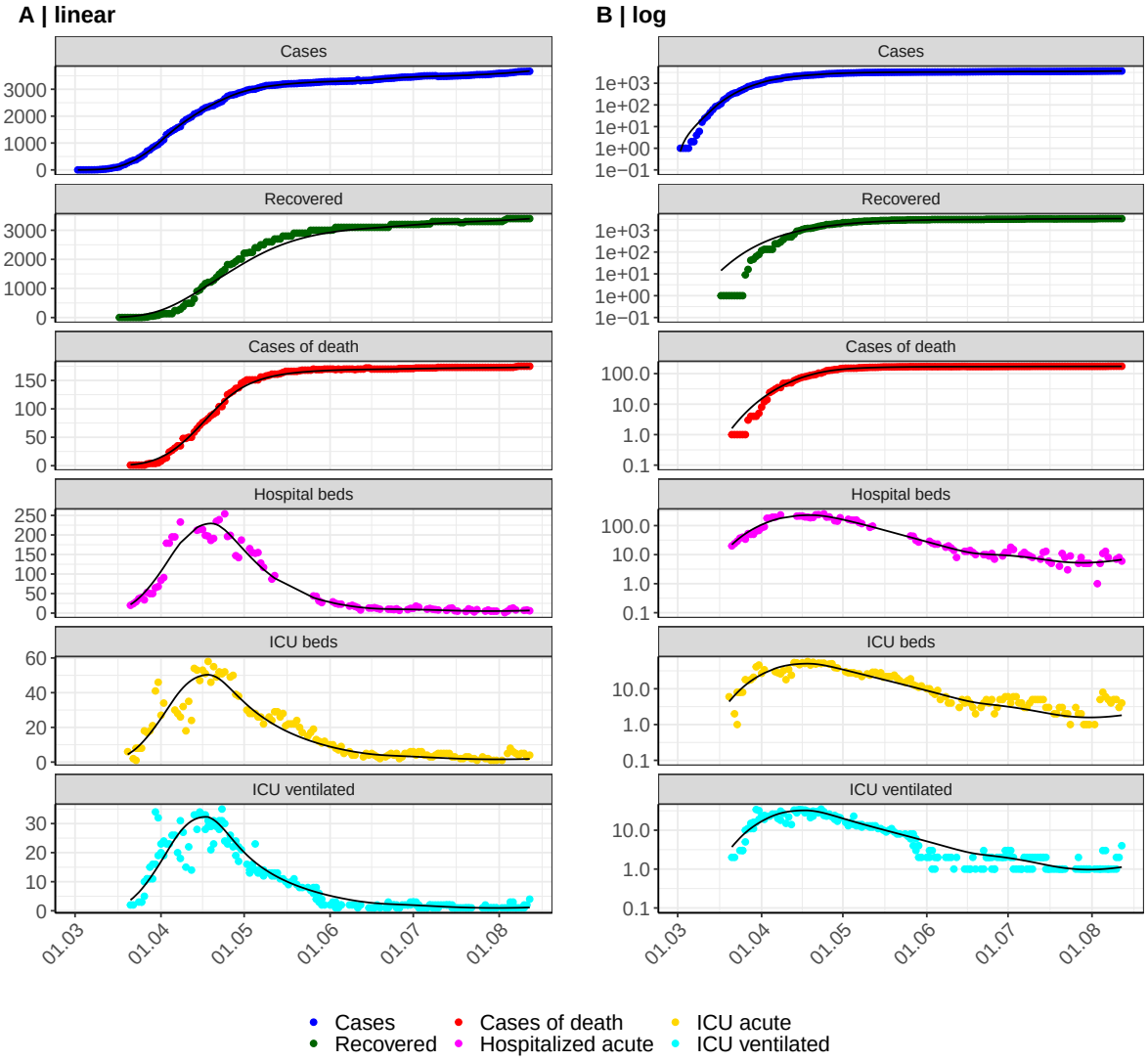


Figure 44: Model description of the reported case numbers, occupancy of hospital beds, recovery and deaths in Brandenburg. Points: reported data; lines: model description.

Fig. 45 shows the goodness-of-fit for Brandenburg. The values calculated by the model are plotted against the observed data. If the model fit is good, the points scatter randomly along the lines of identity.

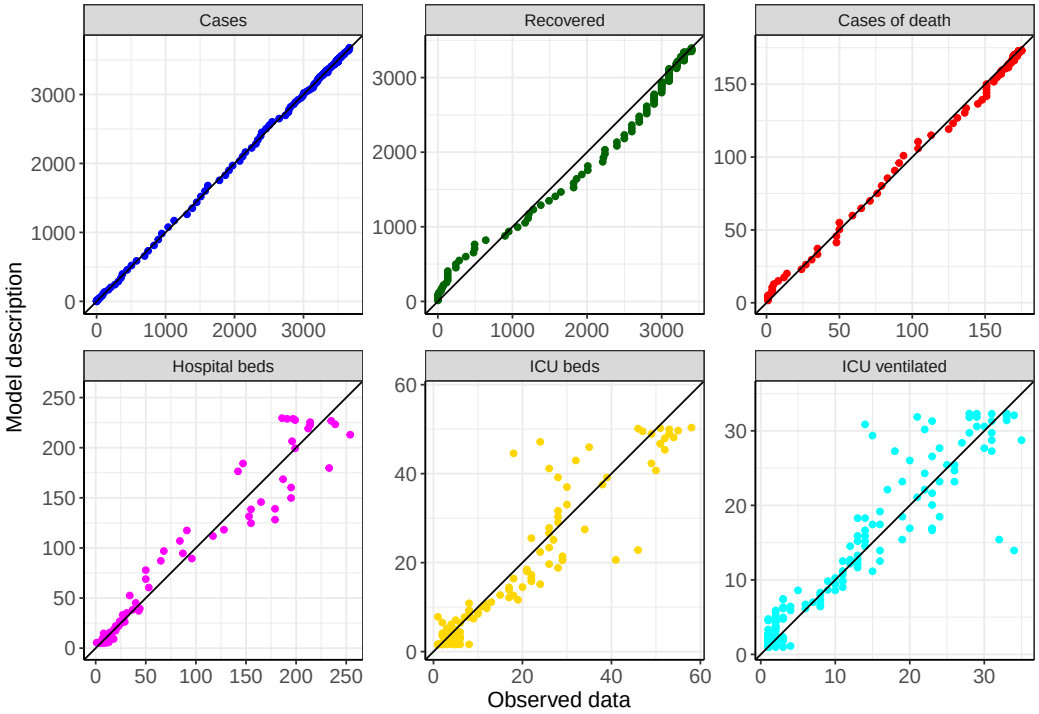


Figure 45: Goodness-of-fit plots for Brandenburg. Lines: lines of identity.

Fig. 46 shows the influence of non-pharmaceutical interventions (NPI) on R(t) for Brandenburg (red line) in comparison with the other federal states (grey lines).

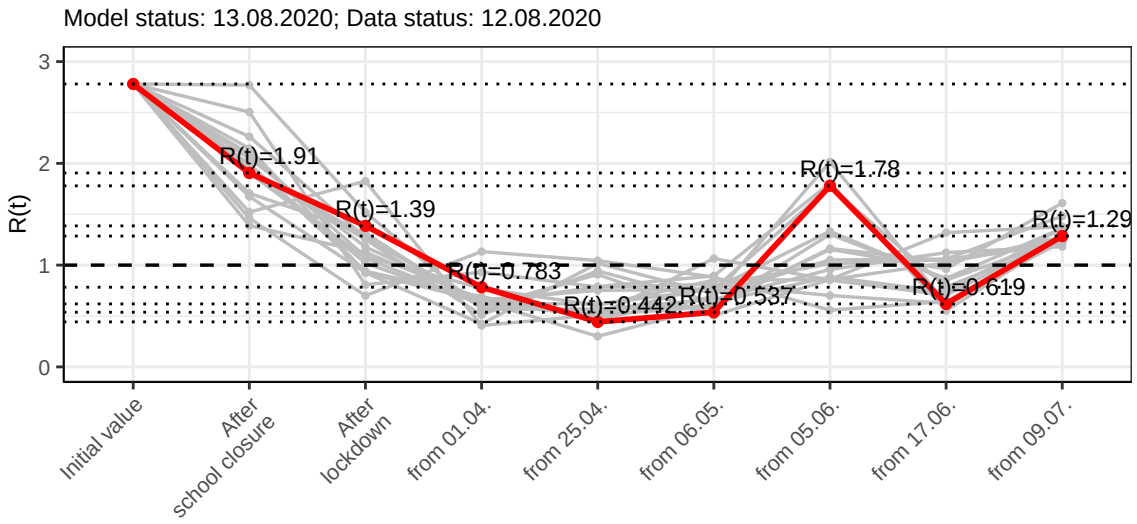


Figure 46: R(t) values before and after the NPIs for Brandenburg

Fig. 47 shows the R(t) estimated value for Brandenburg (red line) over time in comparison with the other federal states (grey lines).

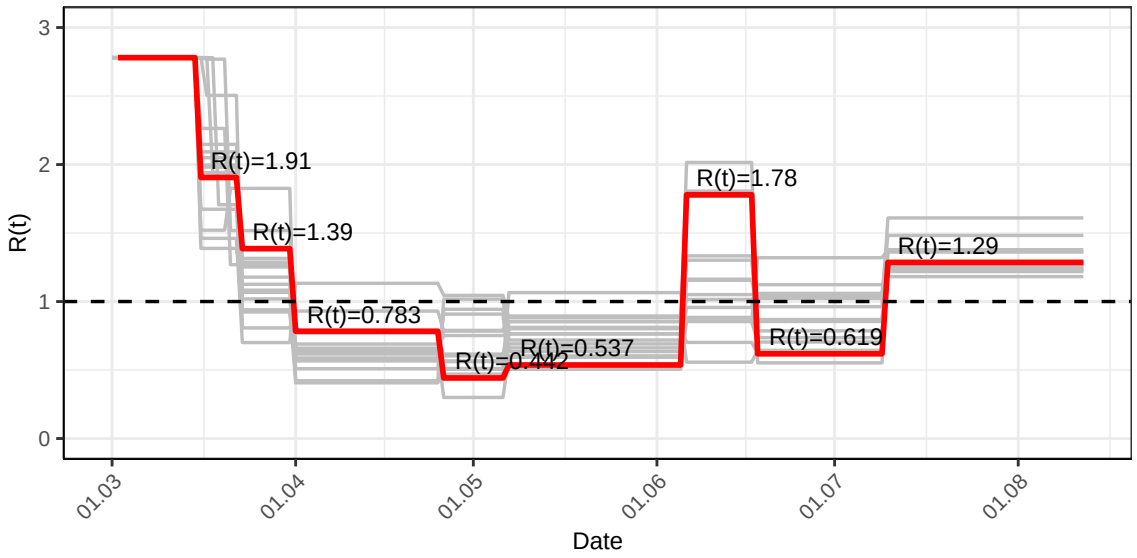


Figure 47: R(t) values over time for Brandenburg

5.2 Model predictions

5.2.1 Prediction for the next 4 weeks assuming that R(t) estimate will not change (R(t) = 1.29)

Fig. 48 and 49 depict the the model predictions for the next 4 weeks for Brandenburg on a linear (48) and a semi-logarithmic (49) scale. The modeling was carried out under the assumption that the R(t) estimated value would remain the same.

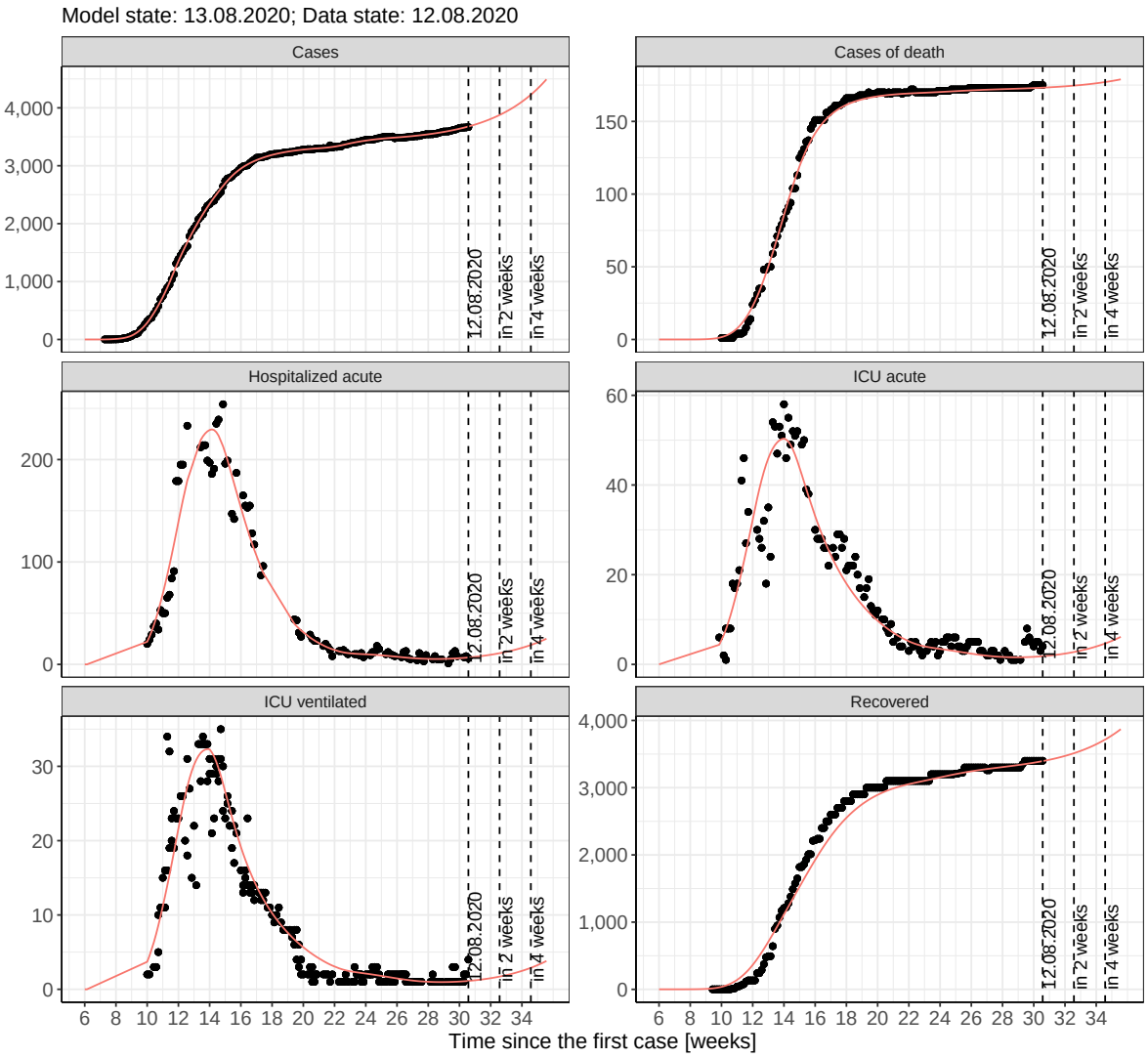


Figure 48: Representation of the model predictions for Brandenburg for the next 4 weeks under the assumption that the R(t) estimate remains the same on linear scale (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths). Points: Reported case numbers; Red lines: Model predictions.

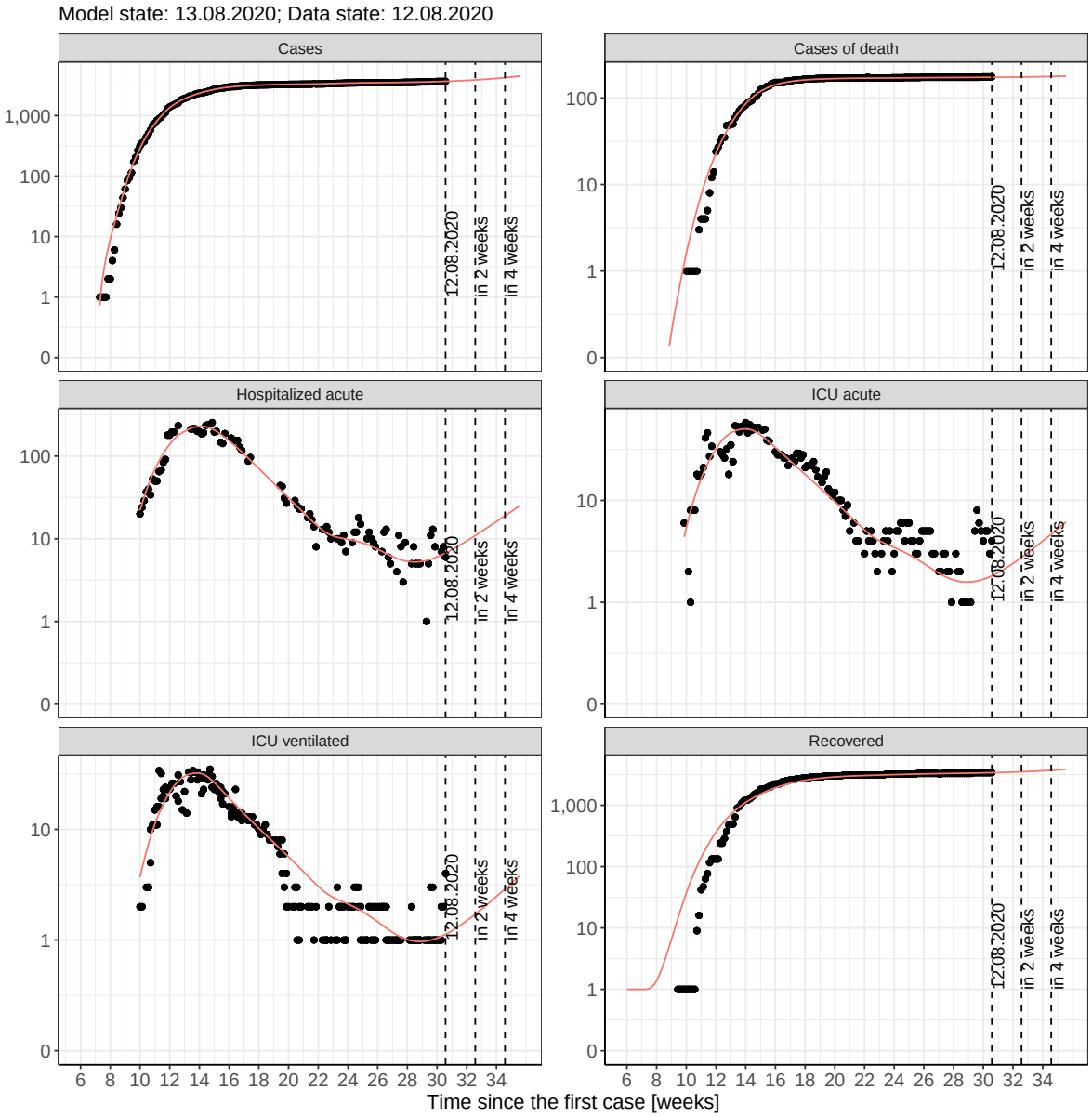


Figure 49: Semi-logarithmic representation of the model prediction (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Brandenburg for the next 4 weeks under the assumption that the R(t) estimate remains the same. Points: Reported case numbers; Red lines: Model predictions.

5.2.2 Predictions for the next 4 weeks assuming different scenarios (with the R(t) value above 1.2) from 13.08.2020

Fig. 50 and 51 represent the model prediction for the next 4 weeks for Brandenburg on a linear (50) and a semi-logarithmic (51) scale. In this simulation different scenarios of the possible development (R(t) = 1.4, 1.6, 1.8 and staying the same) from 13.08.2020 were tested.

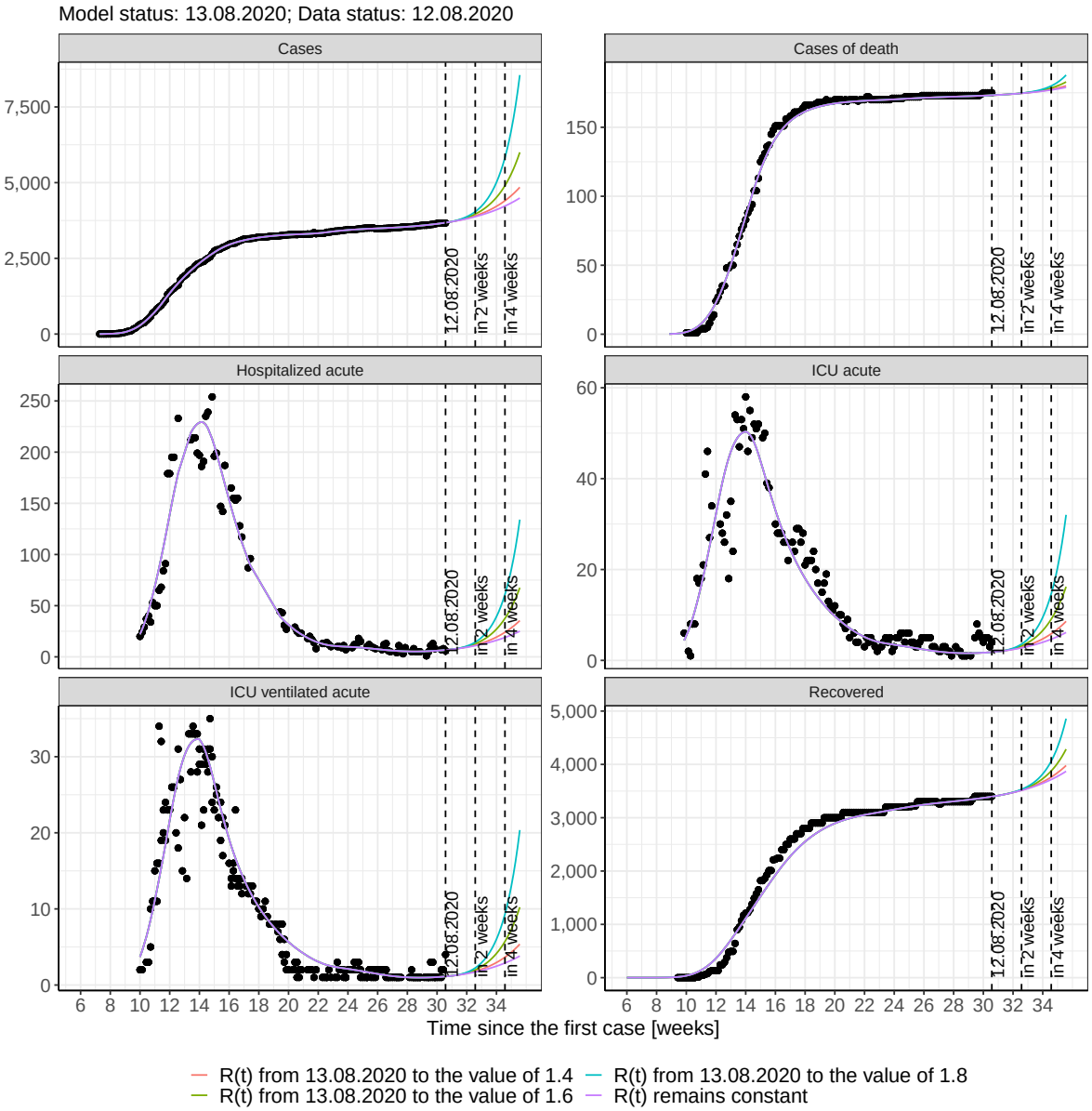


Figure 50: Linear representation of model prediction (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Brandenburg assuming various scenarios from the 13.08.2020. Points: Reported case numbers; Lines: Model predictions.

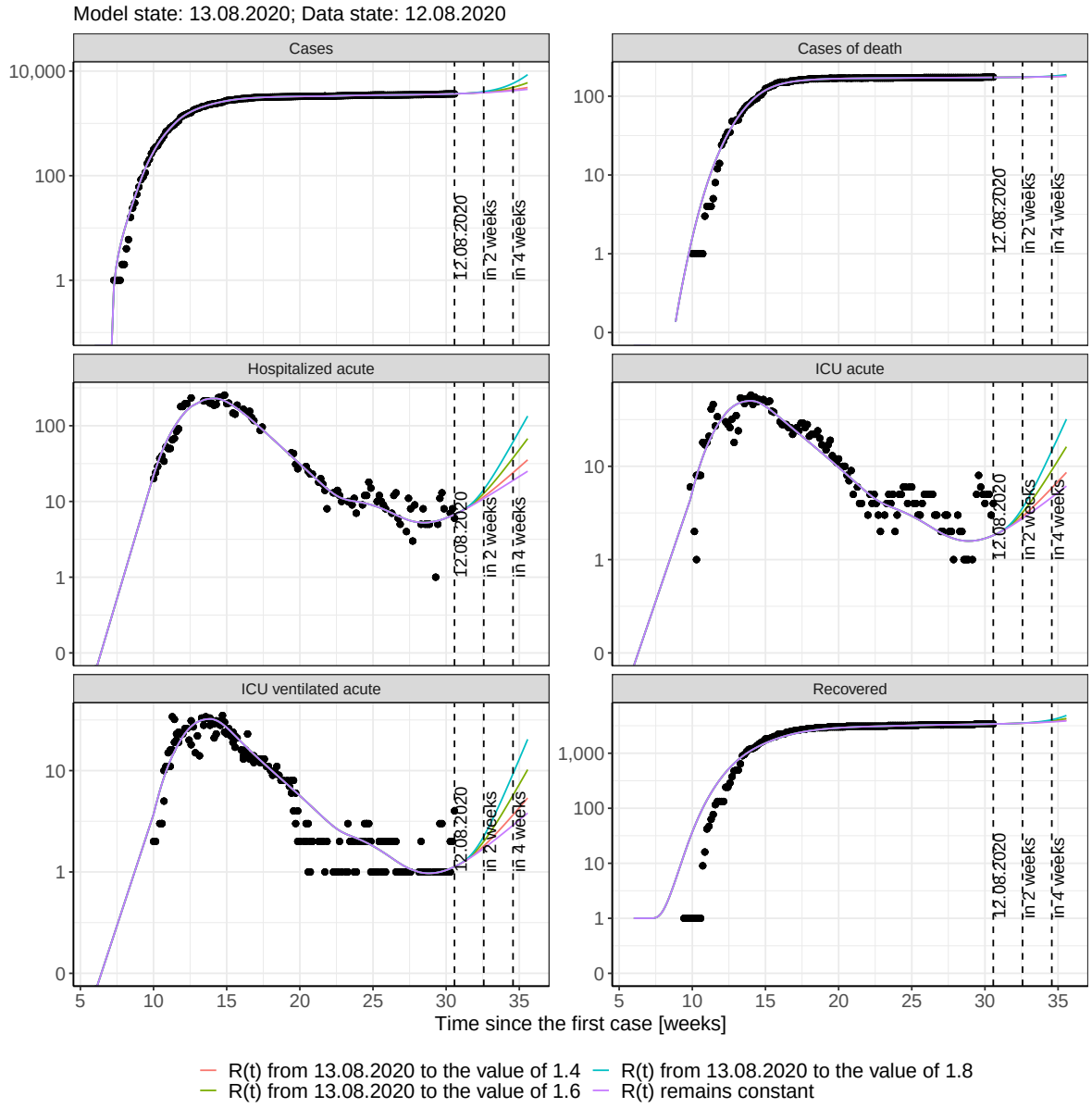


Figure 51: Semi-logarithmic representation of model predictions (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Brandenburg assuming various scenarios from the 13.08.2020. Points: Reported case numbers; Lines: Model predictions.

Fig. 52 and 53 represent the model prediction for the next 16 weeks for Brandenburg on a linear (52) and a semi-logarithmic (53) scale. In this simulation different scenarios of the possible course from the 13.08.2020 were tested.

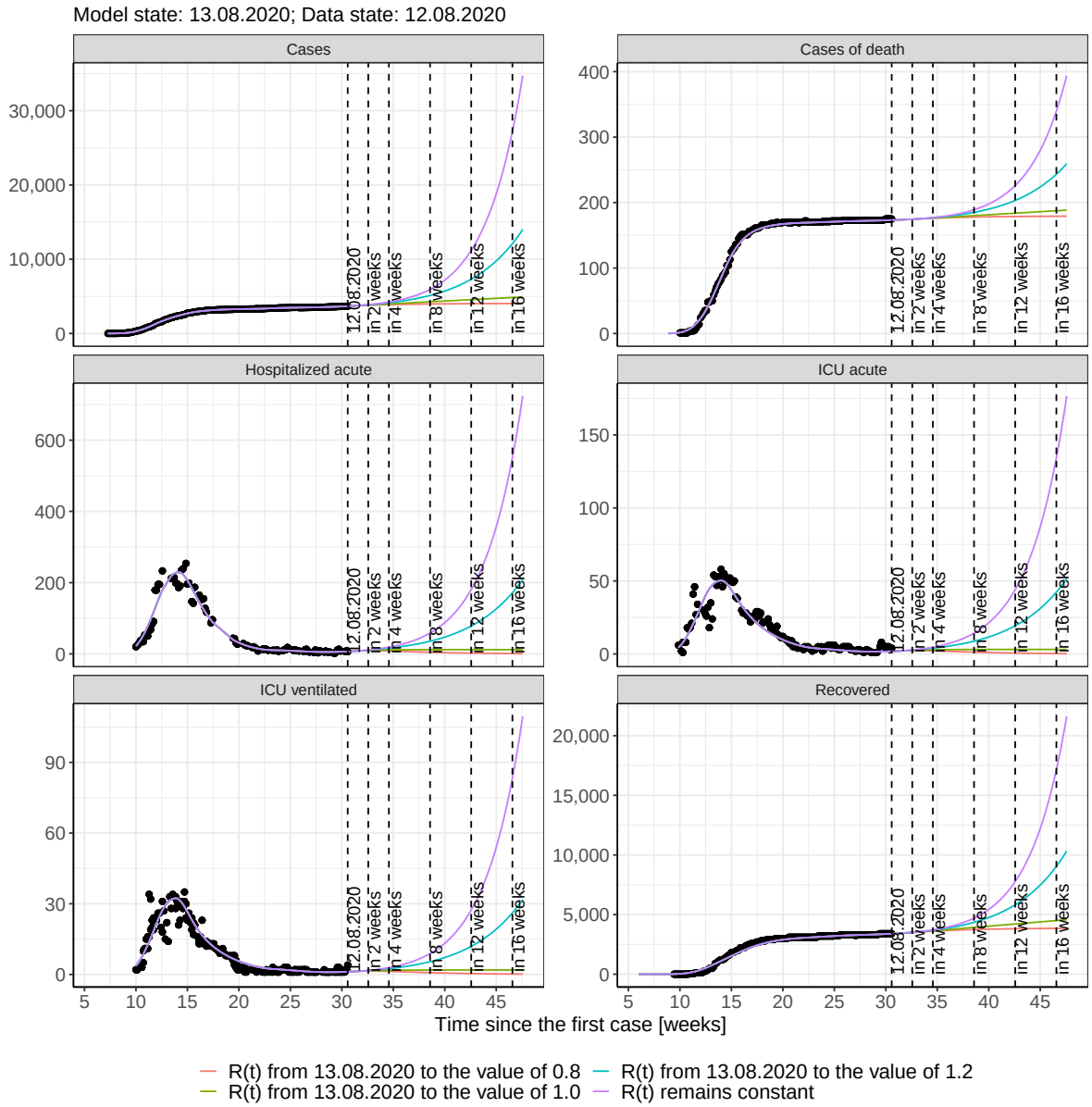


Figure 52: Linear representation of model predictions (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Brandenburg assuming various scenarios from the 13.08.2020. Points: reported case numbers; lines: model prediction.

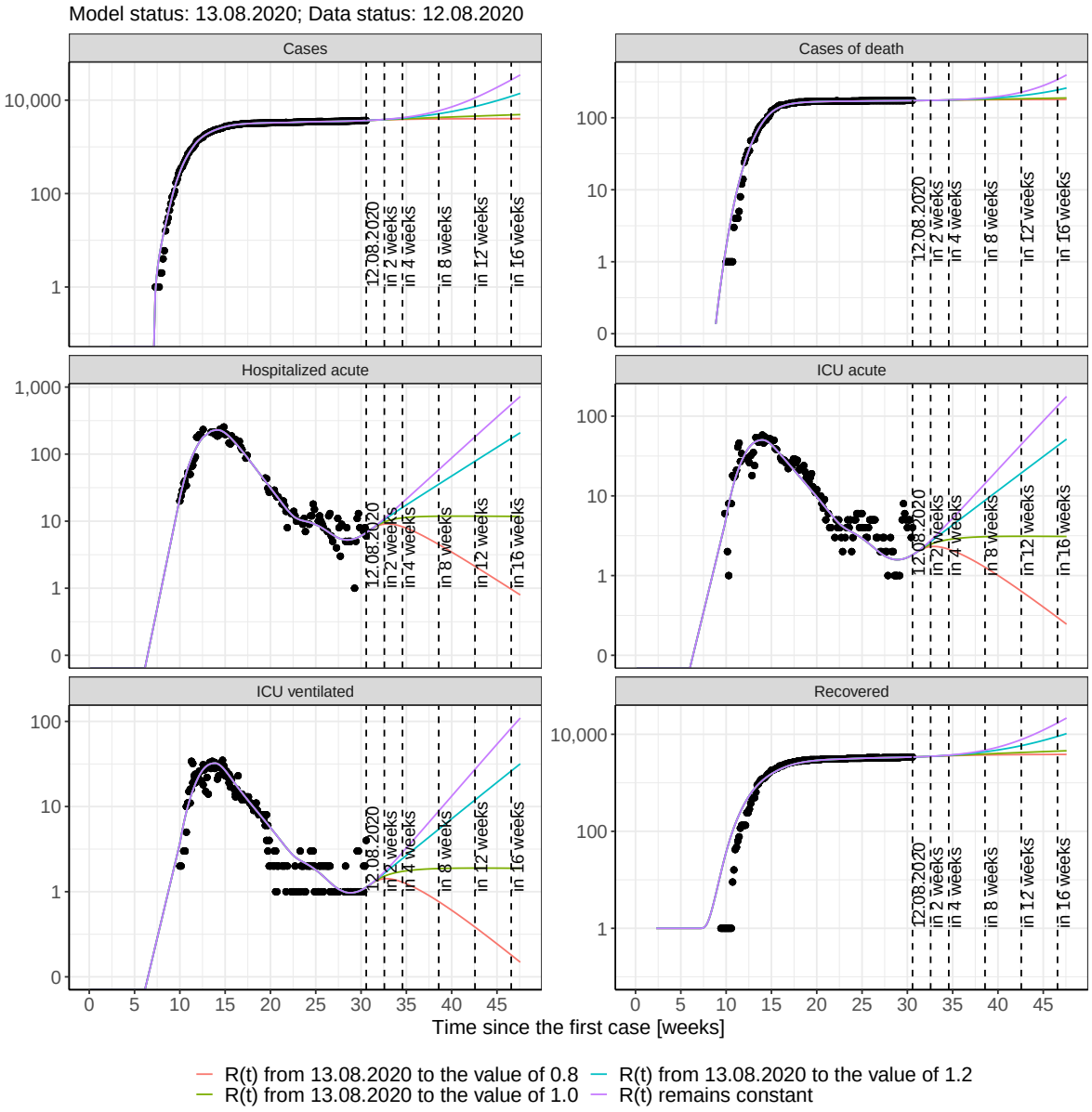


Figure 53: Semi-logarithmic depiction of the model prediction (cases, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Brandenburg assuming various scenarios after 13.08.2020. Points: reported case numbers;lines: model predictions.

The tables show the modeling results for four conceivable scenarios: Scenario 1: The R(t) estimated value after 13.08.2020 remains the same as today's value (Tab. 14); Scenario 2: The R(t) estimated value after 13.08.2020 takes the value of 0.8 (Tab. 15); Scenario 3: The R(t) estimated value takes the value of 1 after the 13.08.2020 (Tab. 16); Scenario 4: The R(t) estimated value takes the value of 1.2 after the 13.08.2020 (Tab. 17) Model status from 13.08.2020; Data status: 12.08.2020.

Table 14: Brandenburg - R(t) remains unchanged after the 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	3689	173	3402	7	2	1
14.08.2020	3700	173	3408	7	2	1
15.08.2020	3712	173	3416	7	2	1
16.08.2020	3724	174	3423	8	2	1
17.08.2020	3736	174	3430	8	2	1
18.08.2020	3750	174	3438	8	2	1
19.08.2020	3763	174	3446	8	2	1
20.08.2020	3778	174	3454	9	2	1
21.08.2020	3792	174	3463	9	2	1
22.08.2020	3808	174	3472	9	2	1
23.08.2020	3824	174	3482	10	2	2
24.08.2020	3841	174	3492	10	3	2
25.08.2020	3858	174	3502	11	3	2
26.08.2020	3877	175	3512	11	3	2
27.08.2020	3896	175	3524	11	3	2
28.08.2020	3915	175	3535	12	3	2
29.08.2020	3936	175	3547	12	3	2
30.08.2020	3957	175	3560	13	3	2
31.08.2020	3980	175	3572	13	3	2
01.09.2020	4003	176	3586	14	3	2
02.09.2020	4027	176	3600	14	4	2
03.09.2020	4052	176	3615	15	4	2
04.09.2020	4078	176	3630	16	4	2
05.09.2020	4106	176	3646	16	4	2
06.09.2020	4134	176	3662	17	4	3
07.09.2020	4164	177	3680	17	4	3
08.09.2020	4195	177	3698	18	4	3
09.09.2020	4227	177	3716	19	5	3

Table 15: Brandenburg - R(t) takes on the value of 0.8 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	3688	173	3402	7	2	1
14.08.2020	3698	173	3408	7	2	1
15.08.2020	3708	173	3415	7	2	1
16.08.2020	3718	174	3423	8	2	1
17.08.2020	3727	174	3430	8	2	1
18.08.2020	3736	174	3437	8	2	1
19.08.2020	3745	174	3445	8	2	1
20.08.2020	3753	174	3453	8	2	1
21.08.2020	3762	174	3461	9	2	1
22.08.2020	3770	174	3469	9	2	1
23.08.2020	3777	174	3477	9	2	1
24.08.2020	3785	174	3485	9	2	1
25.08.2020	3792	174	3493	9	2	1
26.08.2020	3799	175	3501	9	2	1
27.08.2020	3806	175	3509	9	2	1
28.08.2020	3813	175	3517	9	2	1
29.08.2020	3820	175	3525	9	2	1
30.08.2020	3826	175	3533	9	2	1
31.08.2020	3832	175	3541	9	2	1
01.09.2020	3838	175	3549	9	2	1
02.09.2020	3844	175	3556	9	2	1
03.09.2020	3850	175	3564	9	2	1
04.09.2020	3855	176	3572	9	2	1
05.09.2020	3861	176	3579	9	2	1
06.09.2020	3866	176	3586	9	2	1
07.09.2020	3871	176	3593	8	2	1
08.09.2020	3876	176	3600	8	2	1
09.09.2020	3881	176	3607	8	2	1

Table 16: Brandenburg - R(t) takes on the value of 1.0 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	3689	173	3402	7	2	1
14.08.2020	3699	173	3408	7	2	1
15.08.2020	3710	173	3415	7	2	1
16.08.2020	3720	174	3423	8	2	1
17.08.2020	3731	174	3430	8	2	1
18.08.2020	3741	174	3438	8	2	1
19.08.2020	3752	174	3446	8	2	1
20.08.2020	3762	174	3454	9	2	1
21.08.2020	3773	174	3462	9	2	1
22.08.2020	3783	174	3470	9	2	1
23.08.2020	3794	174	3479	9	2	1
24.08.2020	3804	174	3487	9	2	1
25.08.2020	3815	174	3496	10	2	1
26.08.2020	3825	175	3505	10	2	2
27.08.2020	3836	175	3514	10	3	2
28.08.2020	3846	175	3524	10	3	2
29.08.2020	3857	175	3533	10	3	2
30.08.2020	3867	175	3542	10	3	2
31.08.2020	3878	175	3552	10	3	2
01.09.2020	3888	175	3561	11	3	2
02.09.2020	3899	175	3571	11	3	2
03.09.2020	3909	176	3581	11	3	2
04.09.2020	3920	176	3590	11	3	2
05.09.2020	3930	176	3600	11	3	2
06.09.2020	3941	176	3610	11	3	2
07.09.2020	3951	176	3620	11	3	2
08.09.2020	3962	176	3630	11	3	2
09.09.2020	3972	176	3640	11	3	2

Table 17: Brandenburg - R(t) takes on the value of 1.2 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	3689	173	3402	7	2	1
14.08.2020	3700	173	3408	7	2	1
15.08.2020	3711	173	3416	7	2	1
16.08.2020	3723	174	3423	8	2	1
17.08.2020	3735	174	3430	8	2	1
18.08.2020	3747	174	3438	8	2	1
19.08.2020	3760	174	3446	8	2	1
20.08.2020	3773	174	3454	9	2	1
21.08.2020	3786	174	3463	9	2	1
22.08.2020	3800	174	3472	9	2	1
23.08.2020	3814	174	3481	10	2	2
24.08.2020	3829	174	3490	10	3	2
25.08.2020	3844	174	3500	10	3	2
26.08.2020	3859	175	3510	11	3	2
27.08.2020	3875	175	3520	11	3	2
28.08.2020	3891	175	3531	11	3	2
29.08.2020	3908	175	3542	12	3	2
30.08.2020	3925	175	3554	12	3	2
31.08.2020	3943	175	3566	12	3	2
01.09.2020	3962	175	3578	13	3	2
02.09.2020	3980	176	3590	13	3	2
03.09.2020	4000	176	3603	13	3	2
04.09.2020	4020	176	3616	14	3	2
05.09.2020	4040	176	3630	14	4	2
06.09.2020	4061	176	3644	15	4	2
07.09.2020	4083	176	3658	15	4	2
08.09.2020	4105	177	3673	16	4	2
09.09.2020	4128	177	3688	16	4	2

5.2.3 Prediction for the next 4 weeks under the assumption of different scenarios from 13.08.2020

Fig. 54 shows the absolute changes in case numbers compared to the previous day for the next 4 weeks for different R(t) values. If no bars are shown on the plot it means that the number of cases has not changed compared to the previous day.

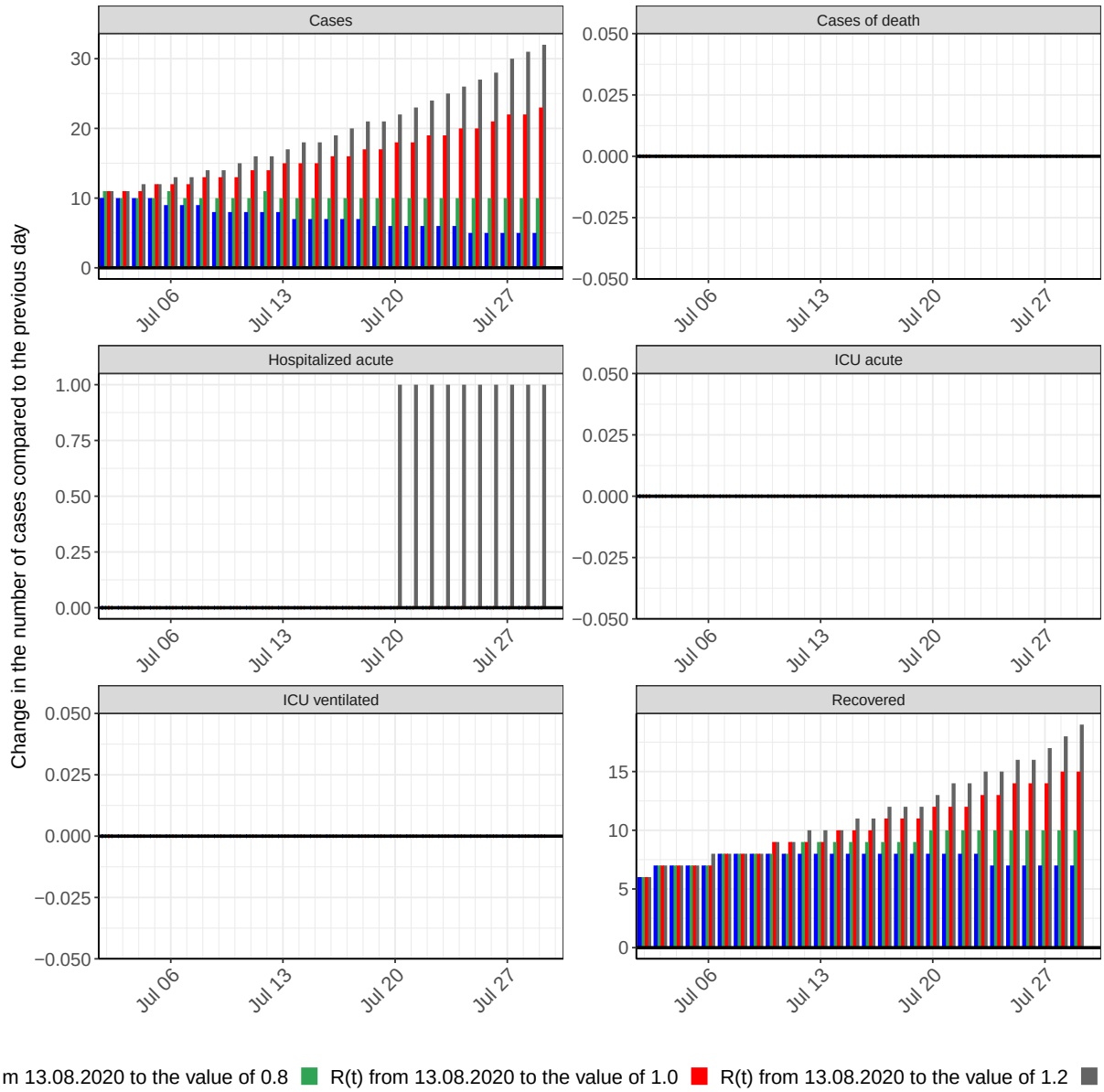


Figure 54: Simulation of daily new cases for the next 4 weeks - Brandenburg

6 Bremen

6.1 Model description

Fig. 55 depicts the results of the modeling (lines) compared to the observed data (points) for Bremen on a linear (A) and semi-logarithmic (B) scale.

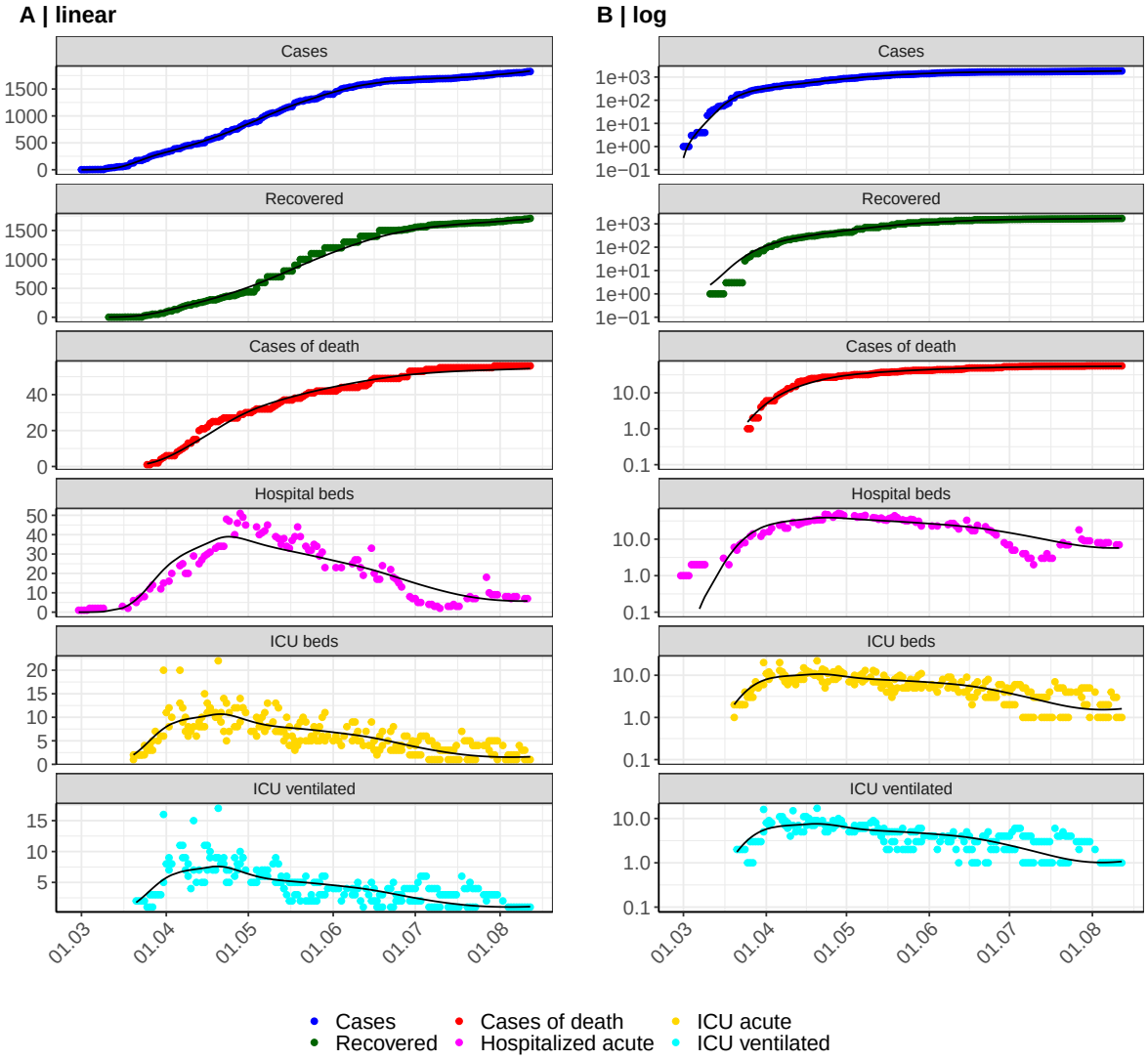


Figure 55: Model description of the reported case numbers, occupancy of hospital beds, recovery and deaths in Bremen. Points: reported data; lines: model description.

Fig. 56 shows the goodness-of-fit for Bremen. The values calculated by the model are plotted against the observed data. If the model fit is good, the points scatter randomly along the lines of identity.

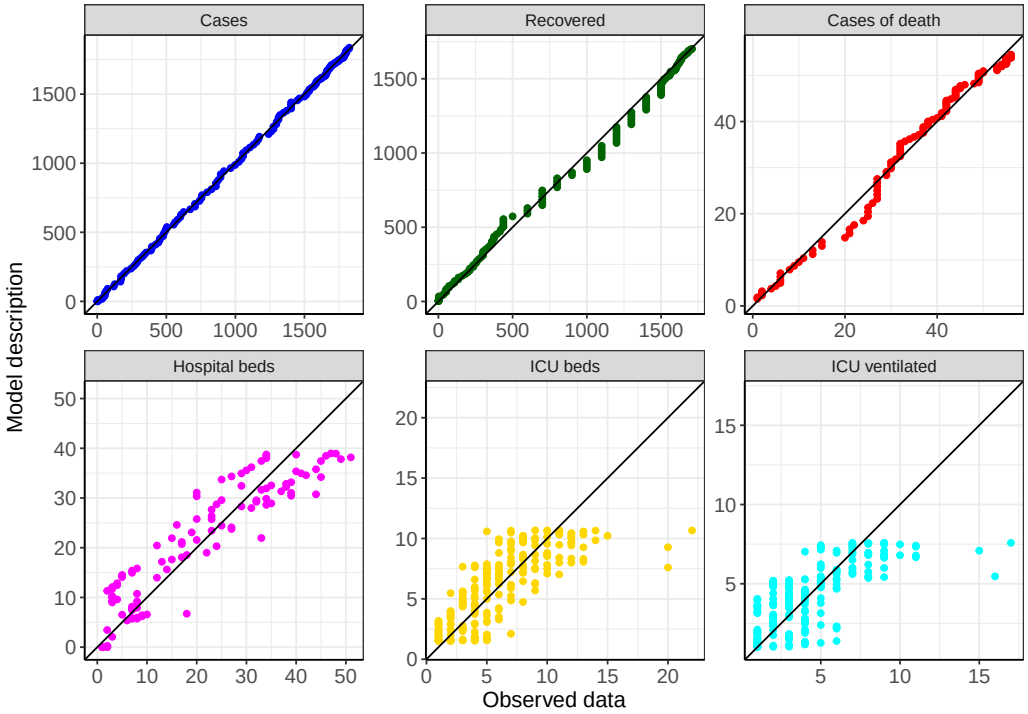


Figure 56: Goodness-of-fit plots for Bremen. Lines: lines of identity.

Fig. 57 shows the influence of non-pharmaceutical interventions (NPI) on R(t) for Bremen (red line) in comparison with the other federal states (grey lines).

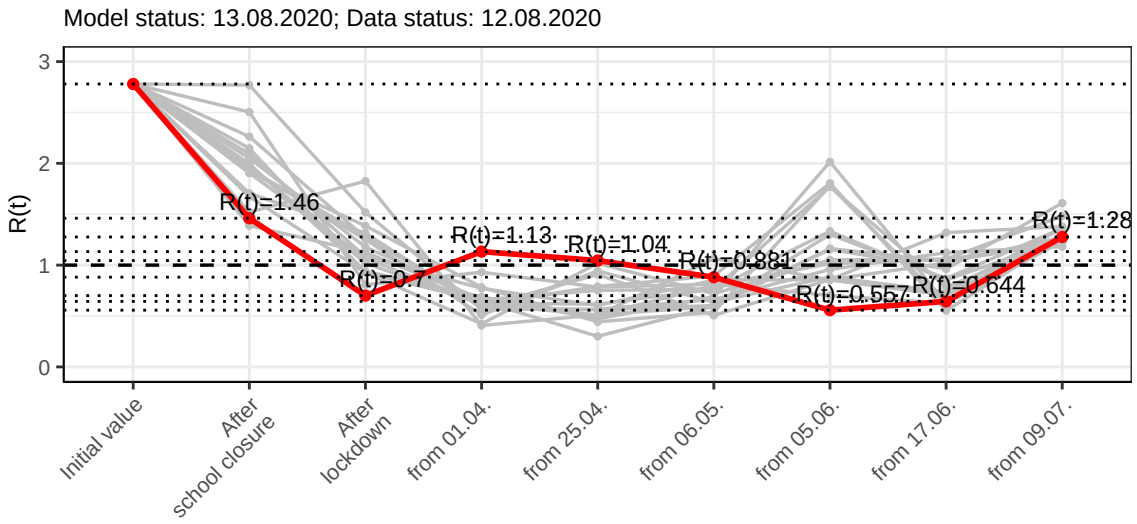


Figure 57: R(t) values before and after the NPIs for Bremen

Fig. 58 shows the R(t) estimated value for Bremen (red line) over time in comparison with the other federal states (grey lines).

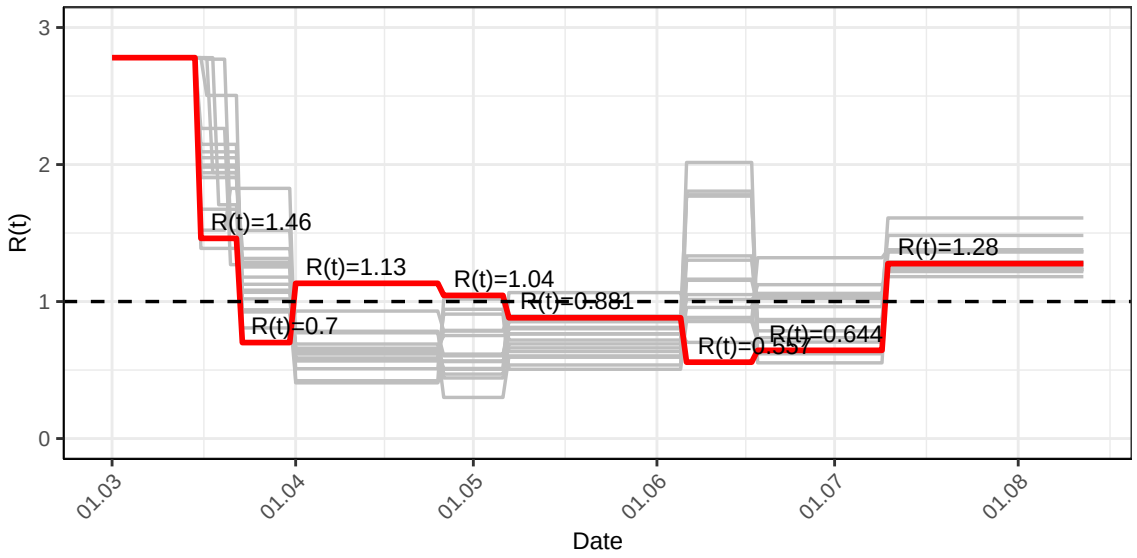


Figure 58: R(t) values over time for Bremen

6.2 Model predictions

6.2.1 Prediction for the next 4 weeks assuming that R(t) estimate will not change (R(t) = 1.28)

Fig. 59 and 60 depict the the model predictions for the next 4 weeks for Bremen on a linear (59) and a semi-logarithmic (60) scale. The modeling was carried out under the assumption that the R(t) estimated value would remain the same.

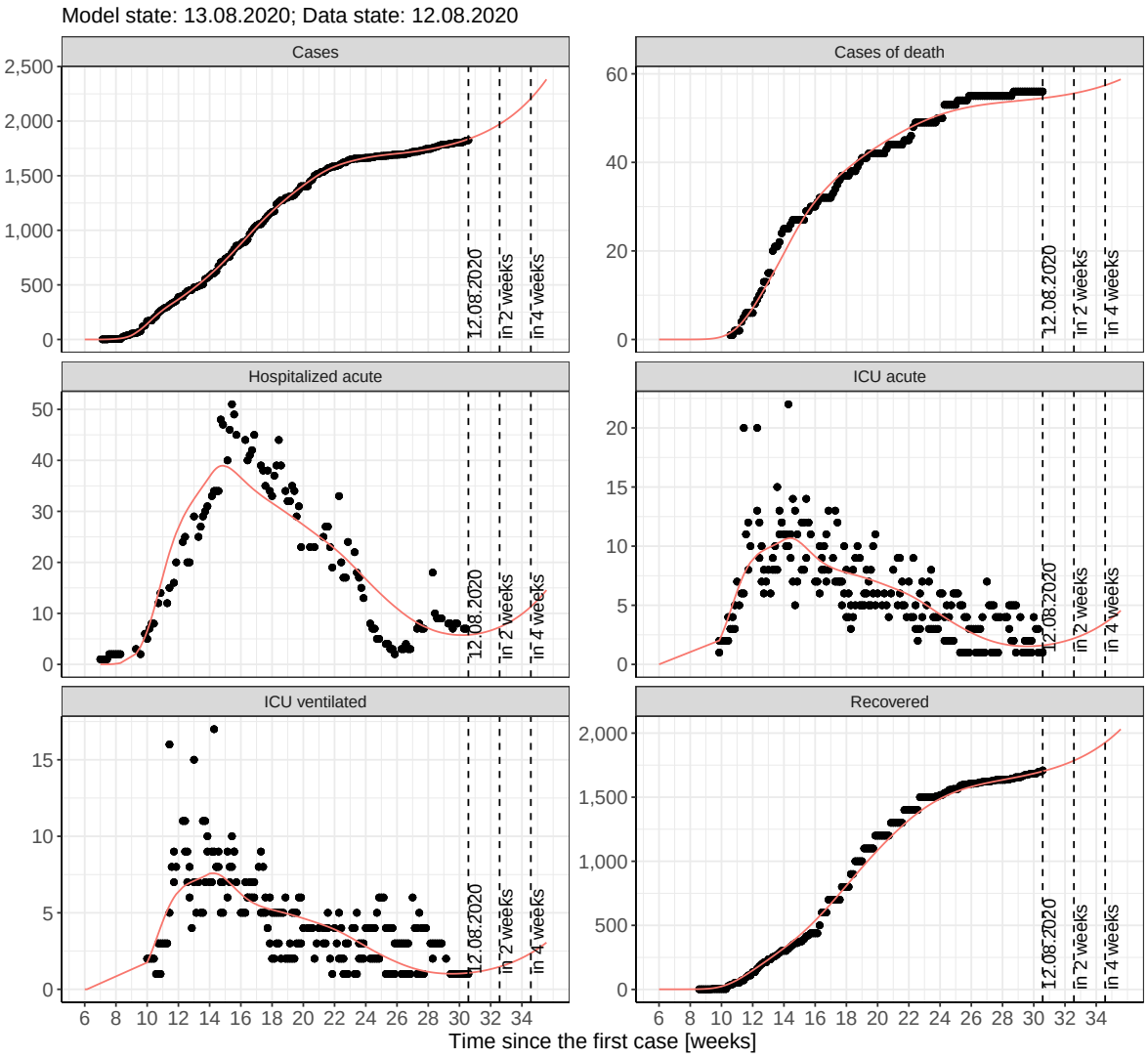


Figure 59: Representation of the model predictions for Bremen for the next 4 weeks under the assumption that the R(t) estimate remains the same on linear scale (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths). Points: Reported case numbers; Red lines: Model predictions.

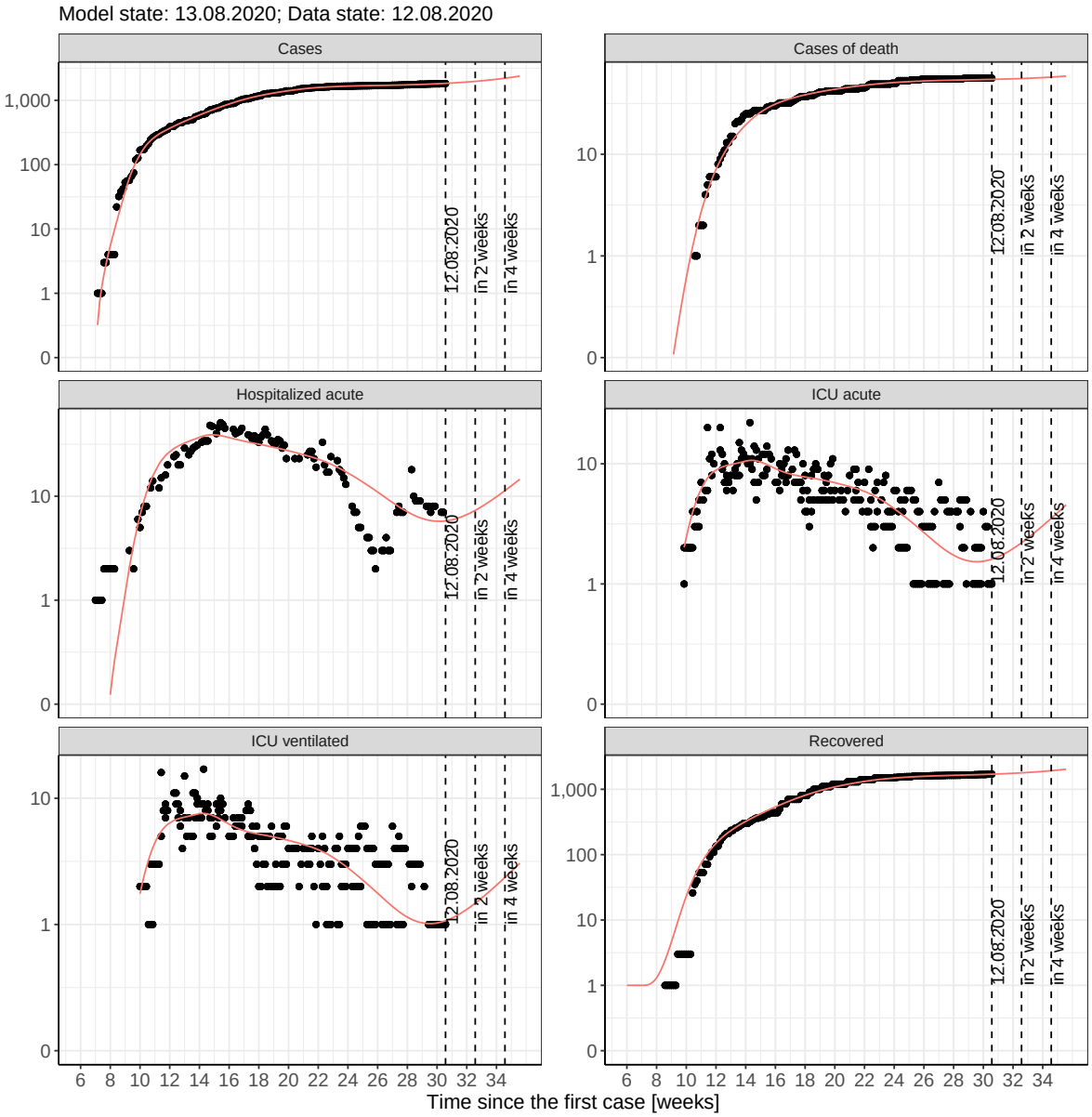


Figure 60: Semi-logarithmic representation of the model prediction (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Bremen for the next 4 weeks under the assumption that the R(t) estimate remains the same. Points: Reported case numbers; Red lines: Model predictions.

6.2.2 Predictions for the next 4 weeks assuming different scenarios (with the R(t) value above 1.2) from 13.08.2020

Fig. 61 and 62 represent the model prediction for the next 4 weeks for Bremen on a linear (61) and a semi-logarithmic (62) scale. In this simulation different scenarios of the possible development (R(t) = 1.4, 1.6, 1.8 and staying the same) from 13.08.2020 were tested.

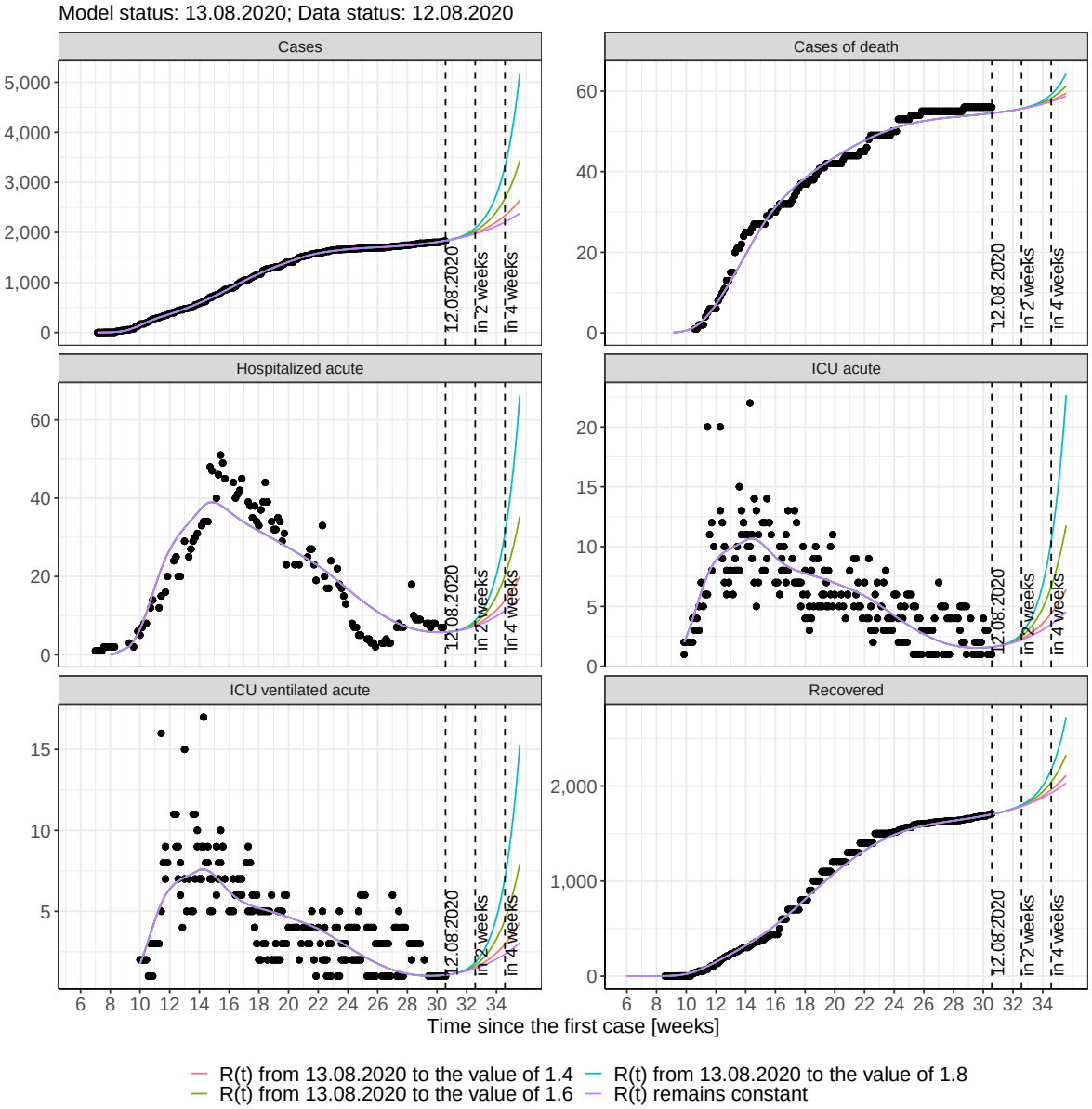


Figure 61: Linear representation of model prediction (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Bremen assuming various scenarios from the 13.08.2020. Points: Reported case numbers; Lines: Model predictions.

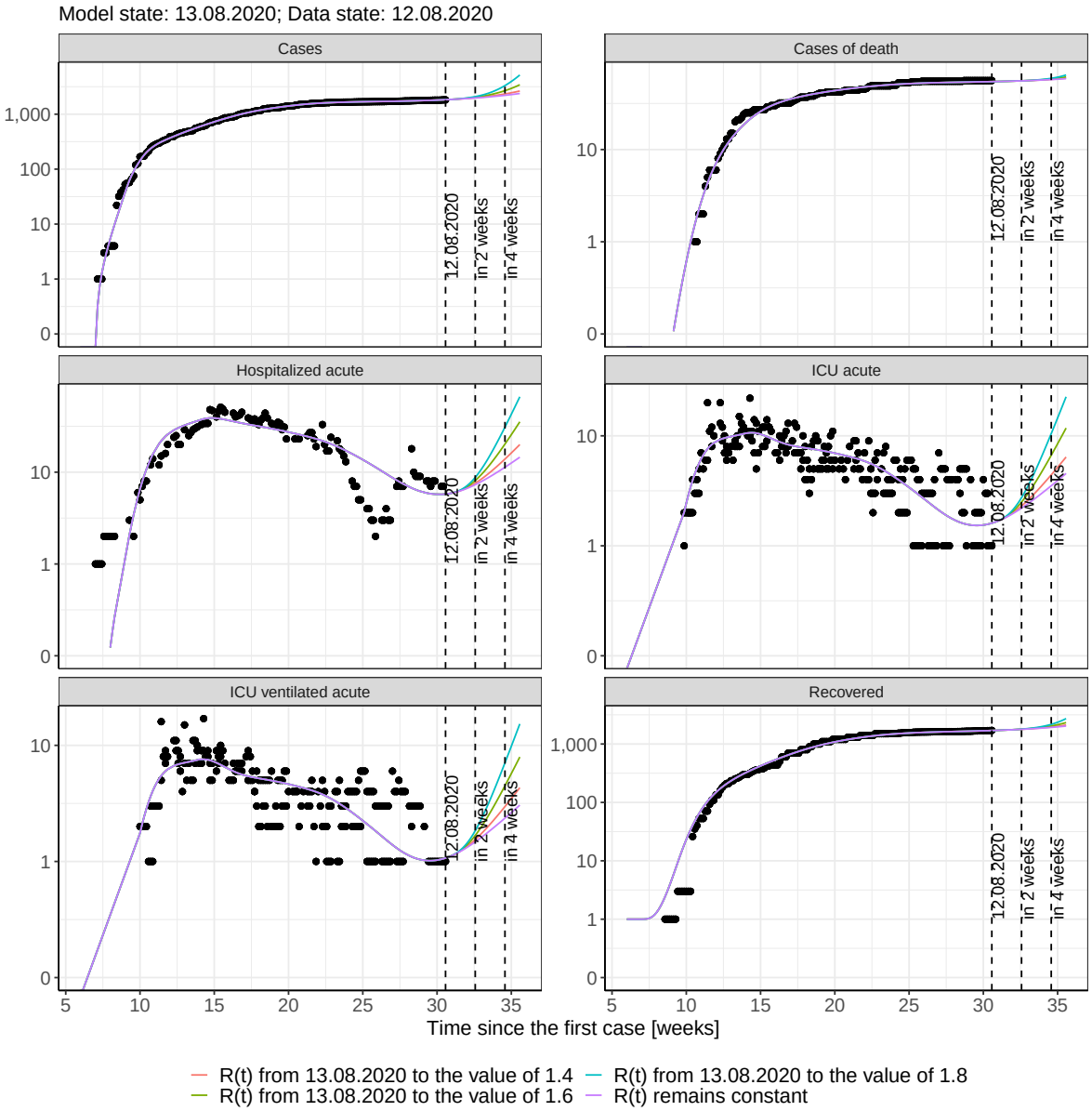


Figure 62: Semi-logarithmic representation of model predictions (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Bremen assuming various scenarios from the 13.08.2020. Points: Reported case numbers; Lines: Model predictions.

Fig. 63 and 64 represent the model prediction for the next 16 weeks for Bremen on a linear (63) and a semi-logarithmic (64) scale. In this simulation different scenarios of the possible course from the 13.08.2020 were tested.

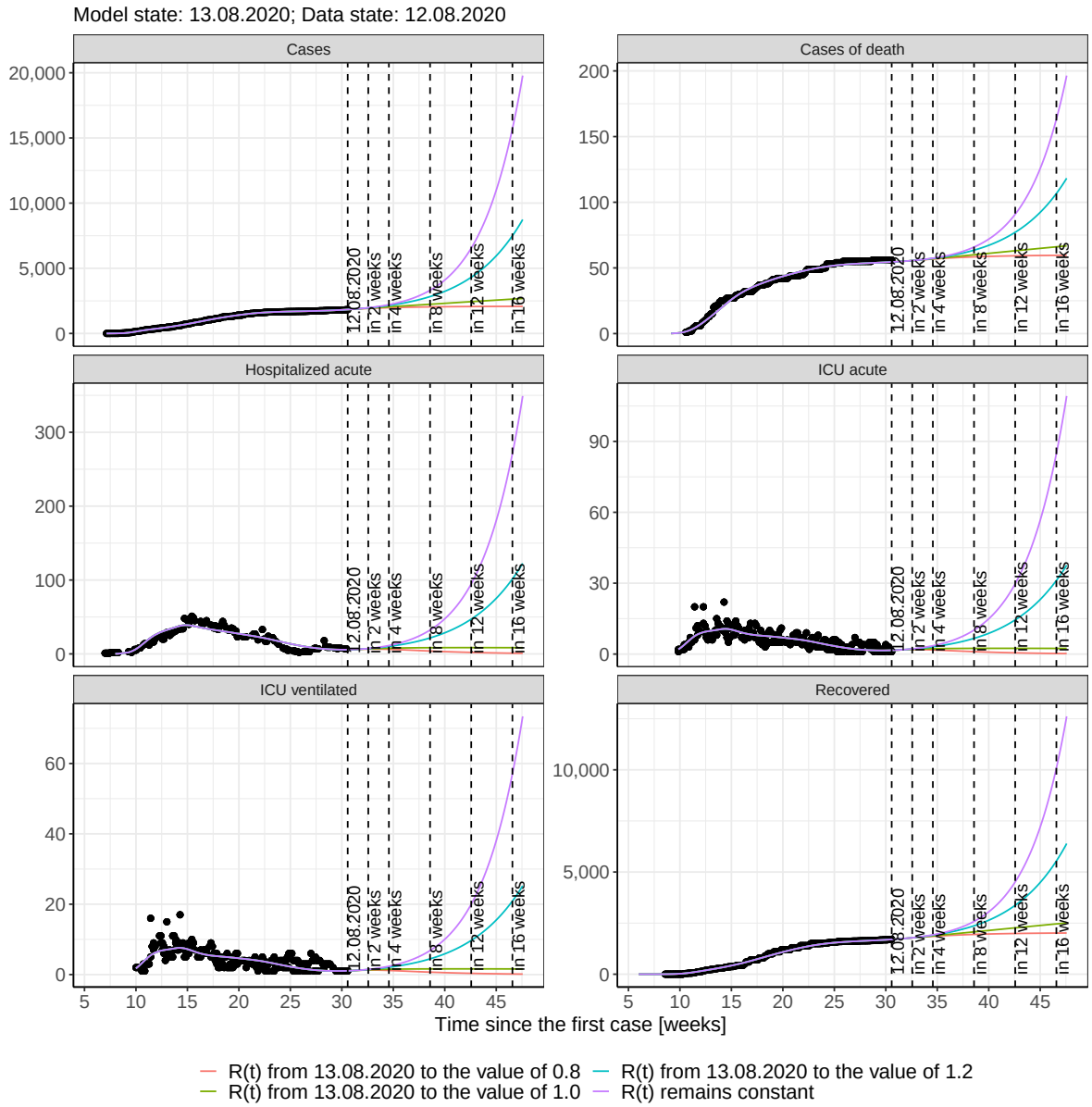


Figure 63: Linear representation of model predictions (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Bremen assuming various scenarios from the 13.08.2020. Points: reported case numbers; lines: model prediction.

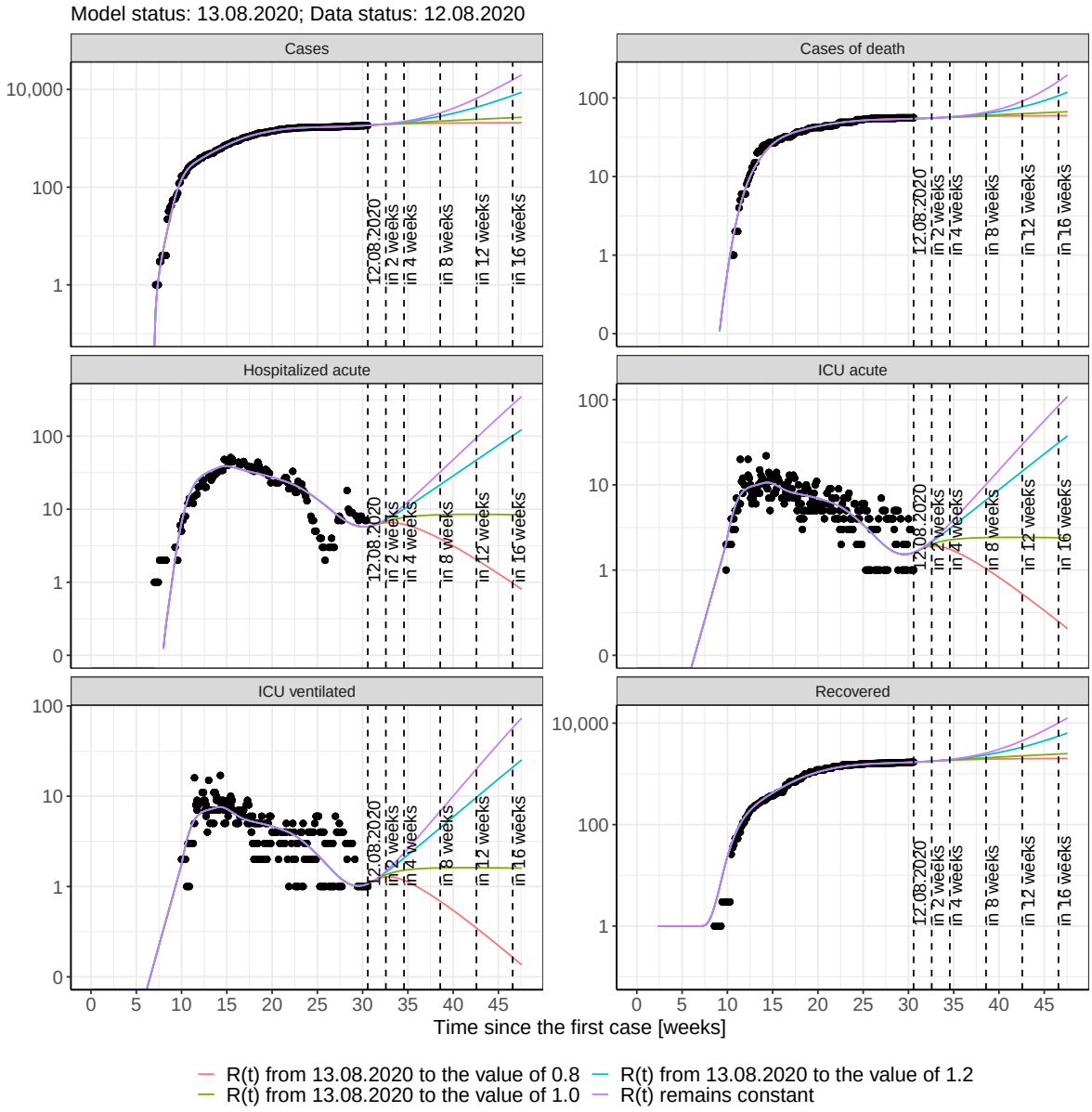


Figure 64: Semi-logarithmic depiction of the model prediction (cases, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Bremen assuming various scenarios after 13.08.2020. Points: reported case numbers;lines: model predictions.

The tables show the modeling results for four conceivable scenarios: Scenario 1: The R(t) estimated value after 13.08.2020 remains the same as today's value (Tab. 18); Scenario 2: The R(t) estimated value after 13.08.2020 takes the value of 0.8 (Tab. 19); Scenario 3: The R(t) estimated value takes the value of 1 after the 13.08.2020 (Tab. 20); Scenario 4: The R(t) estimated value takes the value of 1.2 after the 13.08.2020 (Tab. 21) Model status from 13.08.2020; Data status: 12.08.2020.

Table 18: Bremen - R(t) remains unchanged after the 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	1843	55	1707	6	2	1
14.08.2020	1851	55	1712	6	2	1
15.08.2020	1859	55	1717	6	2	1
16.08.2020	1868	55	1722	6	2	1
17.08.2020	1876	55	1727	6	2	1
18.08.2020	1885	55	1733	6	2	1
19.08.2020	1895	55	1739	6	2	1
20.08.2020	1904	55	1745	6	2	1
21.08.2020	1915	55	1751	7	2	1
22.08.2020	1925	55	1757	7	2	1
23.08.2020	1936	55	1764	7	2	1
24.08.2020	1948	55	1771	7	2	1
25.08.2020	1960	55	1778	7	2	1
26.08.2020	1972	56	1786	7	2	1
27.08.2020	1985	56	1793	8	2	2
28.08.2020	1998	56	1801	8	2	2
29.08.2020	2012	56	1810	8	2	2
30.08.2020	2027	56	1818	8	2	2
31.08.2020	2042	56	1828	8	3	2
01.09.2020	2058	56	1837	9	3	2
02.09.2020	2074	56	1847	9	3	2
03.09.2020	2091	57	1857	9	3	2
04.09.2020	2108	57	1867	10	3	2
05.09.2020	2127	57	1878	10	3	2
06.09.2020	2146	57	1890	10	3	2
07.09.2020	2165	57	1901	11	3	2
08.09.2020	2186	57	1914	11	3	2
09.09.2020	2207	57	1926	11	4	2

Table 19: Bremen - R(t) takes on the value of 0.8 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	1843	55	1707	6	2	1
14.08.2020	1850	55	1712	6	2	1
15.08.2020	1857	55	1717	6	2	1
16.08.2020	1864	55	1722	6	2	1
17.08.2020	1870	55	1727	6	2	1
18.08.2020	1876	55	1732	6	2	1
19.08.2020	1882	55	1738	6	2	1
20.08.2020	1888	55	1744	6	2	1
21.08.2020	1894	55	1749	6	2	1
22.08.2020	1899	55	1755	6	2	1
23.08.2020	1905	55	1761	6	2	1
24.08.2020	1910	55	1766	6	2	1
25.08.2020	1915	55	1772	6	2	1
26.08.2020	1920	56	1778	7	2	1
27.08.2020	1925	56	1784	7	2	1
28.08.2020	1930	56	1789	7	2	1
29.08.2020	1934	56	1795	7	2	1
30.08.2020	1938	56	1800	7	2	1
31.08.2020	1943	56	1806	7	2	1
01.09.2020	1947	56	1811	7	2	1
02.09.2020	1951	56	1817	7	2	1
03.09.2020	1955	56	1822	6	2	1
04.09.2020	1959	56	1827	6	2	1
05.09.2020	1962	56	1832	6	2	1
06.09.2020	1966	57	1837	6	2	1
07.09.2020	1970	57	1842	6	2	1
08.09.2020	1973	57	1847	6	2	1
09.09.2020	1976	57	1852	6	2	1

Table 20: Bremen - R(t) takes on the value of 1.0 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	1843	55	1707	6	2	1
14.08.2020	1850	55	1712	6	2	1
15.08.2020	1858	55	1717	6	2	1
16.08.2020	1865	55	1722	6	2	1
17.08.2020	1872	55	1727	6	2	1
18.08.2020	1880	55	1733	6	2	1
19.08.2020	1887	55	1738	6	2	1
20.08.2020	1894	55	1744	6	2	1
21.08.2020	1902	55	1750	6	2	1
22.08.2020	1909	55	1756	6	2	1
23.08.2020	1916	55	1762	7	2	1
24.08.2020	1923	55	1768	7	2	1
25.08.2020	1931	55	1774	7	2	1
26.08.2020	1938	56	1781	7	2	1
27.08.2020	1945	56	1787	7	2	1
28.08.2020	1952	56	1794	7	2	1
29.08.2020	1960	56	1800	7	2	1
30.08.2020	1967	56	1807	7	2	1
31.08.2020	1974	56	1813	7	2	1
01.09.2020	1982	56	1820	7	2	1
02.09.2020	1989	56	1827	7	2	1
03.09.2020	1996	56	1834	7	2	1
04.09.2020	2003	56	1840	7	2	1
05.09.2020	2010	57	1847	7	2	1
06.09.2020	2018	57	1854	8	2	1
07.09.2020	2025	57	1861	8	2	1
08.09.2020	2032	57	1868	8	2	2
09.09.2020	2039	57	1875	8	2	2

Table 21: Bremen - R(t) takes on the value of 1.2 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	1843	55	1707	6	2	1
14.08.2020	1851	55	1712	6	2	1
15.08.2020	1859	55	1717	6	2	1
16.08.2020	1867	55	1722	6	2	1
17.08.2020	1875	55	1727	6	2	1
18.08.2020	1884	55	1733	6	2	1
19.08.2020	1892	55	1738	6	2	1
20.08.2020	1901	55	1744	6	2	1
21.08.2020	1911	55	1750	6	2	1
22.08.2020	1920	55	1757	7	2	1
23.08.2020	1930	55	1763	7	2	1
24.08.2020	1940	55	1770	7	2	1
25.08.2020	1951	55	1777	7	2	1
26.08.2020	1961	56	1784	7	2	1
27.08.2020	1972	56	1791	7	2	1
28.08.2020	1984	56	1799	7	2	2
29.08.2020	1995	56	1807	8	2	2
30.08.2020	2007	56	1815	8	2	2
31.08.2020	2020	56	1823	8	2	2
01.09.2020	2032	56	1832	8	2	2
02.09.2020	2045	56	1840	8	3	2
03.09.2020	2058	56	1849	9	3	2
04.09.2020	2072	57	1859	9	3	2
05.09.2020	2086	57	1868	9	3	2
06.09.2020	2101	57	1878	9	3	2
07.09.2020	2116	57	1888	10	3	2
08.09.2020	2131	57	1898	10	3	2
09.09.2020	2147	57	1909	10	3	2

6.2.3 Prediction for the next 4 weeks under the assumption of different scenarios from 13.08.2020

Fig. 65 shows the absolute changes in case numbers compared to the previous day for the next 4 weeks for different R(t) values. If no bars are shown on the plot it means that the number of cases has not changed compared to the previous day.

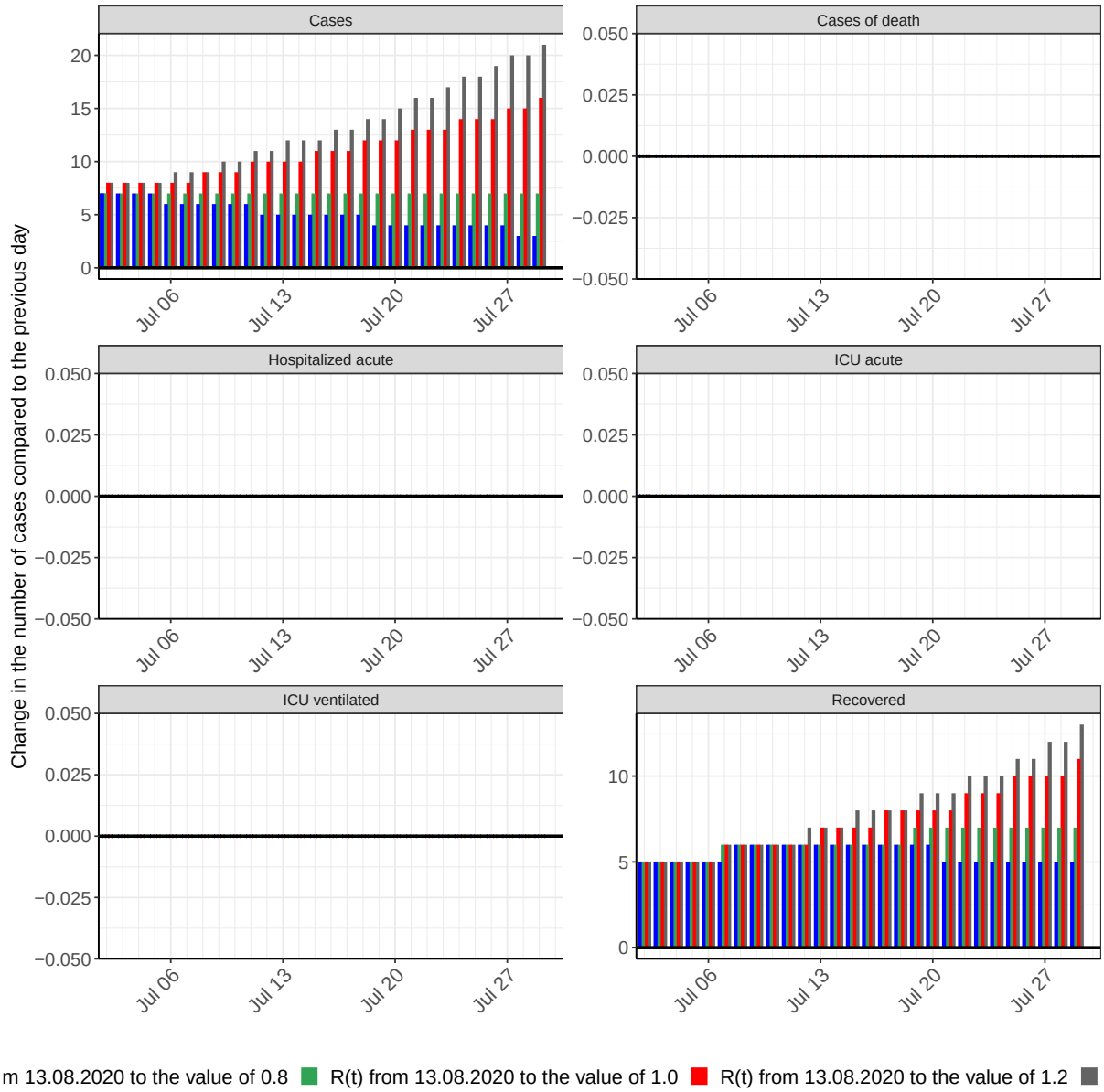


Figure 65: Simulation of daily new cases for the next 4 weeks - Bremen

7 Hamburg

7.1 Model description

Fig. 66 depicts the results of the modeling (lines) compared to the observed data (points) for Hamburg on a linear (A) and semi-logarithmic (B) scale.

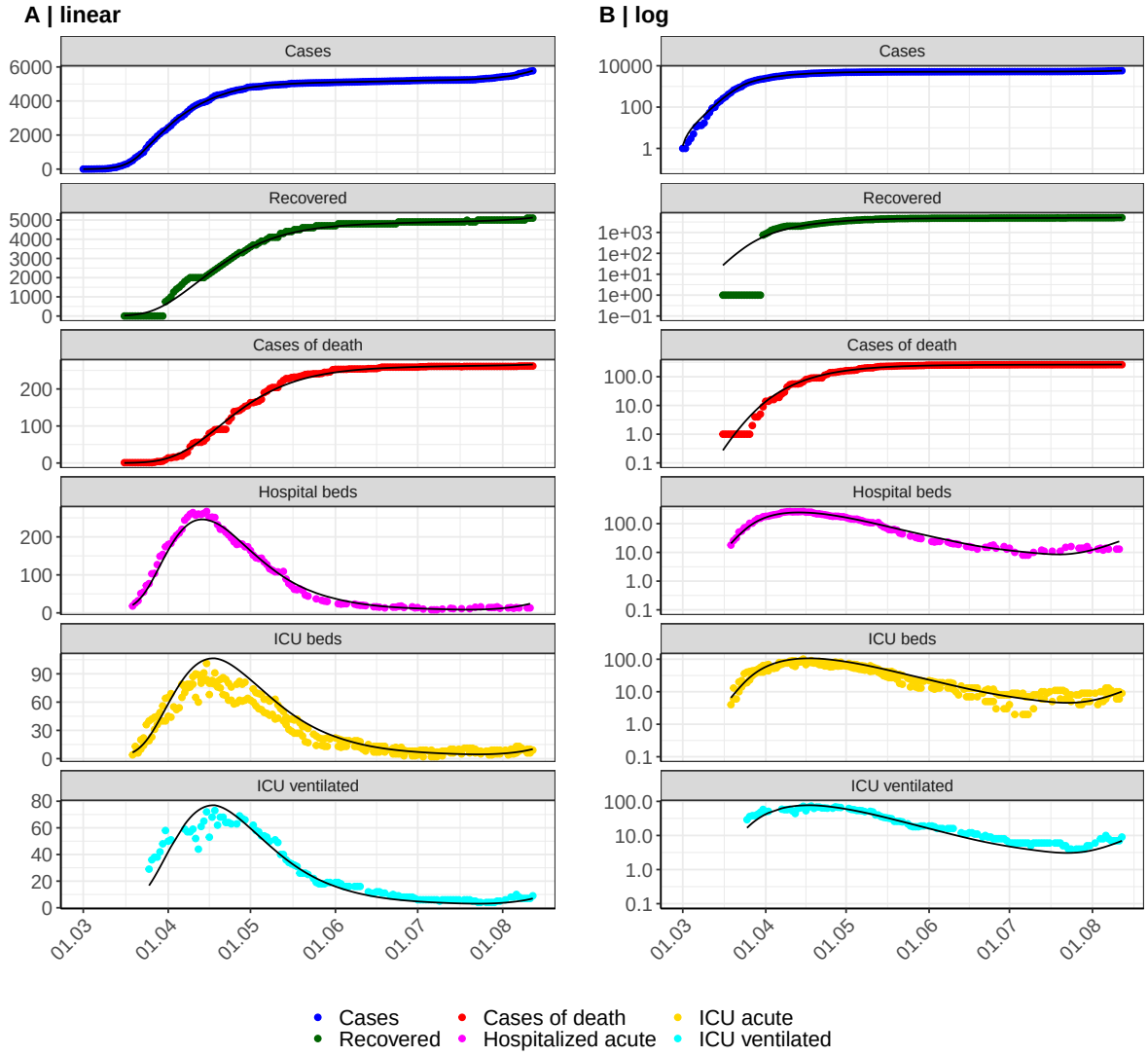


Figure 66: Model description of the reported case numbers, occupancy of hospital beds, recovery and deaths in Hamburg. Points: reported data; lines: model description.

Fig. 67 shows the goodness-of-fit for Hamburg. The values calculated by the model are plotted against the observed data. If the model fit is good, the points scatter randomly along the lines of identity.

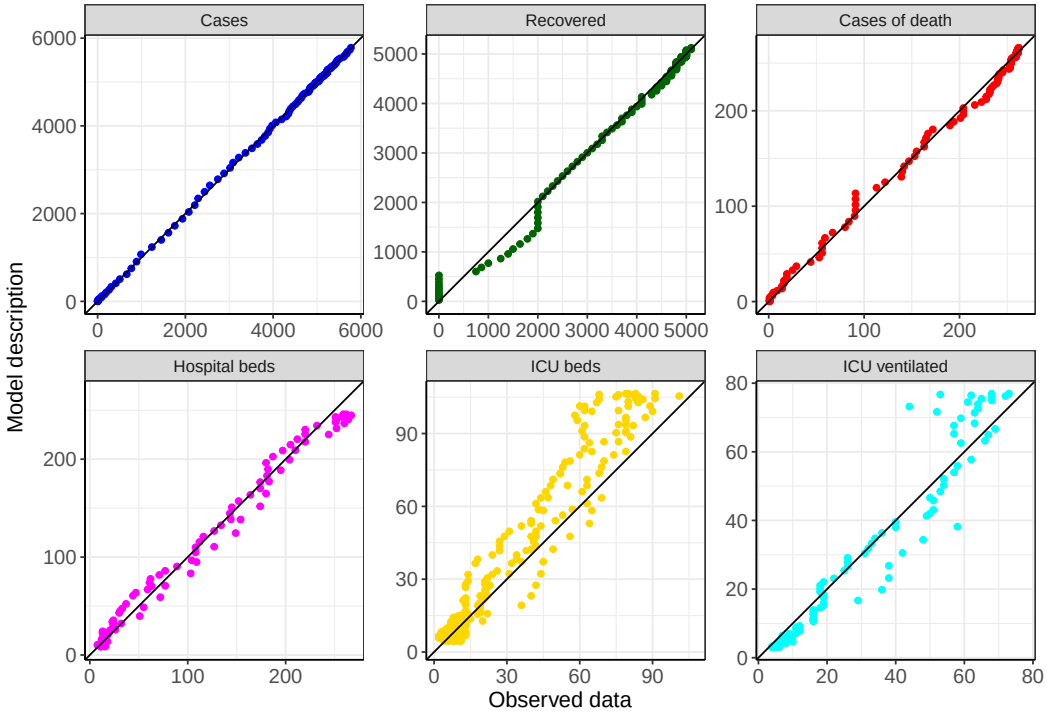


Figure 67: Goodness-of-fit plots for Hamburg. Lines: lines of identity.

Fig. 68 shows the influence of non-pharmaceutical interventions (NPI) on R(t) for Hamburg (red line) in comparison with the other federal states (grey lines).

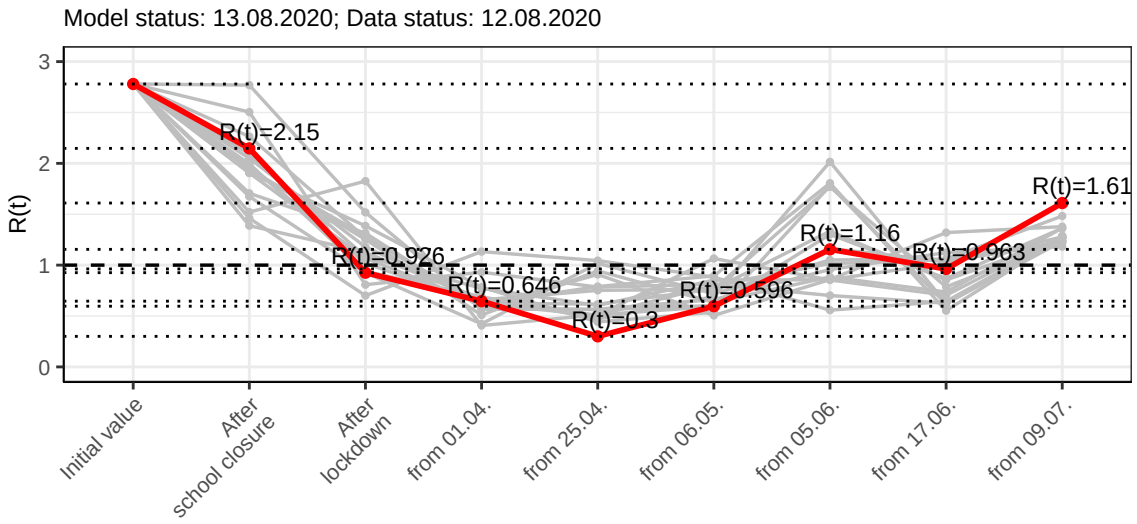


Figure 68: R(t) values before and after the NPIs for Hamburg

Fig. 69 shows the R(t) estimated value for Hamburg (red line) over time in comparison with the other federal states (grey lines).

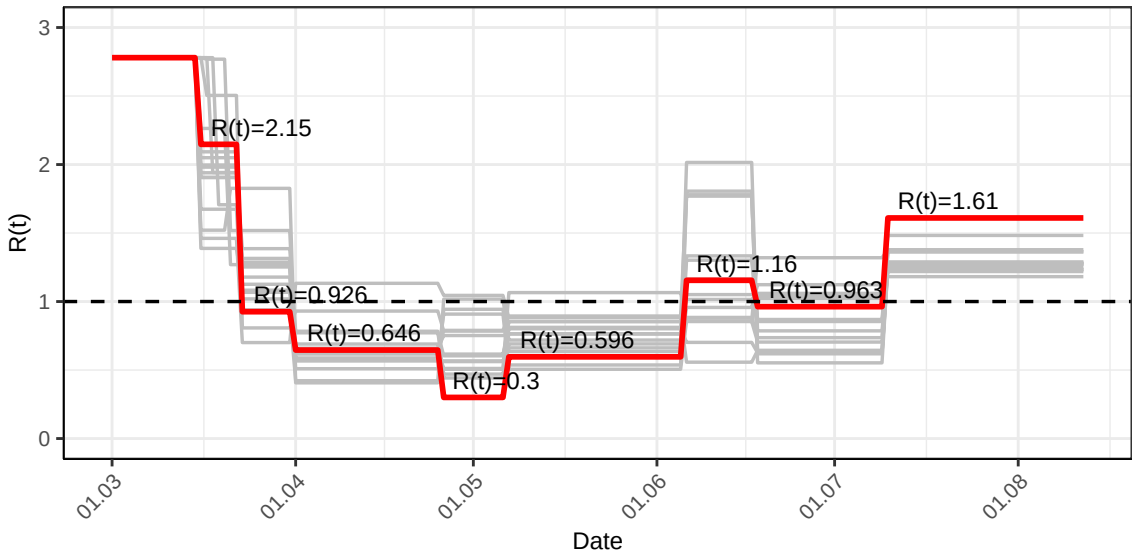


Figure 69: R(t) values over time for Hamburg

7.2 Model predictions

7.2.1 Prediction for the next 4 weeks assuming that R(t) estimate will not change (R(t) = 1.61)

Fig. 70 and 71 depict the the model predictions for the next 4 weeks for Hamburg on a linear (70) and a semi-logarithmic (71) scale. The modeling was carried out under the assumption that the R(t) estimated value would remain the same.

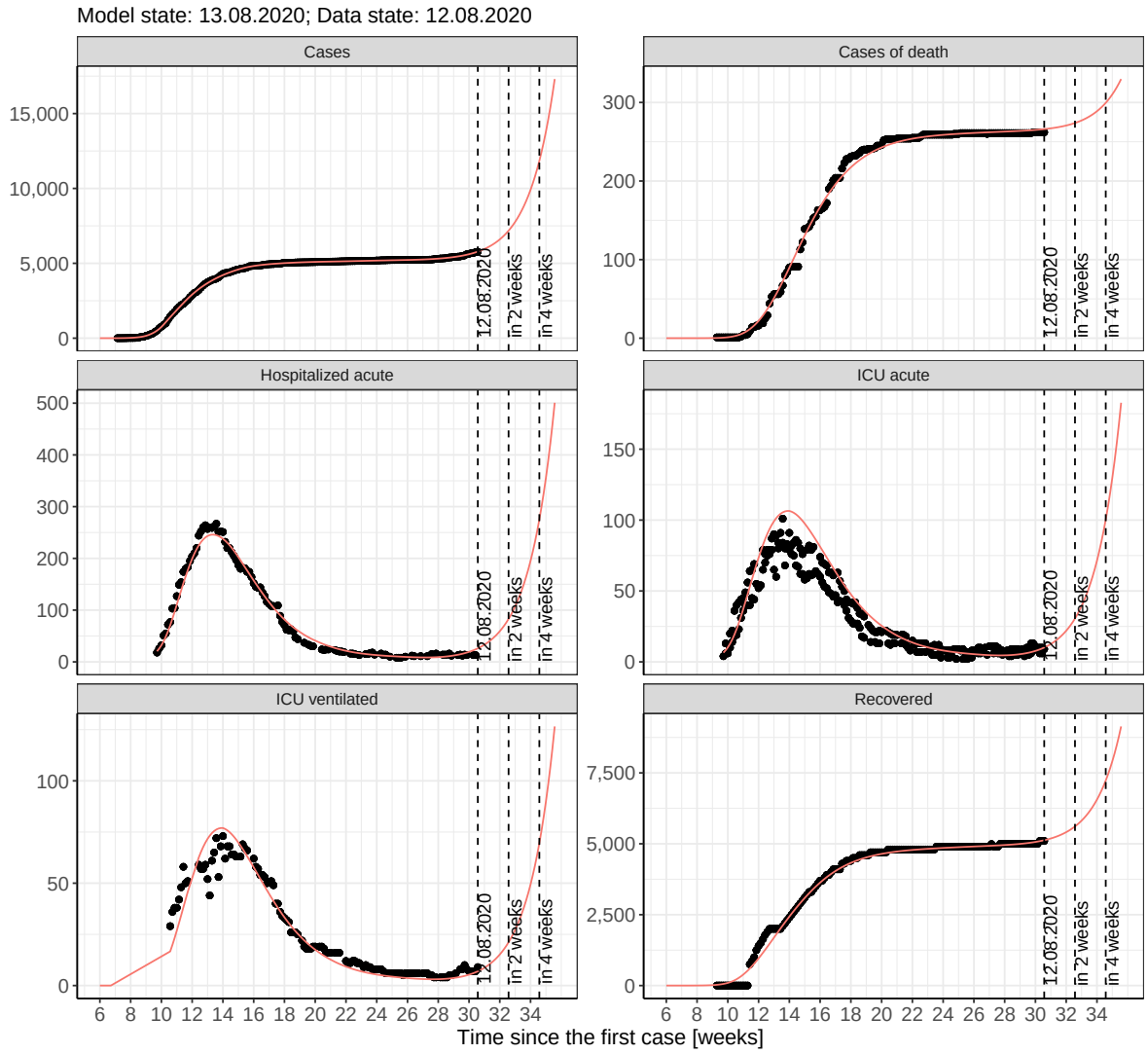


Figure 70: Representation of the model predictions for Hamburg for the next 4 weeks under the assumption that the R(t) estimate remains the same on linear scale (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths). Points: Reported case numbers; Red lines: Model predictions.

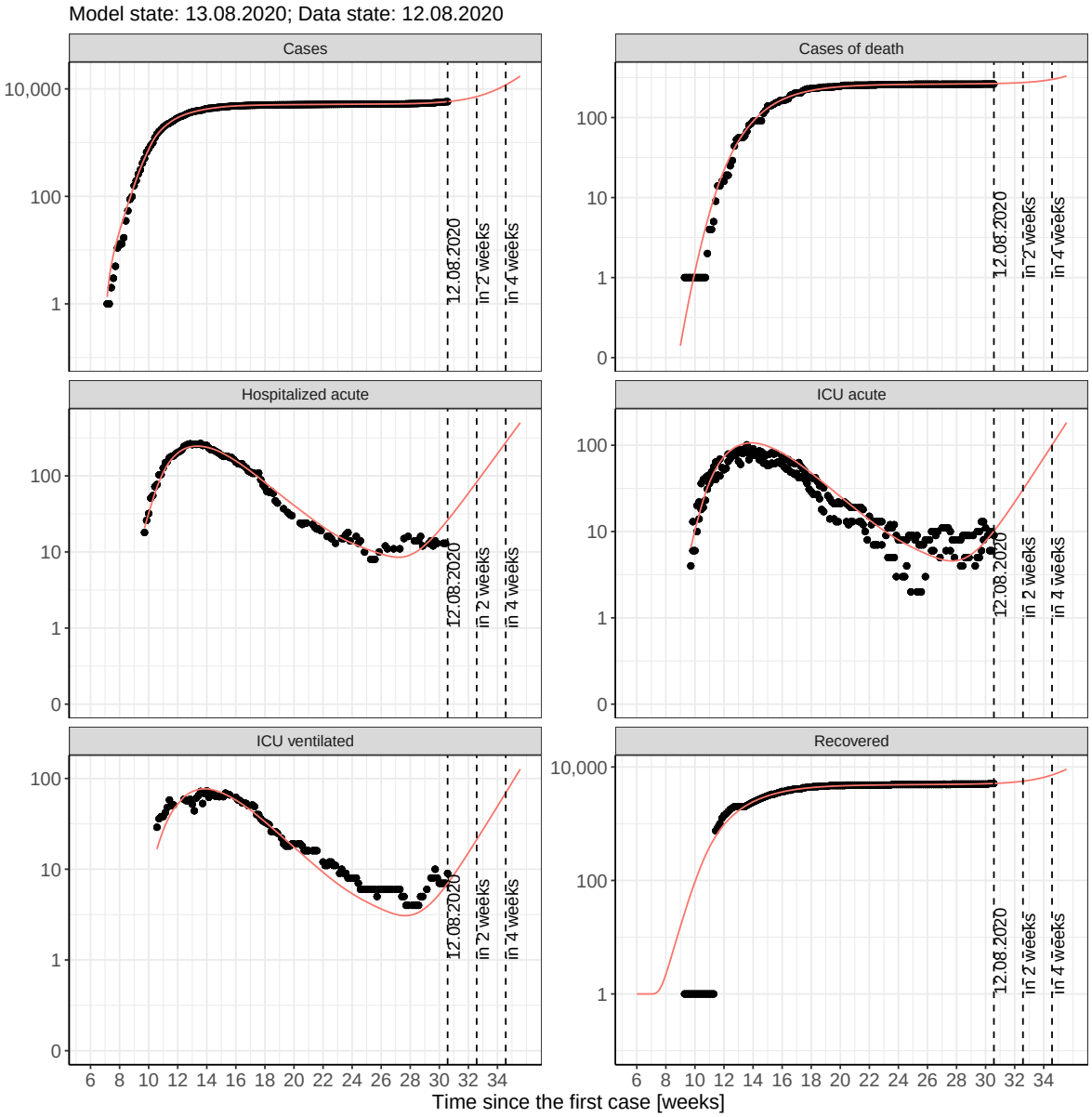


Figure 71: Semi-logarithmic representation of the model prediction (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Hamburg for the next 4 weeks under the assumption that the R(t) estimate remains the same. Points: Reported case numbers; Red lines: Model predictions.

7.2.2 Predictions for the next 4 weeks assuming different scenarios (with the R(t) value above 1.2) from 13.08.2020

Fig. 72 and 73 represent the model prediction for the next 4 weeks for Hamburg on a linear (72) and a semi-logarithmic (73) scale. In this simulation different scenarios of the possible development (R(t) = 1.4, 1.6, 1.8 and staying the same) from 13.08.2020 were tested.

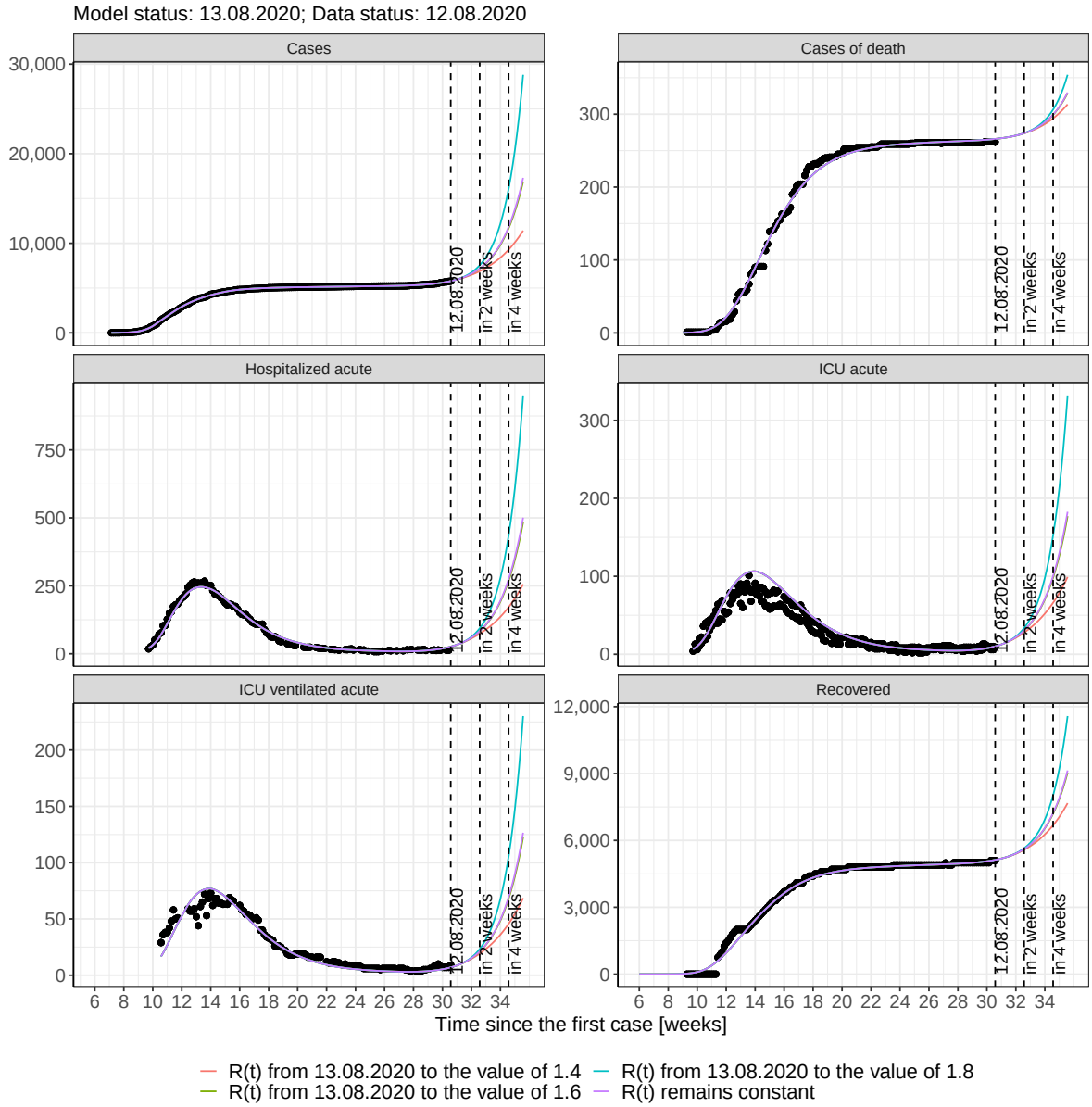


Figure 72: Linear representation of model prediction (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Hamburg assuming various scenarios from the 13.08.2020. Points: Reported case numbers; Lines: Model predictions.

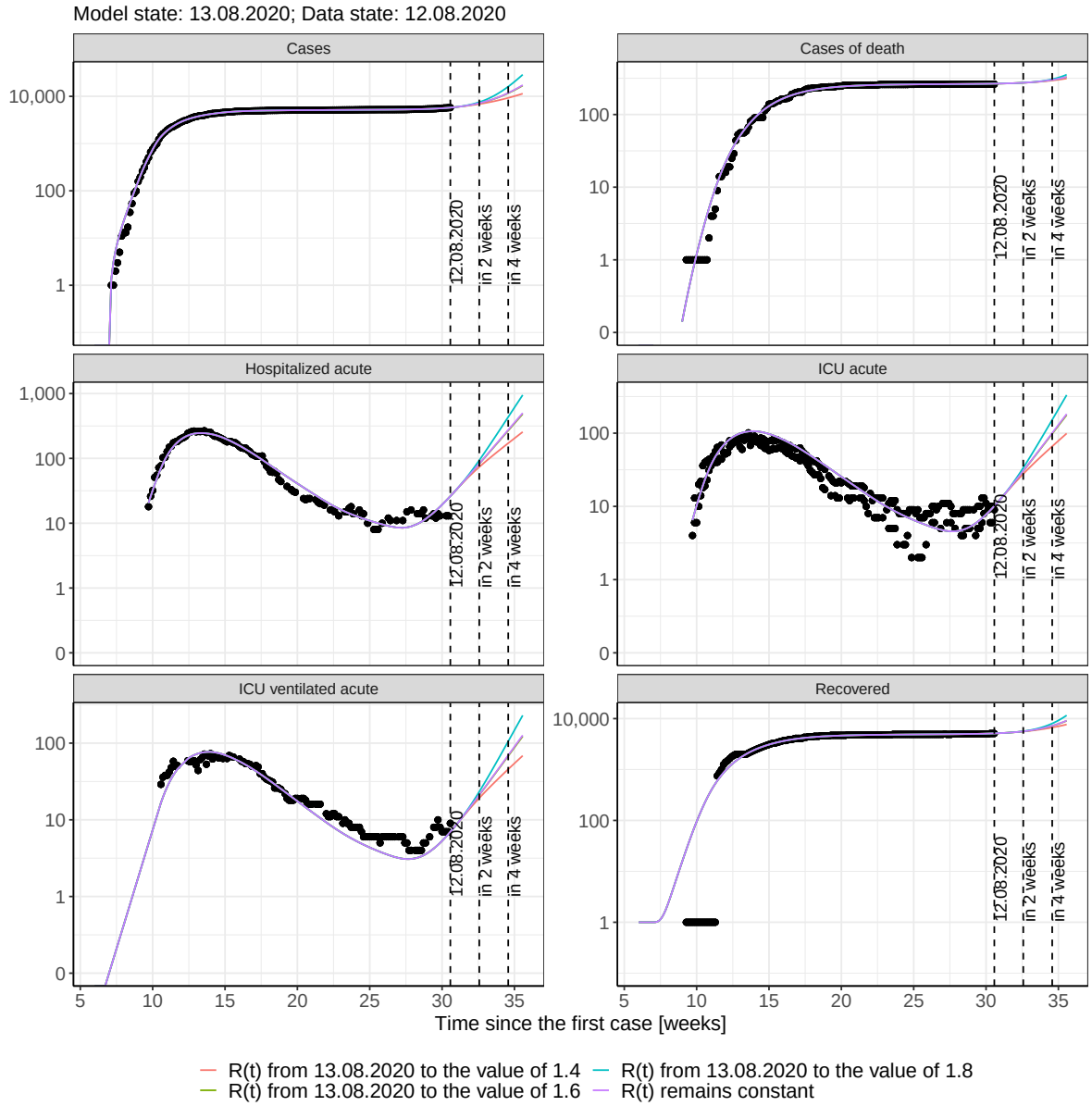


Figure 73: Semi-logarithmic representation of model predictions (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Hamburg assuming various scenarios from the 13.08.2020. Points: Reported case numbers; Lines: Model predictions.

Fig. 74 and 75 represent the model prediction for the next 16 weeks for Hamburg on a linear (74) and a semi-logarithmic (75) scale. In this simulation different scenarios of the possible course from the 13.08.2020 were tested.

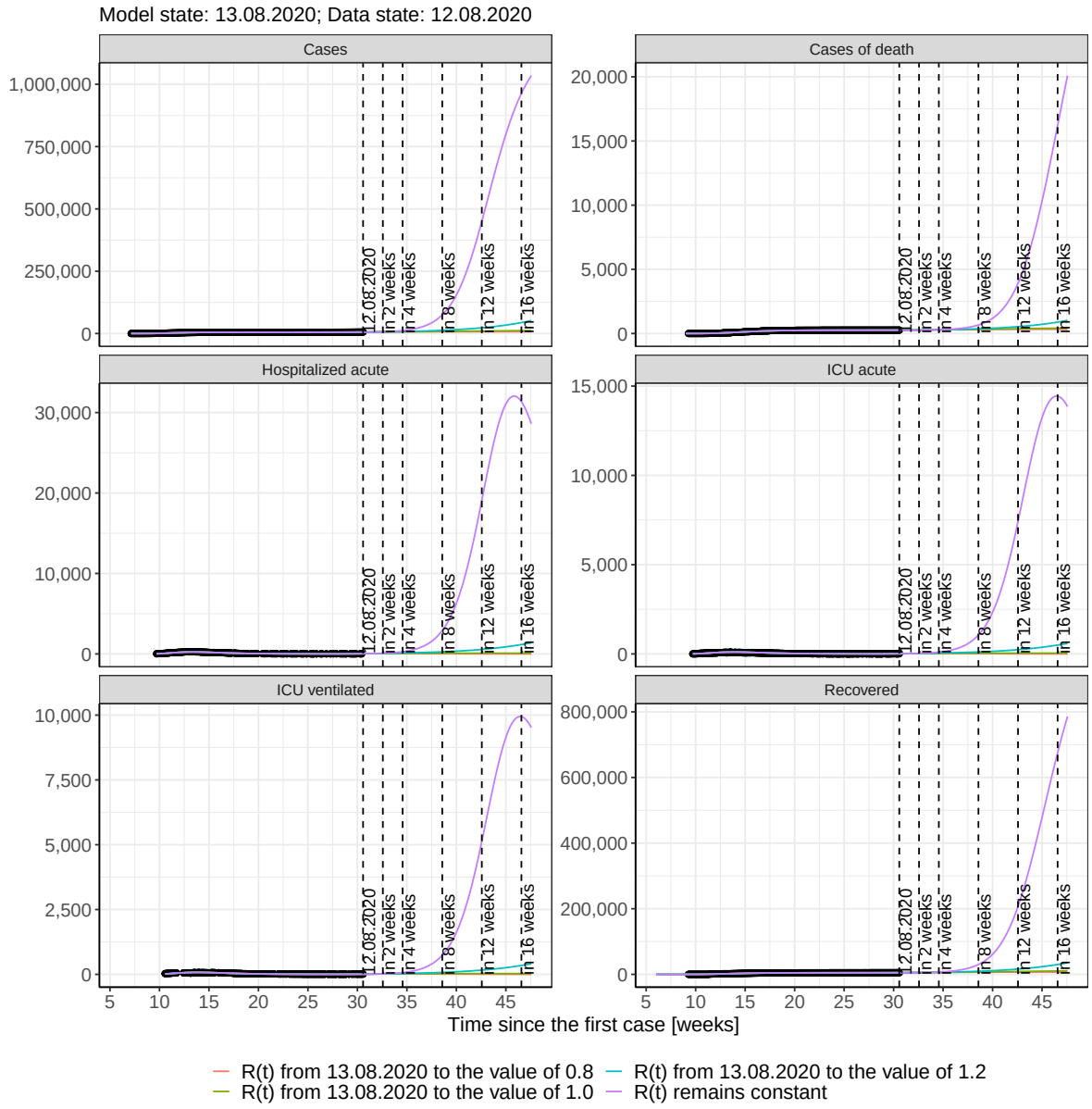


Figure 74: Linear representation of model predictions (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Hamburg assuming various scenarios from the 13.08.2020. Points: reported case numbers; lines: model prediction.

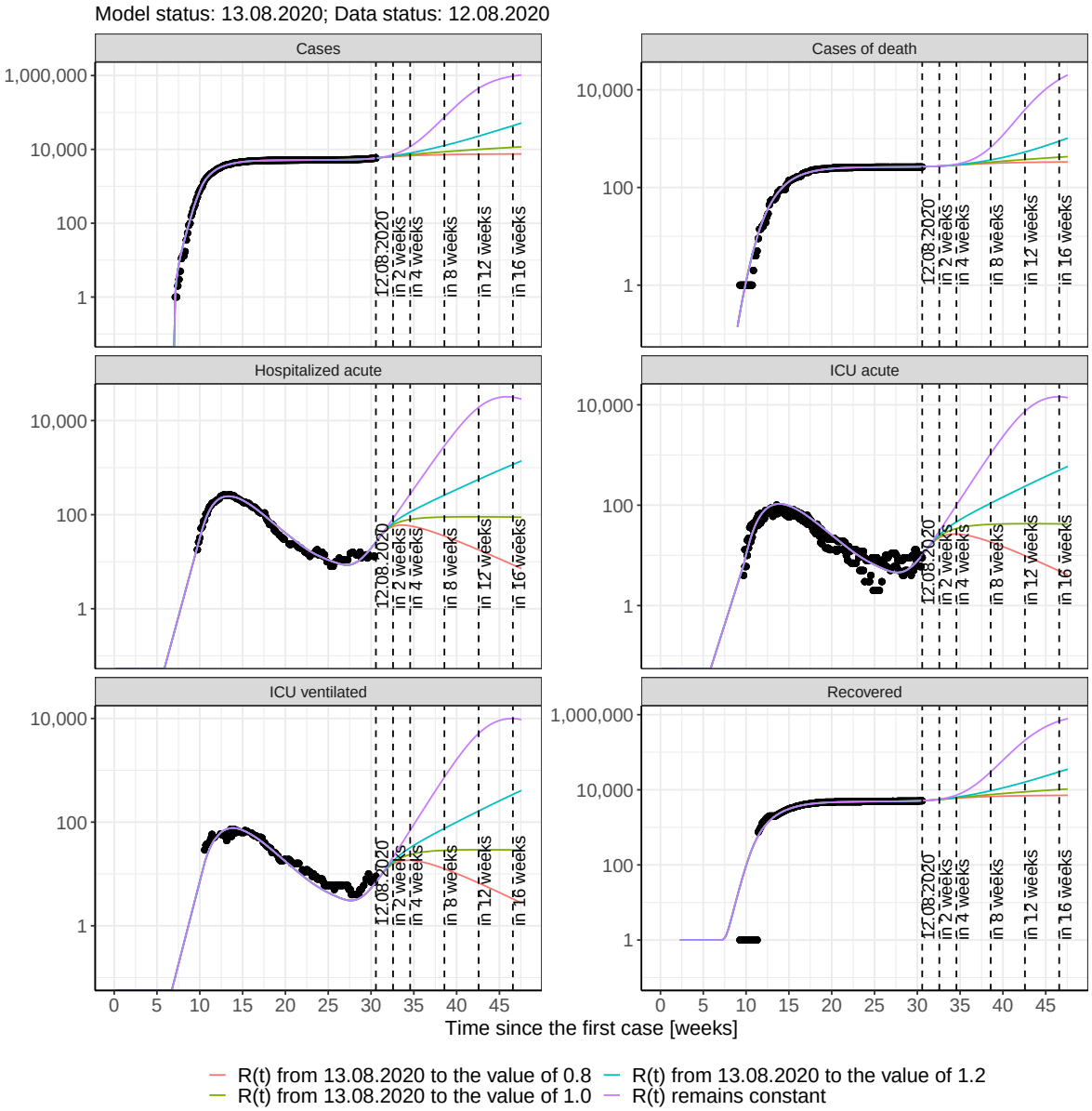


Figure 75: Semi-logarithmic depiction of the model prediction (cases, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Hamburg assuming various scenarios after 13.08.2020. Points: reported case numbers;lines: model predictions.

The tables show the modeling results for four conceivable scenarios: Scenario 1: The R(t) estimated value after 13.08.2020 remains the same as today's value (Tab. 22); Scenario 2: The R(t) estimated value after 13.08.2020 takes the value of 0.8 (Tab. 23); Scenario 3: The R(t) estimated value takes the value of 1 after the 13.08.2020 (Tab. 24); Scenario 4: The R(t) estimated value takes the value of 1.2 after the 13.08.2020 (Tab. 25) Model status from 13.08.2020; Data status: 12.08.2020.

Table 22: Hamburg - R(t) remains unchanged after the 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	5834	266	5145	28	11	7
14.08.2020	5893	267	5165	31	12	8
15.08.2020	5957	267	5188	33	13	9
16.08.2020	6026	267	5212	36	14	9
17.08.2020	6102	268	5238	39	15	10
18.08.2020	6185	268	5267	42	16	11
19.08.2020	6275	269	5298	46	17	12
20.08.2020	6373	269	5332	50	19	13
21.08.2020	6480	270	5369	54	20	14
22.08.2020	6597	271	5410	59	22	15
23.08.2020	6724	271	5454	64	24	16
24.08.2020	6863	272	5502	70	26	18
25.08.2020	7014	273	5555	76	28	19
26.08.2020	7179	274	5612	83	31	21
27.08.2020	7359	275	5674	90	33	23
28.08.2020	7554	276	5742	98	36	25
29.08.2020	7768	277	5816	107	39	27
30.08.2020	8000	278	5897	117	43	30
31.08.2020	8254	280	5984	127	47	32
01.09.2020	8530	281	6080	139	51	35
02.09.2020	8831	283	6185	151	55	38
03.09.2020	9159	285	6298	164	60	42
04.09.2020	9516	287	6423	179	65	45
05.09.2020	9905	289	6558	195	71	49
06.09.2020	10329	291	6705	213	78	54
07.09.2020	10791	294	6866	232	85	59
08.09.2020	11294	296	7041	252	92	64
09.09.2020	11841	300	7231	275	100	70

Table 23: Hamburg - R(t) takes on the value of 0.8 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	5831	266	5145	28	11	7
14.08.2020	5880	267	5165	31	12	8
15.08.2020	5928	267	5187	33	13	9
16.08.2020	5975	267	5211	36	13	9
17.08.2020	6020	268	5236	38	14	10
18.08.2020	6064	268	5262	41	15	11
19.08.2020	6106	269	5290	43	16	11
20.08.2020	6148	269	5319	46	17	12
21.08.2020	6188	270	5350	48	18	13
22.08.2020	6227	271	5381	50	19	13
23.08.2020	6265	271	5412	52	20	14
24.08.2020	6302	272	5445	53	21	14
25.08.2020	6337	273	5478	55	22	15
26.08.2020	6372	273	5512	56	22	16
27.08.2020	6406	274	5546	57	23	16
28.08.2020	6439	275	5580	58	24	16
29.08.2020	6470	276	5614	59	24	17
30.08.2020	6501	277	5648	59	25	17
31.08.2020	6531	278	5682	59	25	17
01.09.2020	6561	279	5717	60	26	18
02.09.2020	6589	280	5751	60	26	18
03.09.2020	6617	280	5784	60	26	18
04.09.2020	6643	281	5818	60	26	18
05.09.2020	6669	282	5851	59	26	18
06.09.2020	6695	283	5884	59	27	18
07.09.2020	6719	284	5916	59	27	18
08.09.2020	6743	286	5948	58	27	18
09.09.2020	6766	287	5980	58	27	18

Table 24: Hamburg - R(t) takes on the value of 1.0 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	5832	266	5145	28	11	7
14.08.2020	5883	267	5165	31	12	8
15.08.2020	5935	267	5187	33	13	9
16.08.2020	5986	267	5211	36	14	9
17.08.2020	6037	268	5236	38	15	10
18.08.2020	6088	268	5263	41	16	11
19.08.2020	6140	269	5292	44	17	11
20.08.2020	6191	269	5322	46	18	12
21.08.2020	6242	270	5354	49	19	13
22.08.2020	6293	271	5386	52	20	14
23.08.2020	6344	271	5421	54	21	14
24.08.2020	6395	272	5456	56	22	15
25.08.2020	6446	273	5492	59	23	16
26.08.2020	6498	273	5530	61	24	17
27.08.2020	6548	274	5568	63	25	17
28.08.2020	6600	275	5608	65	26	18
29.08.2020	6650	276	5648	66	27	18
30.08.2020	6701	277	5689	68	28	19
31.08.2020	6752	278	5730	69	28	20
01.09.2020	6803	279	5773	71	29	20
02.09.2020	6854	280	5816	72	30	21
03.09.2020	6905	281	5859	73	31	21
04.09.2020	6956	282	5903	75	31	22
05.09.2020	7006	283	5947	76	32	22
06.09.2020	7057	285	5992	77	33	23
07.09.2020	7108	286	6037	77	33	23
08.09.2020	7158	287	6083	78	34	23
09.09.2020	7209	288	6129	79	34	24

Table 25: Hamburg - R(t) takes on the value of 1.2 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	5833	266	5145	28	11	7
14.08.2020	5886	267	5165	31	12	8
15.08.2020	5942	267	5187	33	13	9
16.08.2020	5998	267	5211	36	14	9
17.08.2020	6056	268	5237	39	15	10
18.08.2020	6116	268	5264	41	16	11
19.08.2020	6178	269	5294	44	17	12
20.08.2020	6241	269	5325	48	18	12
21.08.2020	6307	270	5358	51	19	13
22.08.2020	6374	271	5393	54	20	14
23.08.2020	6442	271	5430	57	22	15
24.08.2020	6513	272	5469	60	23	16
25.08.2020	6586	273	5509	63	24	17
26.08.2020	6661	274	5552	67	26	18
27.08.2020	6738	274	5596	70	27	19
28.08.2020	6818	275	5642	73	28	20
29.08.2020	6899	276	5690	76	30	21
30.08.2020	6983	277	5740	79	31	22
31.08.2020	7069	278	5792	83	33	23
01.09.2020	7158	280	5846	86	34	24
02.09.2020	7249	281	5902	89	36	25
03.09.2020	7342	282	5959	93	37	26
04.09.2020	7439	283	6019	96	39	27
05.09.2020	7538	285	6081	100	40	28
06.09.2020	7640	286	6145	103	42	29
07.09.2020	7744	288	6210	107	43	30
08.09.2020	7852	289	6278	110	45	31
09.09.2020	7963	291	6348	114	46	32

7.2.3 Prediction for the next 4 weeks under the assumption of different scenarios from 13.08.2020

Fig. 76 shows the absolute changes in case numbers compared to the previous day for the next 4 weeks for different R(t) values. If no bars are shown on the plot it means that the number of cases has not changed compared to the previous day.

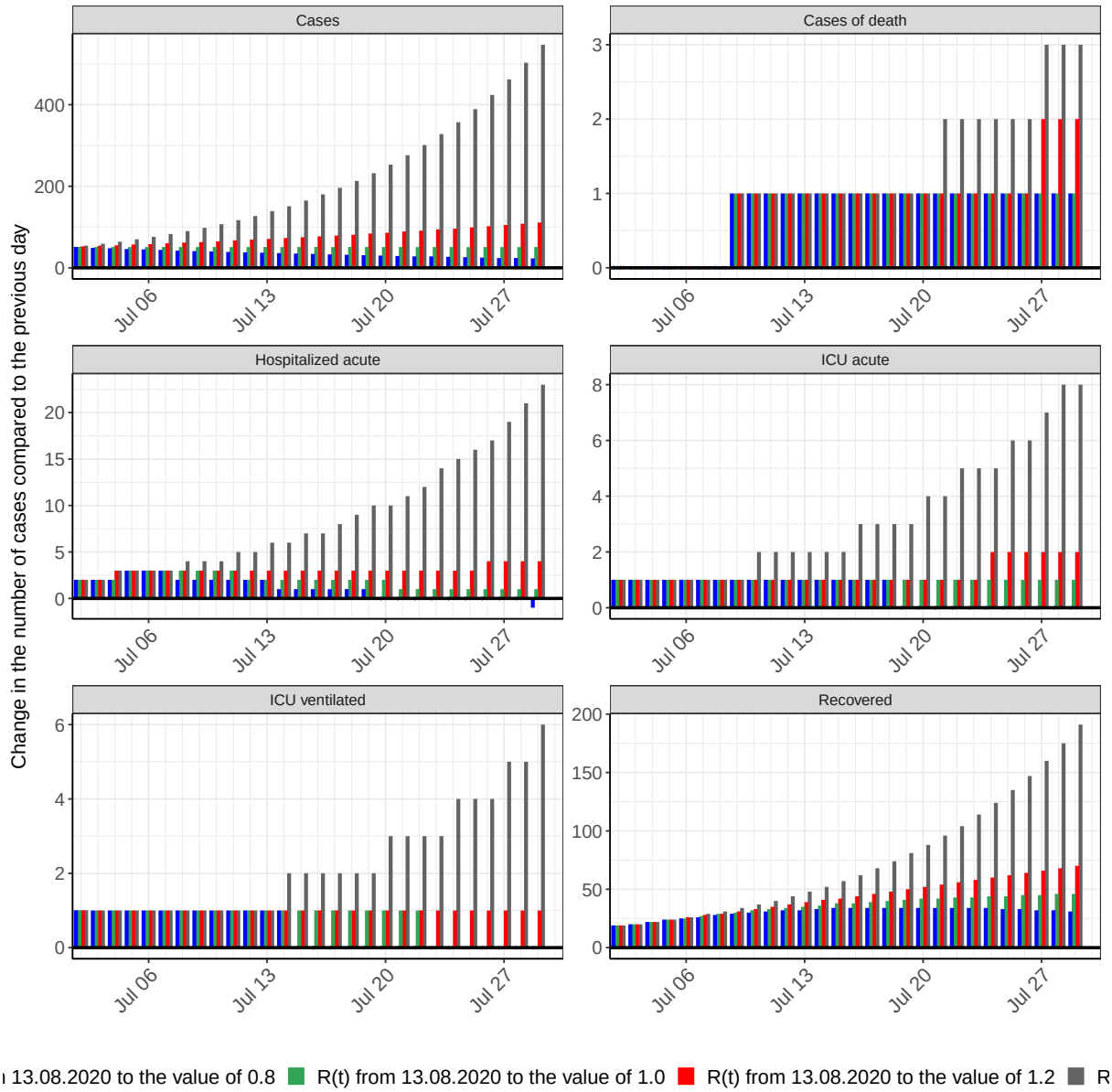


Figure 76: Simulation of daily new cases for the next 4 weeks - Hamburg

8 Hesse

8.1 Model description

Fig. 77 depicts the results of the modeling (lines) compared to the observed data (points) for Hesse on a linear (A) and semi-logarithmic (B) scale.

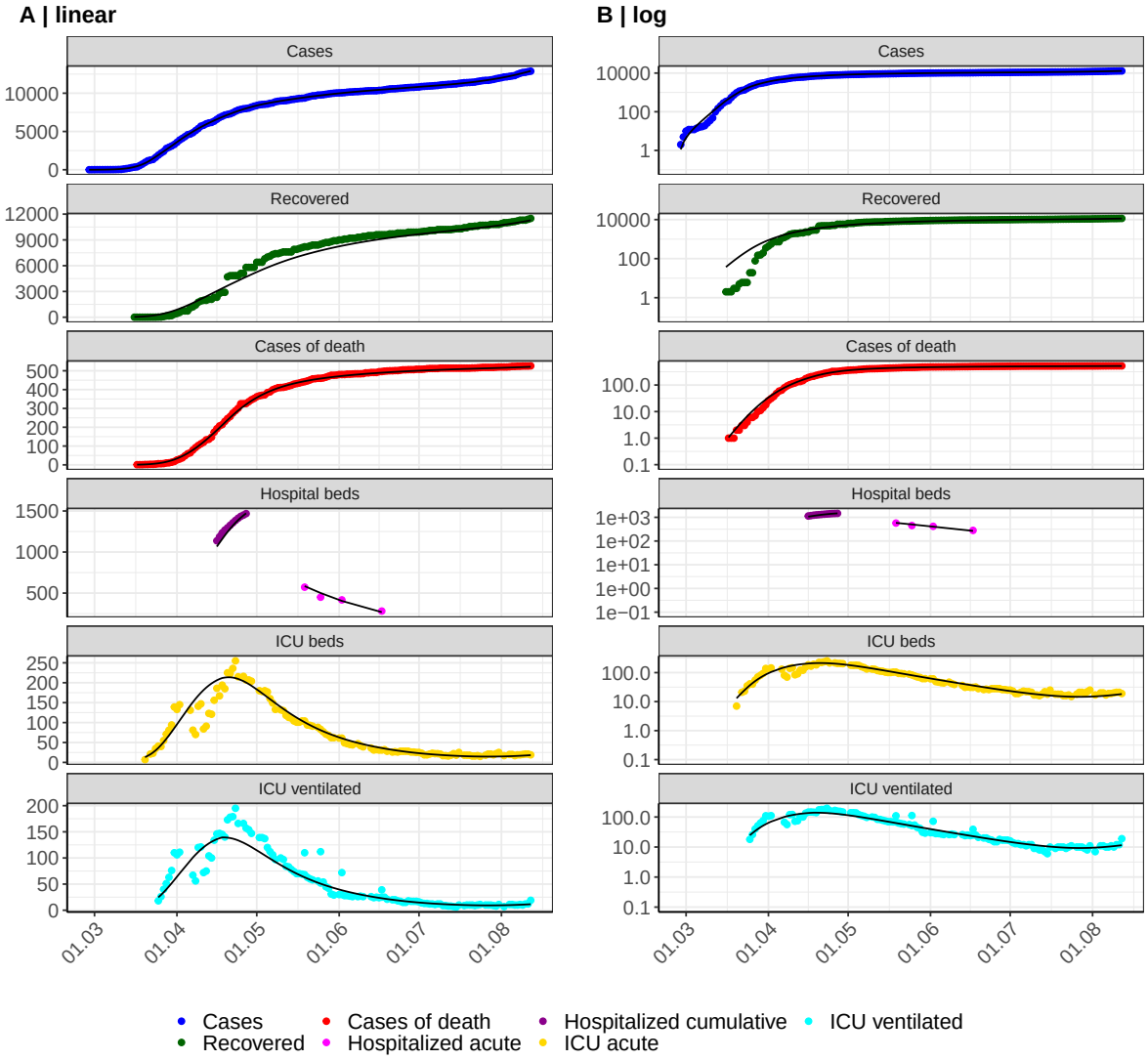


Figure 77: Model description of the reported case numbers, occupancy of hospital beds, recovery and deaths in Hesse. Points: reported data; lines: model description.

Fig. 78 shows the goodness-of-fit for Hesse. The values calculated by the model are plotted against the observed data. If the model fit is good, the points scatter randomly along the lines of identity.

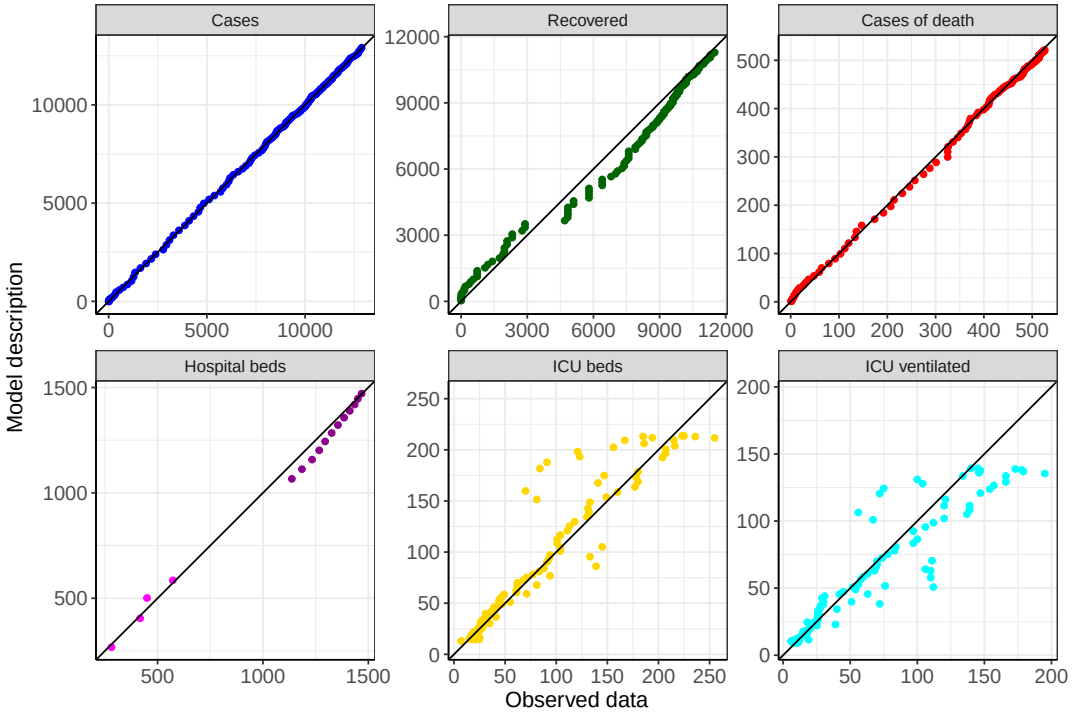


Figure 78: Goodness-of-fit plots for Hesse. Lines: lines of identity.

Fig. 79 shows the influence of non-pharmaceutical interventions (NPI) on R(t) for Hesse (red line) in comparison with the other federal states (grey lines).

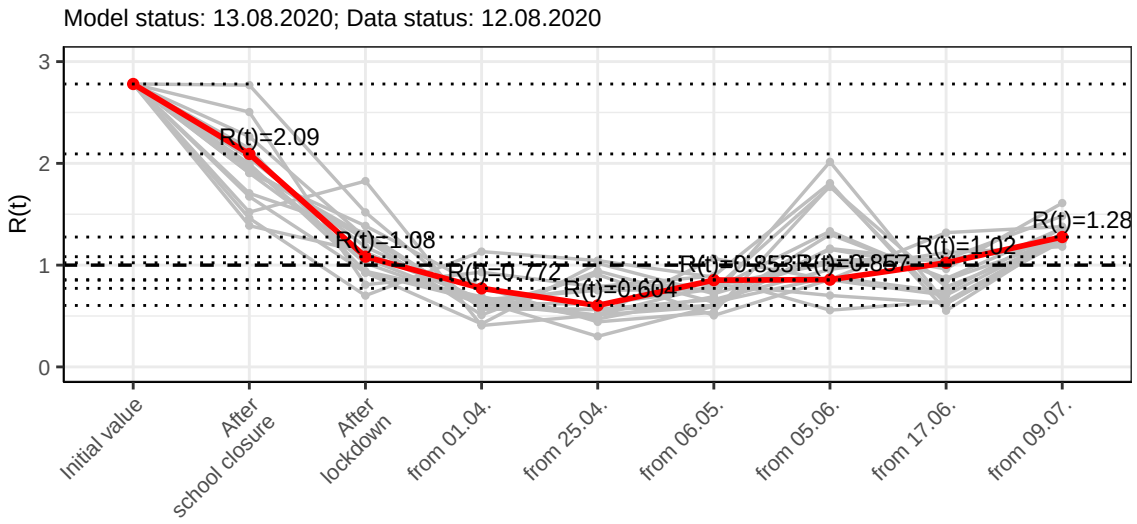


Figure 79: R(t) values before and after the NPIs for Hesse

Fig. 80 shows the R(t) estimated value for Hesse (red line) over time in comparison with the other federal states (grey lines).

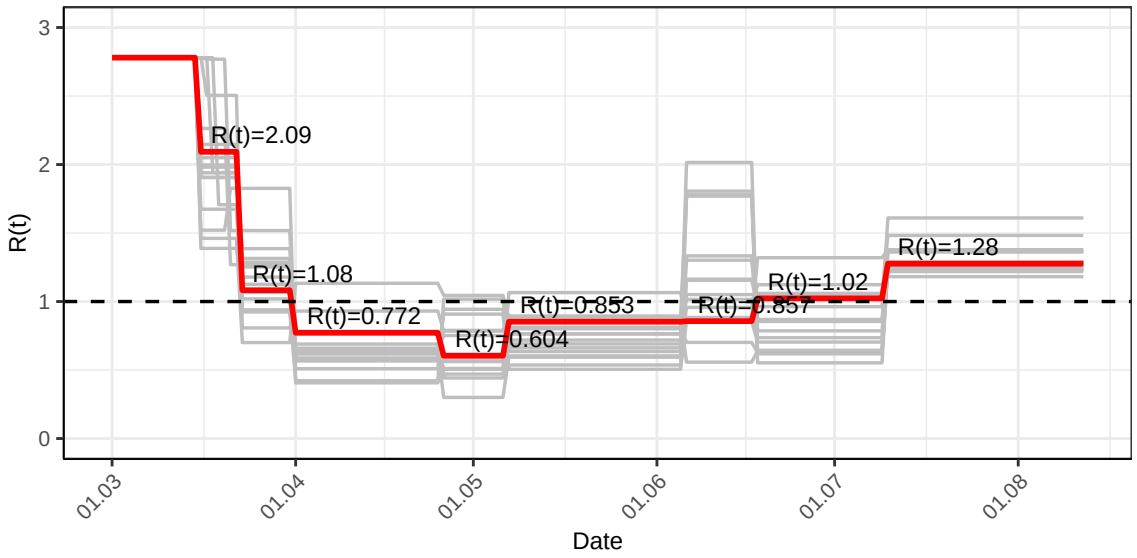


Figure 80: R(t) values over time for Hesse

8.2 Model predictions

8.2.1 Prediction for the next 4 weeks assuming that R(t) estimate will not change (R(t) = 1.28)

Fig. 81 and 82 depict the the model predictions for the next 4 weeks for Hesse on a linear (81) and a semi-logarithmic (82) scale. The modeling was carried out under the assumption that the R(t) estimated value would remain the same.

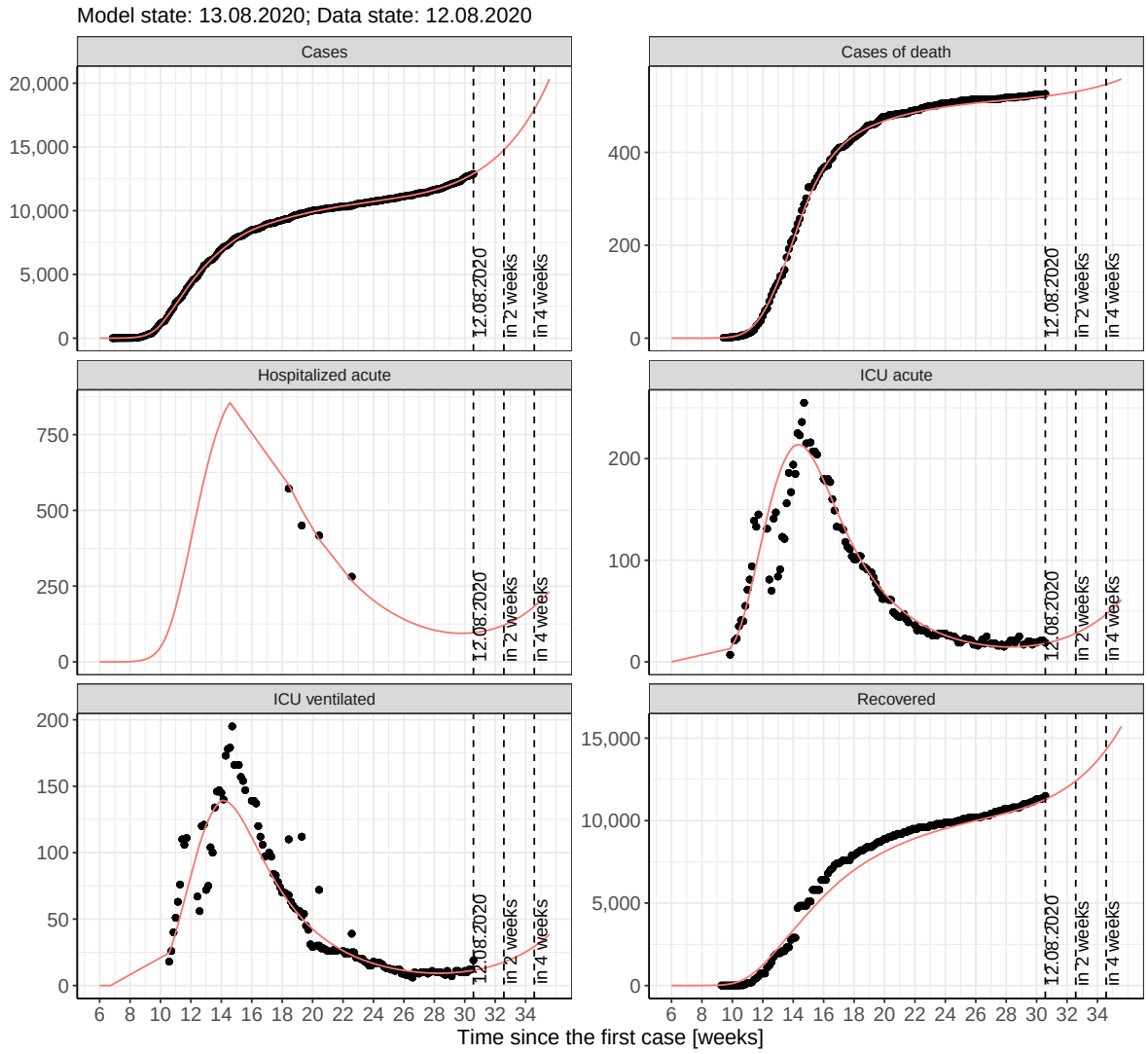


Figure 81: Representation of the model predictions for Hesse for the next 4 weeks under the assumption that the R(t) estimate remains the same on linear scale (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths). Points: Reported case numbers; Red lines: Model predictions.

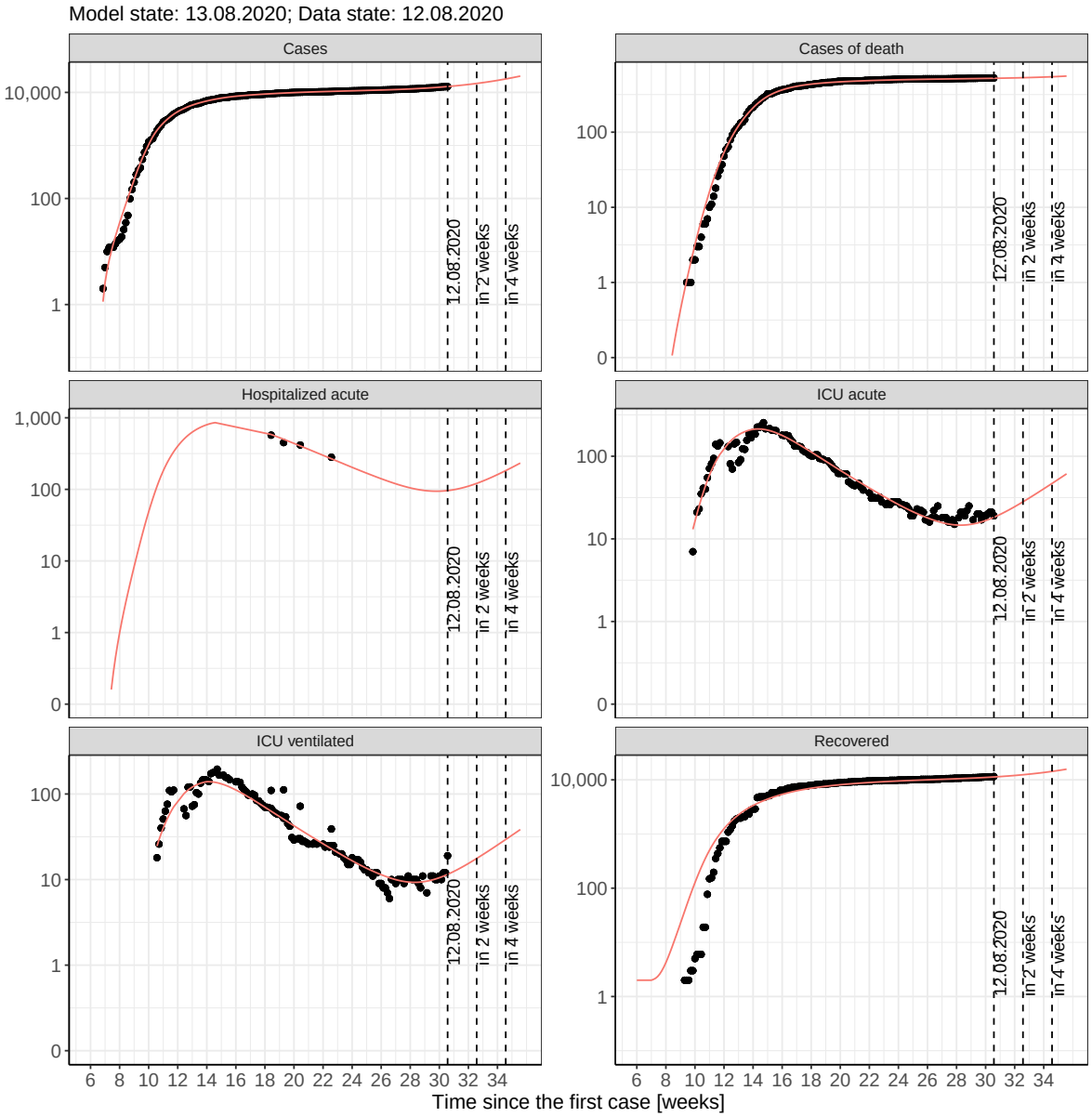


Figure 82: Semi-logarithmic representation of the model prediction (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Hesse for the next 4 weeks under the assumption that the R(t) estimate remains the same. Points: Reported case numbers; Red lines: Model predictions.

8.2.2 Predictions for the next 4 weeks assuming different scenarios (with the R(t) value above 1.2) from 13.08.2020

Fig. 83 and 84 represent the model prediction for the next 4 weeks for Hesse on a linear (83) and a semi-logarithmic (84) scale. In this simulation different scenarios of the possible development (R(t) = 1.4, 1.6, 1.8 and staying the same) from 13.08.2020 were tested.

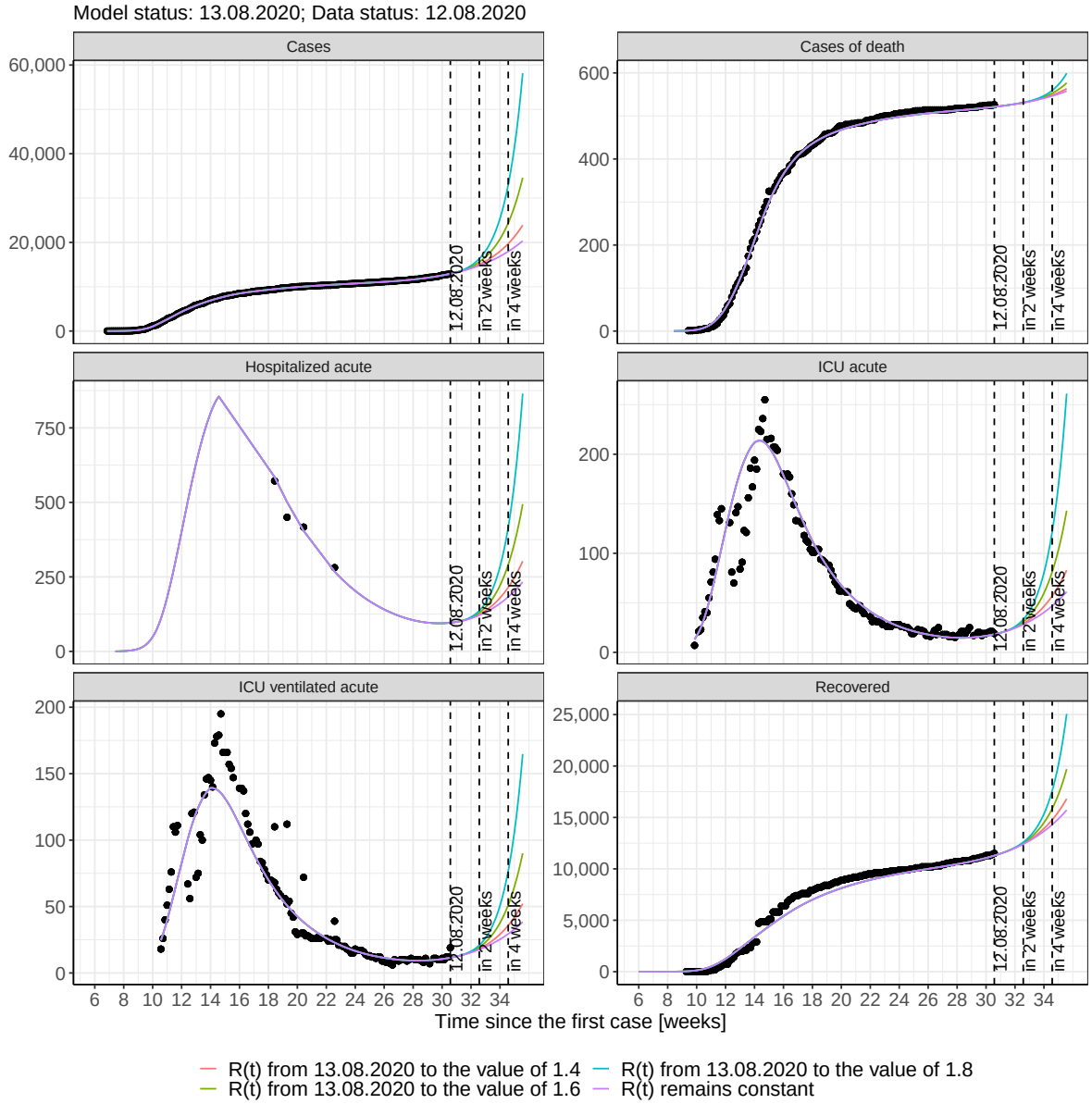


Figure 83: Linear representation of model prediction (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Hesse assuming various scenarios from the 13.08.2020. Points: Reported case numbers; Lines: Model predictions.

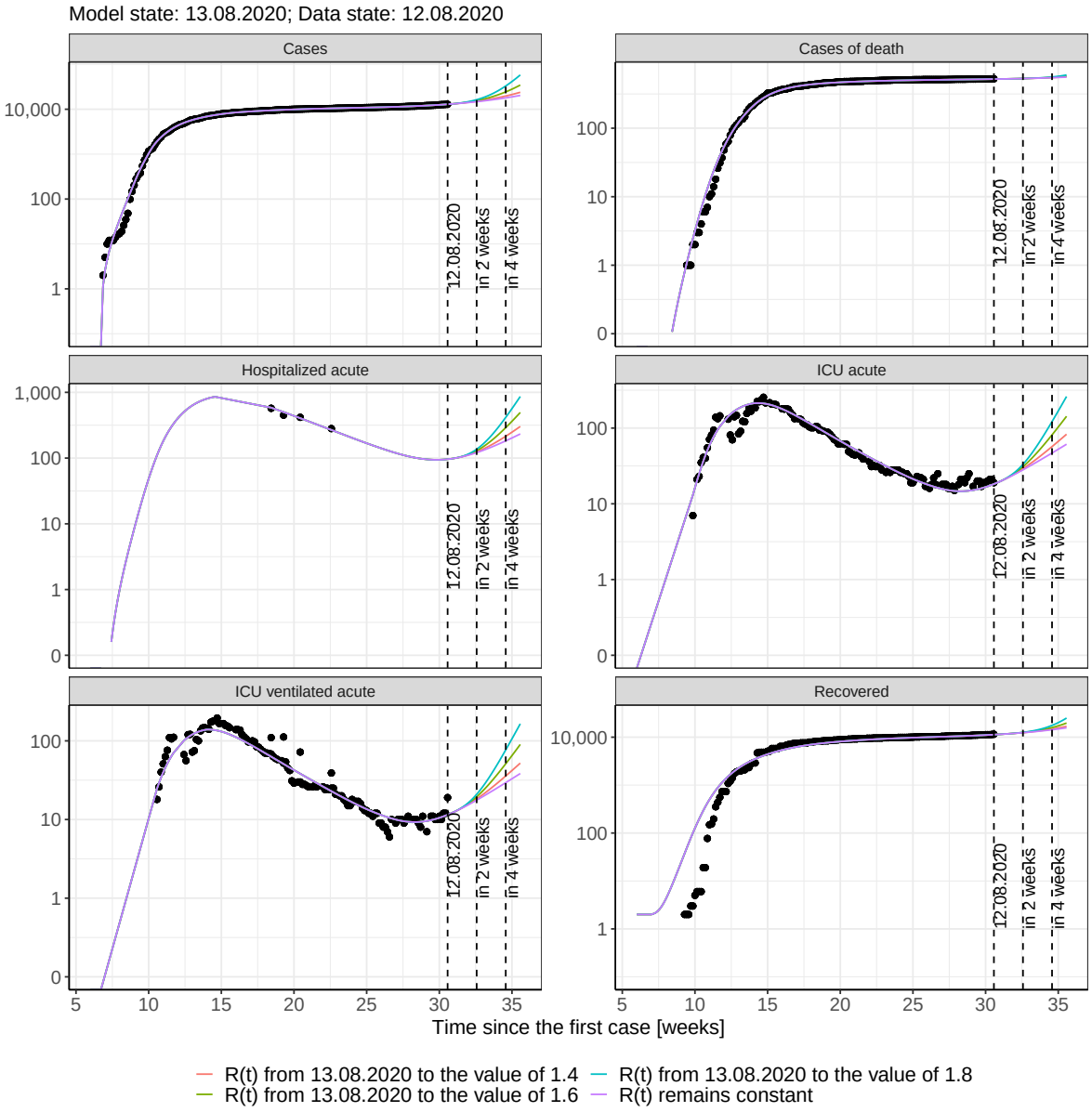


Figure 84: Semi-logarithmic representation of model predictions (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Hesse assuming various scenarios from the 13.08.2020. Points: Reported case numbers; Lines: Model predictions.

Fig. 85 and 86 represent the model prediction for the next 16 weeks for Hesse on a linear (85) and a semi-logarithmic (86) scale. In this simulation different scenarios of the possible course from the 13.08.2020 were tested.

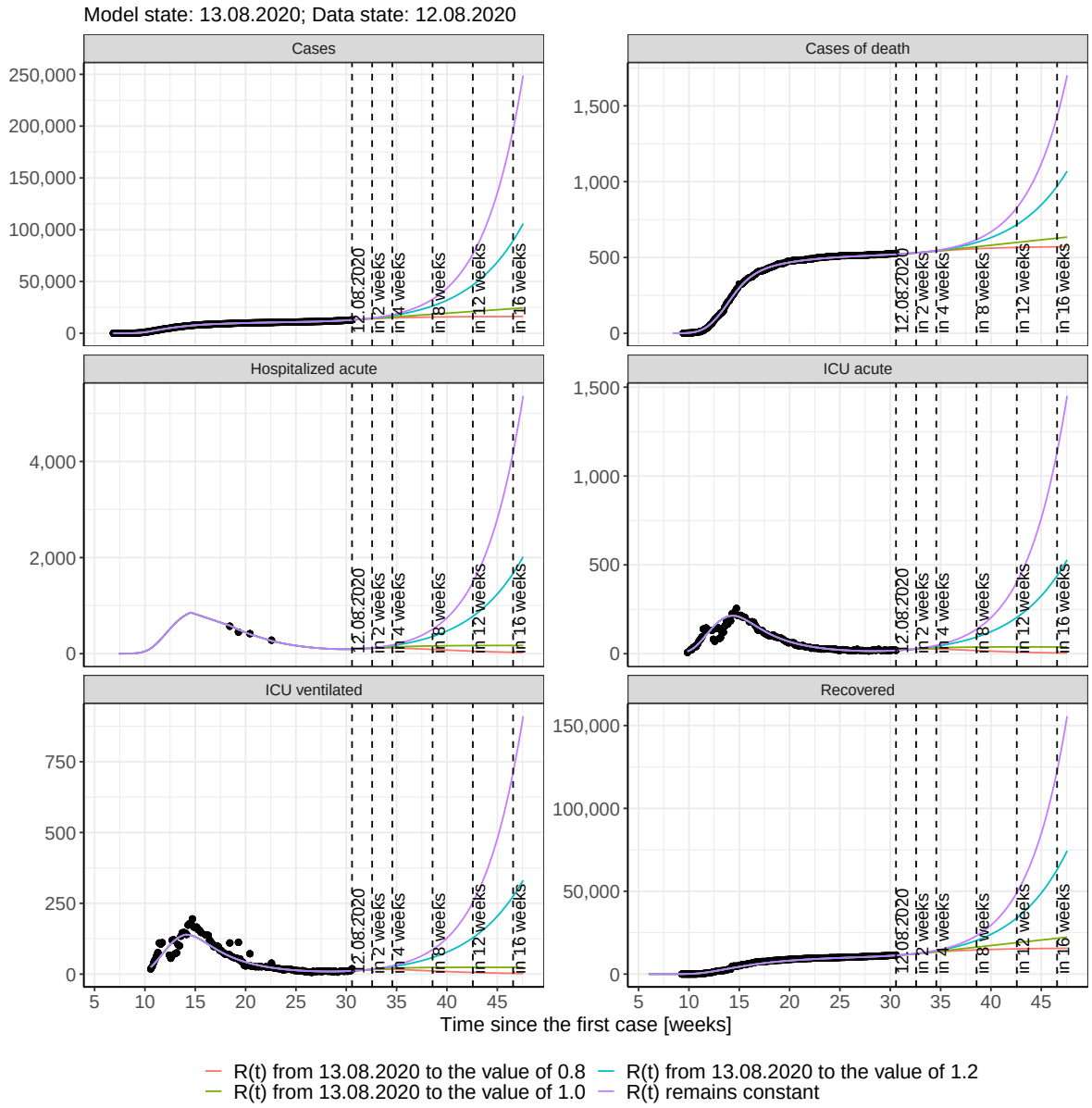


Figure 85: Linear representation of model predictions (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Hesse assuming various scenarios from the 13.08.2020. Points: reported case numbers; lines: model prediction.

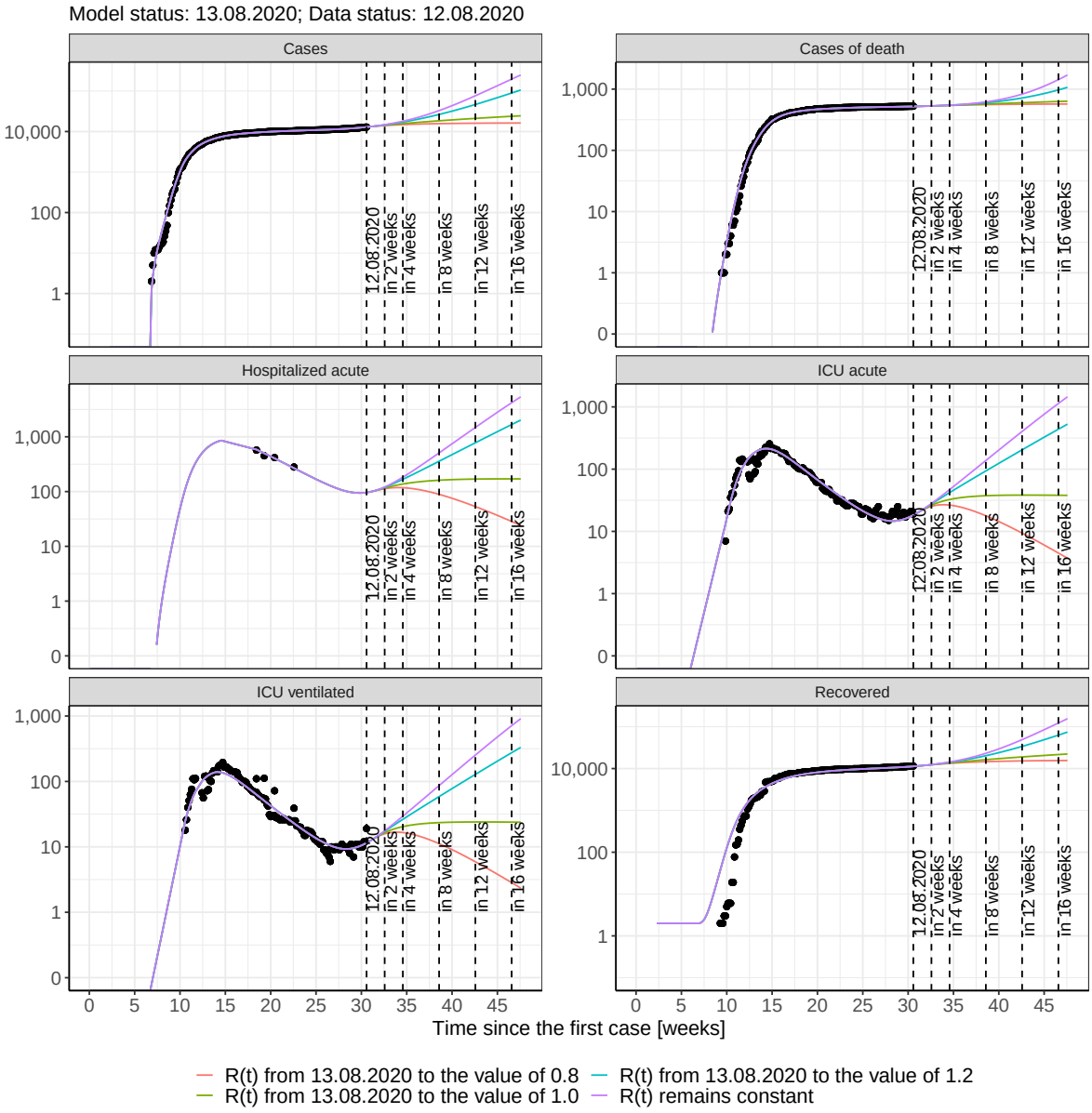


Figure 86: Semi-logarithmic depiction of the model prediction (cases, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Hesse assuming various scenarios after 13.08.2020. Points: reported case numbers;lines: model predictions.

The tables show the modeling results for four conceivable scenarios: Scenario 1: The R(t) estimated value after 13.08.2020 remains the same as today's value (Tab. 26); Scenario 2: The R(t) estimated value after 13.08.2020 takes the value of 0.8 (Tab. 27); Scenario 3: The R(t) estimated value takes the value of 1 after the 13.08.2020 (Tab. 28); Scenario 4: The R(t) estimated value takes the value of 1.2 after the 13.08.2020 (Tab. 29) Model status from 13.08.2020; Data status: 12.08.2020.

Table 26: Hesse - R(t) remains unchanged after the 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	13010	522	11349	97	19	12
14.08.2020	13115	522	11414	98	19	12
15.08.2020	13224	523	11481	99	20	12
16.08.2020	13338	523	11550	100	20	13
17.08.2020	13456	524	11622	102	21	13
18.08.2020	13579	525	11696	103	22	14
19.08.2020	13707	525	11774	105	22	14
20.08.2020	13840	526	11854	107	23	14
21.08.2020	13978	527	11937	109	24	15
22.08.2020	14122	528	12024	111	25	15
23.08.2020	14271	528	12114	113	25	16
24.08.2020	14427	529	12207	116	26	16
25.08.2020	14588	530	12304	118	27	17
26.08.2020	14756	531	12404	121	28	18
27.08.2020	14931	532	12509	124	29	18
28.08.2020	15113	533	12617	127	30	19
29.08.2020	15302	533	12730	131	31	20
30.08.2020	15498	534	12847	134	32	20
31.08.2020	15702	535	12969	138	34	21
01.09.2020	15915	536	13095	142	35	22
02.09.2020	16135	538	13227	147	36	23
03.09.2020	16365	539	13363	151	37	24
04.09.2020	16603	540	13505	156	39	24
05.09.2020	16852	541	13652	161	40	25
06.09.2020	17110	542	13805	166	42	26
07.09.2020	17378	544	13965	171	43	27
08.09.2020	17657	545	14130	177	45	28
09.09.2020	17947	546	14302	183	47	29

Table 27: Hesse - R(t) takes on the value of 0.8 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	13006	522	11349	97	19	12
14.08.2020	13101	522	11414	98	19	12
15.08.2020	13194	523	11480	99	20	12
16.08.2020	13283	523	11549	100	20	13
17.08.2020	13370	524	11619	101	21	13
18.08.2020	13455	525	11691	103	21	13
19.08.2020	13537	525	11765	104	22	14
20.08.2020	13617	526	11839	105	23	14
21.08.2020	13695	527	11915	107	23	14
22.08.2020	13770	528	11991	108	24	15
23.08.2020	13843	528	12068	109	24	15
24.08.2020	13914	529	12145	110	24	15
25.08.2020	13983	530	12222	112	25	16
26.08.2020	14051	531	12299	113	25	16
27.08.2020	14116	531	12376	114	26	16
28.08.2020	14179	532	12452	115	26	16
29.08.2020	14241	533	12528	115	26	16
30.08.2020	14301	534	12603	116	26	17
31.08.2020	14359	534	12678	117	27	17
01.09.2020	14415	535	12751	117	27	17
02.09.2020	14470	536	12824	118	27	17
03.09.2020	14524	537	12895	118	27	17
04.09.2020	14575	538	12965	118	27	17
05.09.2020	14626	538	13034	118	27	17
06.09.2020	14675	539	13102	118	27	17
07.09.2020	14722	540	13169	118	27	17
08.09.2020	14768	541	13234	118	27	17
09.09.2020	14813	542	13298	118	26	17

Table 28: Hesse - R(t) takes on the value of 1.0 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	13008	522	11349	97	19	12
14.08.2020	13107	522	11414	98	19	12
15.08.2020	13206	523	11480	99	20	12
16.08.2020	13305	523	11549	100	20	13
17.08.2020	13404	524	11620	101	21	13
18.08.2020	13503	525	11693	103	21	14
19.08.2020	13602	525	11768	104	22	14
20.08.2020	13701	526	11845	106	23	14
21.08.2020	13800	527	11924	107	23	15
22.08.2020	13898	528	12004	109	24	15
23.08.2020	13997	528	12085	111	25	15
24.08.2020	14096	529	12168	112	25	16
25.08.2020	14195	530	12253	114	26	16
26.08.2020	14294	531	12338	116	26	17
27.08.2020	14392	531	12424	118	27	17
28.08.2020	14491	532	12512	119	27	17
29.08.2020	14589	533	12600	121	28	18
30.08.2020	14688	534	12689	122	28	18
31.08.2020	14787	535	12779	124	29	18
01.09.2020	14885	536	12869	126	29	18
02.09.2020	14983	537	12960	127	30	19
03.09.2020	15082	538	13052	129	30	19
04.09.2020	15180	538	13144	130	31	19
05.09.2020	15279	539	13236	132	31	19
06.09.2020	15377	540	13329	133	31	20
07.09.2020	15475	541	13422	135	32	20
08.09.2020	15574	542	13516	136	32	20
09.09.2020	15672	543	13609	137	33	20

Table 29: Hesse - R(t) takes on the value of 1.2 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	13009	522	11349	97	19	12
14.08.2020	13113	522	11414	98	19	12
15.08.2020	13219	523	11481	99	20	12
16.08.2020	13329	523	11550	100	20	13
17.08.2020	13441	524	11621	102	21	13
18.08.2020	13557	525	11696	103	22	14
19.08.2020	13676	525	11772	105	22	14
20.08.2020	13799	526	11852	106	23	14
21.08.2020	13925	527	11933	108	24	15
22.08.2020	14054	528	12018	110	24	15
23.08.2020	14187	528	12105	112	25	16
24.08.2020	14325	529	12196	115	26	16
25.08.2020	14466	530	12289	117	27	17
26.08.2020	14611	531	12384	120	28	17
27.08.2020	14760	532	12483	122	28	18
28.08.2020	14913	532	12585	125	29	18
29.08.2020	15071	533	12690	128	30	19
30.08.2020	15234	534	12798	131	31	20
31.08.2020	15401	535	12909	134	32	20
01.09.2020	15572	536	13024	137	33	21
02.09.2020	15749	537	13142	140	34	21
03.09.2020	15931	538	13263	144	35	22
04.09.2020	16117	539	13388	147	36	23
05.09.2020	16310	541	13517	151	37	23
06.09.2020	16507	542	13649	155	38	24
07.09.2020	16711	543	13786	159	40	25
08.09.2020	16920	544	13926	163	41	26
09.09.2020	17135	545	14070	167	42	26

8.2.3 Prediction for the next 4 weeks under the assumption of different scenarios from 13.08.2020

Fig. 87 shows the absolute changes in case numbers compared to the previous day for the next 4 weeks for different R(t) values. If no bars are shown on the plot it means that the number of cases has not changed compared to the previous day.

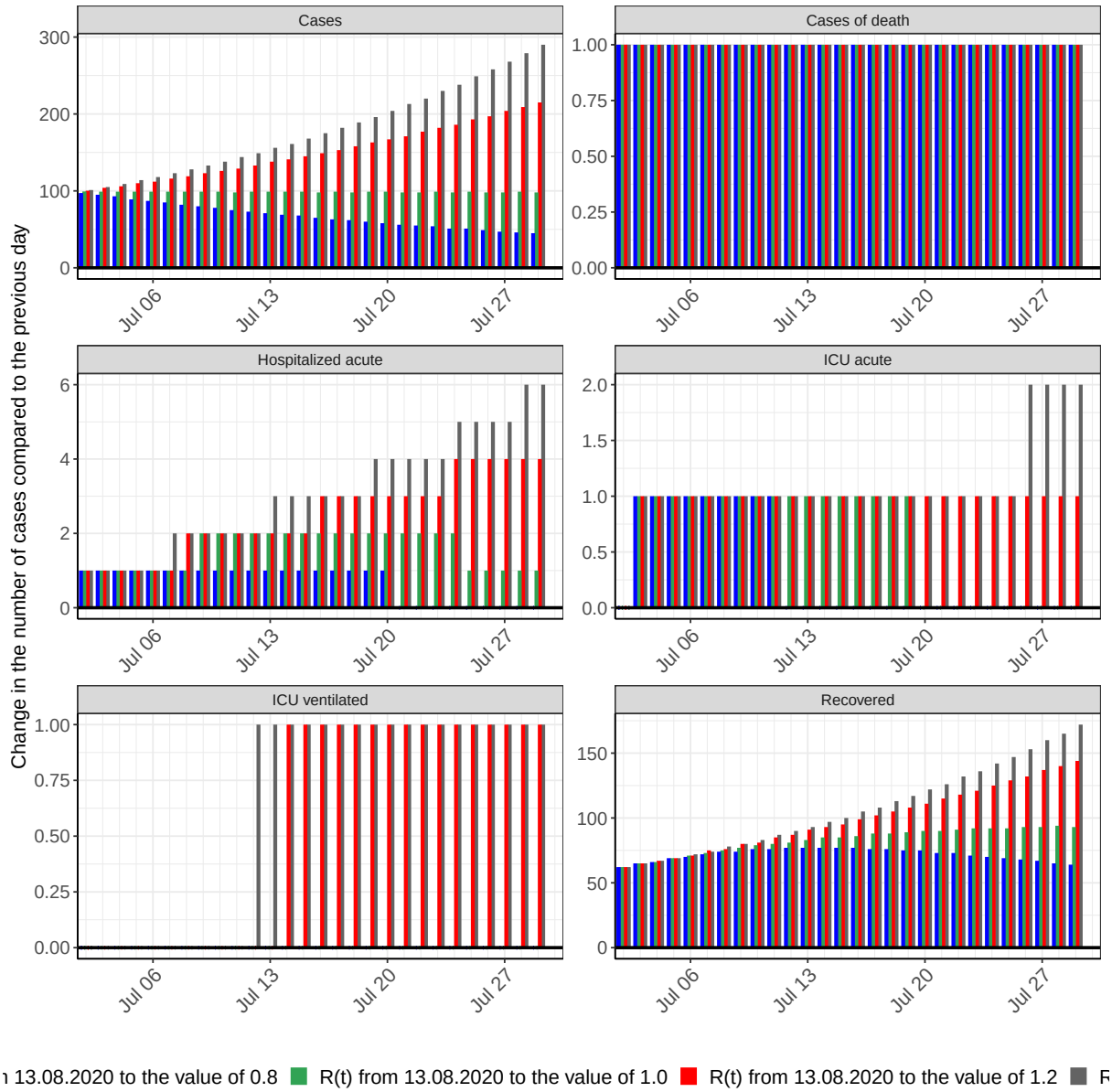


Figure 87: Simulation of daily new cases for the next 4 weeks - Hesse

9 Mecklenburg-Vorpommern

9.1 Model description

Fig. 88 depicts the results of the modeling (lines) compared to the observed data (points) for Mecklenburg-Vorpommern on a linear (A) and semi-logarithmic (B) scale.

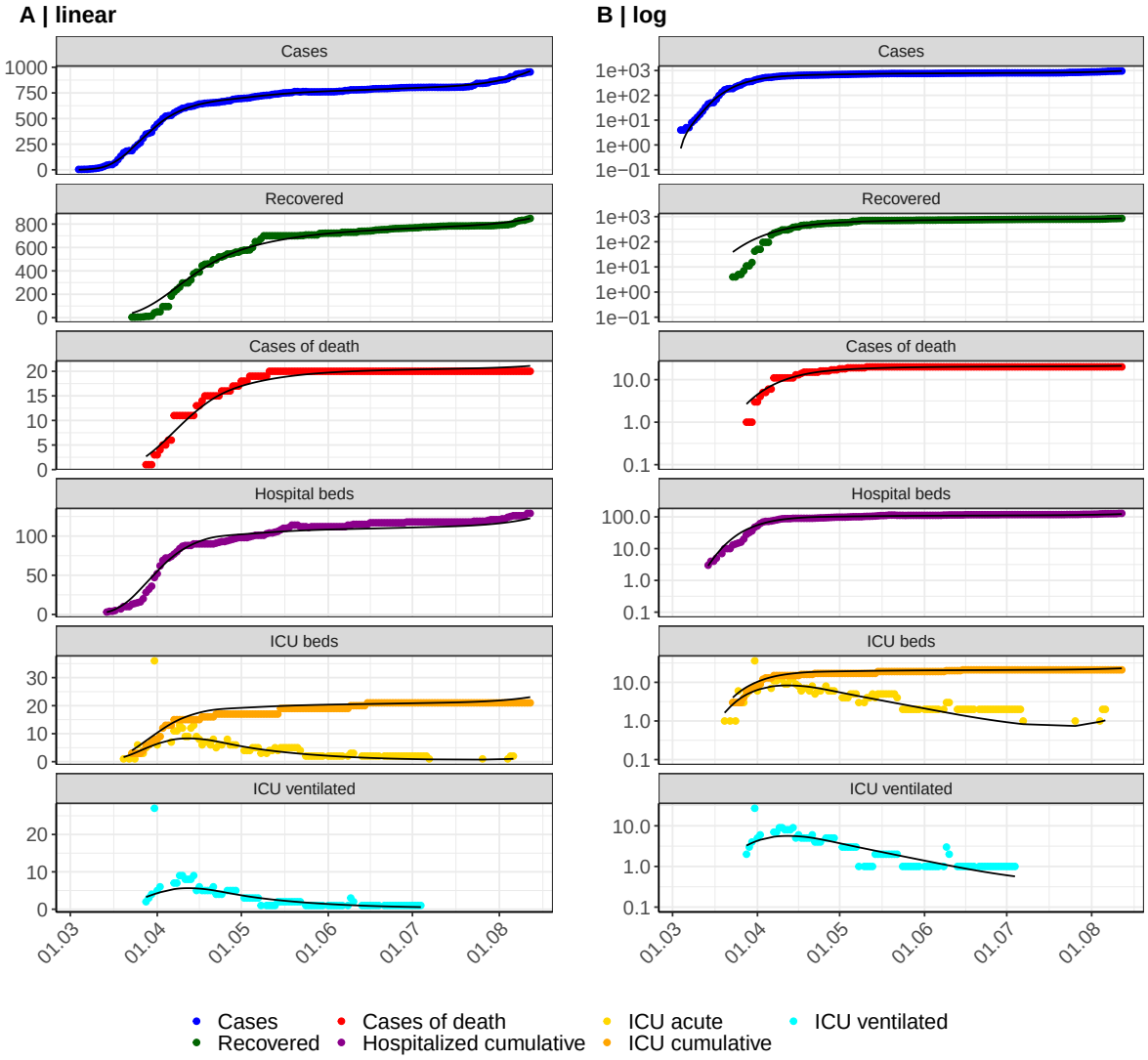


Figure 88: Model description of the reported case numbers, occupancy of hospital beds, recovery and deaths in Mecklenburg-Vorpommern. Points: reported data; lines: model description.

Fig. 89 shows the goodness-of-fit for Mecklenburg-Vorpommern. The values calculated by the model are plotted against the observed data. If the model fit is good, the points scatter randomly along the lines of identity.

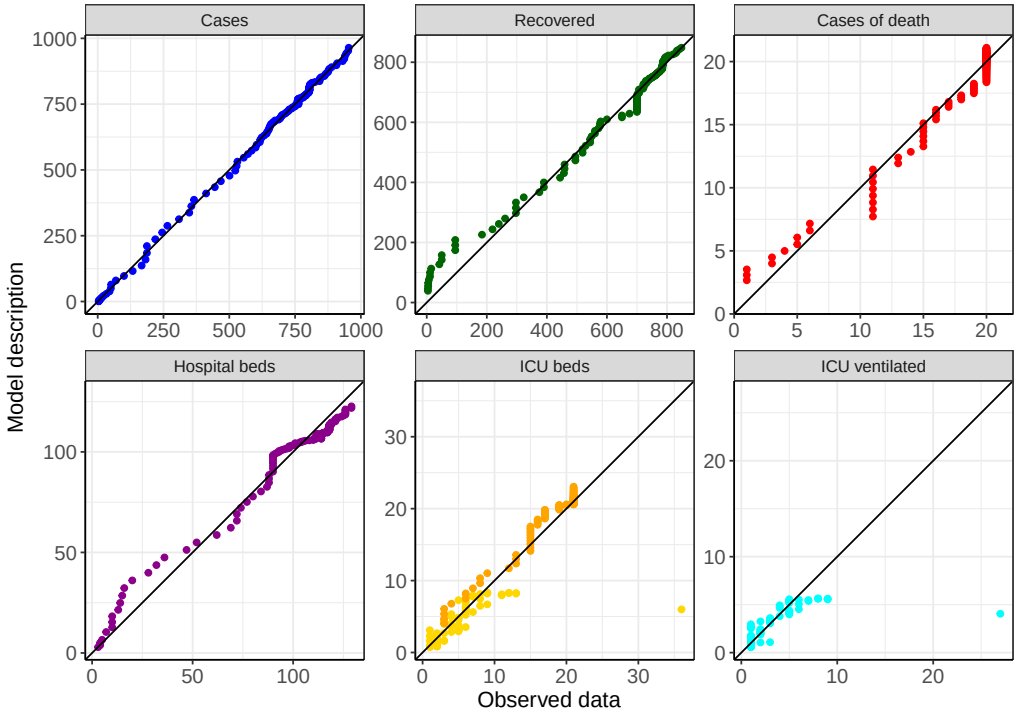


Figure 89: Goodness-of-fit plots for Mecklenburg-Vorpommern. Lines: lines of identity.

Fig. 90 shows the influence of non-pharmaceutical interventions (NPI) on R(t) for Mecklenburg-Vorpommern (red line) in comparison with the other federal states (grey lines).

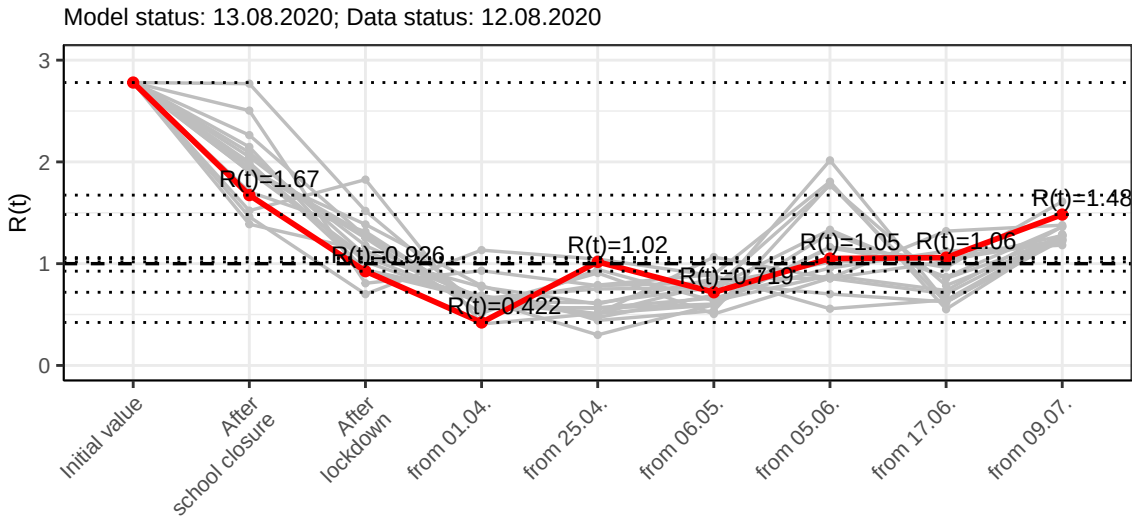


Figure 90: R(t) values before and after the NPIs for Mecklenburg-Vorpommern

Fig. 91 shows the R(t) estimated value for Mecklenburg-Vorpommern (red line) over time in comparison with the other federal states (grey lines).

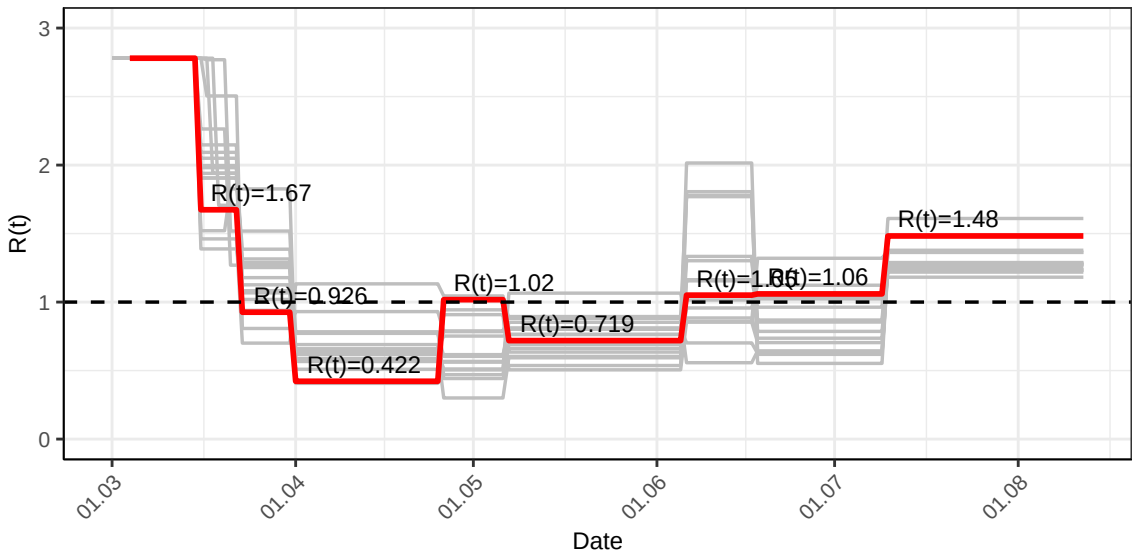


Figure 91: R(t) values over time for Mecklenburg-Vorpommern

9.2 Model predictions

9.2.1 Prediction for the next 4 weeks assuming that R(t) estimate will not change (R(t) = 1.48)

Fig. 92 and 93 depict the the model predictions for the next 4 weeks for Mecklenburg-Vorpommern on a linear (92) and a semi-logarithmic (93) scale. The modeling was carried out under the assumption that the R(t) estimated value would remain the same.

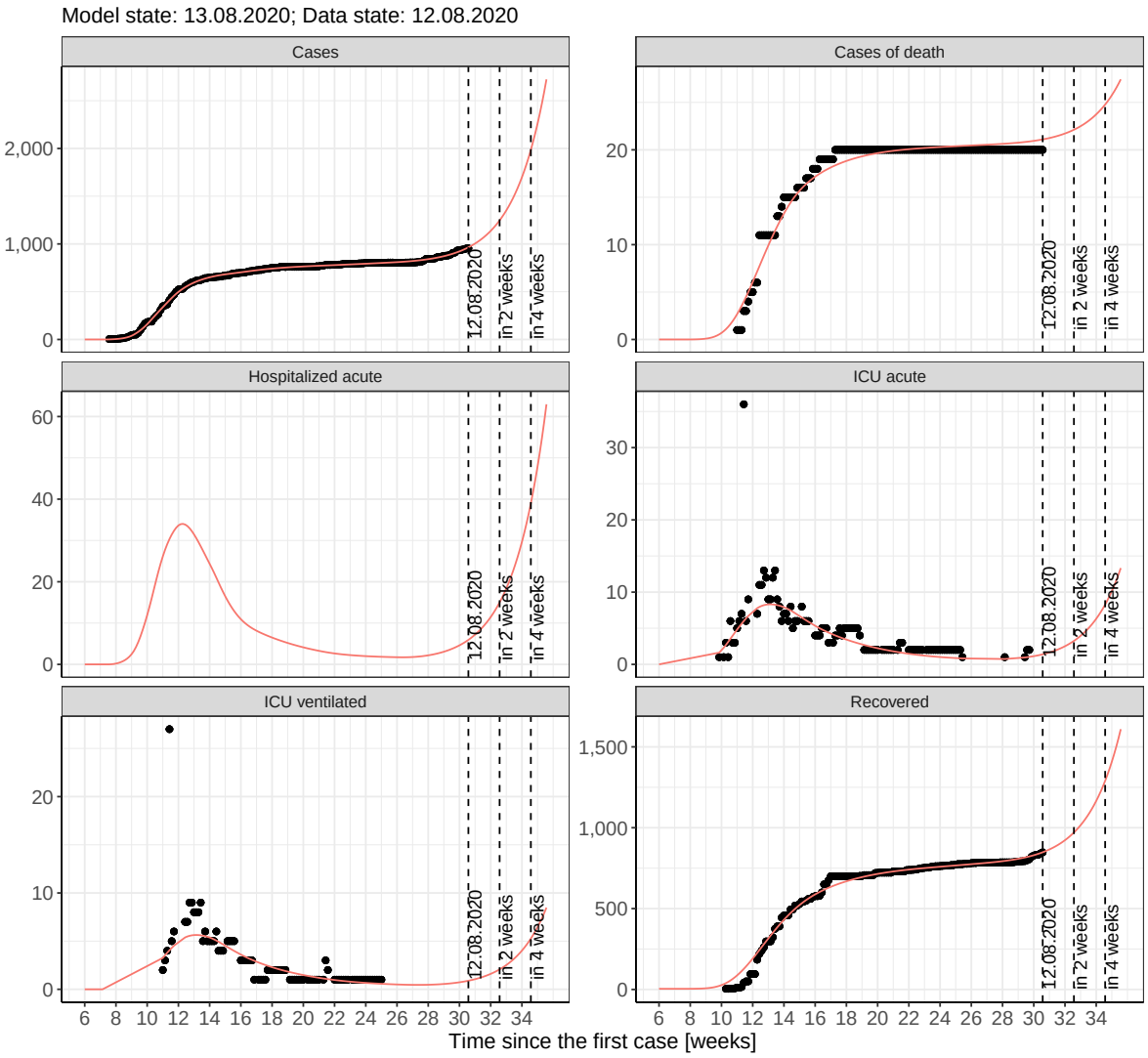


Figure 92: Representation of the model predictions for Mecklenburg-Vorpommern for the next 4 weeks under the assumption that the R(t) estimate remains the same on linear scale (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths). Points: Reported case numbers; Red lines: Model predictions.

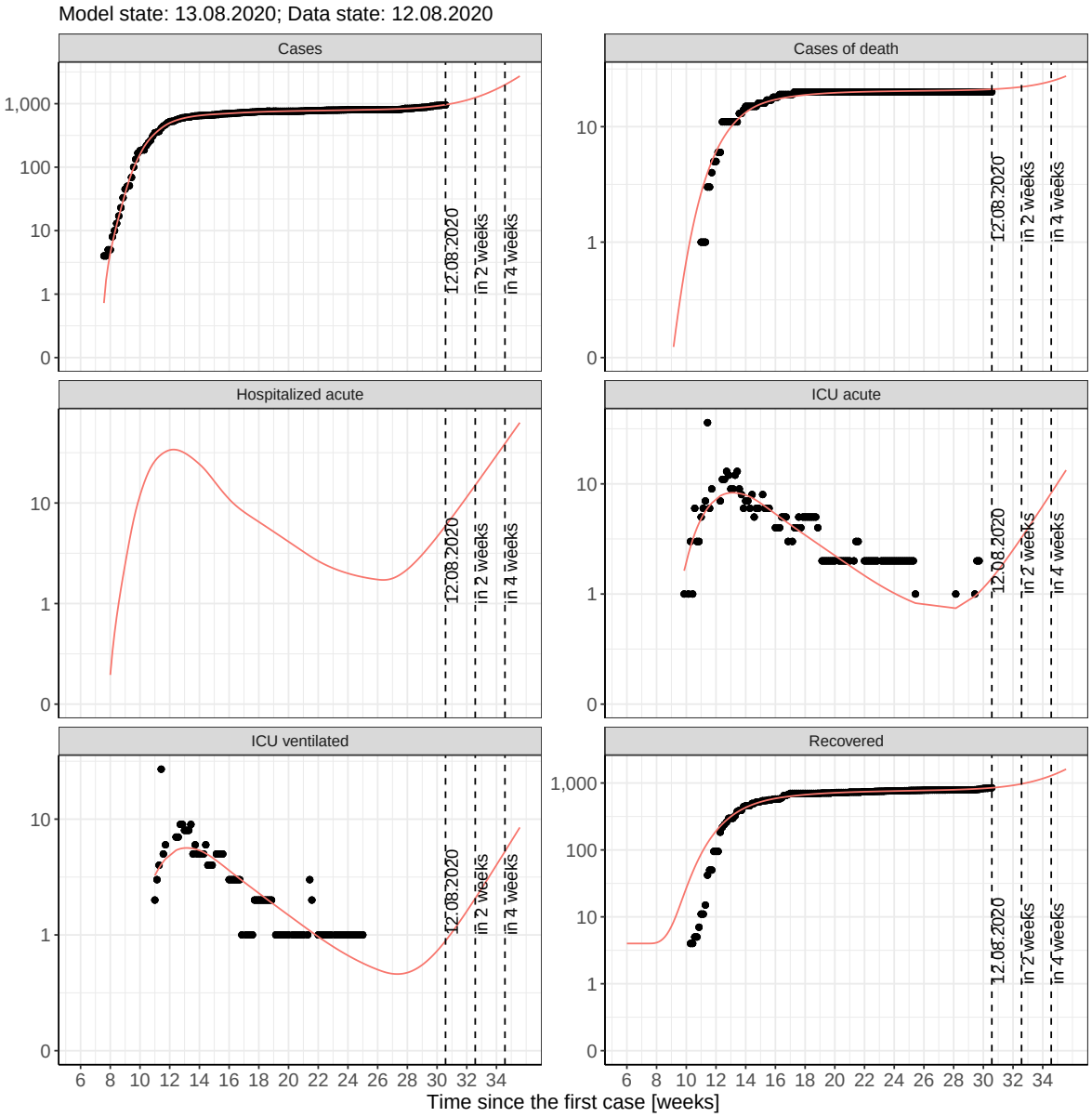


Figure 93: Semi-logarithmic representation of the model prediction (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Mecklenburg-Vorpommern for the next 4 weeks under the assumption that the R(t) estimate remains the same. Points: Reported case numbers; Red lines: Model predictions.

9.2.2 Predictions for the next 4 weeks assuming different scenarios (with the R(t) value above 1.2) from 13.08.2020

Fig. 94 and 95 represent the model prediction for the next 4 weeks for Mecklenburg-Vorpommern on a linear (94) and a semi-logarithmic (95) scale. In this simulation different scenarios of the possible development (R(t) = 1.4, 1.6, 1.8 and staying the same) from 13.08.2020 were tested.

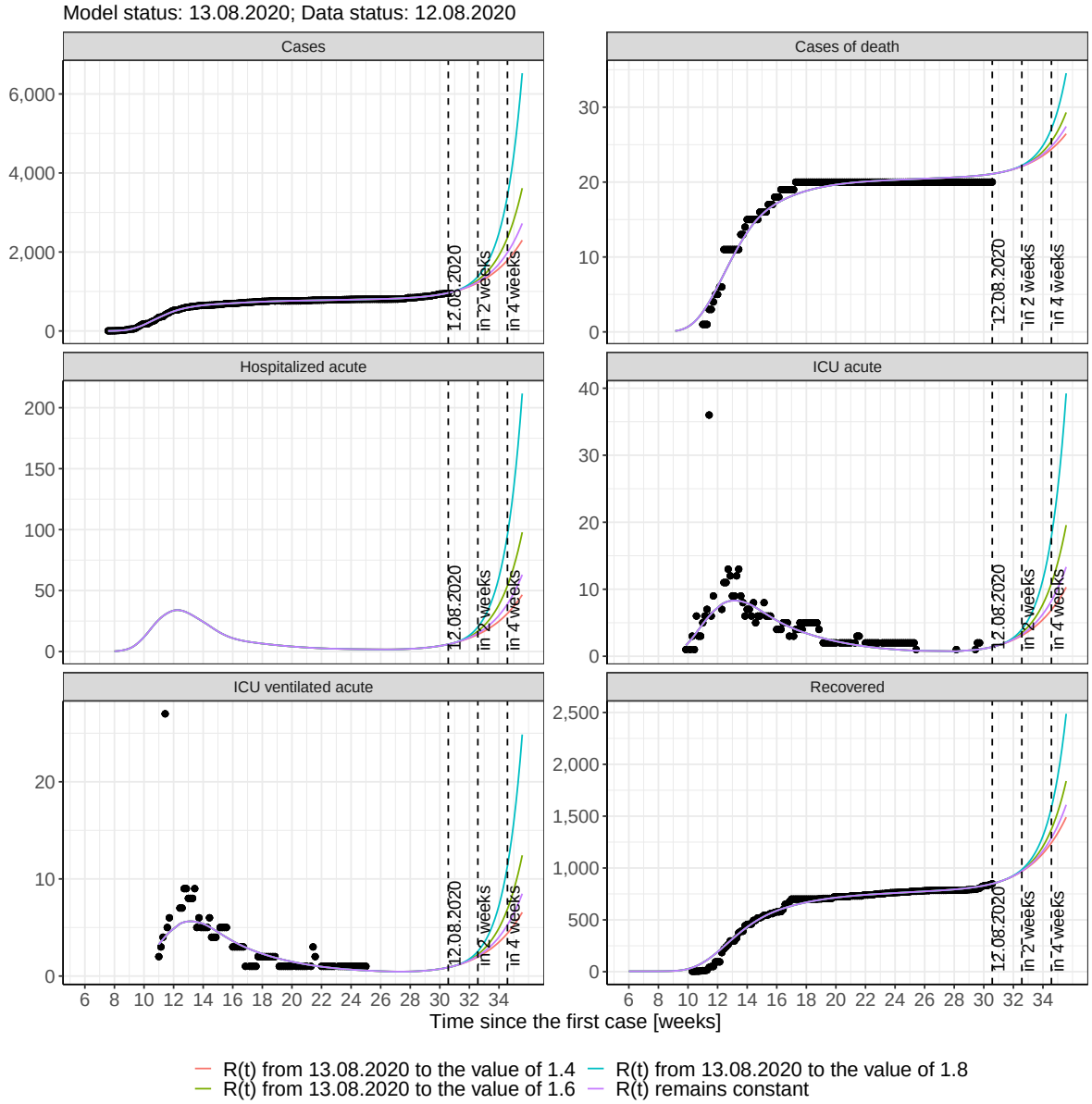


Figure 94: Linear representation of model prediction (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Mecklenburg-Vorpommern assuming various scenarios from the 13.08.2020. Points: Reported case numbers; Lines: Model predictions.

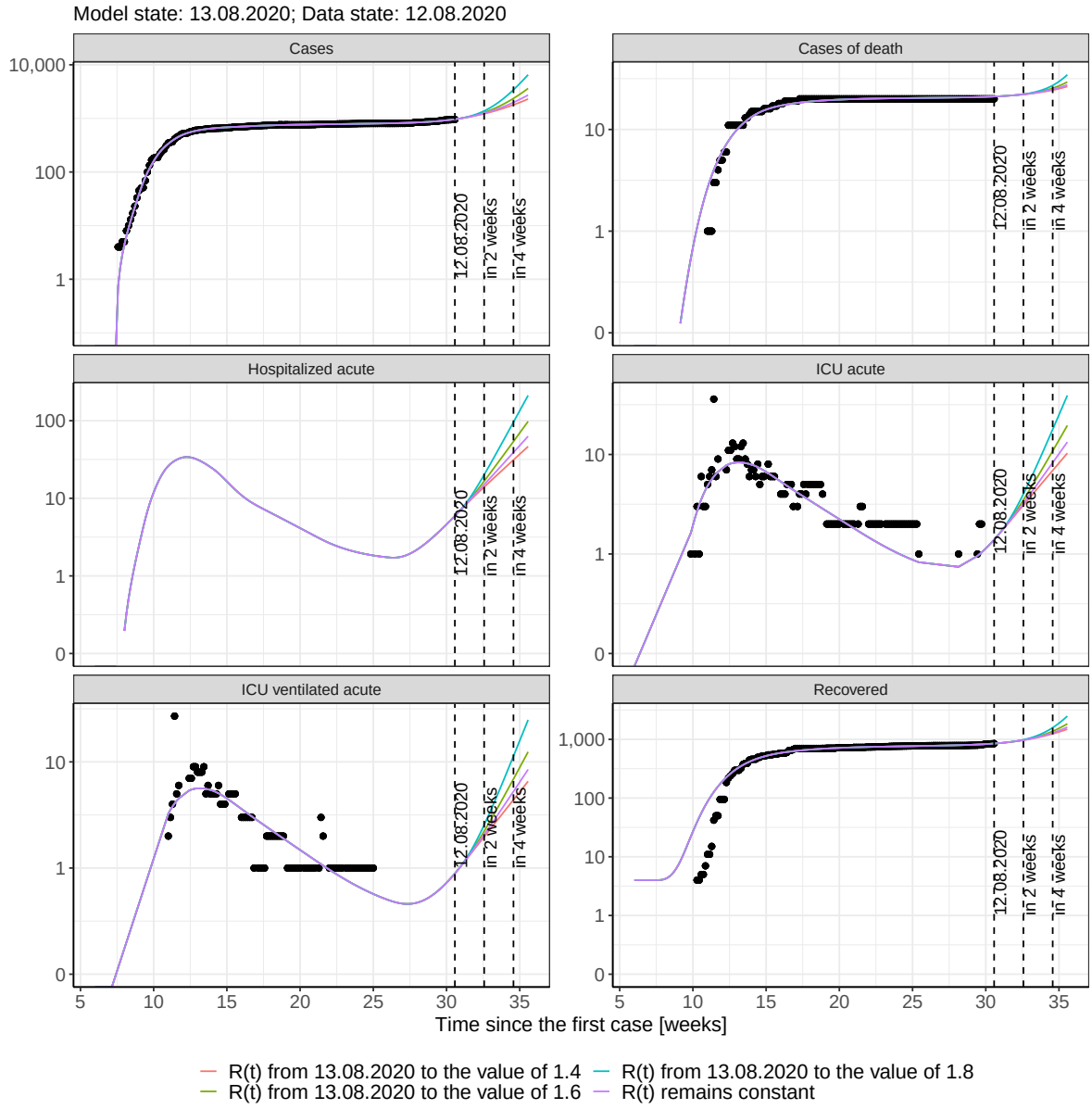


Figure 95: Semi-logarithmic representation of model predictions (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Mecklenburg-Vorpommern assuming various scenarios from the 13.08.2020. Points: Reported case numbers; Lines: Model predictions.

Fig. 96 and 97 represent the model prediction for the next 16 weeks for Mecklenburg-Vorpommern on a linear (96) and a semi-logarithmic (97) scale. In this simulation different scenarios of the possible course from the 13.08.2020 were tested.

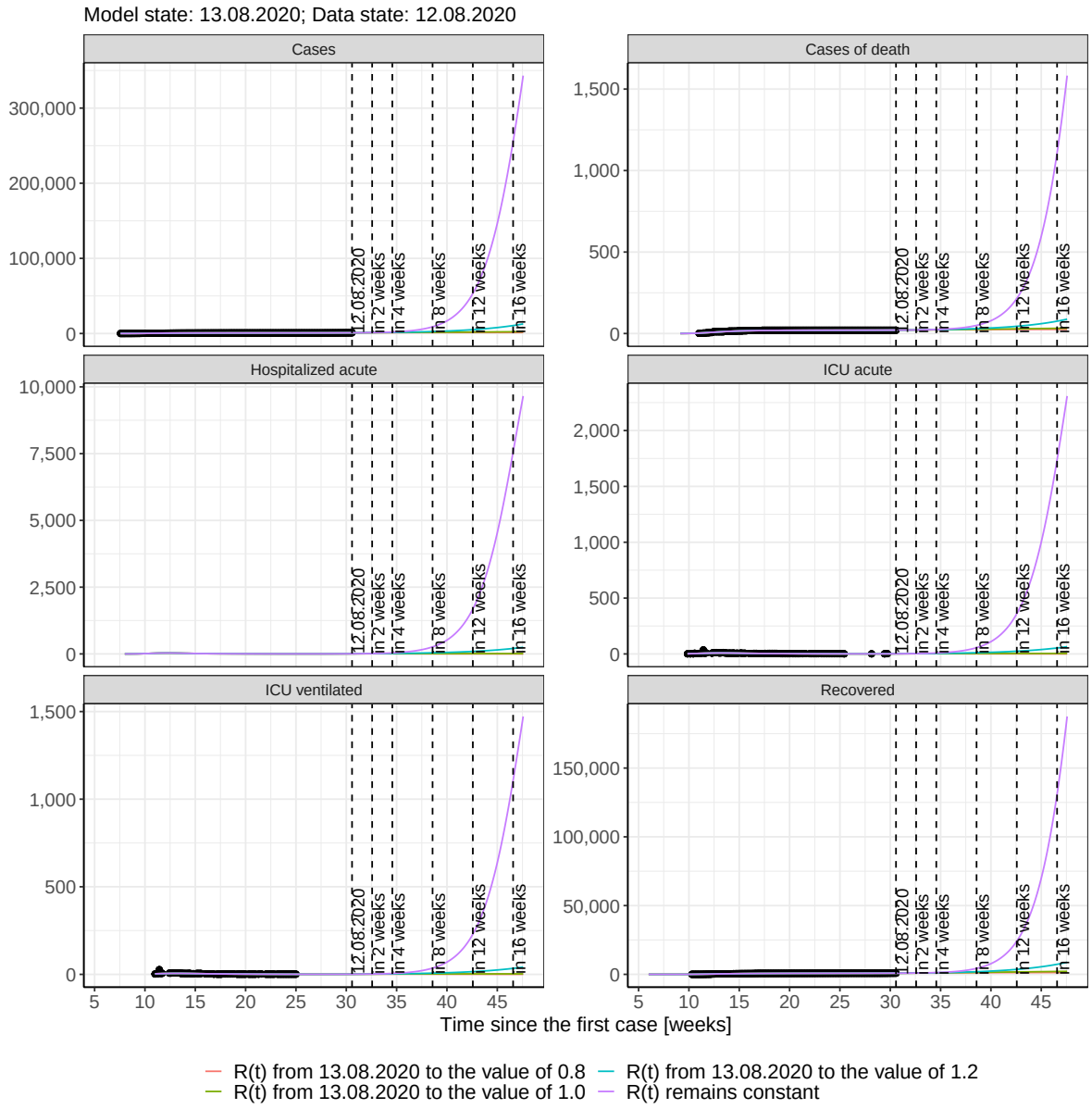


Figure 96: Linear representation of model predictions (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Mecklenburg-Vorpommern assuming various scenarios from the 13.08.2020. Points: reported case numbers; lines: model prediction.

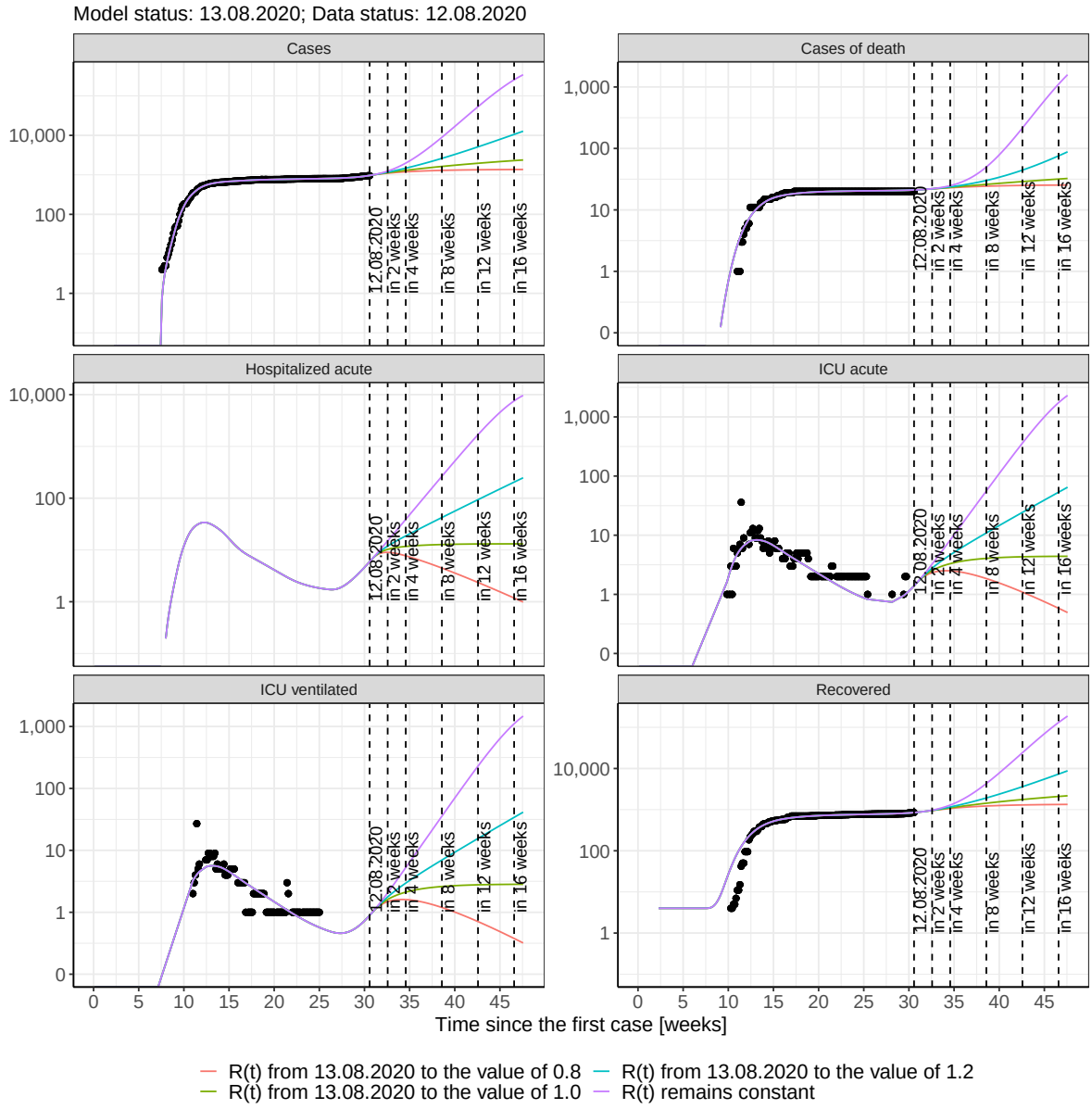


Figure 97: Semi-logarithmic depiction of the model prediction (cases, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Mecklenburg-Vorpommern assuming various scenarios after 13.08.2020. Points: reported case numbers;lines: model predictions.

The tables show the modeling results for four conceivable scenarios: Scenario 1: The R(t) estimated value after 13.08.2020 remains the same as today's value (Tab. 30); Scenario 2: The R(t) estimated value after 13.08.2020 takes the value of 0.8 (Tab. 31); Scenario 3: The R(t) estimated value takes the value of 1 after the 13.08.2020 (Tab. 32); Scenario 4: The R(t) estimated value takes the value of 1.2 after the 13.08.2020 (Tab. 33) Model status from 13.08.2020; Data status: 12.08.2020.

Table 30: Mecklenburg-Vorpommern - R(t) remains unchanged after the 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	977	21	854	6	1	1
14.08.2020	990	21	859	7	2	1
15.08.2020	1004	21	866	7	2	1
16.08.2020	1020	21	872	8	2	1
17.08.2020	1036	21	879	8	2	1
18.08.2020	1053	21	887	9	2	1
19.08.2020	1072	21	895	9	2	1
20.08.2020	1092	22	904	10	2	1
21.08.2020	1114	22	913	11	2	2
22.08.2020	1137	22	923	11	3	2
23.08.2020	1161	22	934	12	3	2
24.08.2020	1188	22	945	13	3	2
25.08.2020	1216	22	957	14	3	2
26.08.2020	1246	22	970	15	3	2
27.08.2020	1279	22	985	16	3	2
28.08.2020	1314	22	1000	17	4	2
29.08.2020	1351	22	1016	18	4	3
30.08.2020	1391	23	1033	20	4	3
31.08.2020	1434	23	1052	21	5	3
01.09.2020	1480	23	1071	23	5	3
02.09.2020	1529	23	1092	24	5	3
03.09.2020	1581	23	1115	26	6	4
04.09.2020	1638	24	1140	28	6	4
05.09.2020	1698	24	1166	30	6	4
06.09.2020	1762	24	1194	32	7	4
07.09.2020	1832	24	1224	34	7	5
08.09.2020	1906	24	1256	36	8	5
09.09.2020	1985	25	1290	39	8	5

Table 31: Mecklenburg-Vorpommern - R(t) takes on the value of 0.8 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	976	21	854	6	1	1
14.08.2020	988	21	859	7	2	1
15.08.2020	999	21	866	7	2	1
16.08.2020	1010	21	872	8	2	1
17.08.2020	1020	21	879	8	2	1
18.08.2020	1030	21	886	8	2	1
19.08.2020	1040	21	893	8	2	1
20.08.2020	1050	22	901	9	2	1
21.08.2020	1059	22	909	9	2	1
22.08.2020	1068	22	917	9	2	1
23.08.2020	1077	22	925	9	2	1
24.08.2020	1086	22	934	9	2	1
25.08.2020	1094	22	942	9	2	1
26.08.2020	1102	22	951	9	2	1
27.08.2020	1110	22	959	9	2	2
28.08.2020	1118	22	968	9	2	2
29.08.2020	1126	22	977	9	2	2
30.08.2020	1133	22	985	9	2	2
31.08.2020	1140	22	994	9	2	2
01.09.2020	1147	22	1002	9	2	2
02.09.2020	1153	22	1011	9	2	2
03.09.2020	1160	23	1019	8	2	2
04.09.2020	1166	23	1027	8	3	2
05.09.2020	1172	23	1036	8	3	2
06.09.2020	1178	23	1044	8	3	2
07.09.2020	1184	23	1052	8	3	2
08.09.2020	1190	23	1059	8	3	2
09.09.2020	1195	23	1067	8	2	2

Table 32: Mecklenburg-Vorpommern - R(t) takes on the value of 1.0 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	976	21	854	6	1	1
14.08.2020	988	21	859	7	2	1
15.08.2020	1000	21	866	7	2	1
16.08.2020	1012	21	872	8	2	1
17.08.2020	1024	21	879	8	2	1
18.08.2020	1036	21	886	8	2	1
19.08.2020	1048	21	894	9	2	1
20.08.2020	1060	22	902	9	2	1
21.08.2020	1072	22	910	9	2	1
22.08.2020	1084	22	919	9	2	1
23.08.2020	1096	22	927	10	2	1
24.08.2020	1108	22	936	10	2	2
25.08.2020	1120	22	946	10	2	2
26.08.2020	1132	22	955	10	3	2
27.08.2020	1144	22	965	10	3	2
28.08.2020	1156	22	975	11	3	2
29.08.2020	1168	22	985	11	3	2
30.08.2020	1180	22	995	11	3	2
31.08.2020	1192	22	1006	11	3	2
01.09.2020	1204	23	1016	11	3	2
02.09.2020	1216	23	1027	11	3	2
03.09.2020	1228	23	1038	11	3	2
04.09.2020	1240	23	1049	11	3	2
05.09.2020	1251	23	1060	11	3	2
06.09.2020	1263	23	1071	11	3	2
07.09.2020	1275	23	1082	12	3	2
08.09.2020	1287	23	1093	12	3	2
09.09.2020	1299	23	1104	12	3	2

Table 33: Mecklenburg-Vorpommern - R(t) takes on the value of 1.2 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	976	21	854	6	1	1
14.08.2020	989	21	859	7	2	1
15.08.2020	1002	21	866	7	2	1
16.08.2020	1015	21	872	8	2	1
17.08.2020	1029	21	879	8	2	1
18.08.2020	1043	21	886	8	2	1
19.08.2020	1057	21	894	9	2	1
20.08.2020	1072	22	903	9	2	1
21.08.2020	1087	22	911	10	2	1
22.08.2020	1103	22	920	10	2	1
23.08.2020	1119	22	930	11	2	2
24.08.2020	1136	22	940	11	3	2
25.08.2020	1153	22	950	11	3	2
26.08.2020	1170	22	961	12	3	2
27.08.2020	1188	22	972	12	3	2
28.08.2020	1207	22	984	13	3	2
29.08.2020	1226	22	996	13	3	2
30.08.2020	1246	22	1008	14	3	2
31.08.2020	1266	23	1021	14	3	2
01.09.2020	1287	23	1035	15	4	2
02.09.2020	1308	23	1049	15	4	2
03.09.2020	1331	23	1063	16	4	2
04.09.2020	1353	23	1078	16	4	2
05.09.2020	1377	23	1093	17	4	3
06.09.2020	1401	23	1109	17	4	3
07.09.2020	1426	23	1125	18	4	3
08.09.2020	1451	24	1142	18	4	3
09.09.2020	1477	24	1160	19	5	3

9.2.3 Prediction for the next 4 weeks under the assumption of different scenarios from 13.08.2020

Fig. 98 shows the absolute changes in case numbers compared to the previous day for the next 4 weeks for different R(t) values. If no bars are shown on the plot it means that the number of cases has not changed compared to the previous day.

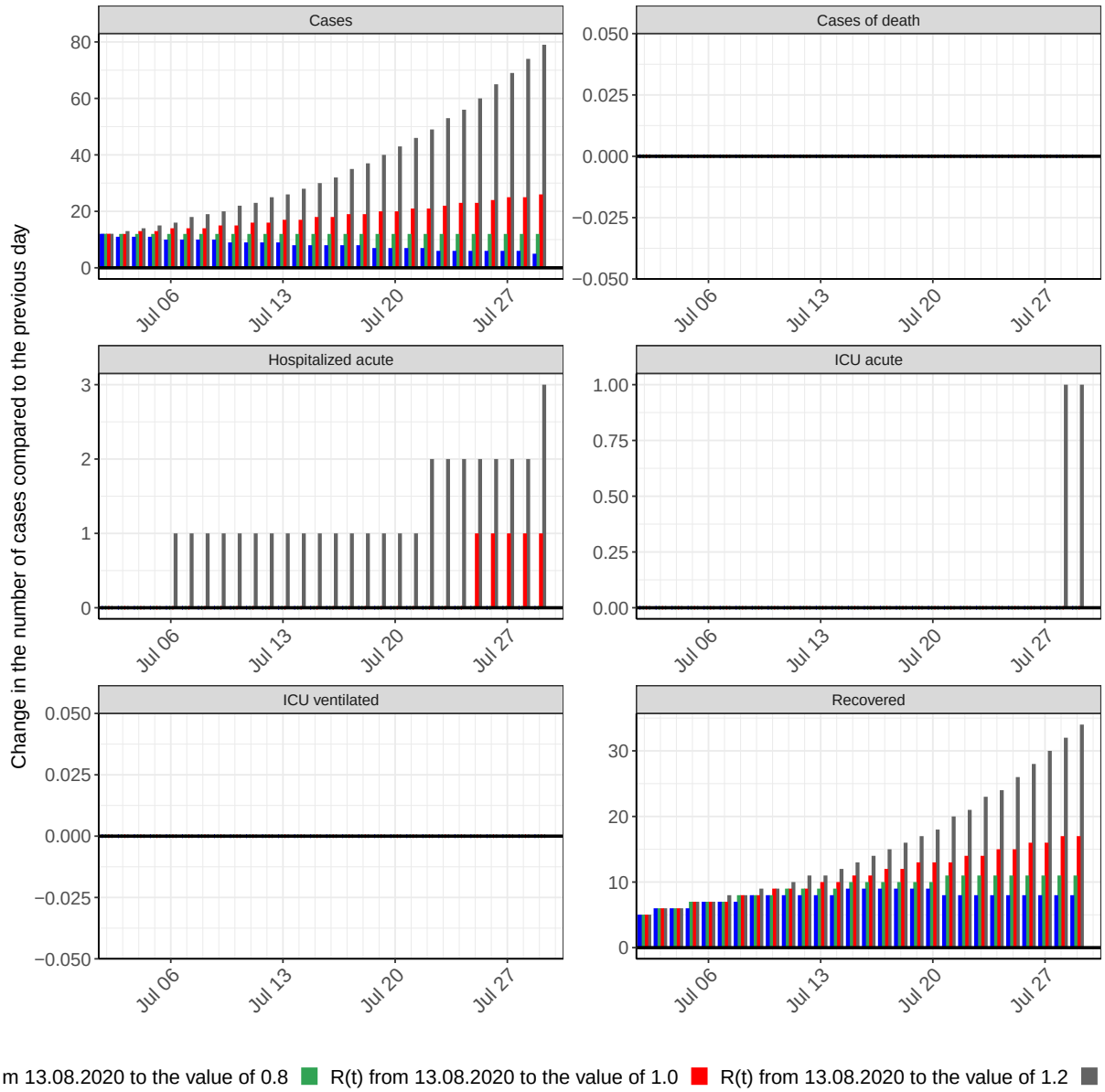


Figure 98: Simulation of daily new cases for the next 4 weeks - Mecklenburg-Vorpommern

10 Lower Saxony

10.1 Model description

Fig. 99 depicts the results of the modeling (lines) compared to the observed data (points) for Lower Saxony on a linear (A) and semi-logarithmic (B) scale.

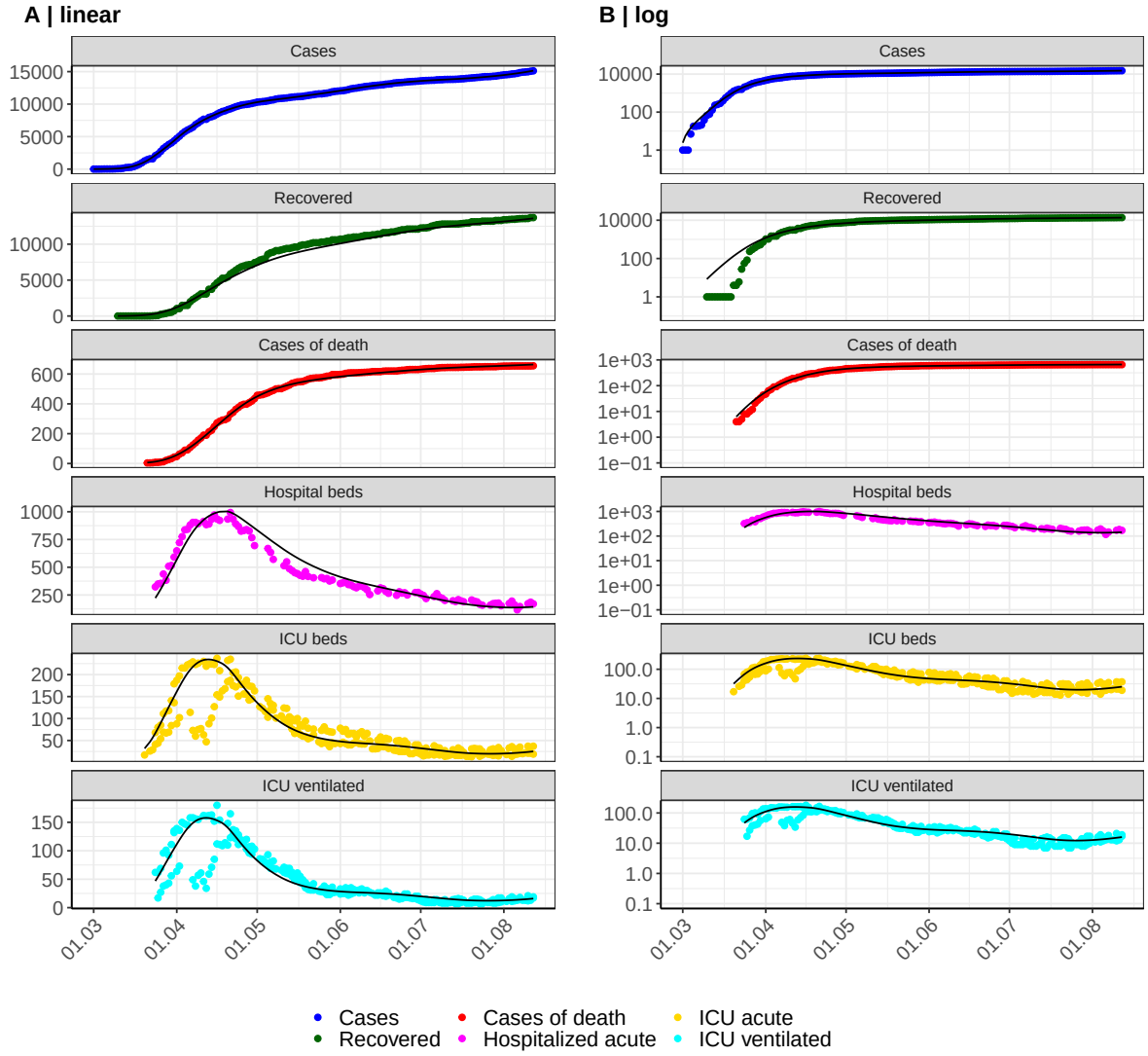


Figure 99: Model description of the reported case numbers, occupancy of hospital beds, recovery and deaths in Lower Saxony. Points: reported data; lines: model description.

Fig. 100 shows the goodness-of-fit for Lower Saxony. The values calculated by the model are plotted against the observed data. If the model fit is good, the points scatter randomly along the lines of identity.

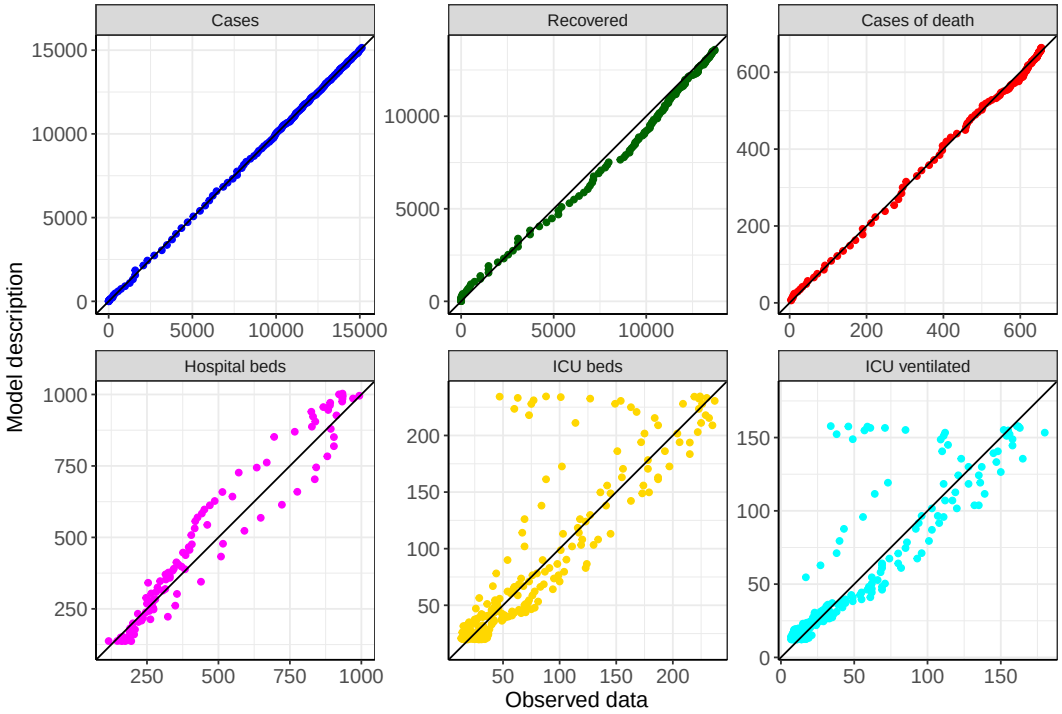


Figure 100: Goodness-of-fit plots for Lower Saxony. Lines: lines of identity.

Fig. 101 shows the influence of non-pharmaceutical interventions (NPI) on R(t) for Lower Saxony (red line) in comparison with the other federal states (grey lines).

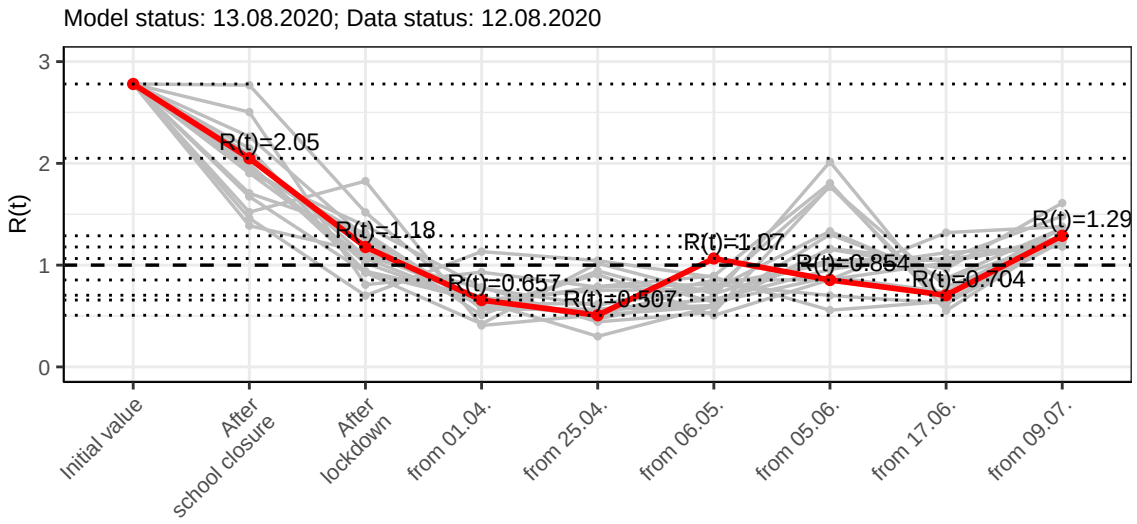


Figure 101: R(t) values before and after the NPIs for Lower Saxony

Fig. 102 shows the R(t) estimated value for Lower Saxony (red line) over time in comparison with the other federal states (grey lines).

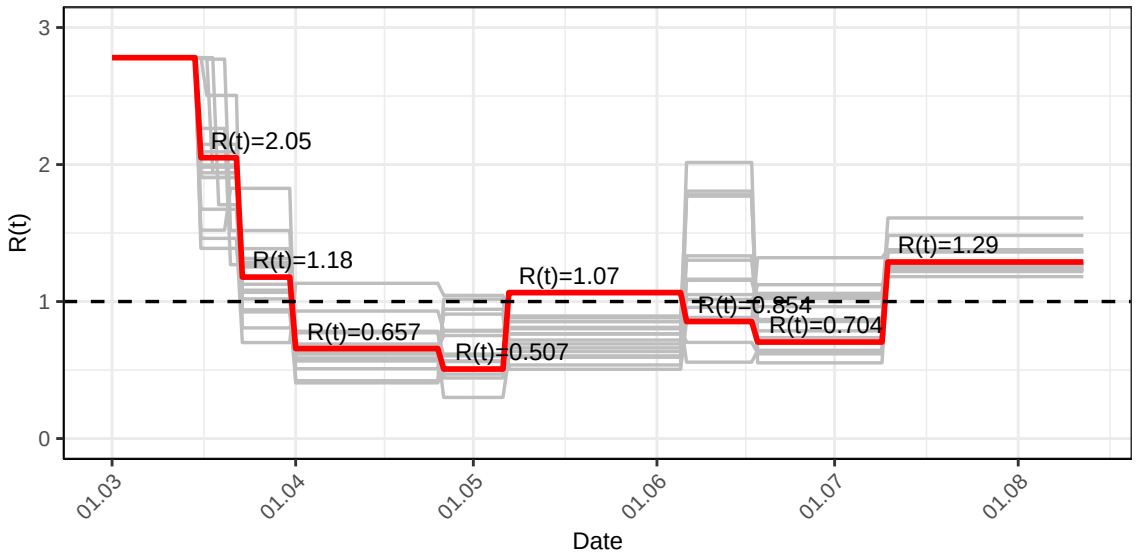


Figure 102: R(t) values over time for Lower Saxony

10.2 Model predictions

10.2.1 Prediction for the next 4 weeks assuming that R(t) estimate will not change (R(t) = 1.29)

Fig. 103 and 104 depict the the model predictions for the next 4 weeks for Lower Saxony on a linear (103) and a semi-logarithmic (104) scale. The modeling was carried out under the assumption that the R(t) estimated value would remain the same.

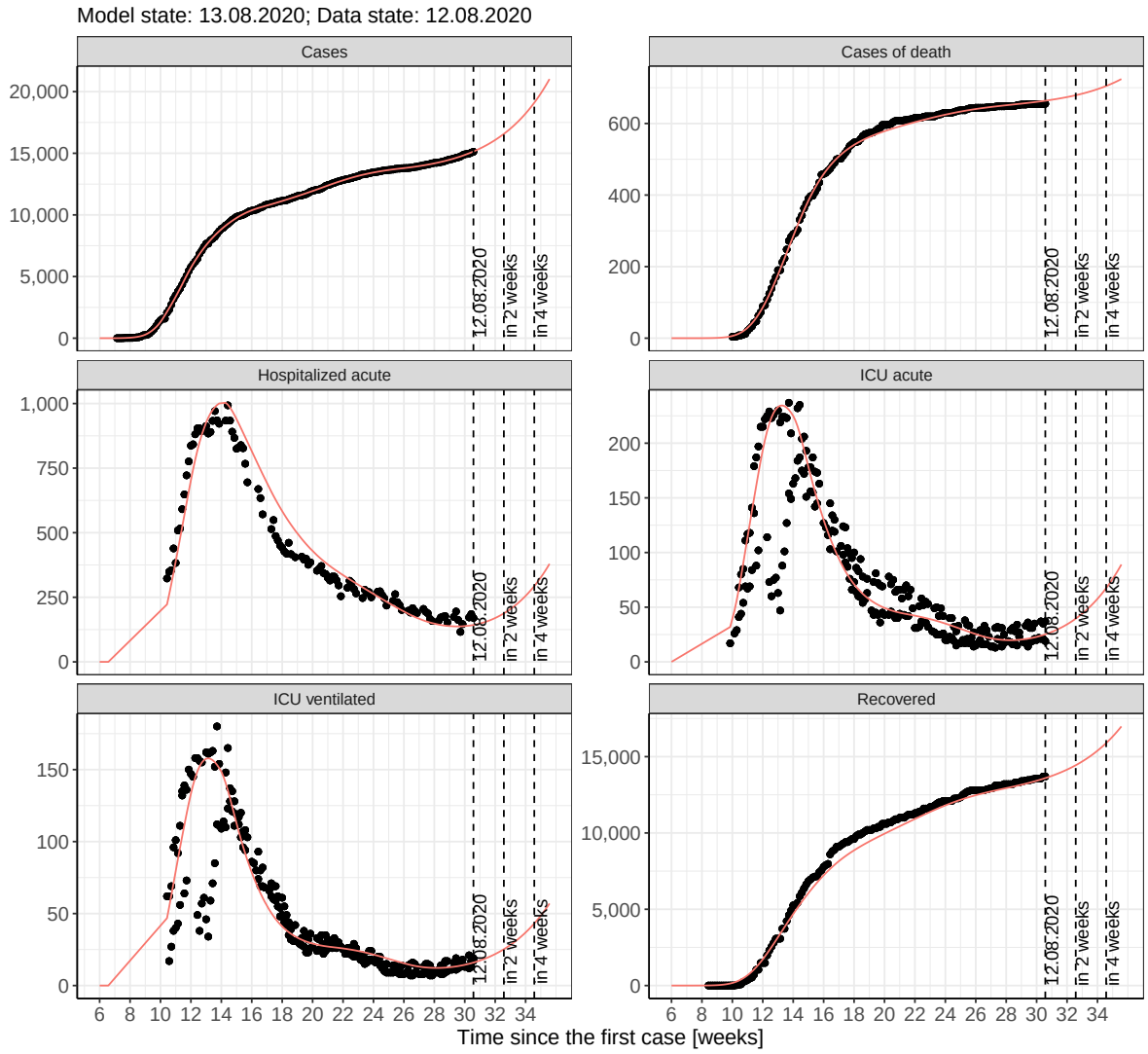


Figure 103: Representation of the model predictions for Lower Saxony for the next 4 weeks under the assumption that the R(t) estimate remains the same on linear scale (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths). Points: Reported case numbers; Red lines: Model predictions.

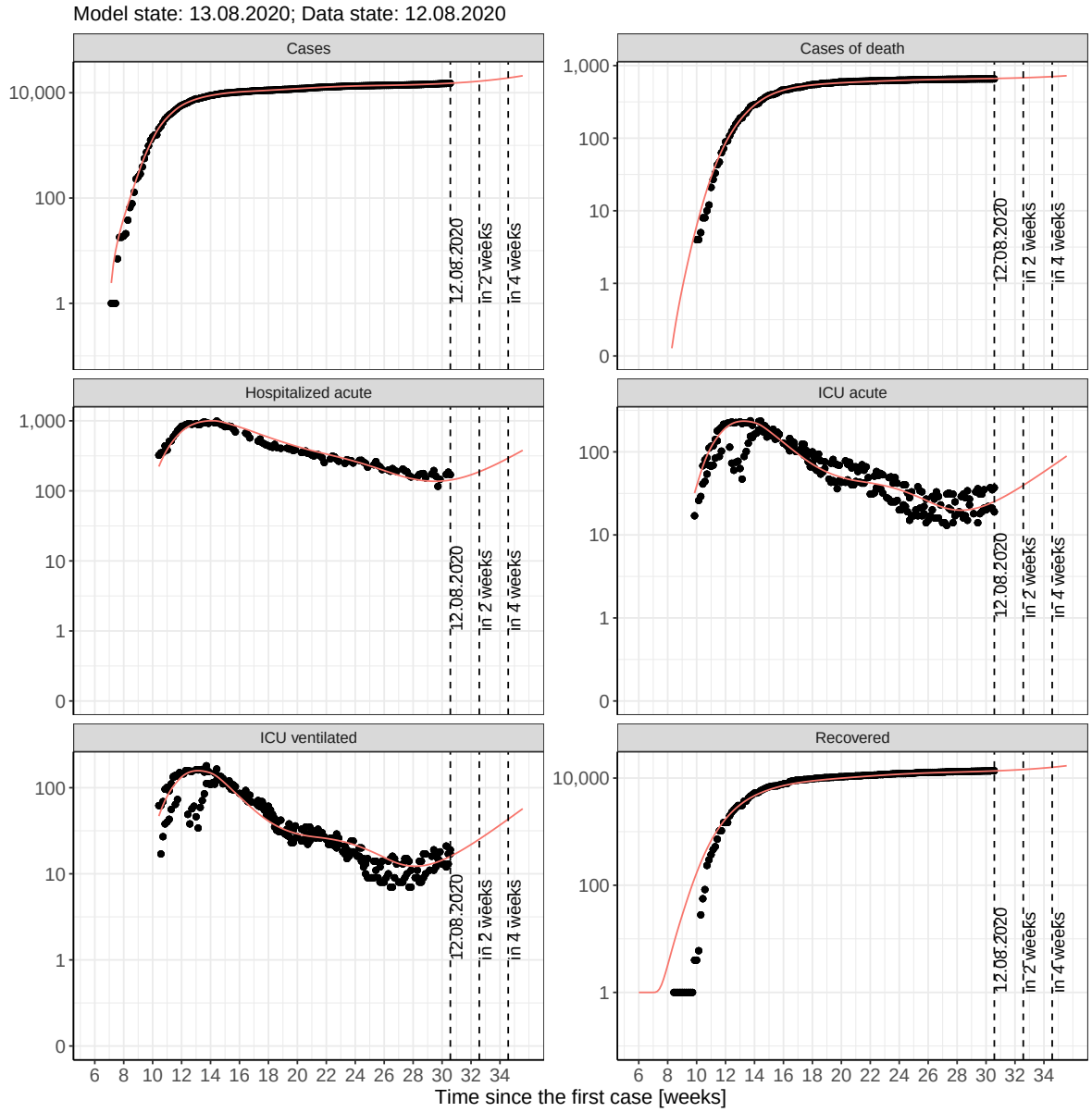


Figure 104: Semi-logarithmic representation of the model prediction (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Lower Saxony for the next 4 weeks under the assumption that the R(t) estimate remains the same. Points: Reported case numbers; Red lines: Model predictions.

10.2.2 Predictions for the next 4 weeks assuming different scenarios (with the R(t) value above 1.2) from 13.08.2020

Fig. 105 and 106 represent the model prediction for the next 4 weeks for Lower Saxony on a linear (105) and a semi-logarithmic (106) scale. In this simulation different scenarios of the possible development (R(t) = 1.4, 1.6, 1.8 and staying the same) from 13.08.2020 were tested.

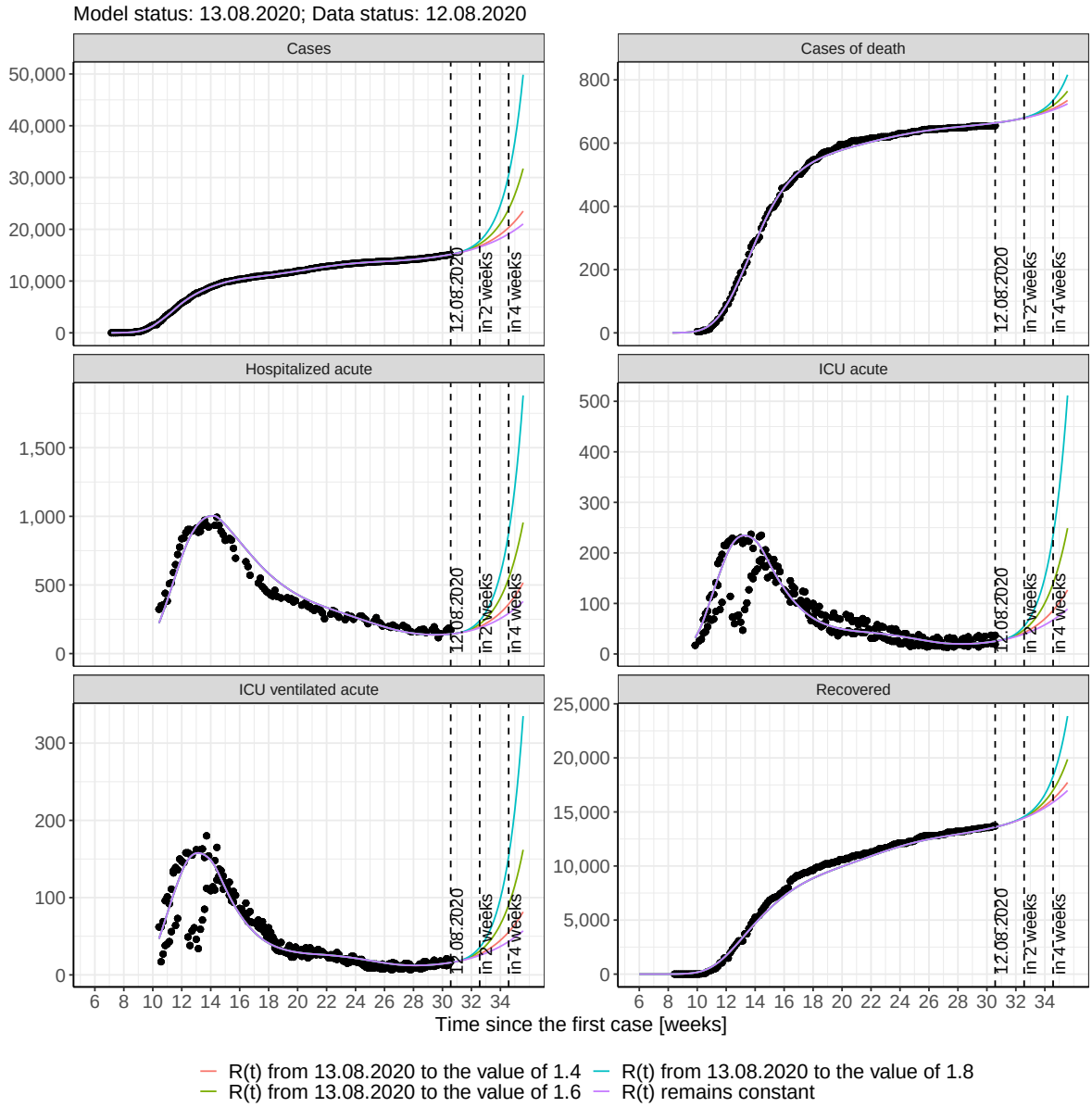


Figure 105: Linear representation of model prediction (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Lower Saxony assuming various scenarios from the 13.08.2020. Points: Reported case numbers; Lines: Model predictions.

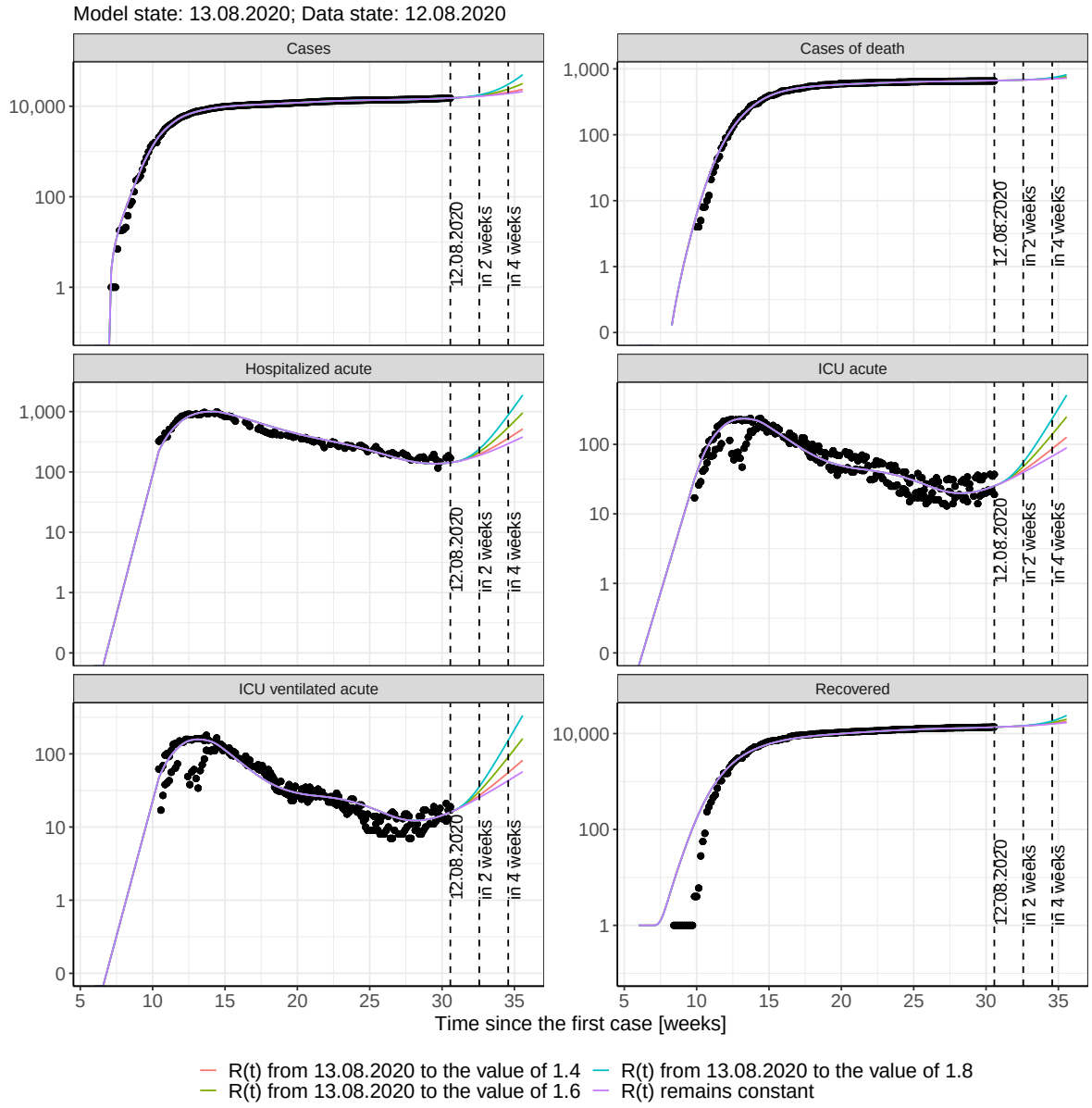


Figure 106: Semi-logarithmic representation of model predictions (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Lower Saxony assuming various scenarios from the 13.08.2020. Points: Reported case numbers; Lines: Model predictions.

Fig. 107 and 108 represent the model prediction for the next 16 weeks for Lower Saxony on a linear (107) and a semi-logarithmic (108) scale. In this simulation different scenarios of the possible course from the 13.08.2020 were tested.

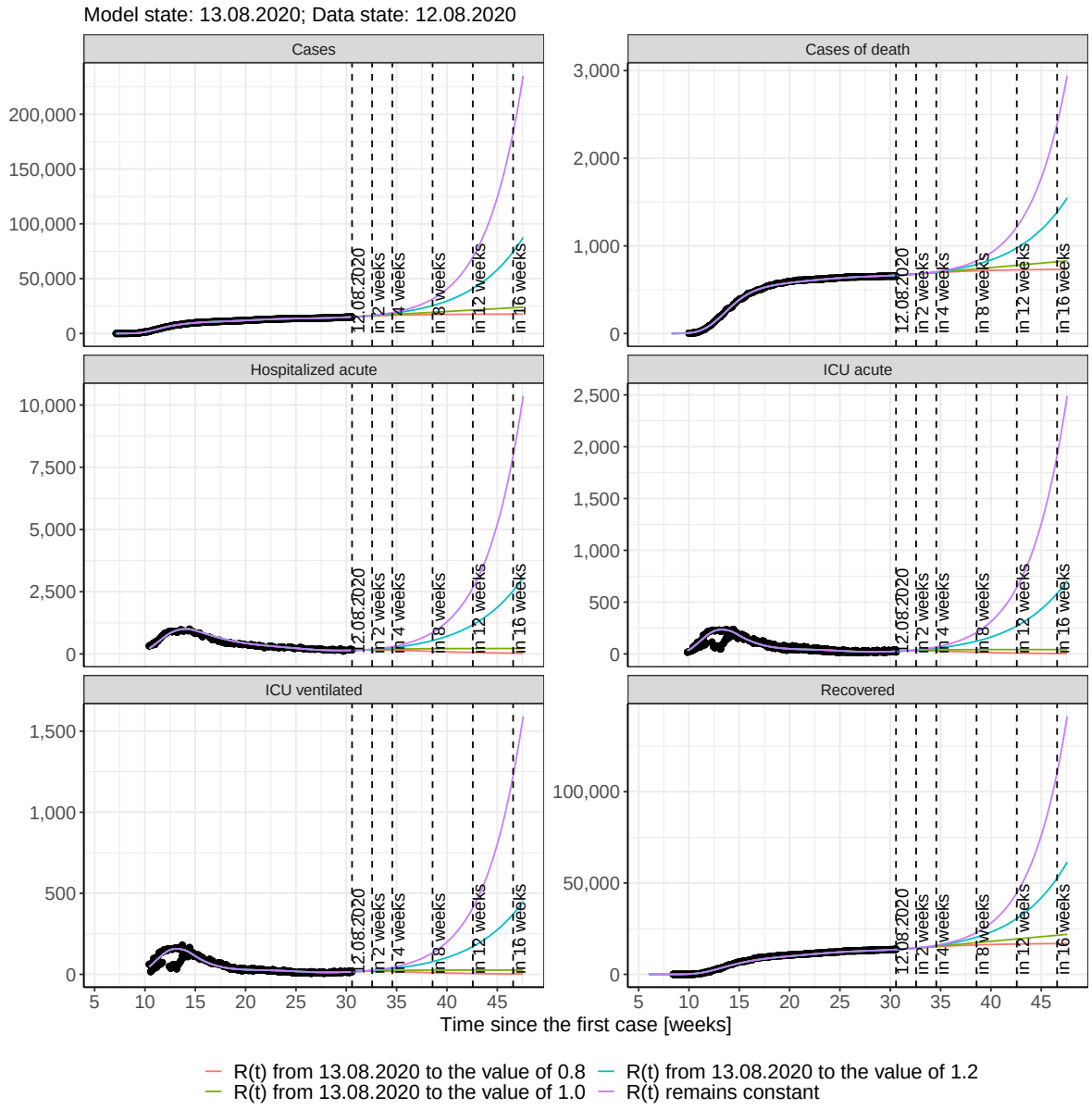


Figure 107: Linear representation of model predictions (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Lower Saxony assuming various scenarios from the 13.08.2020. Points: reported case numbers; lines: model prediction.

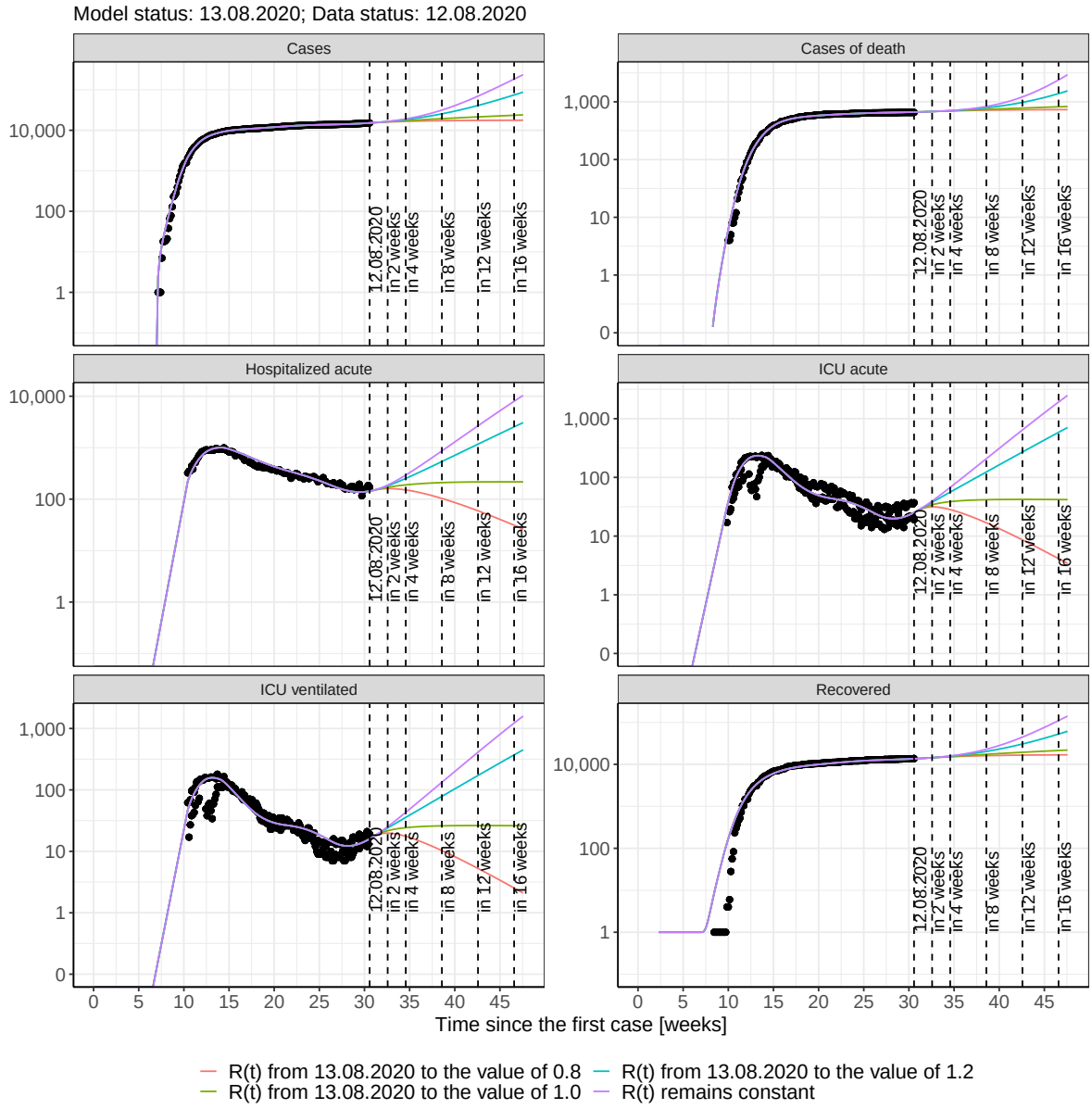


Figure 108: Semi-logarithmic depiction of the model prediction (cases, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Lower Saxony assuming various scenarios after 13.08.2020. Points: reported case numbers;lines: model predictions.

The tables show the modeling results for four conceivable scenarios: Scenario 1: The R(t) estimated value after 13.08.2020 remains the same as today's value (Tab. 34); Scenario 2: The R(t) estimated value after 13.08.2020 takes the value of 0.8 (Tab. 35); Scenario 3: The R(t) estimated value takes the value of 1 after the 13.08.2020 (Tab. 36); Scenario 4: The R(t) estimated value takes the value of 1.2 after the 13.08.2020 (Tab. 37) Model status from 13.08.2020; Data status: 12.08.2020.

Table 34: Lower Saxony - R(t) remains unchanged after the 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	15222	665	13641	144	26	16
14.08.2020	15302	665	13690	146	27	17
15.08.2020	15386	666	13740	148	27	17
16.08.2020	15473	667	13793	151	28	18
17.08.2020	15564	668	13847	153	29	19
18.08.2020	15658	669	13904	156	30	19
19.08.2020	15757	670	13962	159	31	20
20.08.2020	15860	672	14023	162	32	20
21.08.2020	15967	673	14086	166	33	21
22.08.2020	16078	674	14151	170	34	22
23.08.2020	16194	675	14219	174	36	23
24.08.2020	16315	676	14289	178	37	23
25.08.2020	16441	678	14363	183	38	24
26.08.2020	16572	679	14439	188	40	25
27.08.2020	16709	680	14518	193	41	26
28.08.2020	16851	682	14600	198	43	27
29.08.2020	17000	683	14686	204	44	28
30.08.2020	17154	685	14775	211	46	29
31.08.2020	17315	687	14868	217	48	30
01.09.2020	17483	688	14964	224	49	32
02.09.2020	17657	690	15064	231	51	33
03.09.2020	17839	692	15168	239	53	34
04.09.2020	18028	694	15277	247	55	35
05.09.2020	18226	696	15390	255	58	37
06.09.2020	18431	698	15507	264	60	38
07.09.2020	18645	700	15629	273	62	40
08.09.2020	18869	702	15756	283	65	41
09.09.2020	19101	705	15889	293	67	43

Table 35: Lower Saxony - R(t) takes on the value of 0.8 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	15219	665	13641	144	26	16
14.08.2020	15291	665	13690	146	27	17
15.08.2020	15362	666	13740	148	27	17
16.08.2020	15430	667	13792	150	28	18
17.08.2020	15496	668	13845	152	29	18
18.08.2020	15561	669	13900	153	29	19
19.08.2020	15624	670	13955	155	30	19
20.08.2020	15684	671	14011	156	30	19
21.08.2020	15744	673	14068	157	30	19
22.08.2020	15801	674	14126	158	31	20
23.08.2020	15857	675	14184	159	31	20
24.08.2020	15911	676	14242	159	31	20
25.08.2020	15964	677	14301	160	31	20
26.08.2020	16015	678	14359	160	31	20
27.08.2020	16065	679	14417	160	31	20
28.08.2020	16113	681	14474	160	31	20
29.08.2020	16160	682	14532	160	31	20
30.08.2020	16206	683	14588	160	31	20
31.08.2020	16250	684	14645	159	31	19
01.09.2020	16293	685	14700	159	31	19
02.09.2020	16335	686	14755	158	30	19
03.09.2020	16376	687	14809	157	30	19
04.09.2020	16415	689	14862	156	30	19
05.09.2020	16454	690	14915	155	30	18
06.09.2020	16491	691	14966	154	29	18
07.09.2020	16527	692	15017	153	29	18
08.09.2020	16562	693	15066	152	29	18
09.09.2020	16597	694	15115	151	28	18

Table 36: Lower Saxony - R(t) takes on the value of 1.0 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	15220	665	13641	144	26	16
14.08.2020	15296	665	13690	146	27	17
15.08.2020	15371	666	13740	148	27	17
16.08.2020	15447	667	13792	150	28	18
17.08.2020	15522	668	13846	152	29	18
18.08.2020	15597	669	13901	154	30	19
19.08.2020	15673	670	13958	156	30	19
20.08.2020	15748	671	14016	158	31	20
21.08.2020	15824	673	14075	160	31	20
22.08.2020	15899	674	14135	162	32	20
23.08.2020	15974	675	14197	164	33	21
24.08.2020	16050	676	14259	166	33	21
25.08.2020	16125	677	14323	168	34	21
26.08.2020	16200	678	14387	170	34	22
27.08.2020	16275	680	14452	171	35	22
28.08.2020	16351	681	14518	173	35	22
29.08.2020	16426	682	14585	174	35	22
30.08.2020	16501	684	14652	176	36	23
31.08.2020	16576	685	14720	178	36	23
01.09.2020	16651	686	14788	179	36	23
02.09.2020	16726	688	14856	180	37	23
03.09.2020	16801	689	14925	182	37	23
04.09.2020	16876	690	14995	183	37	24
05.09.2020	16951	692	15064	184	38	24
06.09.2020	17027	693	15134	186	38	24
07.09.2020	17101	694	15204	187	38	24
08.09.2020	17176	696	15275	188	38	24
09.09.2020	17251	697	15346	189	39	24

Table 37: Lower Saxony - R(t) takes on the value of 1.2 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	15221	665	13641	144	26	16
14.08.2020	15300	665	13690	146	27	17
15.08.2020	15381	666	13740	148	27	17
16.08.2020	15465	667	13793	151	28	18
17.08.2020	15550	668	13847	153	29	18
18.08.2020	15639	669	13903	156	30	19
19.08.2020	15729	670	13961	158	31	20
20.08.2020	15823	671	14020	161	32	20
21.08.2020	15919	673	14082	164	33	21
22.08.2020	16018	674	14146	167	34	21
23.08.2020	16119	675	14212	171	35	22
24.08.2020	16224	676	14279	174	36	23
25.08.2020	16331	677	14349	178	37	23
26.08.2020	16442	679	14422	181	38	24
27.08.2020	16556	680	14496	185	39	25
28.08.2020	16673	682	14572	190	40	25
29.08.2020	16793	683	14651	194	41	26
30.08.2020	16917	684	14733	198	42	27
31.08.2020	17044	686	14816	203	43	28
01.09.2020	17175	688	14902	208	45	28
02.09.2020	17310	689	14991	213	46	29
03.09.2020	17449	691	15082	218	47	30
04.09.2020	17591	693	15176	223	49	31
05.09.2020	17738	694	15272	229	50	32
06.09.2020	17889	696	15371	234	52	33
07.09.2020	18044	698	15473	240	53	34
08.09.2020	18204	700	15578	246	55	35
09.09.2020	18368	702	15687	253	56	36

10.2.3 Prediction for the next 4 weeks under the assumption of different scenarios from 13.08.2020

Fig. 109 shows the absolute changes in case numbers compared to the previous day for the next 4 weeks for different R(t) values. If no bars are shown on the plot it means that the number of cases has not changed compared to the previous day.

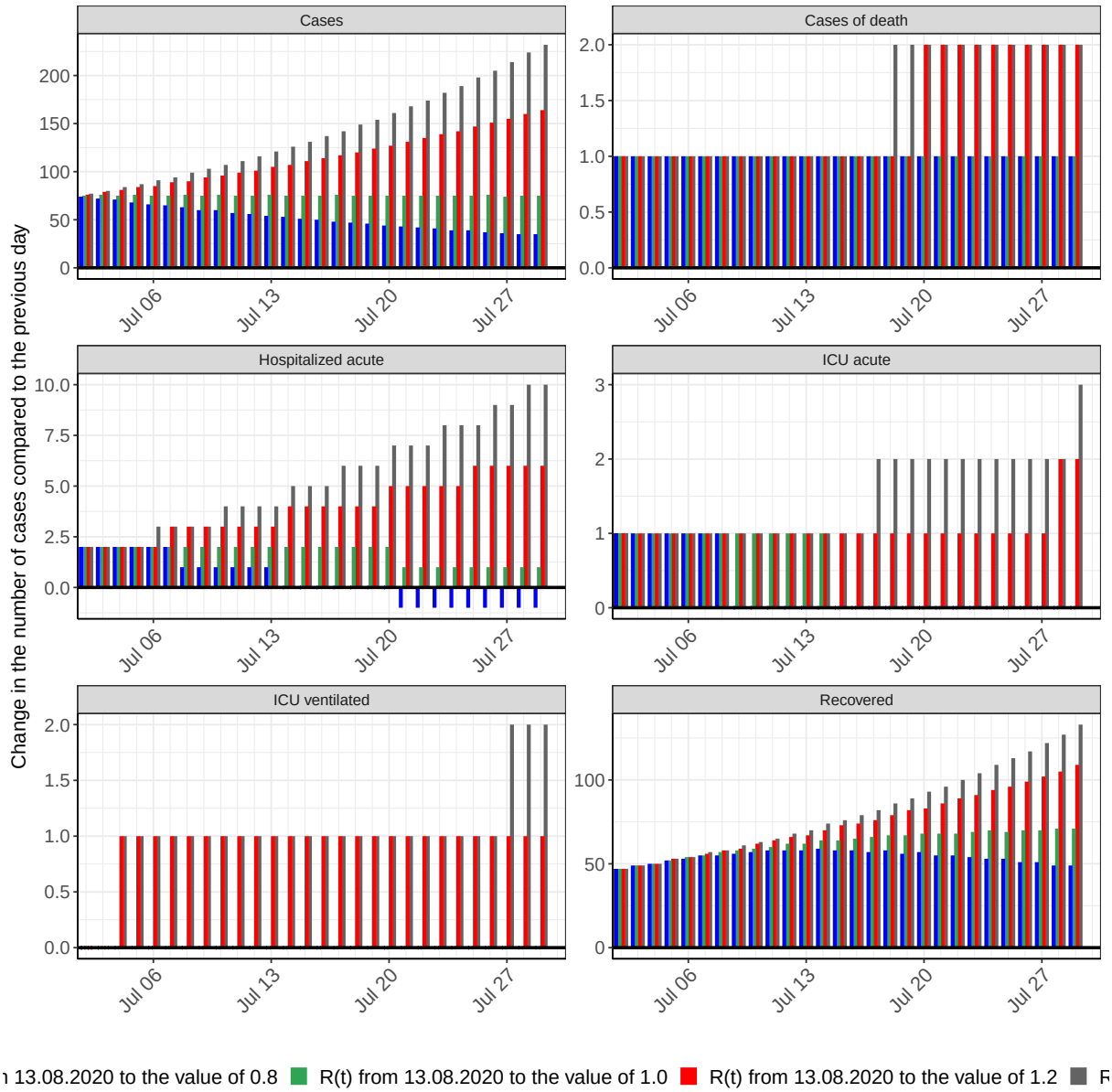


Figure 109: Simulation of daily new cases for the next 4 weeks - Lower Saxony

11 North Rhine-Westphalia

11.1 Model description

Fig. 110 depicts the results of the modeling (lines) compared to the observed data (points) for North Rhine-Westphalia on a linear (A) and semi-logarithmic (B) scale.

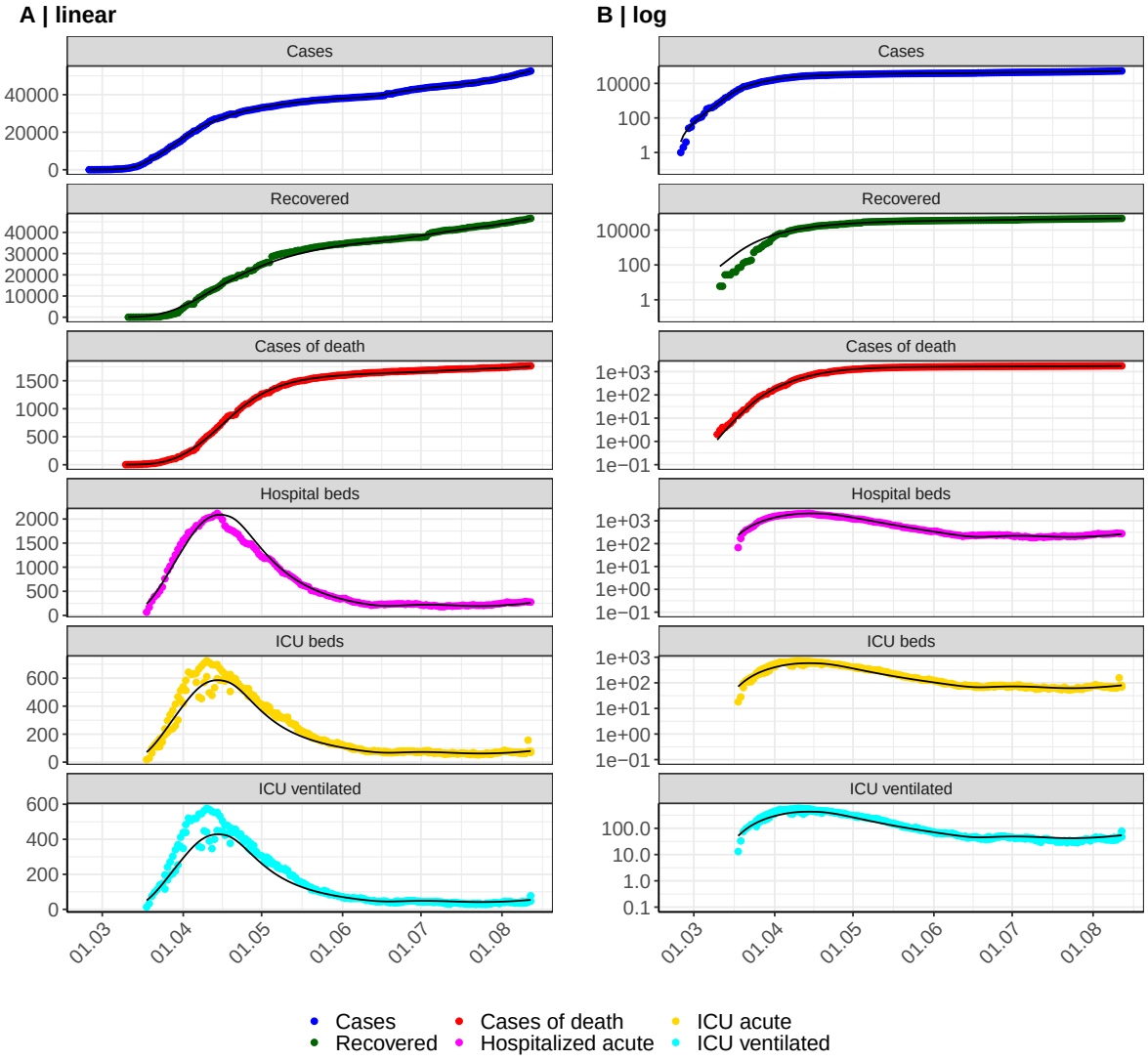


Figure 110: Model description of the reported case numbers, occupancy of hospital beds, recovery and deaths in North Rhine-Westphalia. Points: reported data; lines: model description.

Fig. 111 shows the goodness-of-fit for North Rhine-Westphalia. The values calculated by the model are plotted against the observed data. If the model fit is good, the points scatter randomly along the lines of identity.

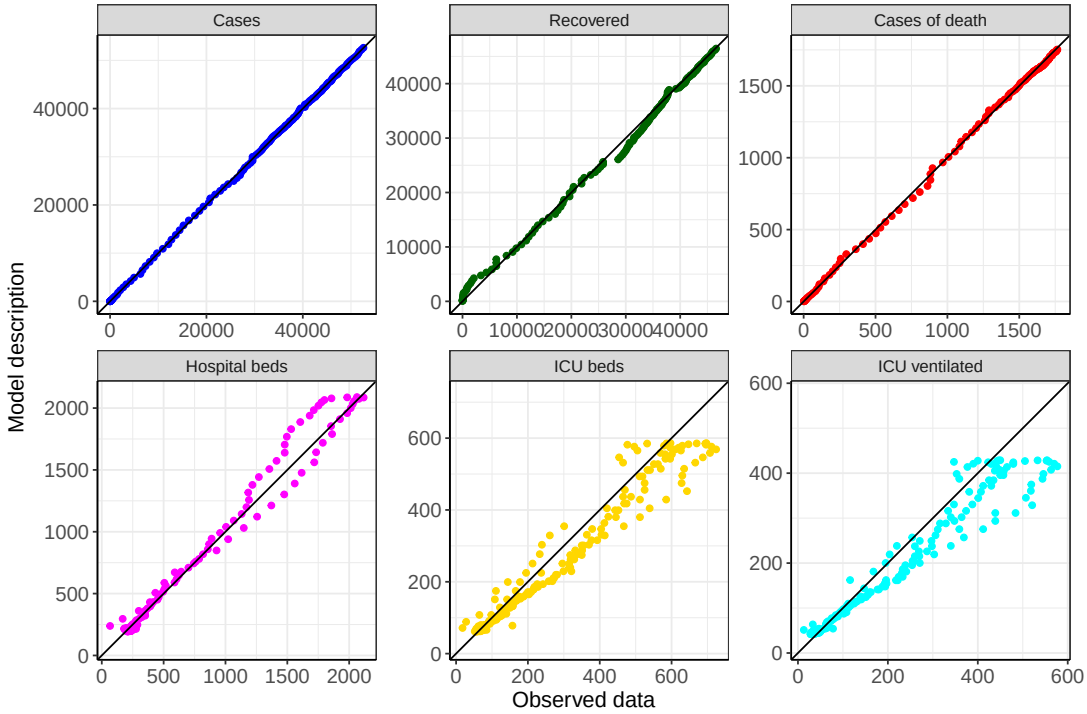


Figure 111: Goodness-of-fit plots for North Rhine-Westphalia. Lines: lines of identity.

Fig. 112 shows the influence of non-pharmaceutical interventions (NPI) on R(t) for North Rhine-Westphalia (red line) in comparison with the other federal states (grey lines).

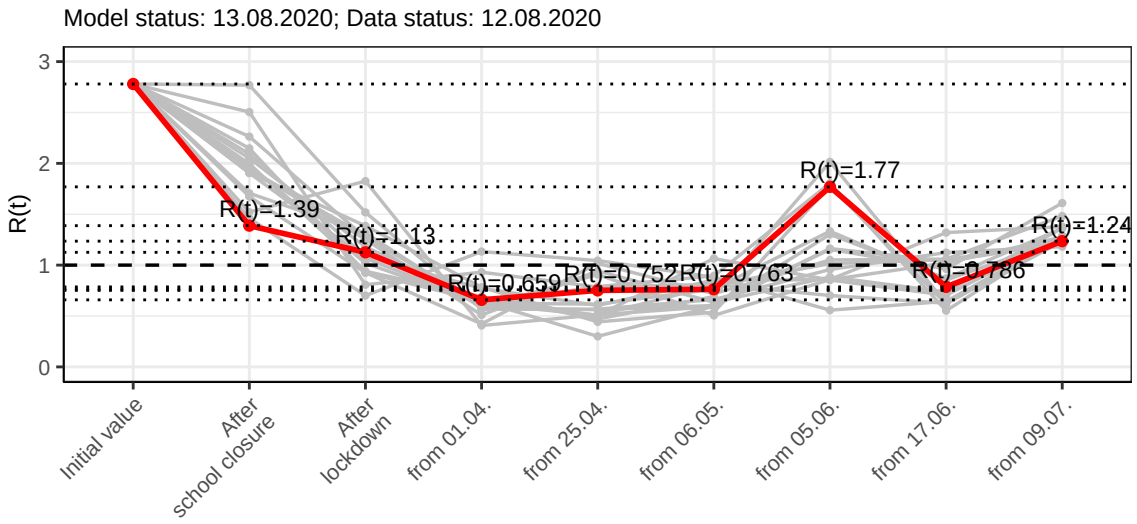


Figure 112: R(t) values before and after the NPIs for North Rhine-Westphalia

Fig. 113 shows the R(t) estimated value for North Rhine-Westphalia (red line) over time in comparison with the other federal states (grey lines).

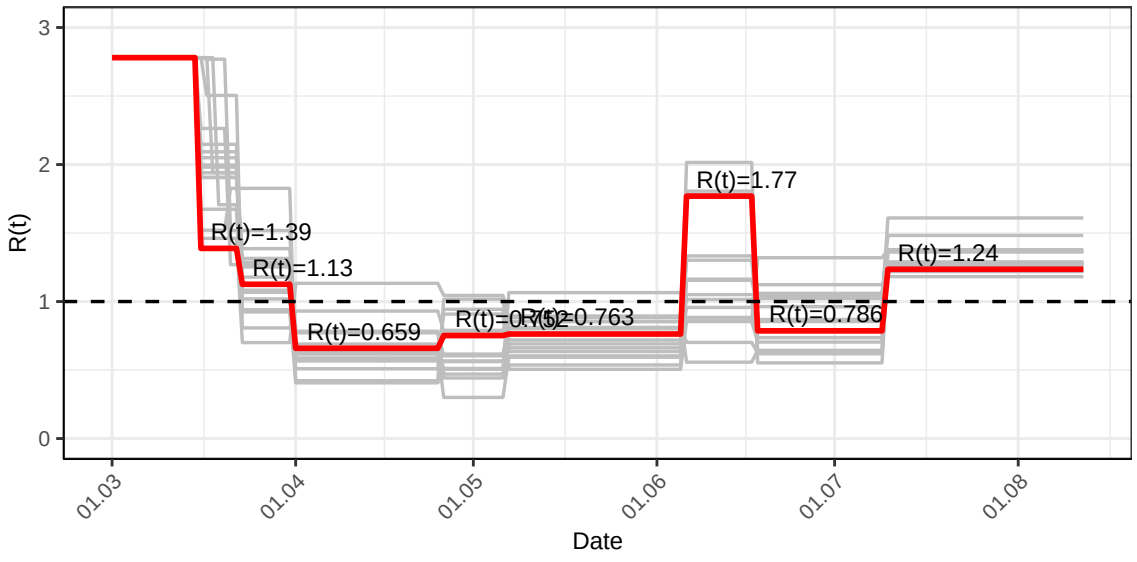


Figure 113: R(t) values over time for North Rhine-Westphalia

11.2 Model predictions

11.2.1 Prediction for the next 4 weeks assuming that R(t) estimate will not change (R(t) = 1.24)

Fig. 114 and 115 depict the the model predictions for the next 4 weeks for North Rhine-Westphalia on a linear (114) and a semi-logarithmic (115) scale. The modeling was carried out under the assumption that the R(t) estimated value would remain the same.

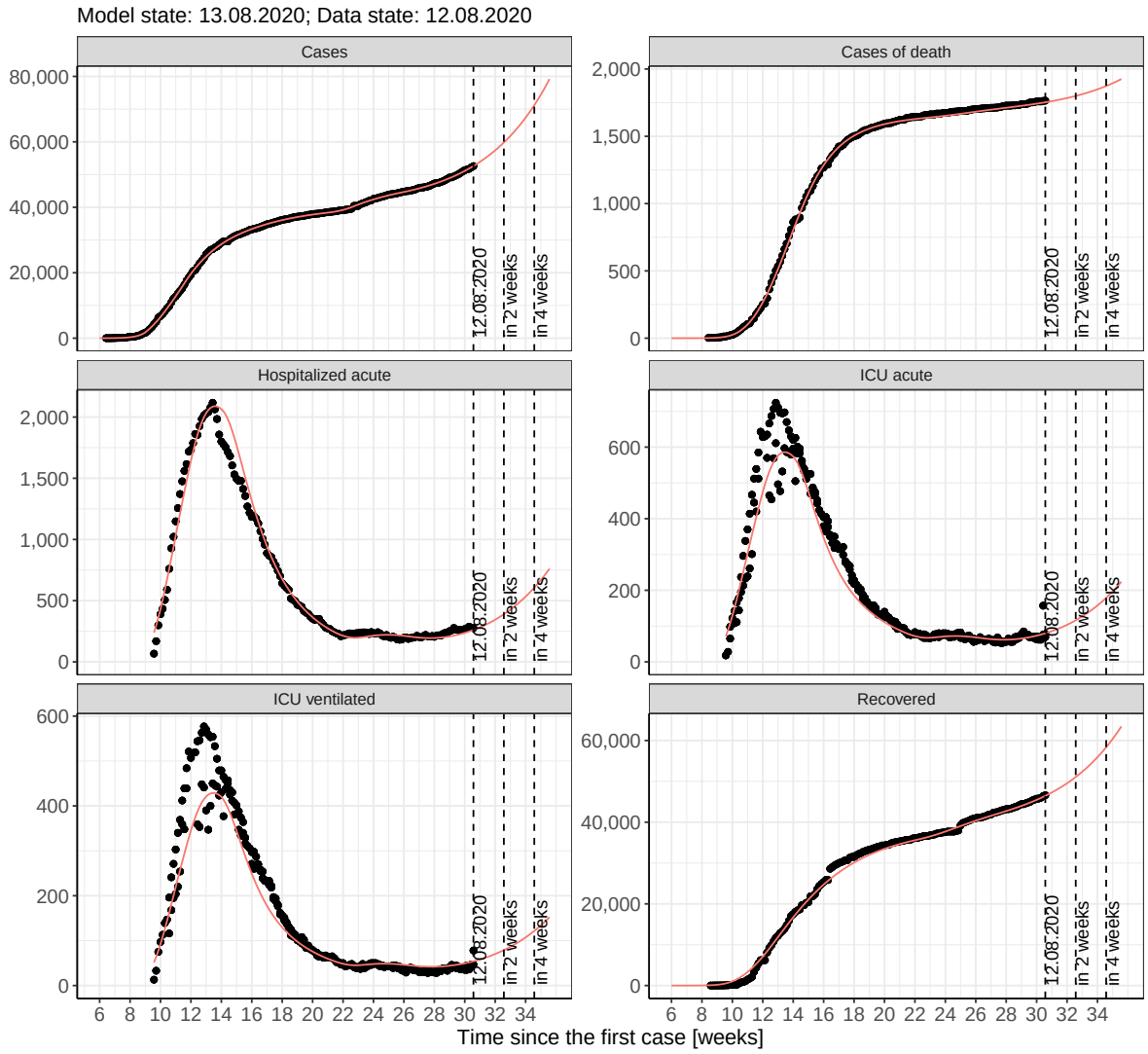


Figure 114: Representation of the model predictions for North Rhine-Westphalia for the next 4 weeks under the assumption that the R(t) estimate remains the same on linear scale (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths). Points: Reported case numbers; Red lines: Model predictions.

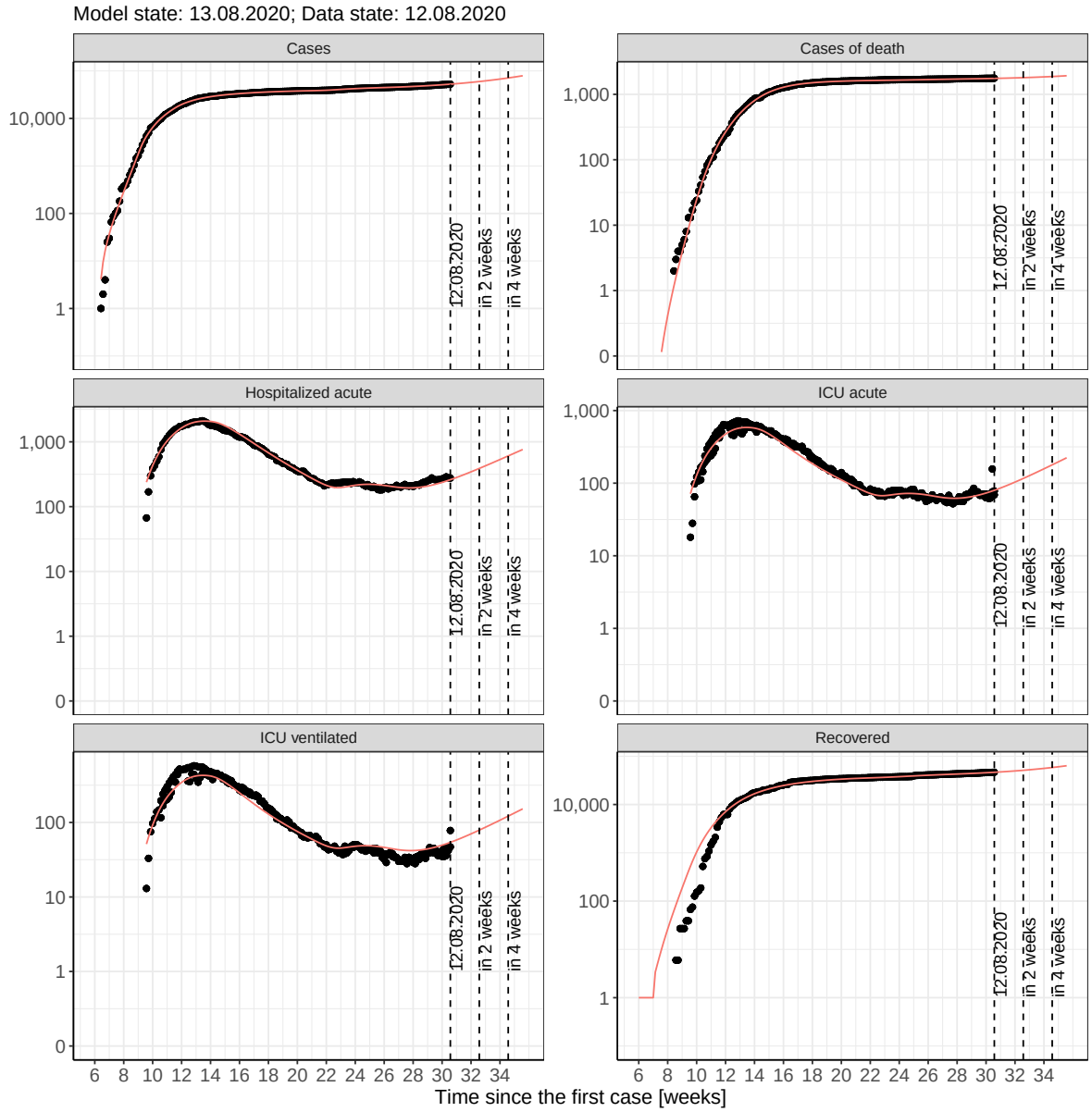


Figure 115: Semi-logarithmic representation of the model prediction (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for North Rhine-Westphalia for the next 4 weeks under the assumption that the R(t) estimate remains the same. Points: Reported case numbers; Red lines: Model predictions.

11.2.2 Predictions for the next 4 weeks assuming different scenarios (with the R(t) value above 1.2) from 13.08.2020

Fig. 116 and 117 represent the model prediction for the next 4 weeks for North Rhine-Westphalia on a linear (116) and a semi-logarithmic (117) scale. In this simulation different scenarios of the possible development (R(t) = 1.4, 1.6, 1.8 and staying the same) from 13.08.2020 were tested.

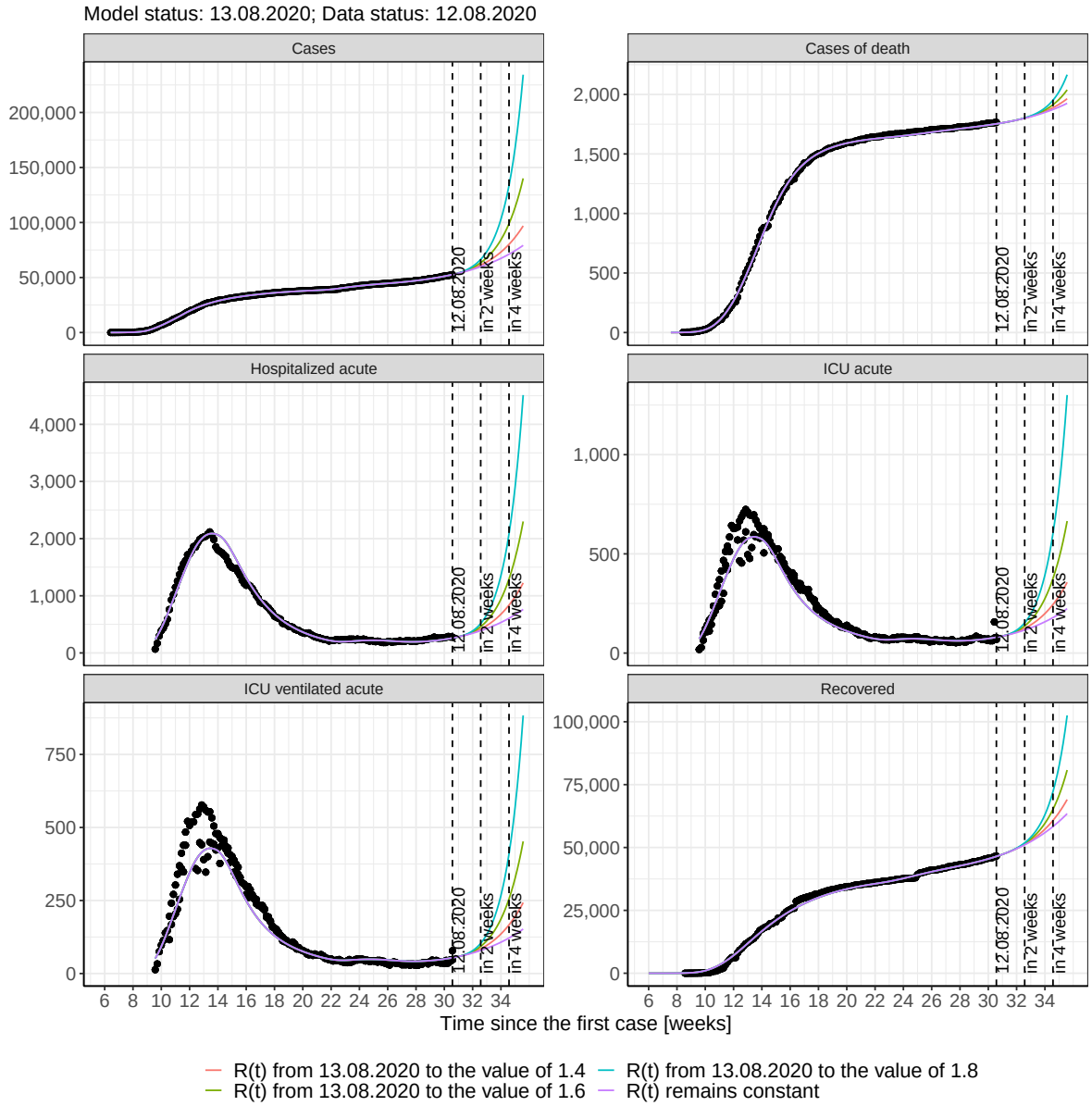


Figure 116: Linear representation of model prediction (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for North Rhine-Westphalia assuming various scenarios from the 13.08.2020. Points: Reported case numbers; Lines: Model predictions.

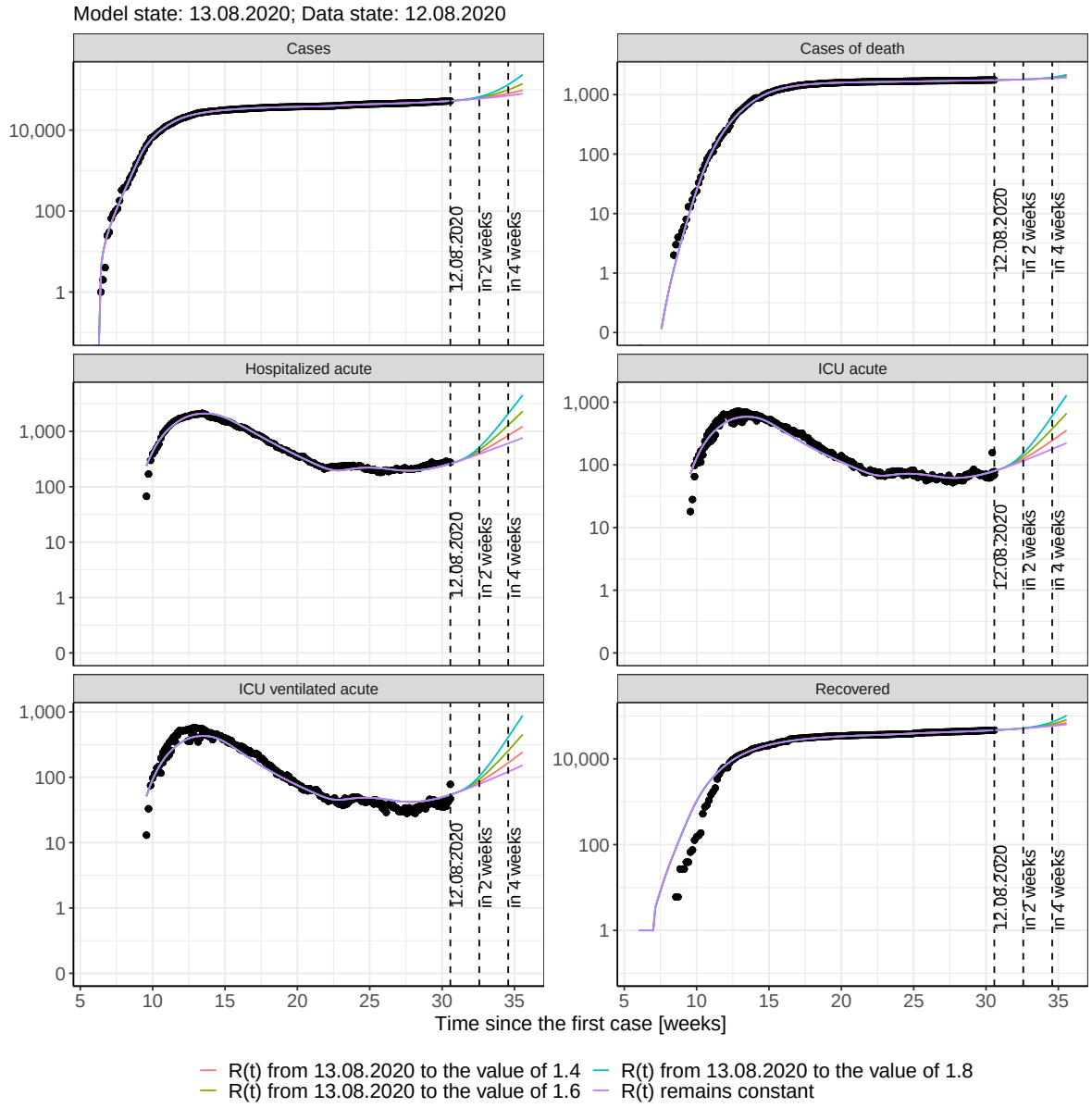


Figure 117: Semi-logarithmic representation of model predictions (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for North Rhine-Westphalia assuming various scenarios from the 13.08.2020. Points: Reported case numbers; Lines: Model predictions.

Fig. 118 and 119 represent the model prediction for the next 16 weeks for North Rhine-Westphalia on a linear (118) and a semi-logarithmic (119) scale. In this simulation different scenarios of the possible course from the 13.08.2020 were tested.

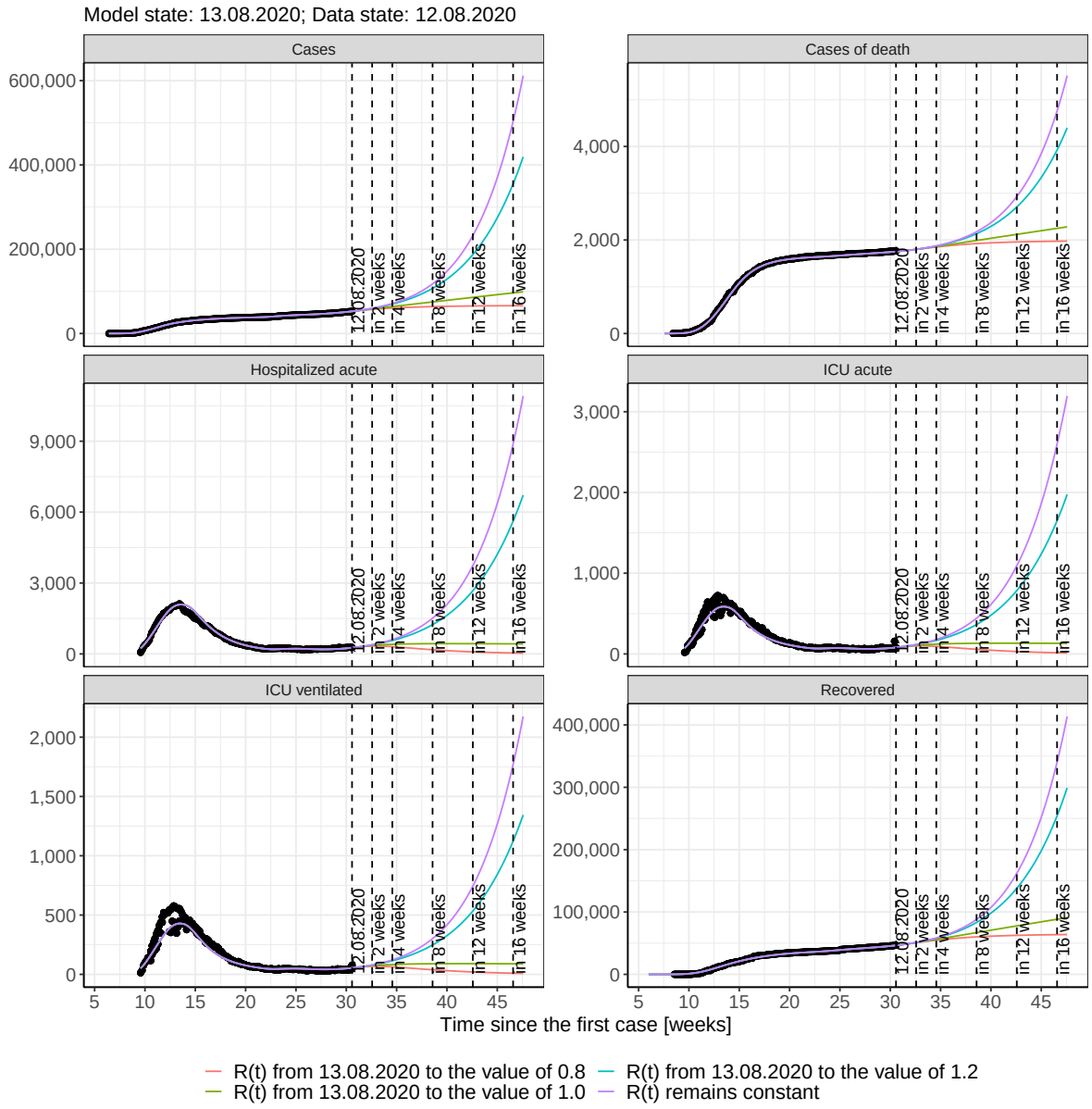


Figure 118: Linear representation of model predictions (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for North Rhine-Westphalia assuming various scenarios from the 13.08.2020. Points: reported case numbers; lines: model prediction.

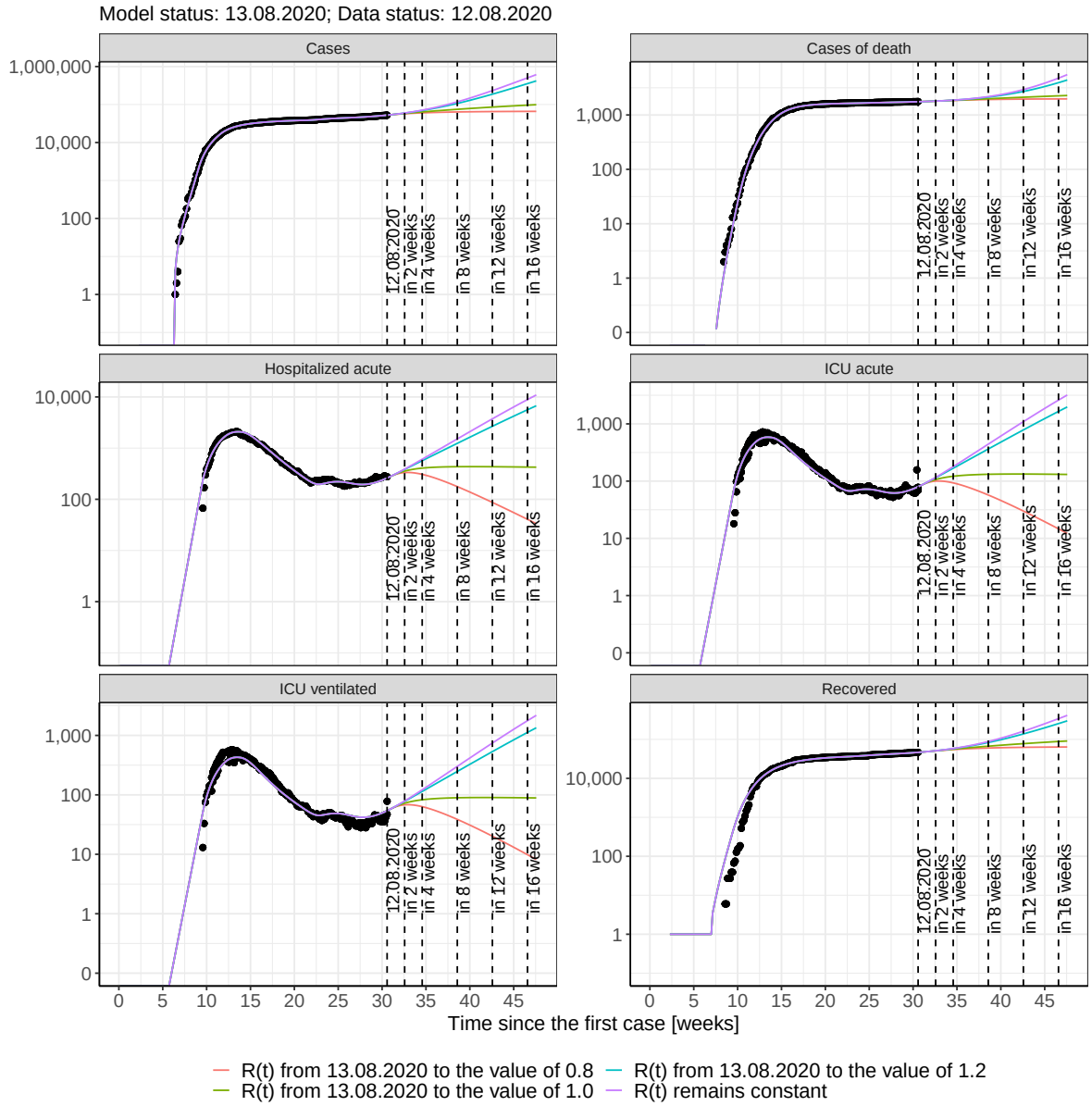


Figure 119: Semi-logarithmic depiction of the model prediction (cases, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for North Rhine-Westphalia assuming various scenarios after 13.08.2020. Points: reported case numbers;lines: model predictions.

The tables show the modeling results for four conceivable scenarios: Scenario 1: The R(t) estimated value after 13.08.2020 remains the same as today's value (Tab. 38); Scenario 2: The R(t) estimated value after 13.08.2020 takes the value of 0.8 (Tab. 39); Scenario 3: The R(t) estimated value takes the value of 1 after the 13.08.2020 (Tab. 40); Scenario 4: The R(t) estimated value takes the value of 1.2 after the 13.08.2020 (Tab. 41) Model status from 13.08.2020; Data status: 12.08.2020.

Table 38: North Rhine-Westphalia - R(t) remains unchanged after the 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	53036	1756	46719	267	82	55
14.08.2020	53459	1758	46993	274	84	57
15.08.2020	53897	1761	47276	282	86	58
16.08.2020	54349	1764	47568	290	88	60
17.08.2020	54817	1767	47870	298	90	61
18.08.2020	55301	1770	48181	306	93	63
19.08.2020	55801	1774	48503	315	95	65
20.08.2020	56317	1777	48835	325	98	66
21.08.2020	56851	1781	49177	334	101	68
22.08.2020	57403	1784	49531	344	103	70
23.08.2020	57973	1788	49897	355	106	72
24.08.2020	58563	1792	50275	366	110	74
25.08.2020	59173	1796	50665	377	113	77
26.08.2020	59802	1800	51068	389	116	79
27.08.2020	60454	1804	51484	401	120	81
28.08.2020	61126	1808	51914	414	123	84
29.08.2020	61822	1813	52359	427	127	86
30.08.2020	62541	1818	52818	441	131	89
31.08.2020	63284	1822	53293	455	135	92
01.09.2020	64052	1827	53783	469	139	95
02.09.2020	64845	1832	54290	484	144	98
03.09.2020	65666	1838	54814	500	148	101
04.09.2020	66513	1843	55355	516	153	104
05.09.2020	67390	1849	55914	533	158	107
06.09.2020	68295	1855	56492	551	163	111
07.09.2020	69231	1861	57090	569	168	114
08.09.2020	70198	1867	57707	587	173	118
09.09.2020	71198	1874	58345	607	179	122

Table 39: North Rhine-Westphalia - R(t) takes on the value of 0.8 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	53023	1756	46718	267	82	55
14.08.2020	53409	1758	46993	274	84	57
15.08.2020	53784	1761	47275	281	86	58
16.08.2020	54148	1764	47564	289	88	59
17.08.2020	54501	1767	47860	295	90	61
18.08.2020	54845	1770	48162	302	91	62
19.08.2020	55179	1774	48469	308	93	63
20.08.2020	55503	1777	48780	313	95	64
21.08.2020	55818	1780	49094	318	96	65
22.08.2020	56124	1784	49411	323	97	66
23.08.2020	56422	1788	49729	326	98	67
24.08.2020	56710	1791	50047	329	99	67
25.08.2020	56991	1795	50366	331	100	68
26.08.2020	57264	1798	50684	333	100	68
27.08.2020	57528	1802	51000	334	100	68
28.08.2020	57786	1806	51314	335	100	68
29.08.2020	58036	1810	51625	334	100	68
30.08.2020	58278	1813	51934	334	100	68
31.08.2020	58514	1817	52239	333	100	68
01.09.2020	58743	1821	52540	331	100	68
02.09.2020	58966	1825	52836	329	99	67
03.09.2020	59182	1828	53129	327	98	67
04.09.2020	59392	1832	53417	325	98	67
05.09.2020	59596	1836	53699	322	97	66
06.09.2020	59794	1839	53977	318	96	65
07.09.2020	59987	1843	54250	315	95	65
08.09.2020	60174	1846	54517	311	94	64
09.09.2020	60356	1850	54779	307	93	63

Table 40: North Rhine-Westphalia - R(t) takes on the value of 1.0 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	53029	1756	46718	267	82	55
14.08.2020	53431	1758	46993	274	84	57
15.08.2020	53834	1761	47275	282	86	58
16.08.2020	54236	1764	47566	289	88	60
17.08.2020	54638	1767	47864	296	90	61
18.08.2020	55040	1770	48170	304	92	62
19.08.2020	55442	1774	48484	311	94	64
20.08.2020	55843	1777	48804	318	96	65
21.08.2020	56245	1780	49130	325	98	67
22.08.2020	56646	1784	49462	332	100	68
23.08.2020	57047	1788	49800	338	102	69
24.08.2020	57447	1791	50142	344	103	70
25.08.2020	57848	1795	50490	350	105	71
26.08.2020	58248	1799	50841	356	106	72
27.08.2020	58649	1803	51197	361	108	73
28.08.2020	59049	1807	51556	366	109	74
29.08.2020	59448	1811	51918	370	111	75
30.08.2020	59848	1815	52283	375	112	76
31.08.2020	60247	1819	52651	379	113	77
01.09.2020	60647	1824	53022	383	114	78
02.09.2020	61046	1828	53394	387	115	79
03.09.2020	61444	1832	53769	390	116	79
04.09.2020	61843	1836	54145	393	117	80
05.09.2020	62241	1841	54523	396	118	81
06.09.2020	62639	1845	54902	399	119	81
07.09.2020	63037	1850	55283	402	120	82
08.09.2020	63435	1854	55664	404	121	82
09.09.2020	63833	1859	56047	407	122	83

Table 41: North Rhine-Westphalia - R(t) takes on the value of 1.2 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	53034	1756	46718	267	82	55
14.08.2020	53455	1758	46993	274	84	57
15.08.2020	53887	1761	47276	282	86	58
16.08.2020	54332	1764	47568	290	88	60
17.08.2020	54789	1767	47869	298	90	61
18.08.2020	55259	1770	48180	306	93	63
19.08.2020	55743	1774	48500	315	95	65
20.08.2020	56240	1777	48830	324	98	66
21.08.2020	56751	1781	49170	333	100	68
22.08.2020	57277	1784	49520	342	103	70
23.08.2020	57818	1788	49881	352	106	72
24.08.2020	58374	1792	50253	362	108	74
25.08.2020	58946	1796	50636	373	111	76
26.08.2020	59535	1800	51030	383	115	78
27.08.2020	60139	1804	51436	394	118	80
28.08.2020	60762	1808	51854	406	121	82
29.08.2020	61401	1813	52284	417	124	84
30.08.2020	62059	1817	52727	429	128	87
31.08.2020	62736	1822	53183	441	131	89
01.09.2020	63431	1827	53652	454	135	92
02.09.2020	64146	1832	54134	467	139	94
03.09.2020	64882	1837	54630	480	142	97
04.09.2020	65638	1842	55141	494	146	100
05.09.2020	66416	1848	55666	508	150	102
06.09.2020	67216	1853	56207	522	155	105
07.09.2020	68038	1859	56763	537	159	108
08.09.2020	68884	1865	57334	553	163	111
09.09.2020	69753	1871	57923	568	168	114

11.2.3 Prediction for the next 4 weeks under the assumption of different scenarios from 13.08.2020

Fig. 120 shows the absolute changes in case numbers compared to the previous day for the next 4 weeks for different R(t) values. If no bars are shown on the plot it means that the number of cases has not changed compared to the previous day.

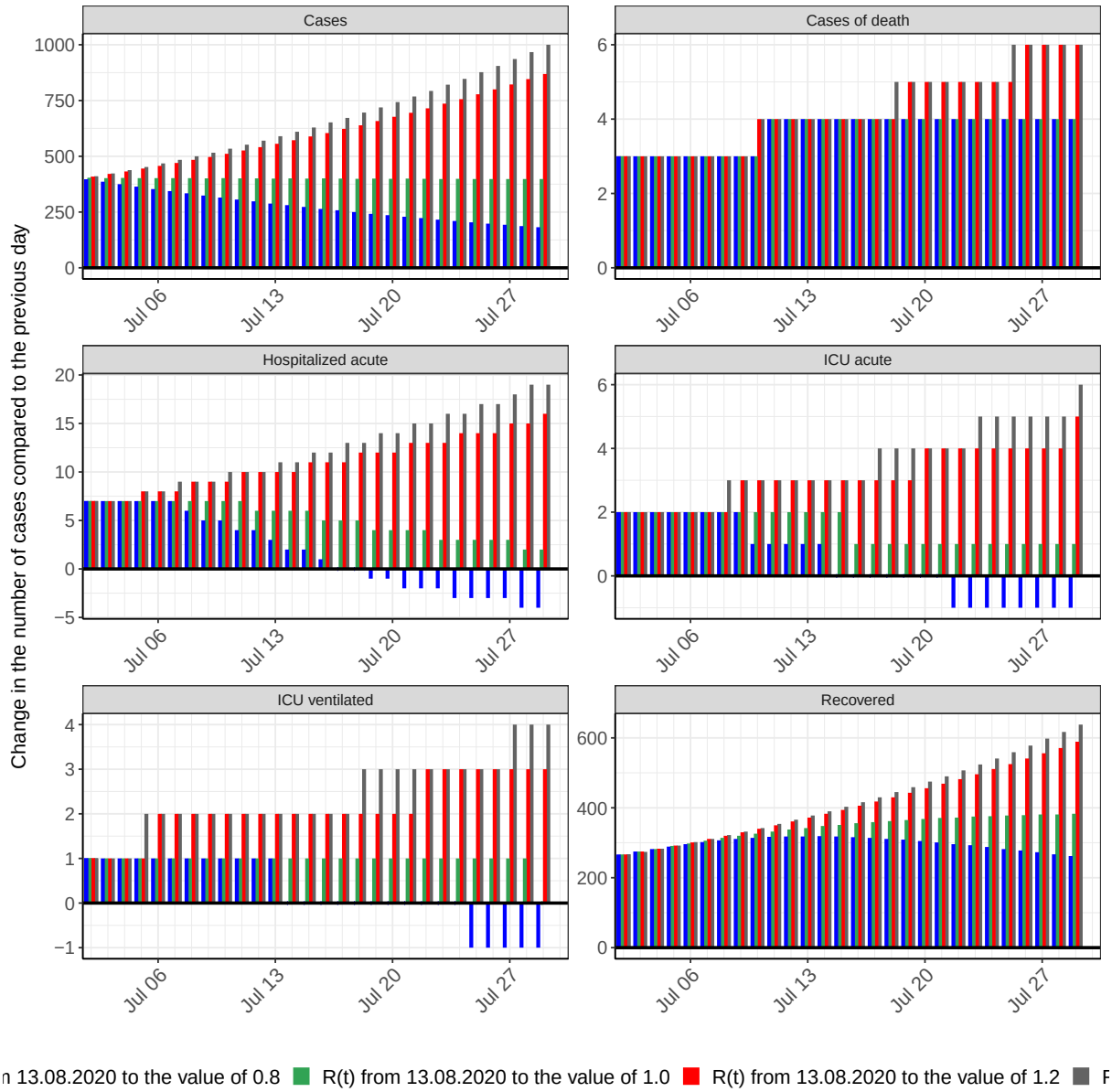


Figure 120: Simulation of daily new cases for the next 4 weeks - North Rhine-Westphalia

12 Rhineland-Palatinate

12.1 Model description

Fig. 121 depicts the results of the modeling (lines) compared to the observed data (points) for Rhineland-Palatinate on a linear (A) and semi-logarithmic (B) scale.

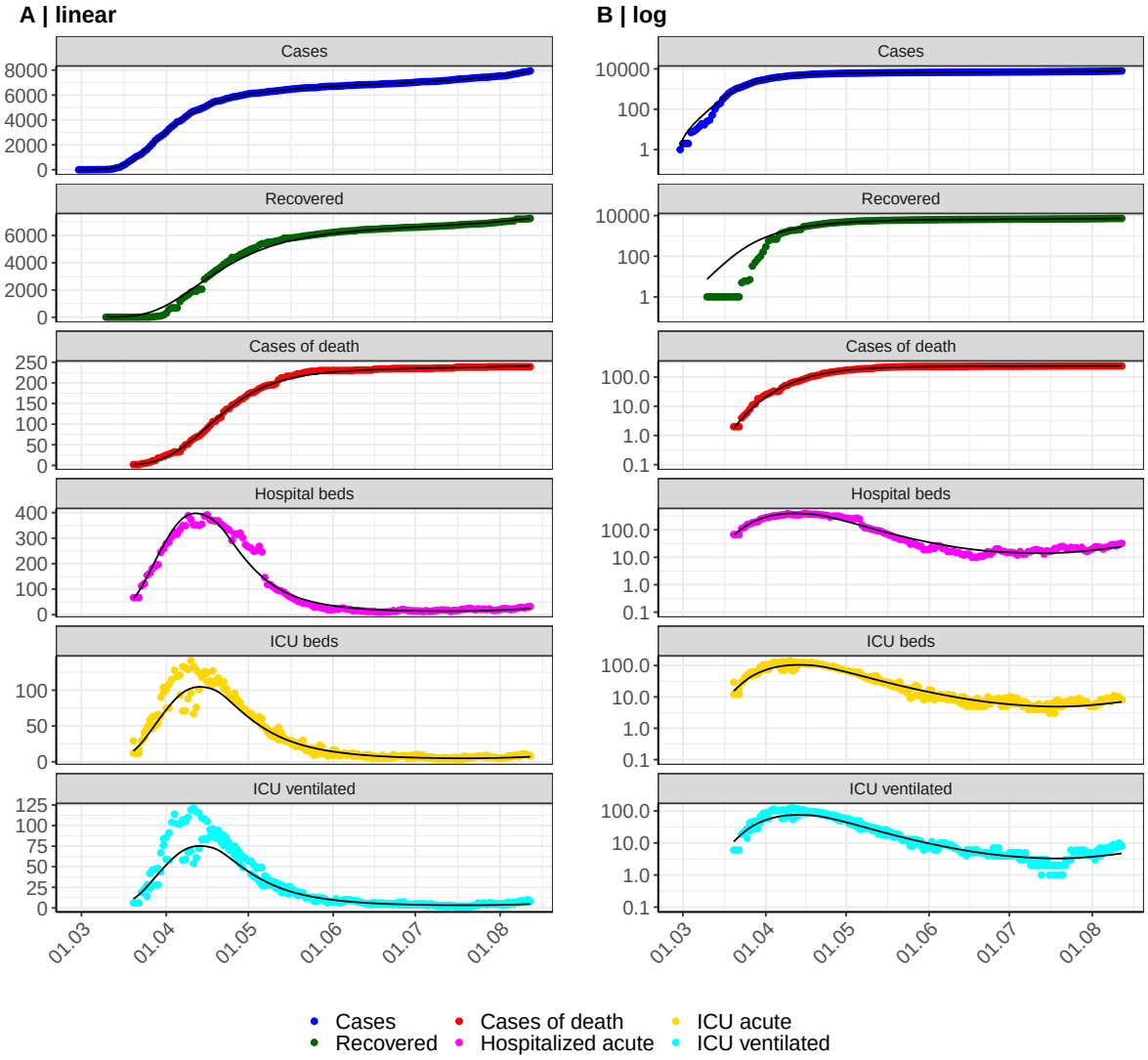


Figure 121: Model description of the reported case numbers, occupancy of hospital beds, recovery and deaths in Rhineland-Palatinate. Points: reported data; lines: model description.

Fig. 122 shows the goodness-of-fit for Rhineland-Palatinate. The values calculated by the model are plotted against the observed data. If the model fit is good, the points scatter randomly along the lines of identity.

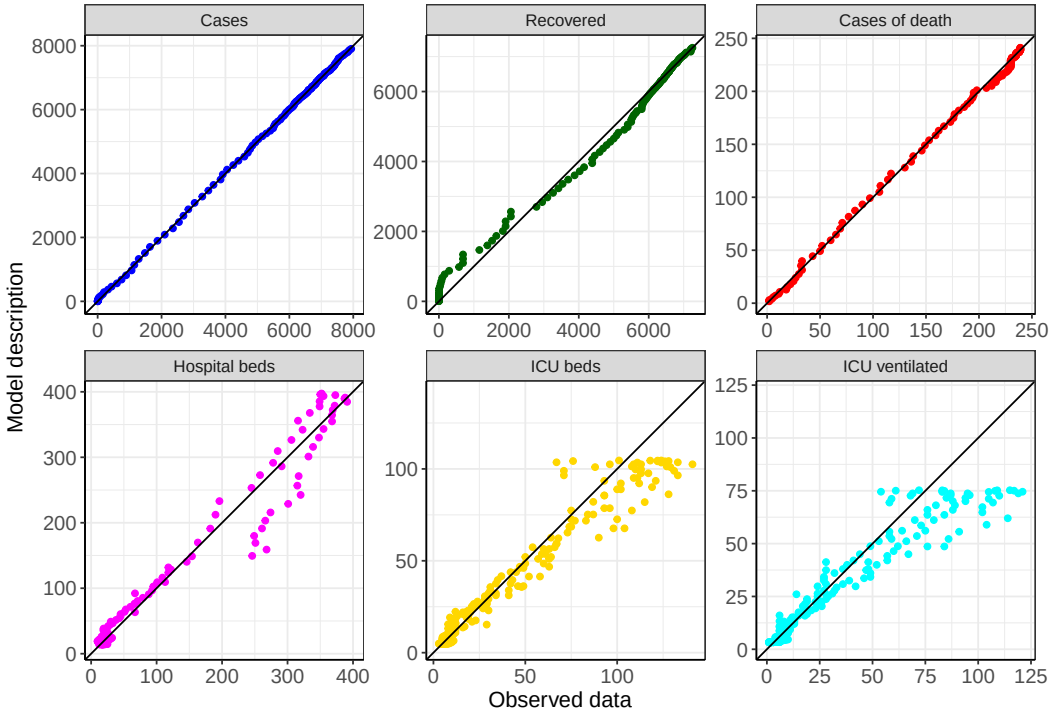


Figure 122: Goodness-of-fit plots for Rhineland-Palatinate. Lines: lines of identity.

Fig. 123 shows the influence of non-pharmaceutical interventions (NPI) on R(t) for Rhineland-Palatinate (red line) in comparison with the other federal states (grey lines).

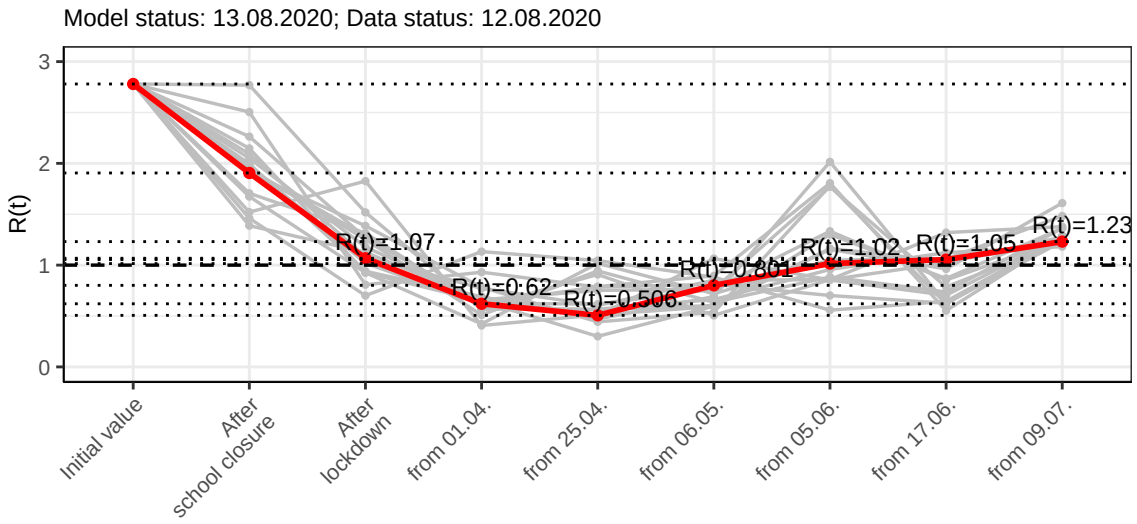


Figure 123: R(t) values before and after the NPIs for Rhineland-Palatinate

Fig. 124 shows the R(t) estimated value for Rhineland-Palatinate (red line) over time in comparison with the other federal states (grey lines).

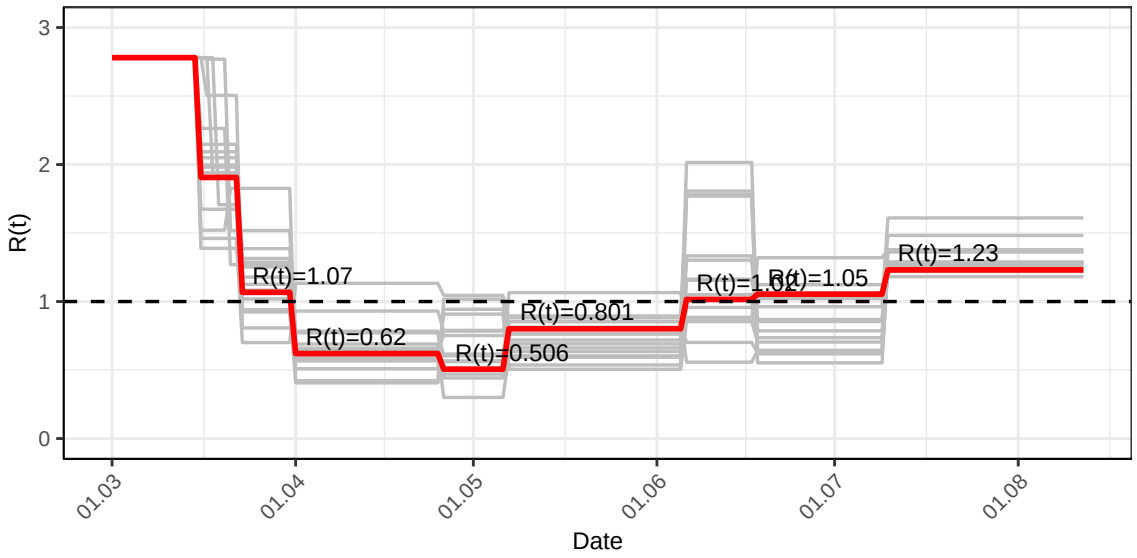


Figure 124: R(t) values over time for Rhineland-Palatinate

12.2 Model predictions

12.2.1 Prediction for the next 4 weeks assuming that R(t) estimate will not change (R(t) = 1.23)

Fig. 125 and 126 depict the the model predictions for the next 4 weeks for Rhineland-Palatinate on a linear (125) and a semi-logarithmic (126) scale. The modeling was carried out under the assumption that the R(t) estimated value would remain the same.

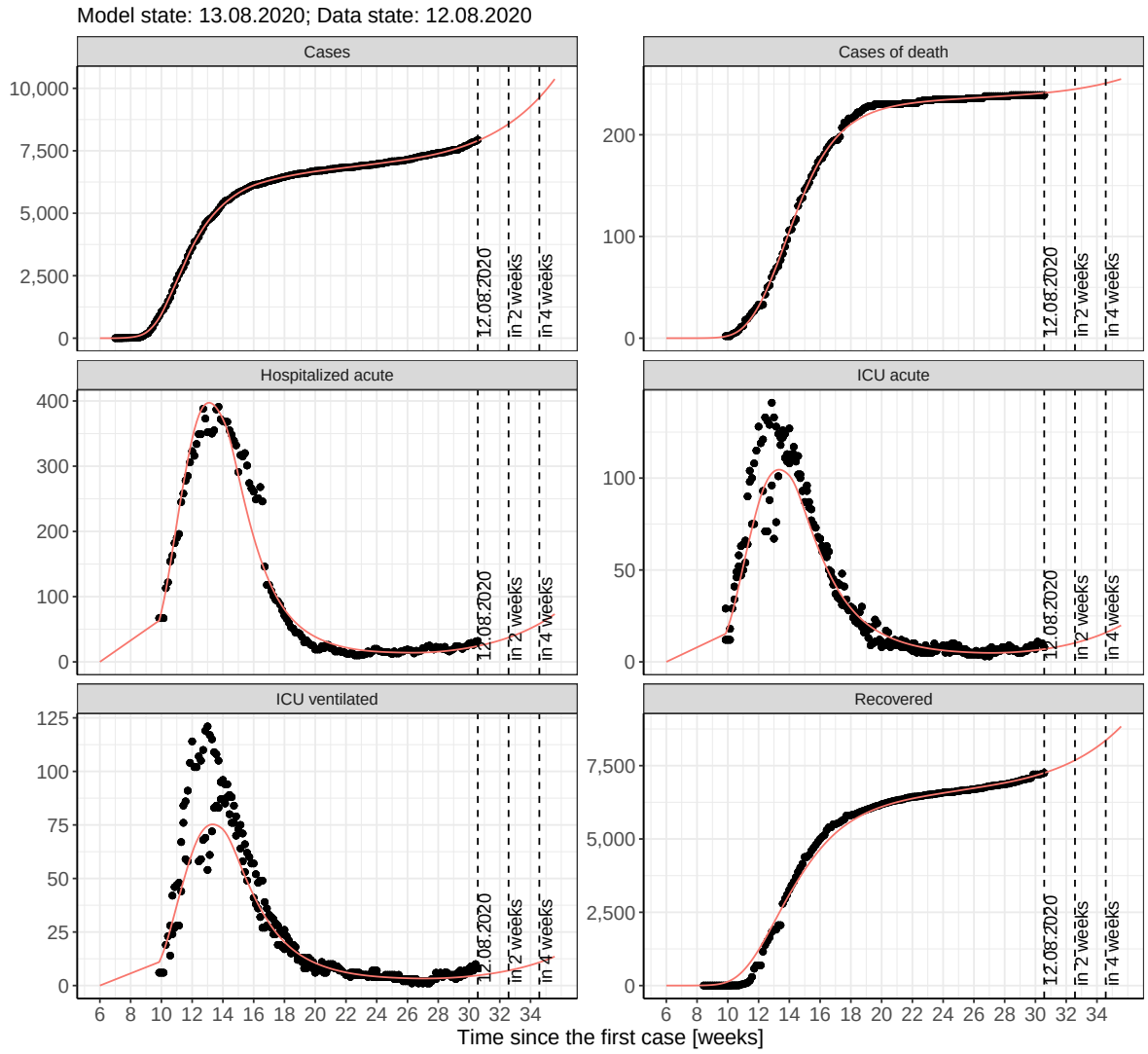


Figure 125: Representation of the model predictions for Rhineland-Palatinate for the next 4 weeks under the assumption that the R(t) estimate remains the same on linear scale (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths). Points: Reported case numbers; Red lines: Model predictions.

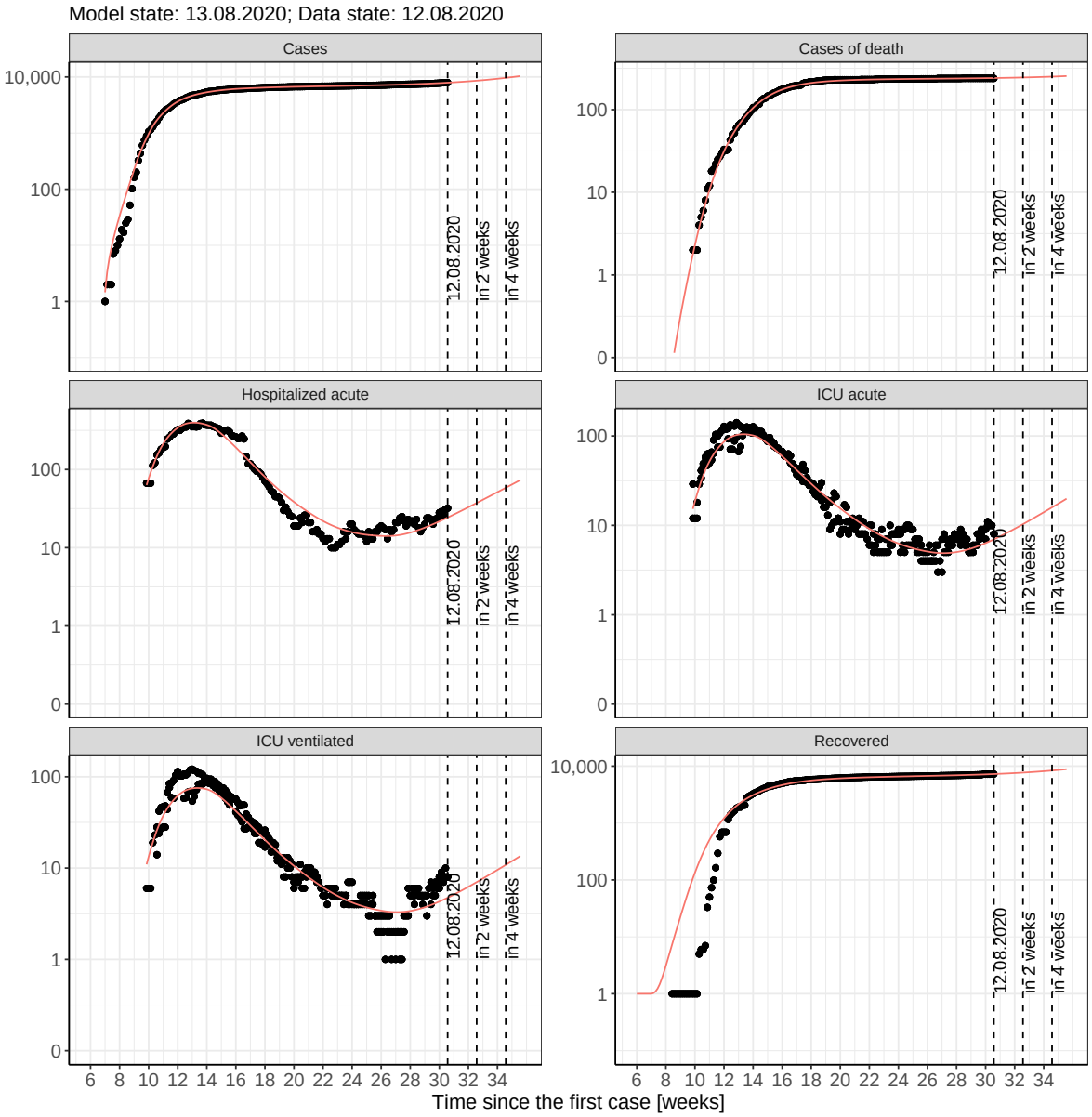


Figure 126: Semi-logarithmic representation of the model prediction (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Rhineland-Palatinate for the next 4 weeks under the assumption that the R(t) estimate remains the same. Points: Reported case numbers; Red lines: Model predictions.

12.2.2 Predictions for the next 4 weeks assuming different scenarios (with the R(t) value above 1.2) from 13.08.2020

Fig. 127 and 128 represent the model prediction for the next 4 weeks for Rhineland-Palatinate on a linear (127) and a semi-logarithmic (128) scale. In this simulation different scenarios of the possible development (R(t) = 1.4, 1.6, 1.8 and staying the same) from 13.08.2020 were tested.

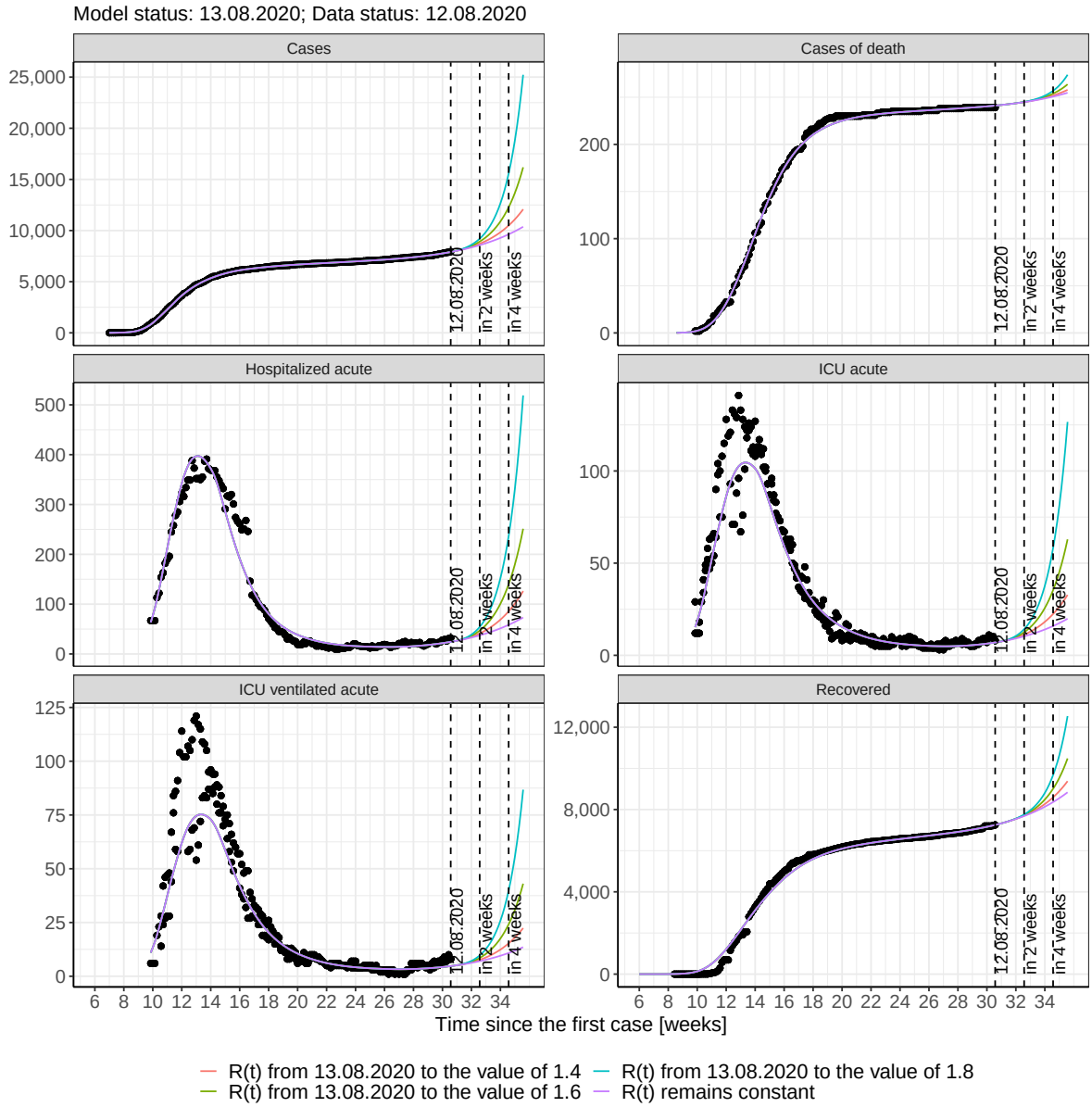


Figure 127: Linear representation of model prediction (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Rhineland-Palatinate assuming various scenarios from the 13.08.2020. Points: Reported case numbers; Lines: Model predictions.

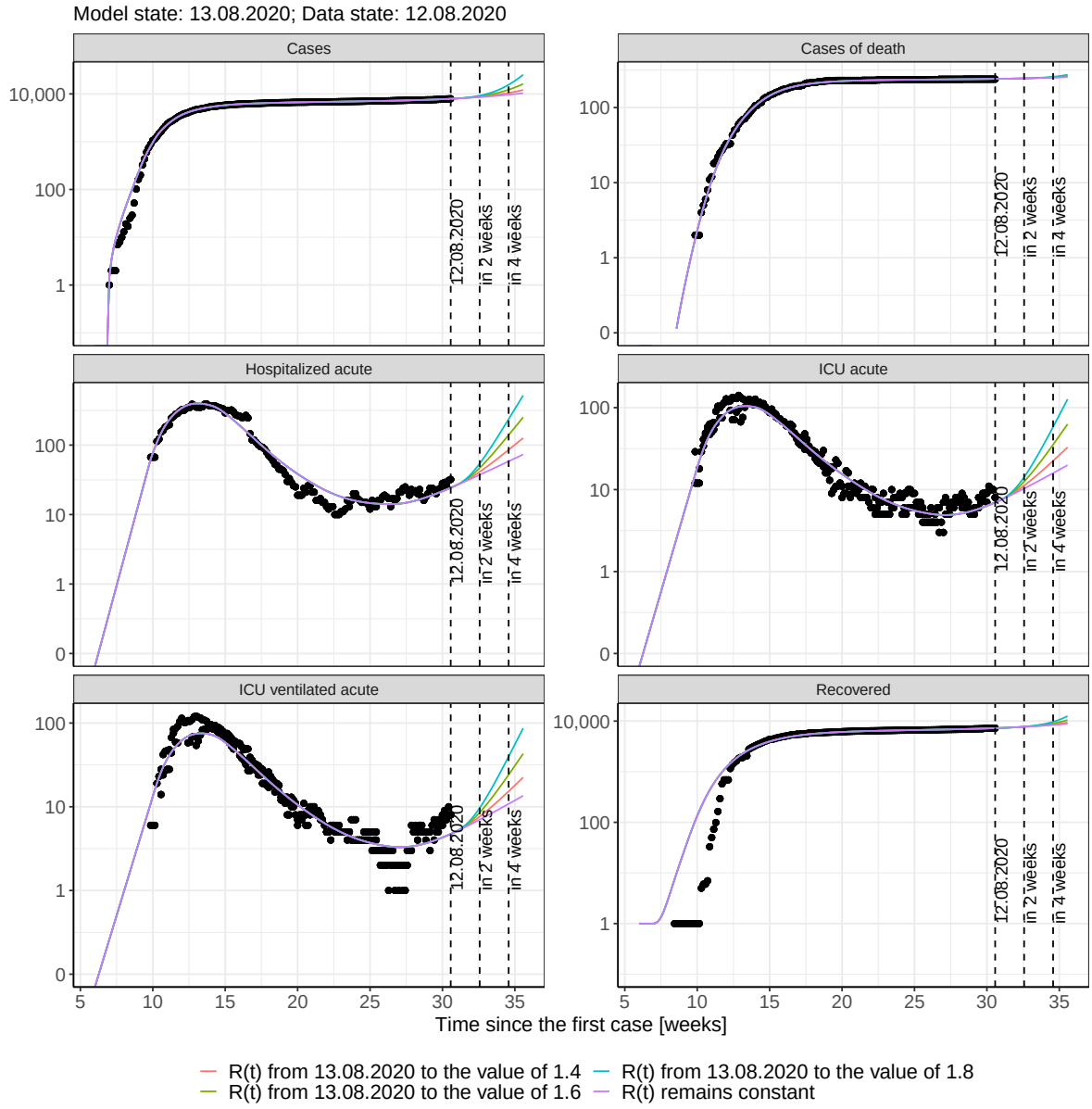


Figure 128: Semi-logarithmic representation of model predictions (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Rhineland-Palatinate assuming various scenarios from the 13.08.2020. Points: Reported case numbers; Lines: Model predictions.

Fig. 129 and 130 represent the model prediction for the next 16 weeks for Rhineland-Palatinate on a linear (129) and a semi-logarithmic (130) scale. In this simulation different scenarios of the possible course from the 13.08.2020 were tested.

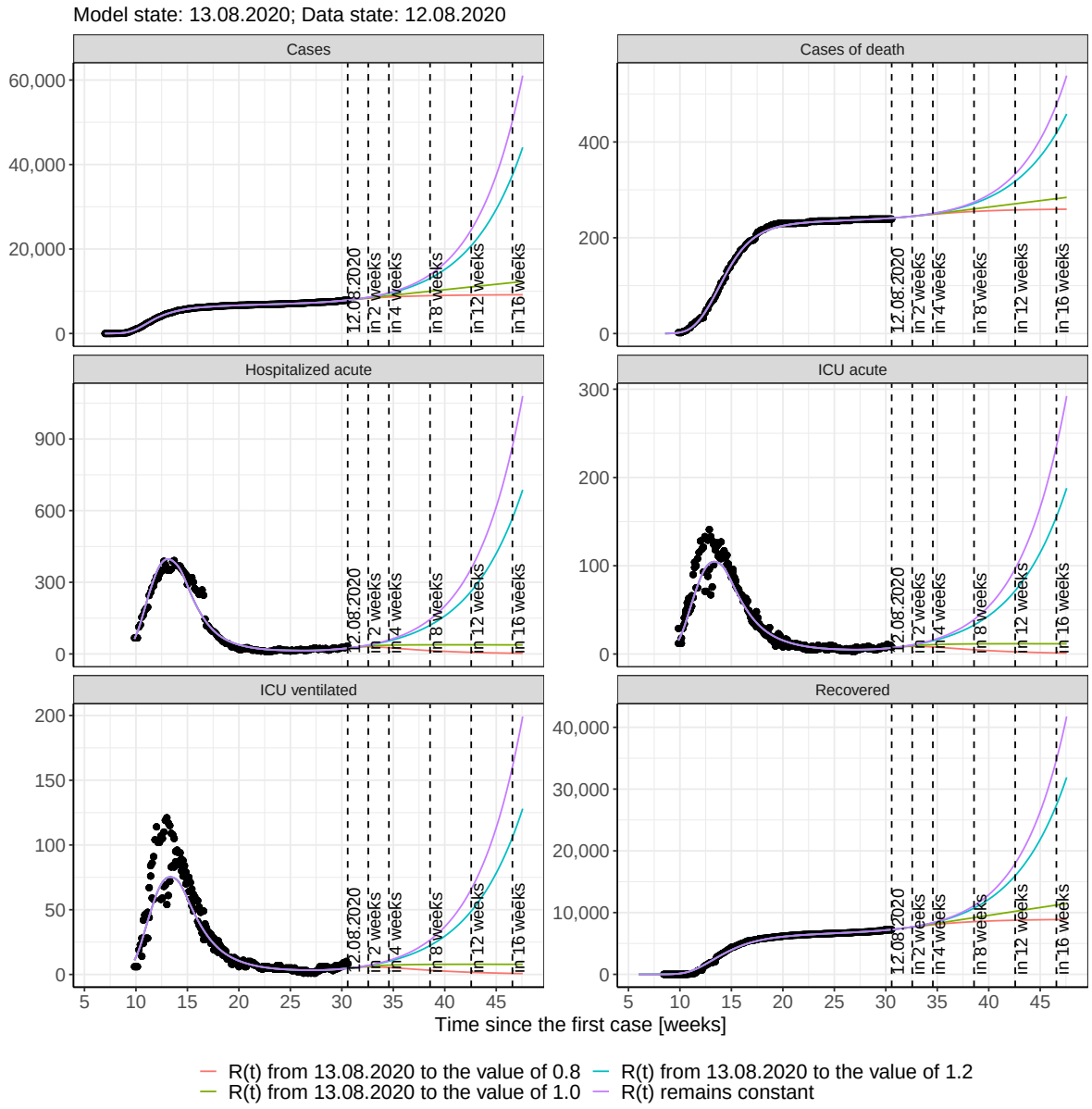


Figure 129: Linear representation of model predictions (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Rhineland-Palatinate assuming various scenarios from the 13.08.2020. Points: reported case numbers; lines: model prediction.

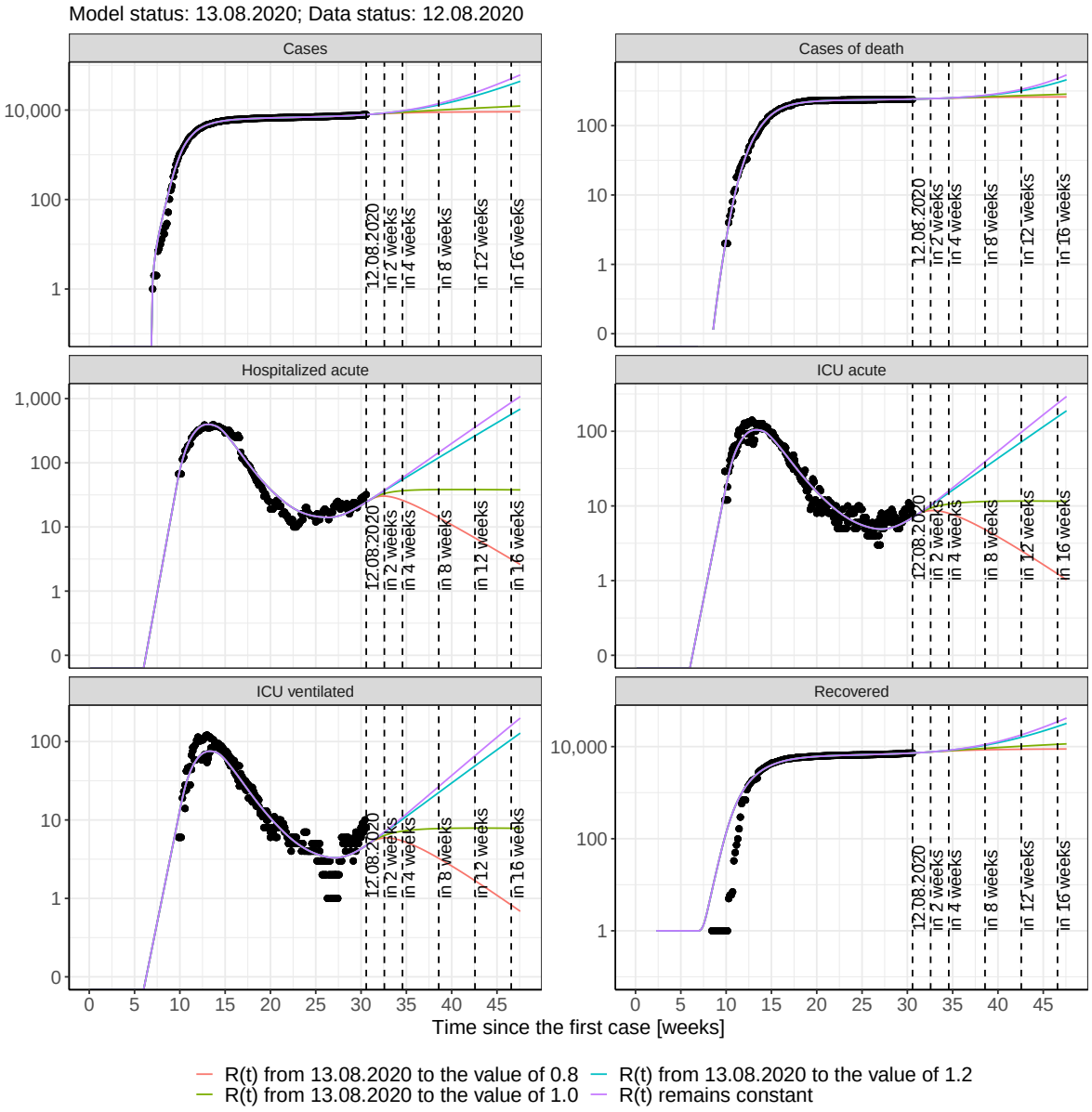


Figure 130: Semi-logarithmic depiction of the model prediction (cases, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Rhineland-Palatinate assuming various scenarios after 13.08.2020. Points: reported case numbers;lines: model predictions.

The tables show the modeling results for four conceivable scenarios: Scenario 1: The R(t) estimated value after 13.08.2020 remains the same as today's value (Tab. 42); Scenario 2: The R(t) estimated value after 13.08.2020 takes the value of 0.8 (Tab. 43); Scenario 3: The R(t) estimated value takes the value of 1 after the 13.08.2020 (Tab. 44); Scenario 4: The R(t) estimated value takes the value of 1.2 after the 13.08.2020 (Tab. 45) Model status from 13.08.2020; Data status: 12.08.2020.

Table 42: Rhineland-Palatinate - R(t) remains unchanged after the 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	7942	241	7277	25	7	5
14.08.2020	7982	242	7302	26	7	5
15.08.2020	8022	242	7329	27	8	5
16.08.2020	8065	242	7356	27	8	5
17.08.2020	8108	242	7384	28	8	5
18.08.2020	8154	243	7414	29	8	6
19.08.2020	8200	243	7444	30	8	6
20.08.2020	8249	243	7475	31	9	6
21.08.2020	8298	243	7507	32	9	6
22.08.2020	8350	244	7540	33	9	6
23.08.2020	8403	244	7574	34	9	6
24.08.2020	8458	244	7609	35	10	7
25.08.2020	8515	245	7646	36	10	7
26.08.2020	8573	245	7683	37	10	7
27.08.2020	8634	245	7722	39	11	7
28.08.2020	8696	246	7762	40	11	7
29.08.2020	8761	246	7804	41	11	8
30.08.2020	8828	246	7847	42	12	8
31.08.2020	8897	247	7891	44	12	8
01.09.2020	8968	247	7937	45	12	8
02.09.2020	9042	247	7984	47	13	9
03.09.2020	9118	248	8033	48	13	9
04.09.2020	9197	248	8084	50	14	9
05.09.2020	9278	249	8136	51	14	10
06.09.2020	9362	249	8190	53	14	10
07.09.2020	9449	250	8245	55	15	10
08.09.2020	9538	250	8303	57	15	10
09.09.2020	9631	251	8362	58	16	11

Table 43: Rhineland-Palatinate - R(t) takes on the value of 0.8 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	7941	241	7277	25	7	5
14.08.2020	7977	242	7302	26	7	5
15.08.2020	8012	242	7329	26	8	5
16.08.2020	8046	242	7356	27	8	5
17.08.2020	8079	242	7384	28	8	5
18.08.2020	8111	243	7412	28	8	5
19.08.2020	8143	243	7440	29	8	6
20.08.2020	8173	243	7470	29	8	6
21.08.2020	8203	243	7499	30	8	6
22.08.2020	8231	244	7529	30	8	6
23.08.2020	8259	244	7558	30	9	6
24.08.2020	8286	244	7588	30	9	6
25.08.2020	8313	244	7618	30	9	6
26.08.2020	8338	245	7648	30	9	6
27.08.2020	8363	245	7678	30	9	6
28.08.2020	8387	245	7707	30	9	6
29.08.2020	8411	246	7736	30	9	6
30.08.2020	8433	246	7765	30	9	6
31.08.2020	8456	246	7794	29	9	6
01.09.2020	8477	247	7822	29	9	6
02.09.2020	8498	247	7850	29	9	6
03.09.2020	8518	247	7878	28	8	6
04.09.2020	8538	247	7905	28	8	6
05.09.2020	8557	248	7932	28	8	6
06.09.2020	8576	248	7958	27	8	6
07.09.2020	8594	248	7983	27	8	6
08.09.2020	8611	249	8008	26	8	5
09.09.2020	8628	249	8033	26	8	5

Table 44: Rhineland-Palatinate - R(t) takes on the value of 1.0 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	7941	241	7277	25	7	5
14.08.2020	7979	242	7302	26	7	5
15.08.2020	8017	242	7329	27	8	5
16.08.2020	8054	242	7356	27	8	5
17.08.2020	8092	242	7384	28	8	5
18.08.2020	8130	243	7412	29	8	5
19.08.2020	8167	243	7442	29	8	6
20.08.2020	8205	243	7472	30	8	6
21.08.2020	8243	243	7502	31	9	6
22.08.2020	8280	244	7533	31	9	6
23.08.2020	8318	244	7565	32	9	6
24.08.2020	8356	244	7597	32	9	6
25.08.2020	8393	244	7630	33	9	6
26.08.2020	8431	245	7663	33	9	6
27.08.2020	8468	245	7696	34	9	6
28.08.2020	8506	245	7730	34	10	7
29.08.2020	8543	246	7764	34	10	7
30.08.2020	8581	246	7798	35	10	7
31.08.2020	8618	246	7833	35	10	7
01.09.2020	8656	247	7867	35	10	7
02.09.2020	8693	247	7902	35	10	7
03.09.2020	8731	247	7938	36	10	7
04.09.2020	8768	248	7973	36	10	7
05.09.2020	8806	248	8009	36	10	7
06.09.2020	8843	248	8044	36	10	7
07.09.2020	8881	249	8080	36	10	7
08.09.2020	8918	249	8116	37	11	7
09.09.2020	8955	250	8152	37	11	7

Table 45: Rhineland-Palatinate - R(t) takes on the value of 1.2 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	7942	241	7277	25	7	5
14.08.2020	7981	242	7302	26	7	5
15.08.2020	8022	242	7329	27	8	5
16.08.2020	8063	242	7356	27	8	5
17.08.2020	8106	242	7384	28	8	5
18.08.2020	8150	243	7413	29	8	6
19.08.2020	8196	243	7443	30	8	6
20.08.2020	8242	243	7474	31	9	6
21.08.2020	8290	243	7506	32	9	6
22.08.2020	8340	244	7539	33	9	6
23.08.2020	8390	244	7573	34	9	6
24.08.2020	8442	244	7608	35	10	7
25.08.2020	8496	245	7643	36	10	7
26.08.2020	8551	245	7680	37	10	7
27.08.2020	8608	245	7718	38	10	7
28.08.2020	8667	246	7758	39	11	7
29.08.2020	8727	246	7798	40	11	8
30.08.2020	8789	246	7840	41	11	8
31.08.2020	8852	247	7882	42	12	8
01.09.2020	8918	247	7926	44	12	8
02.09.2020	8985	247	7972	45	12	8
03.09.2020	9054	248	8018	46	13	9
04.09.2020	9125	248	8066	47	13	9
05.09.2020	9198	249	8116	49	13	9
06.09.2020	9274	249	8166	50	14	9
07.09.2020	9351	250	8219	52	14	10
08.09.2020	9431	250	8273	53	15	10
09.09.2020	9513	251	8328	55	15	10

12.2.3 Prediction for the next 4 weeks under the assumption of different scenarios from 13.08.2020

Fig. 131 shows the absolute changes in case numbers compared to the previous day for the next 4 weeks for different R(t) values. If no bars are shown on the plot it means that the number of cases has not changed compared to the previous day.

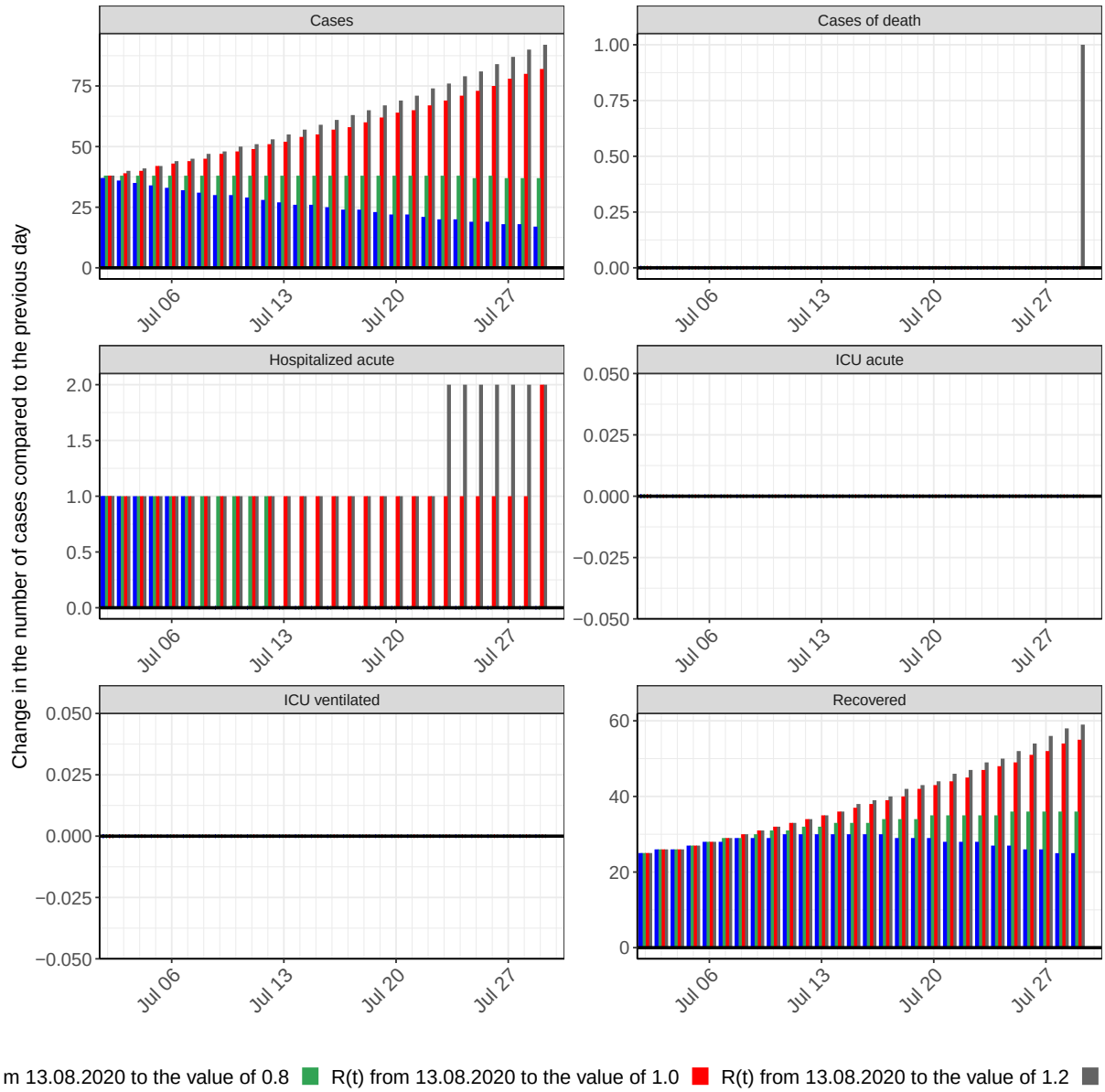


Figure 131: Simulation of daily new cases for the next 4 weeks - Rhineland-Palatinate

13 Saarland

13.1 Model description

Fig. 132 depicts the results of the modeling (lines) compared to the observed data (points) for Saarland on a linear (A) and semi-logarithmic (B) scale.

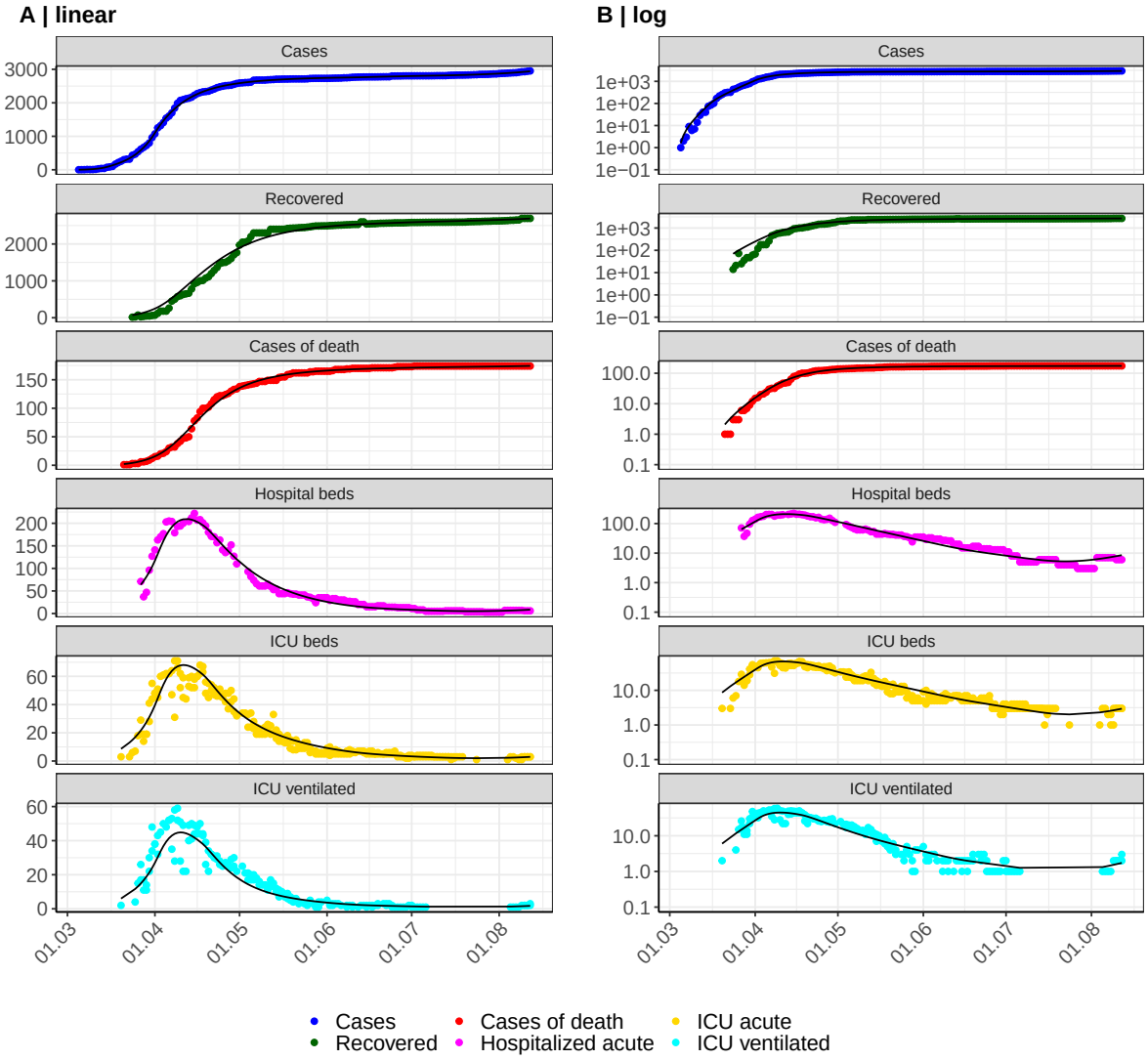


Figure 132: Model description of the reported case numbers, occupancy of hospital beds, recovery and deaths in Saarland. Points: reported data; lines: model description.

Fig. 133 shows the goodness-of-fit for Saarland. The values calculated by the model are plotted against the observed data. If the model fit is good, the points scatter randomly along the lines of identity.

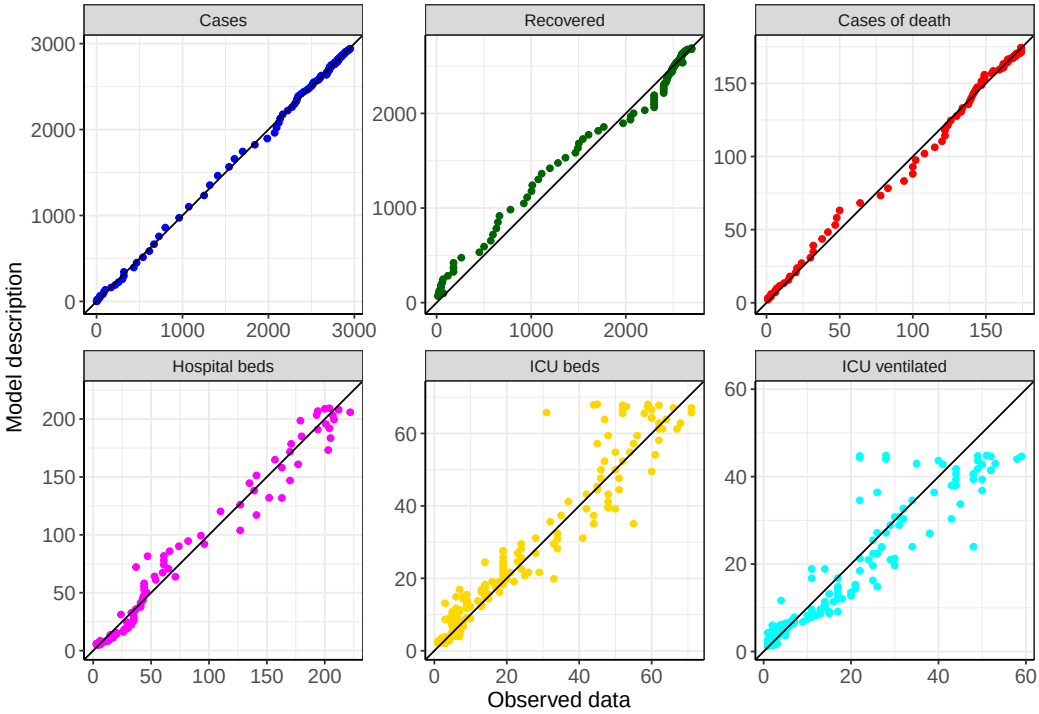


Figure 133: Goodness-of-fit plots for Saarland. Lines: lines of identity.

Fig. 134 shows the influence of non-pharmaceutical interventions (NPI) on R(t) for Saarland (red line) in comparison with the other federal states (grey lines).

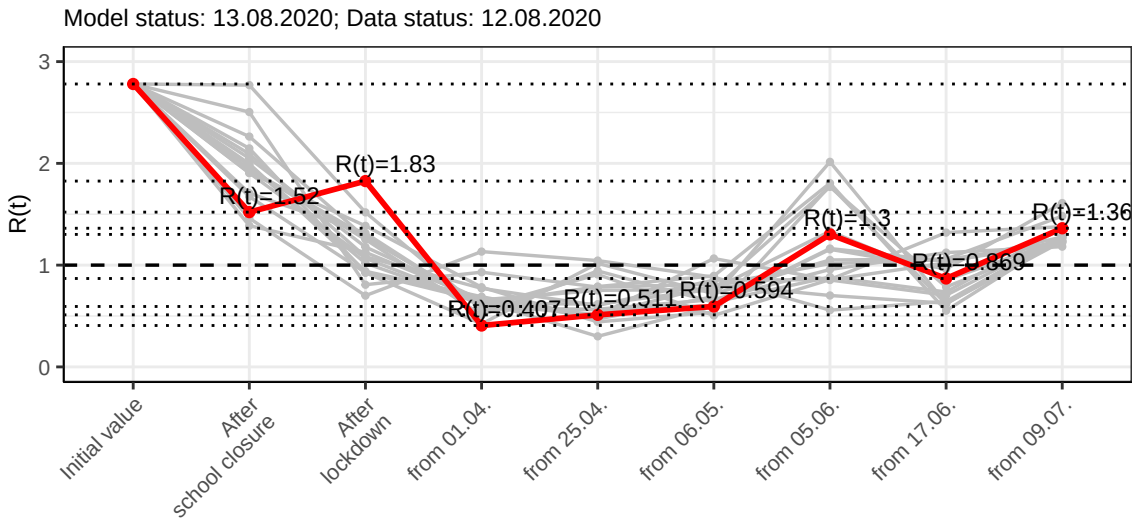


Figure 134: R(t) values before and after the NPIs for Saarland

Fig. 135 shows the R(t) estimated value for Saarland (red line) over time in comparison with the other federal states (grey lines).

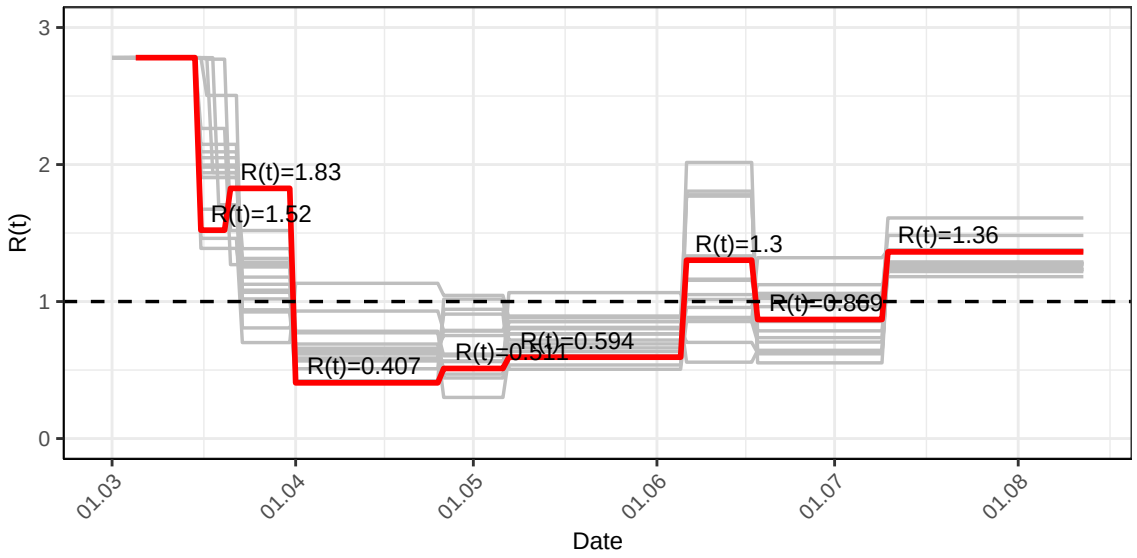


Figure 135: R(t) values over time for Saarland

13.2 Model predictions

13.2.1 Prediction for the next 4 weeks assuming that R(t) estimate will not change (R(t) = 1.36)

Fig. 136 and 137 depict the the model predictions for the next 4 weeks for Saarland on a linear (136) and a semi-logarithmic (137) scale. The modeling was carried out under the assumption that the R(t) estimated value would remain the same.

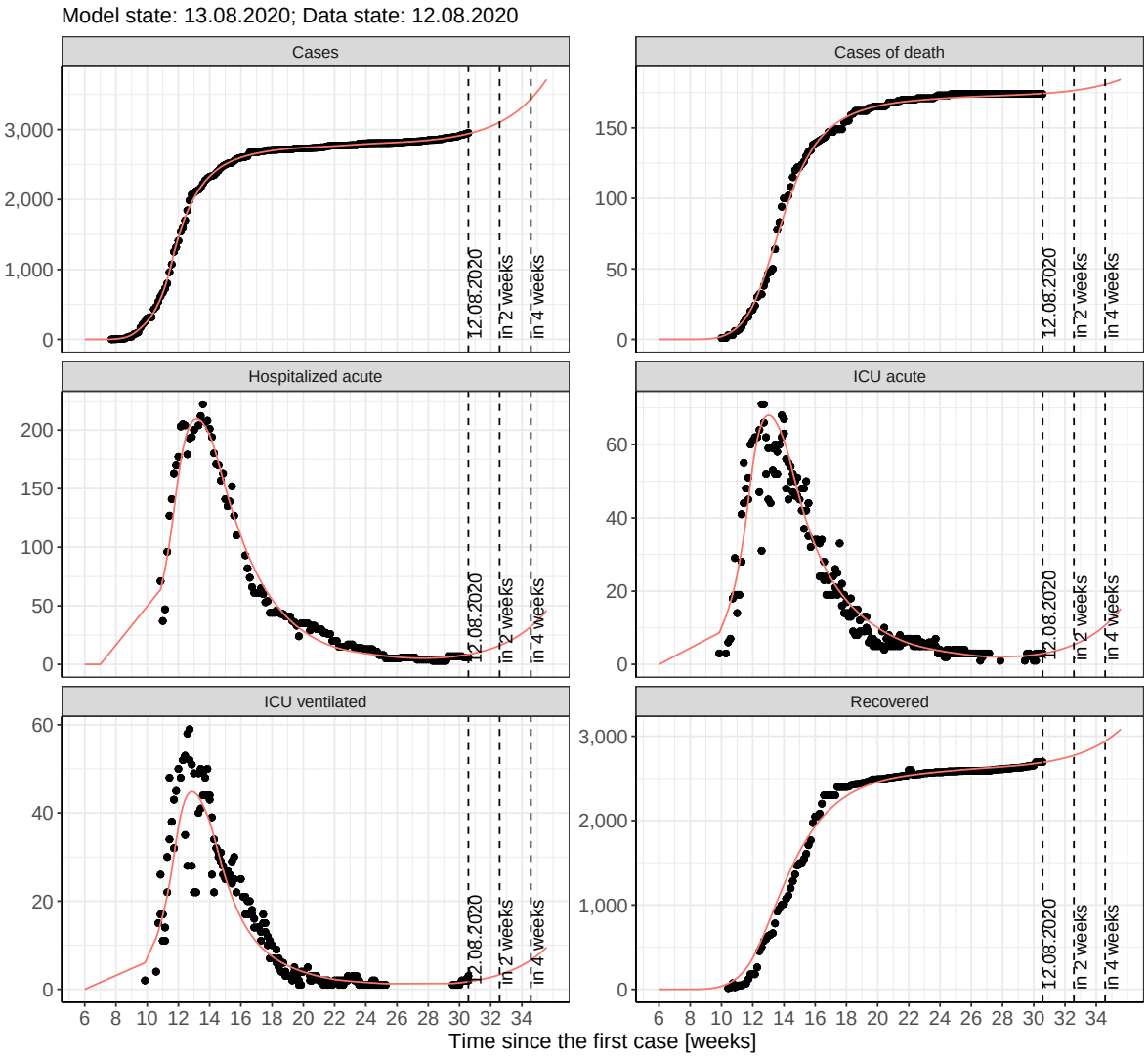


Figure 136: Representation of the model predictions for Saarland for the next 4 weeks under the assumption that the R(t) estimate remains the same on linear scale (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths). Points: Reported case numbers; Red lines: Model predictions.

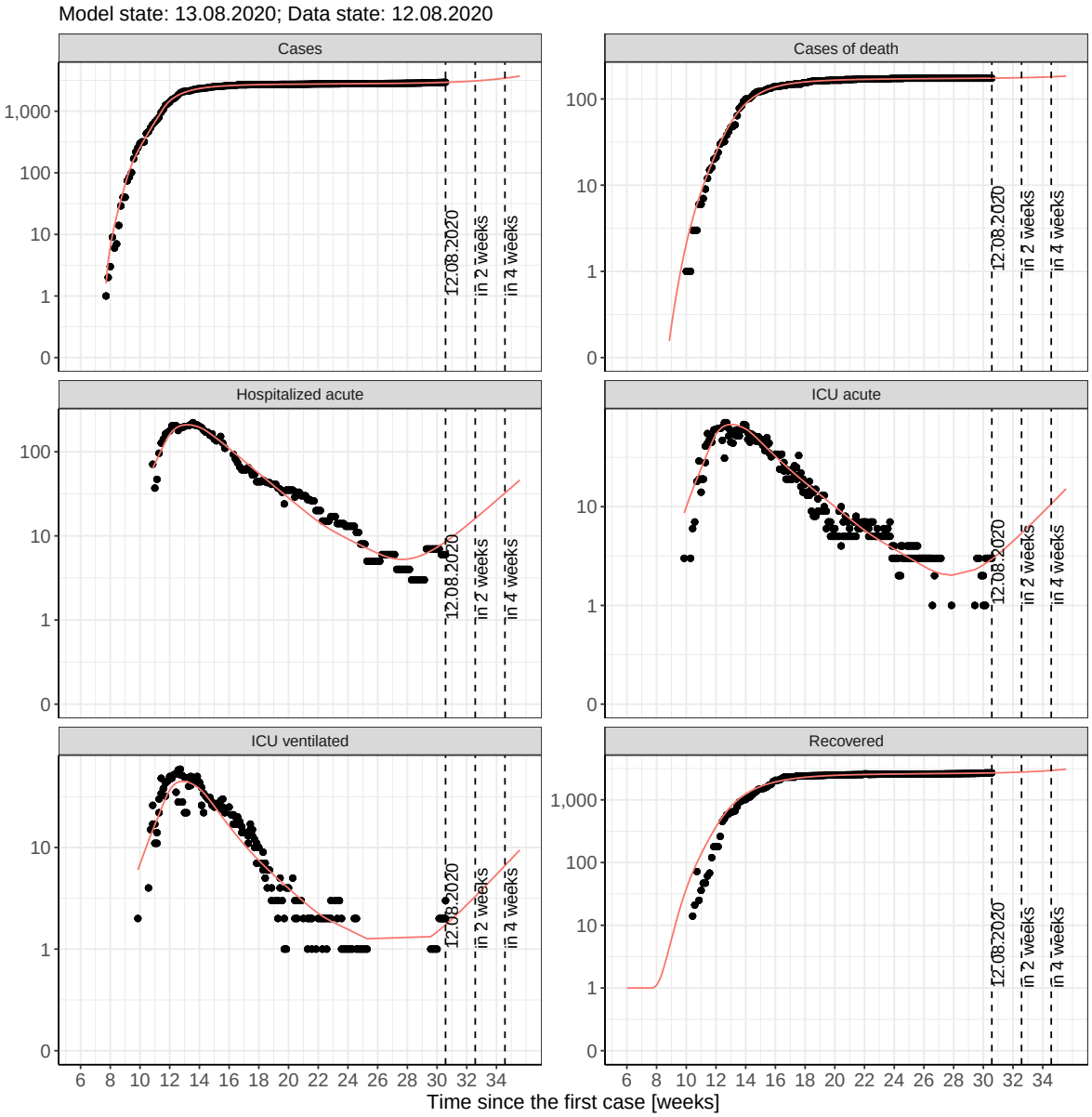


Figure 137: Semi-logarithmic representation of the model prediction (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Saarland for the next 4 weeks under the assumption that the R(t) estimate remains the same. Points: Reported case numbers; Red lines: Model predictions.

13.2.2 Predictions for the next 4 weeks assuming different scenarios (with the R(t) value above 1.2) from 13.08.2020

Fig. 138 and 139 represent the model prediction for the next 4 weeks for Saarland on a linear (138) and a semi-logarithmic (139) scale. In this simulation different scenarios of the possible development (R(t) = 1.4, 1.6, 1.8 and staying the same) from 13.08.2020 were tested.

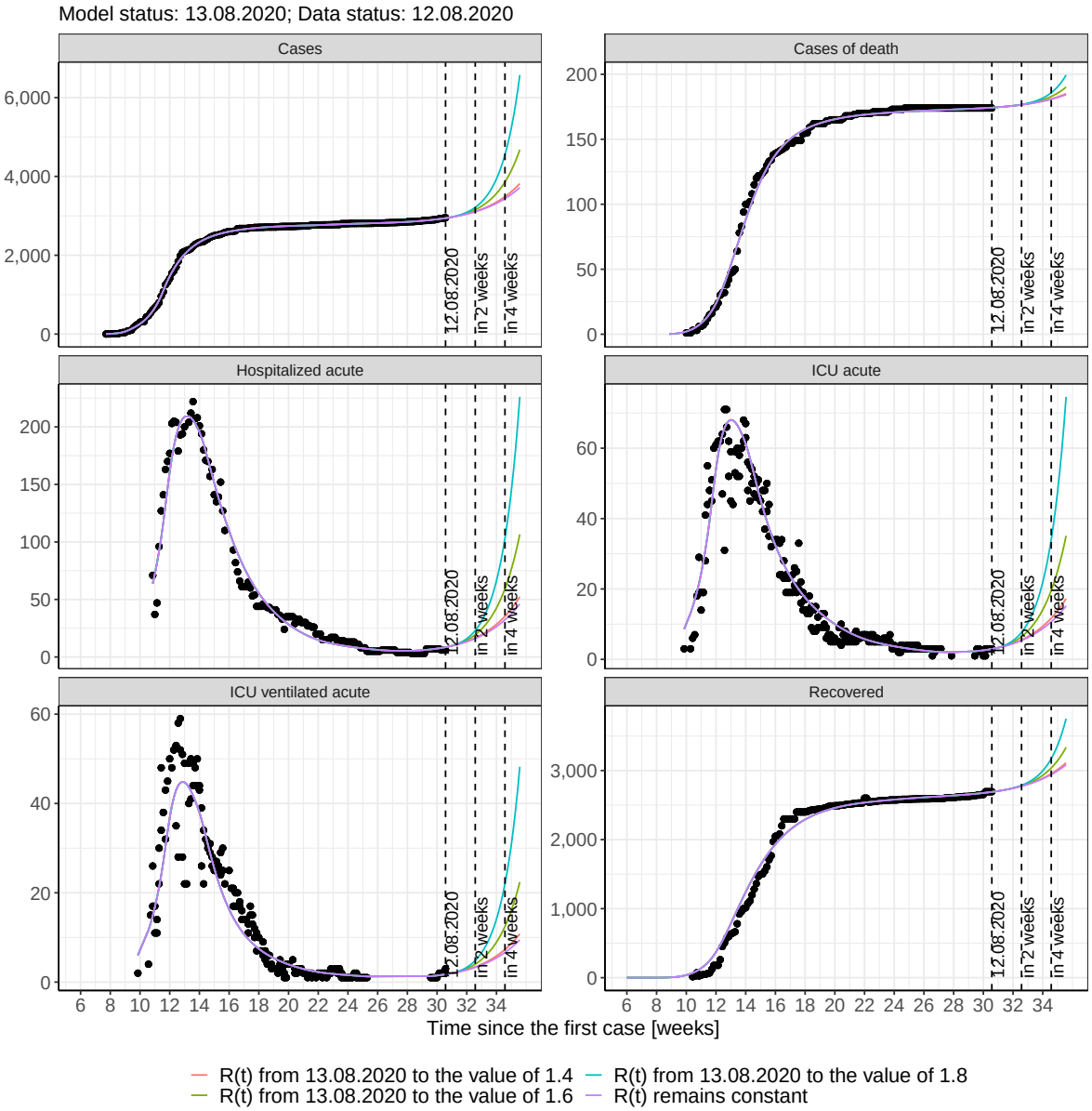


Figure 138: Linear representation of model prediction (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Saarland assuming various scenarios from the 13.08.2020. Points: Reported case numbers; Lines: Model predictions.

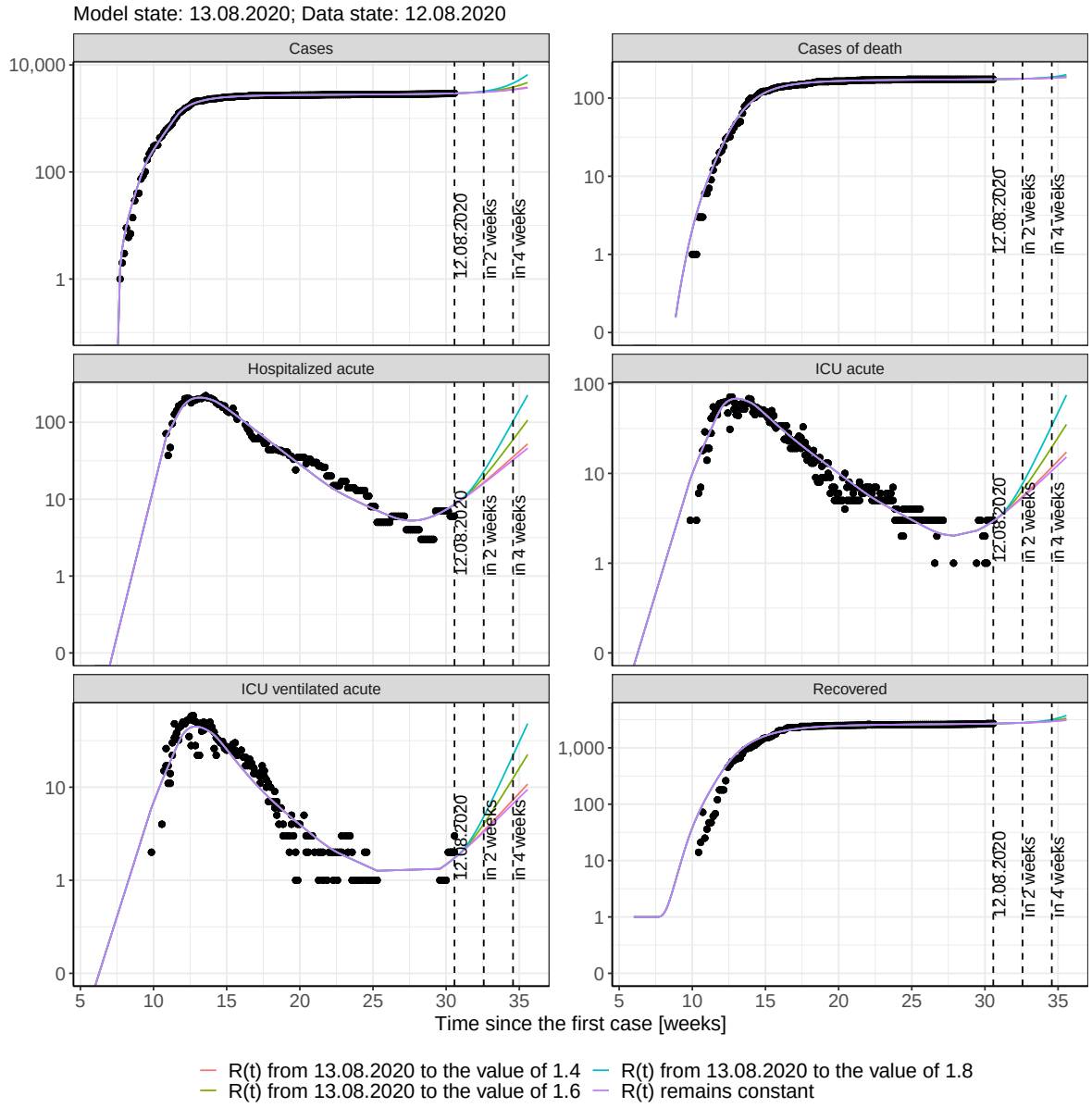


Figure 139: Semi-logarithmic representation of model predictions (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Saarland assuming various scenarios from the 13.08.2020. Points: Reported case numbers; Lines: Model predictions.

Fig. 140 and 141 represent the model prediction for the next 16 weeks for Saarland on a linear (140) and a semi-logarithmic (141) scale. In this simulation different scenarios of the possible course from the 13.08.2020 were tested.

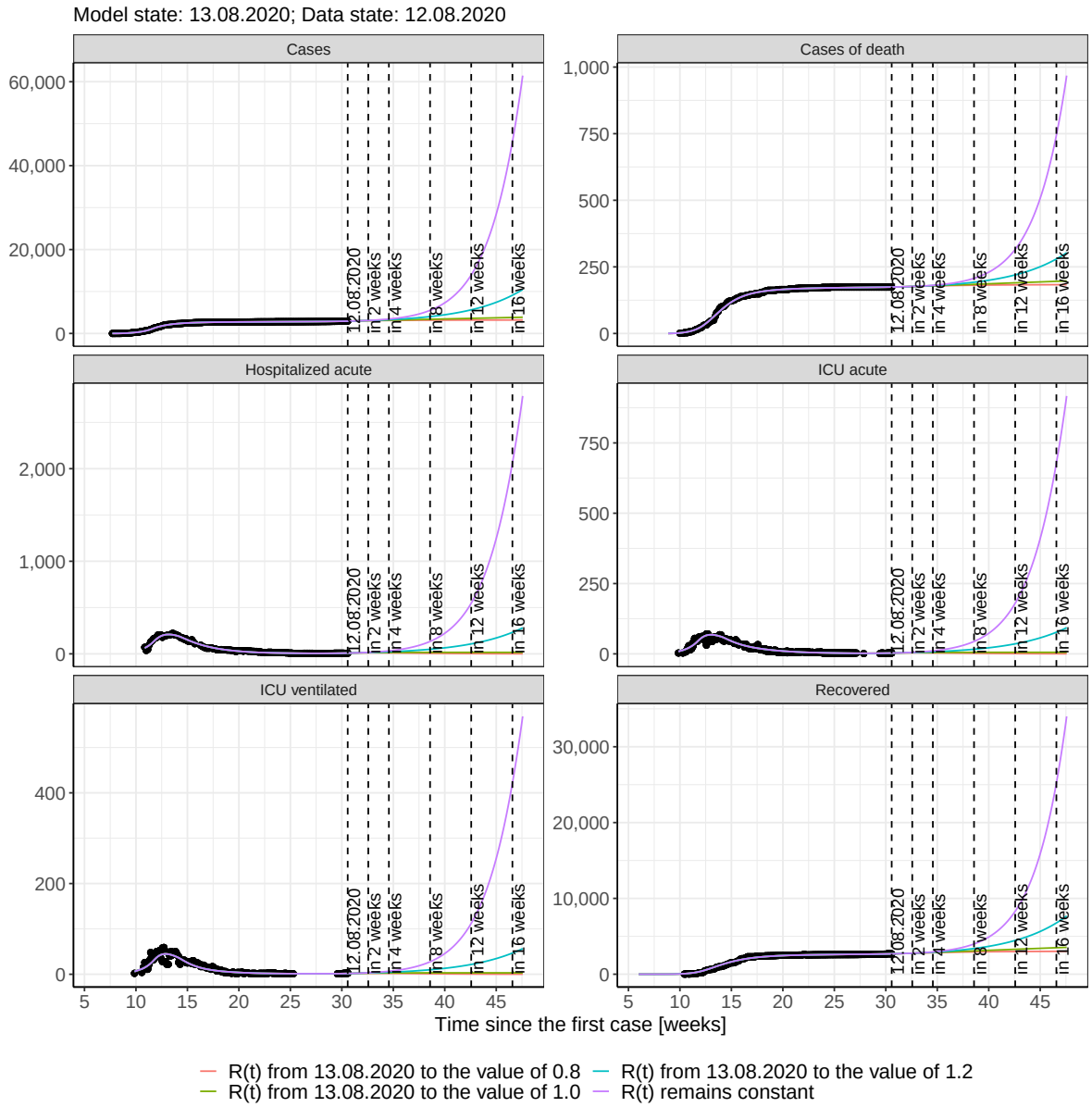


Figure 140: Linear representation of model predictions (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Saarland assuming various scenarios from the 13.08.2020. Points: reported case numbers; lines: model prediction.

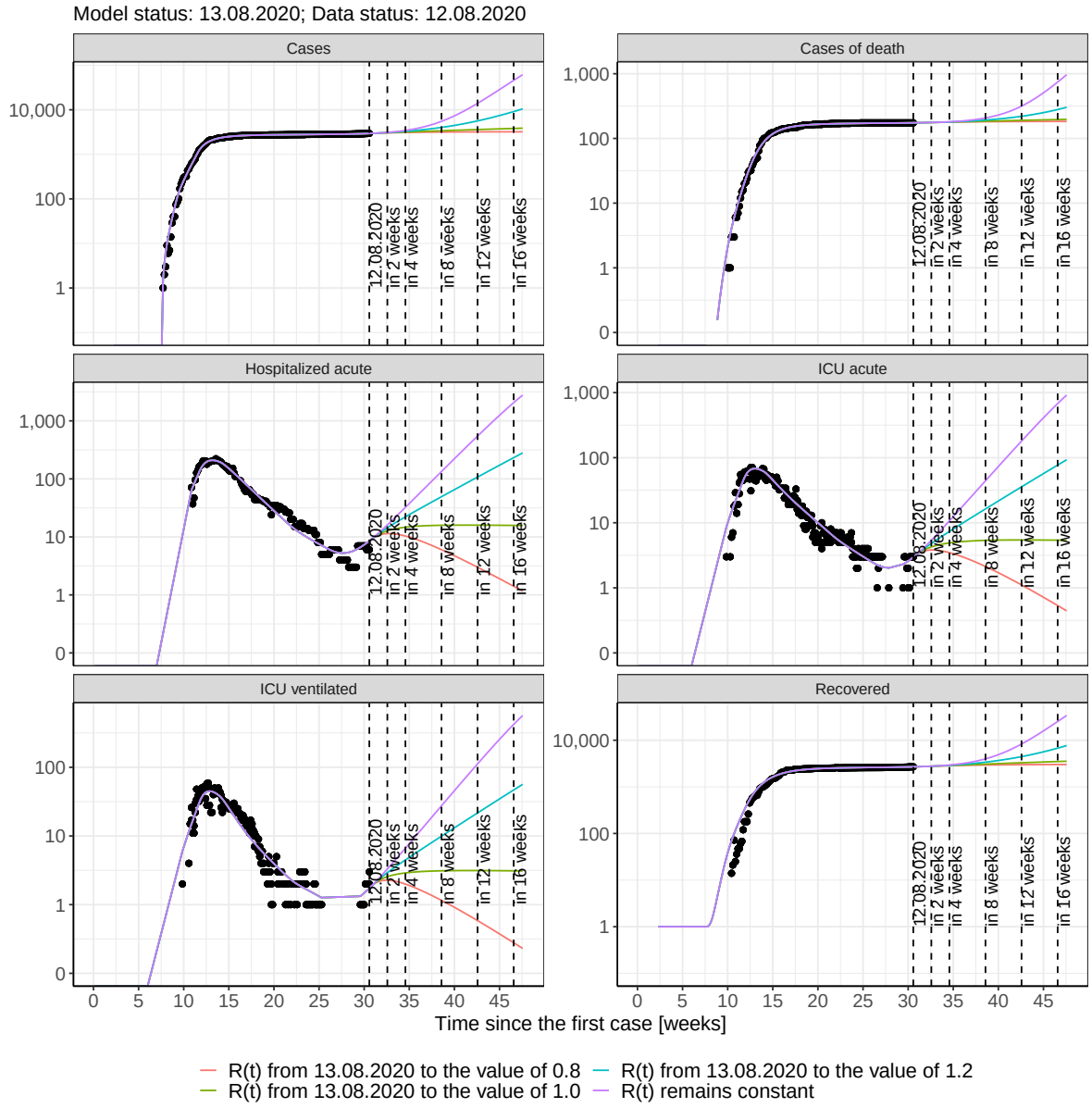


Figure 141: Semi-logarithmic depiction of the model prediction (cases, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Saarland assuming various scenarios after 13.08.2020. Points: reported case numbers;lines: model predictions.

The tables show the modeling results for four conceivable scenarios: Scenario 1: The R(t) estimated value after 13.08.2020 remains the same as today's value (Tab. 46); Scenario 2: The R(t) estimated value after 13.08.2020 takes the value of 0.8 (Tab. 47); Scenario 3: The R(t) estimated value takes the value of 1 after the 13.08.2020 (Tab. 48); Scenario 4: The R(t) estimated value takes the value of 1.2 after the 13.08.2020 (Tab. 49) Model status from 13.08.2020; Data status: 12.08.2020.

Table 46: Saarland - R(t) remains unchanged after the 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	2949	174	2695	9	3	2
14.08.2020	2958	175	2699	9	3	2
15.08.2020	2967	175	2704	10	3	2
16.08.2020	2976	175	2709	10	3	2
17.08.2020	2986	175	2714	11	4	2
18.08.2020	2997	175	2719	11	4	2
19.08.2020	3008	175	2725	12	4	2
20.08.2020	3020	175	2731	12	4	2
21.08.2020	3032	176	2737	13	4	3
22.08.2020	3045	176	2744	13	4	3
23.08.2020	3058	176	2751	14	5	3
24.08.2020	3073	176	2758	15	5	3
25.08.2020	3088	176	2766	15	5	3
26.08.2020	3104	176	2774	16	5	3
27.08.2020	3120	177	2782	17	6	3
28.08.2020	3138	177	2791	18	6	4
29.08.2020	3157	177	2800	19	6	4
30.08.2020	3176	177	2810	20	7	4
31.08.2020	3196	178	2821	21	7	4
01.09.2020	3218	178	2832	22	7	4
02.09.2020	3241	178	2843	23	8	5
03.09.2020	3265	179	2855	24	8	5
04.09.2020	3290	179	2868	25	8	5
05.09.2020	3316	179	2881	26	9	5
06.09.2020	3344	180	2895	28	9	6
07.09.2020	3374	180	2910	29	10	6
08.09.2020	3404	180	2926	31	10	6
09.09.2020	3437	181	2942	32	11	7

Table 47: Saarland - R(t) takes on the value of 0.8 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	2949	174	2695	9	3	2
14.08.2020	2956	175	2699	9	3	2
15.08.2020	2964	175	2704	10	3	2
16.08.2020	2971	175	2708	10	3	2
17.08.2020	2978	175	2714	10	3	2
18.08.2020	2985	175	2719	10	4	2
19.08.2020	2991	175	2724	11	4	2
20.08.2020	2998	175	2729	11	4	2
21.08.2020	3004	176	2735	11	4	2
22.08.2020	3010	176	2741	11	4	2
23.08.2020	3016	176	2746	11	4	2
24.08.2020	3022	176	2752	11	4	2
25.08.2020	3027	176	2758	11	4	2
26.08.2020	3032	176	2764	11	4	2
27.08.2020	3038	176	2769	11	4	2
28.08.2020	3043	177	2775	11	4	2
29.08.2020	3048	177	2781	11	4	2
30.08.2020	3053	177	2787	11	4	2
31.08.2020	3057	177	2792	11	4	2
01.09.2020	3062	177	2798	11	4	2
02.09.2020	3066	177	2804	11	4	2
03.09.2020	3070	178	2809	11	4	2
04.09.2020	3075	178	2814	11	4	2
05.09.2020	3079	178	2820	11	4	2
06.09.2020	3082	178	2825	11	4	2
07.09.2020	3086	178	2830	11	4	2
08.09.2020	3090	178	2835	10	4	2
09.09.2020	3094	178	2840	10	3	2

Table 48: Saarland - R(t) takes on the value of 1.0 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	2949	174	2695	9	3	2
14.08.2020	2957	175	2699	9	3	2
15.08.2020	2965	175	2704	10	3	2
16.08.2020	2973	175	2709	10	3	2
17.08.2020	2981	175	2714	10	4	2
18.08.2020	2989	175	2719	11	4	2
19.08.2020	2997	175	2724	11	4	2
20.08.2020	3004	175	2730	11	4	2
21.08.2020	3012	176	2736	12	4	2
22.08.2020	3020	176	2742	12	4	2
23.08.2020	3028	176	2748	12	4	2
24.08.2020	3036	176	2754	12	4	2
25.08.2020	3044	176	2760	13	4	3
26.08.2020	3052	176	2767	13	4	3
27.08.2020	3060	177	2773	13	4	3
28.08.2020	3068	177	2780	13	4	3
29.08.2020	3076	177	2786	13	4	3
30.08.2020	3084	177	2793	13	4	3
31.08.2020	3092	177	2800	14	5	3
01.09.2020	3099	177	2807	14	5	3
02.09.2020	3107	178	2814	14	5	3
03.09.2020	3115	178	2821	14	5	3
04.09.2020	3123	178	2828	14	5	3
05.09.2020	3131	178	2836	14	5	3
06.09.2020	3139	178	2843	14	5	3
07.09.2020	3147	179	2850	14	5	3
08.09.2020	3154	179	2857	15	5	3
09.09.2020	3162	179	2864	15	5	3

Table 49: Saarland - R(t) takes on the value of 1.2 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	2949	174	2695	9	3	2
14.08.2020	2957	175	2699	9	3	2
15.08.2020	2966	175	2704	10	3	2
16.08.2020	2975	175	2709	10	3	2
17.08.2020	2984	175	2714	10	4	2
18.08.2020	2993	175	2719	11	4	2
19.08.2020	3002	175	2725	11	4	2
20.08.2020	3012	175	2730	12	4	2
21.08.2020	3022	176	2736	12	4	2
22.08.2020	3033	176	2743	13	4	3
23.08.2020	3044	176	2749	13	4	3
24.08.2020	3054	176	2756	13	5	3
25.08.2020	3066	176	2763	14	5	3
26.08.2020	3077	176	2770	14	5	3
27.08.2020	3089	177	2778	15	5	3
28.08.2020	3102	177	2785	15	5	3
29.08.2020	3114	177	2793	16	5	3
30.08.2020	3127	177	2802	16	5	3
31.08.2020	3141	177	2810	17	6	3
01.09.2020	3154	178	2819	17	6	4
02.09.2020	3168	178	2828	18	6	4
03.09.2020	3183	178	2838	19	6	4
04.09.2020	3198	178	2847	19	6	4
05.09.2020	3213	179	2857	20	7	4
06.09.2020	3229	179	2867	20	7	4
07.09.2020	3245	179	2878	21	7	4
08.09.2020	3262	180	2889	22	7	4
09.09.2020	3279	180	2900	22	7	4

13.2.3 Prediction for the next 4 weeks under the assumption of different scenarios from 13.08.2020

Fig. 142 shows the absolute changes in case numbers compared to the previous day for the next 4 weeks for different R(t) values. If no bars are shown on the plot it means that the number of cases has not changed compared to the previous day.

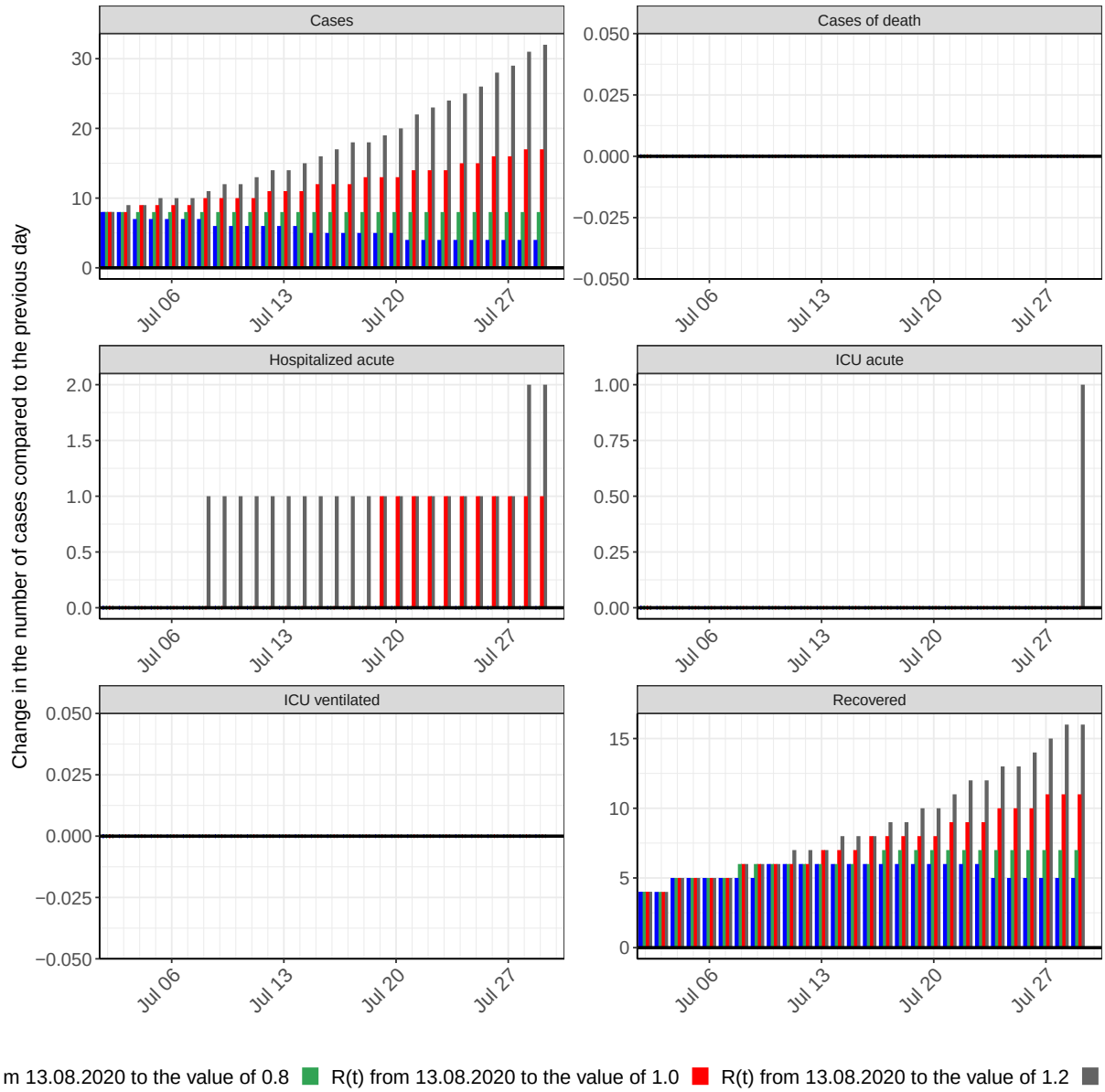


Figure 142: Simulation of daily new cases for the next 4 weeks - Saarland

14 Saxony

14.1 Model description

Fig. 143 depicts the results of the modeling (lines) compared to the observed data (points) for Saxony on a linear (A) and semi-logarithmic (B) scale.

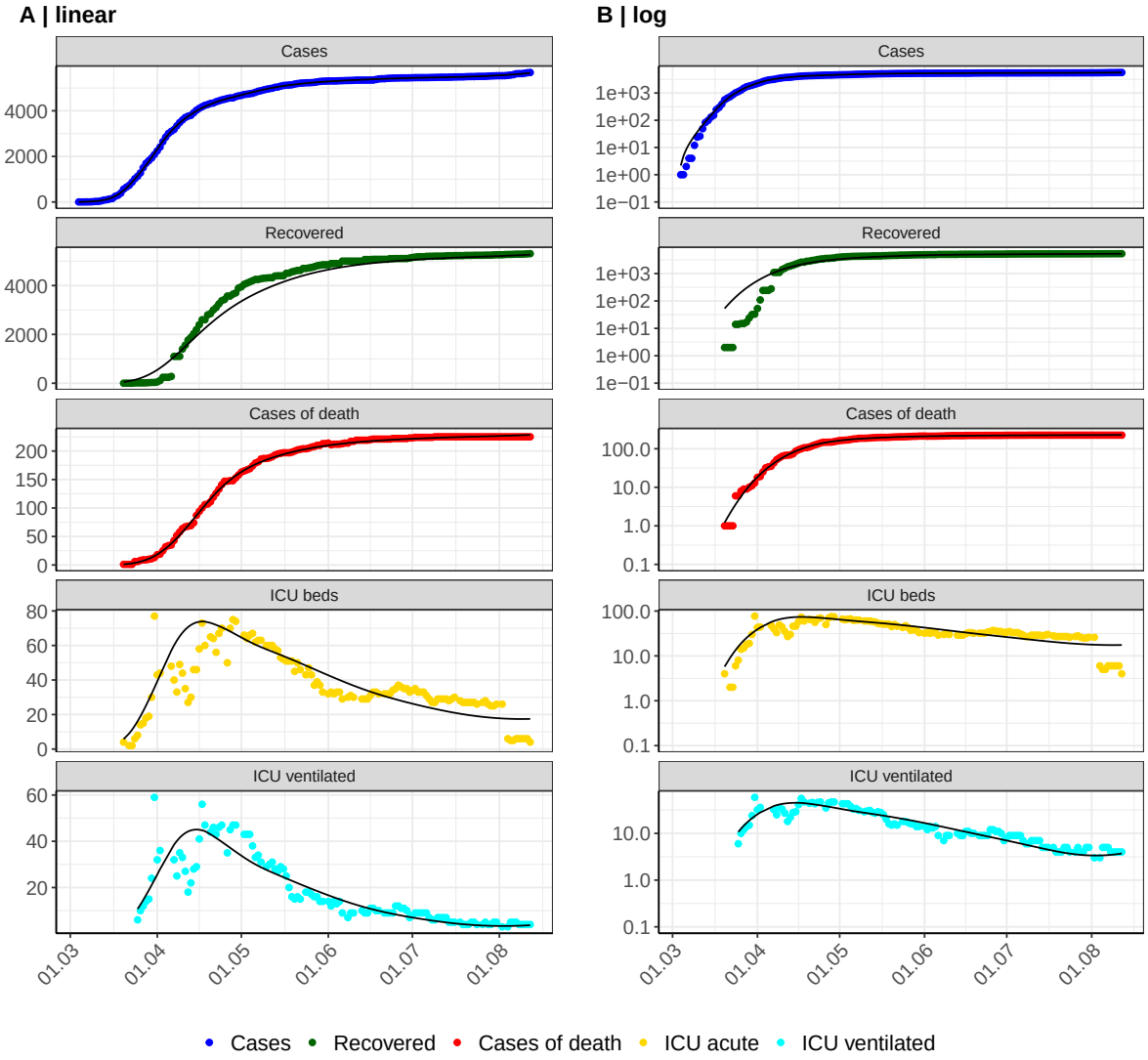


Figure 143: Model description of the reported case numbers, occupancy of hospital beds, recovery and deaths in Saxony. Points: reported data; lines: model description.

Fig. 144 shows the goodness-of-fit for Saxony. The values calculated by the model are plotted against the observed data. If the model fit is good, the points scatter randomly along the lines of identity.

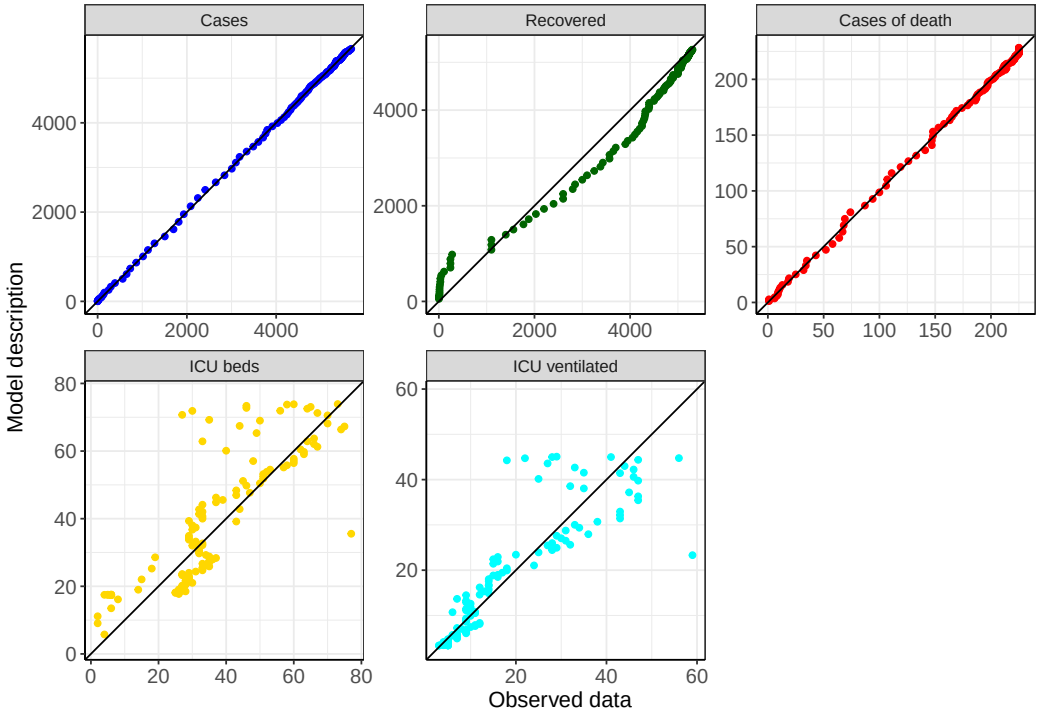


Figure 144: Goodness-of-fit plots for Saxony. Lines: lines of identity.

Fig. 145 shows the influence of non-pharmaceutical interventions (NPI) on R(t) for Saxony (red line) in comparison with the other federal states (grey lines).

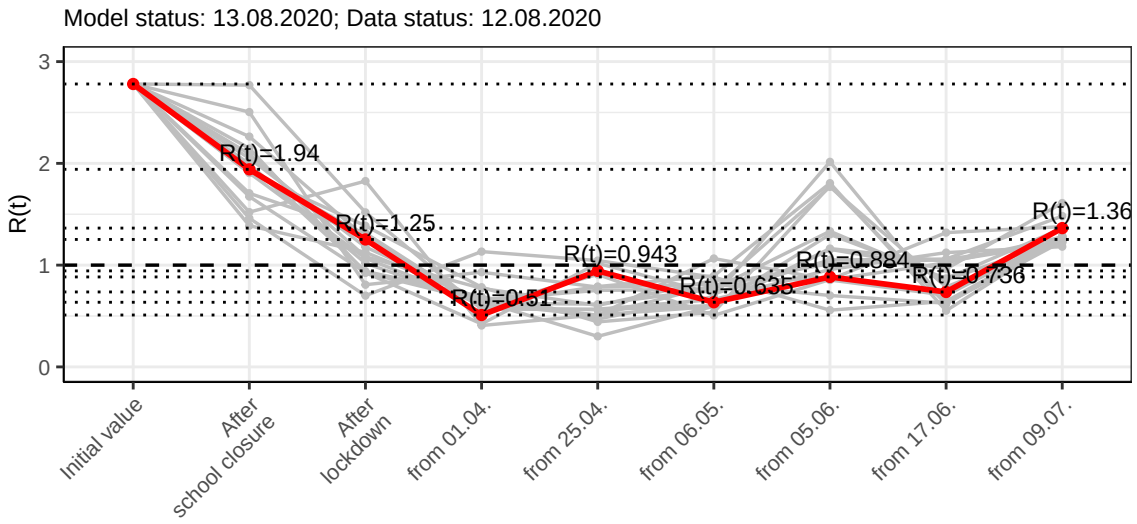


Figure 145: R(t) values before and after the NPIs for Saxony

Fig. 146 shows the R(t) estimated value for Saxony (red line) over time in comparison with the other federal states (grey lines).

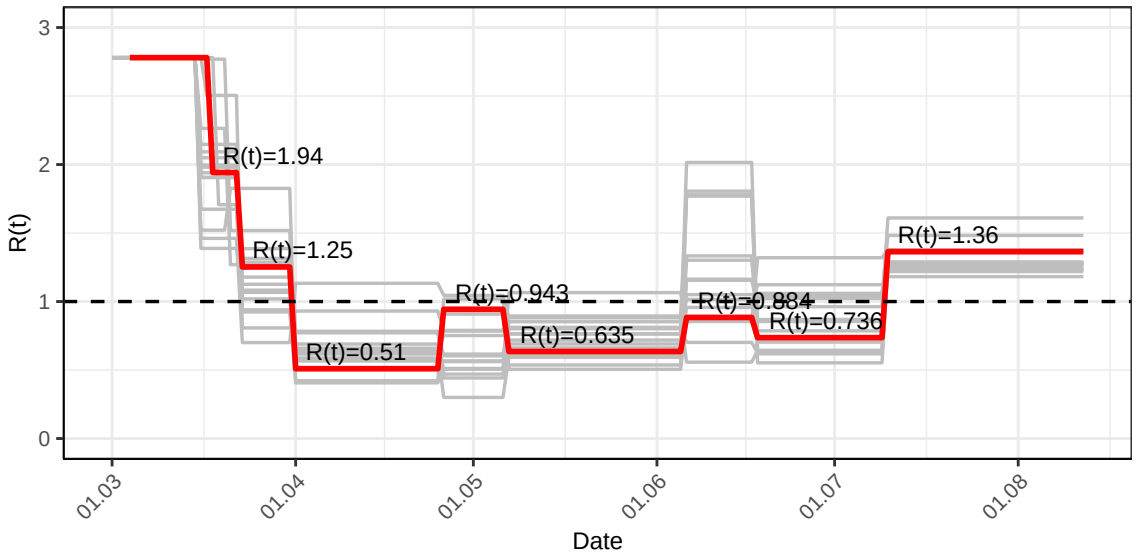


Figure 146: R(t) values over time for Saxony

14.2 Model predictions

14.2.1 Prediction for the next 4 weeks assuming that R(t) estimate will not change (R(t) = 1.36)

Fig. 147 and 148 depict the the model predictions for the next 4 weeks for Saxony on a linear (147) and a semi-logarithmic (148) scale. The modeling was carried out under the assumption that the R(t) estimated value would remain the same.

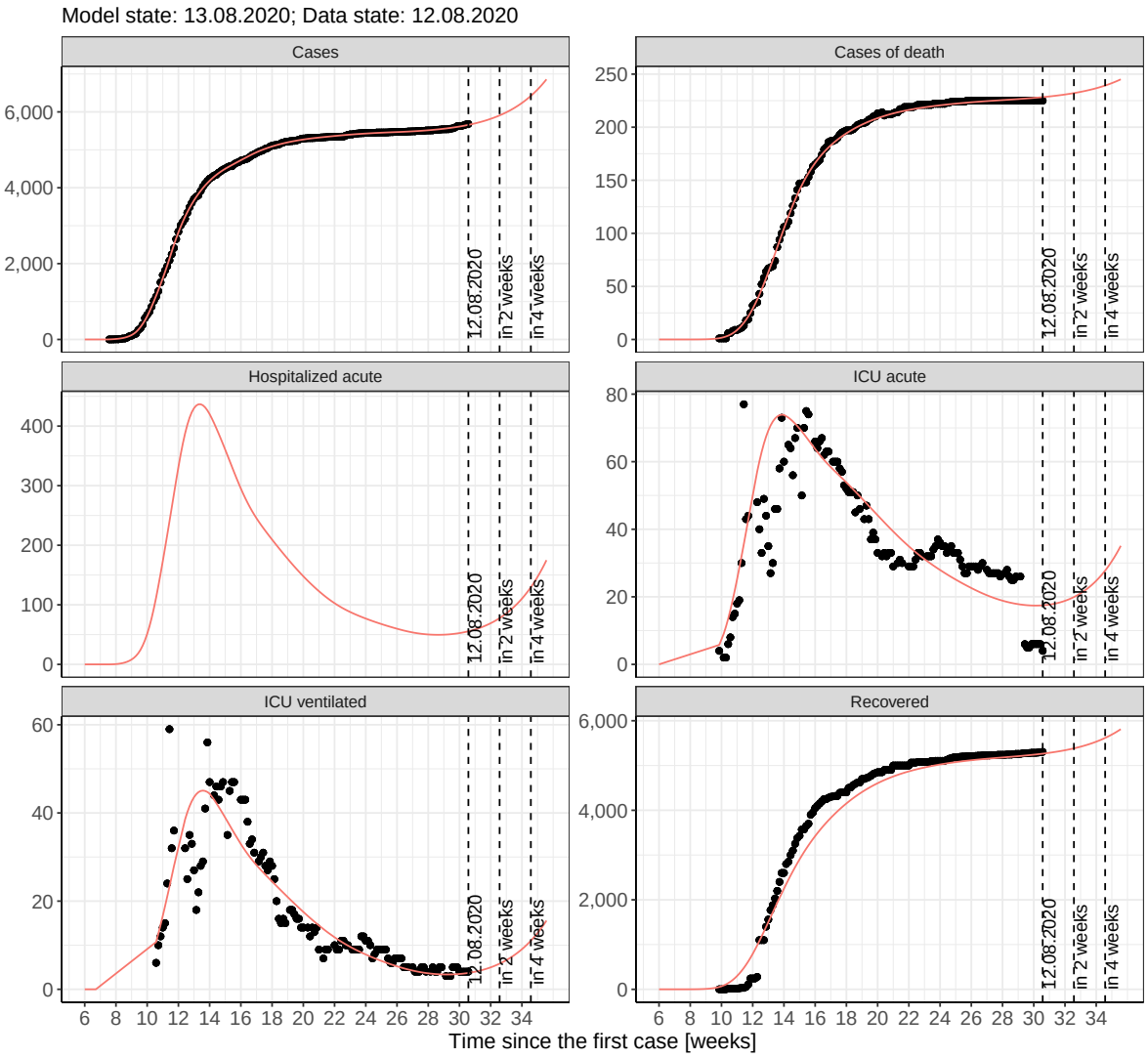


Figure 147: Representation of the model predictions for Saxony for the next 4 weeks under the assumption that the R(t) estimate remains the same on linear scale (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths). Points: Reported case numbers; Red lines: Model predictions.

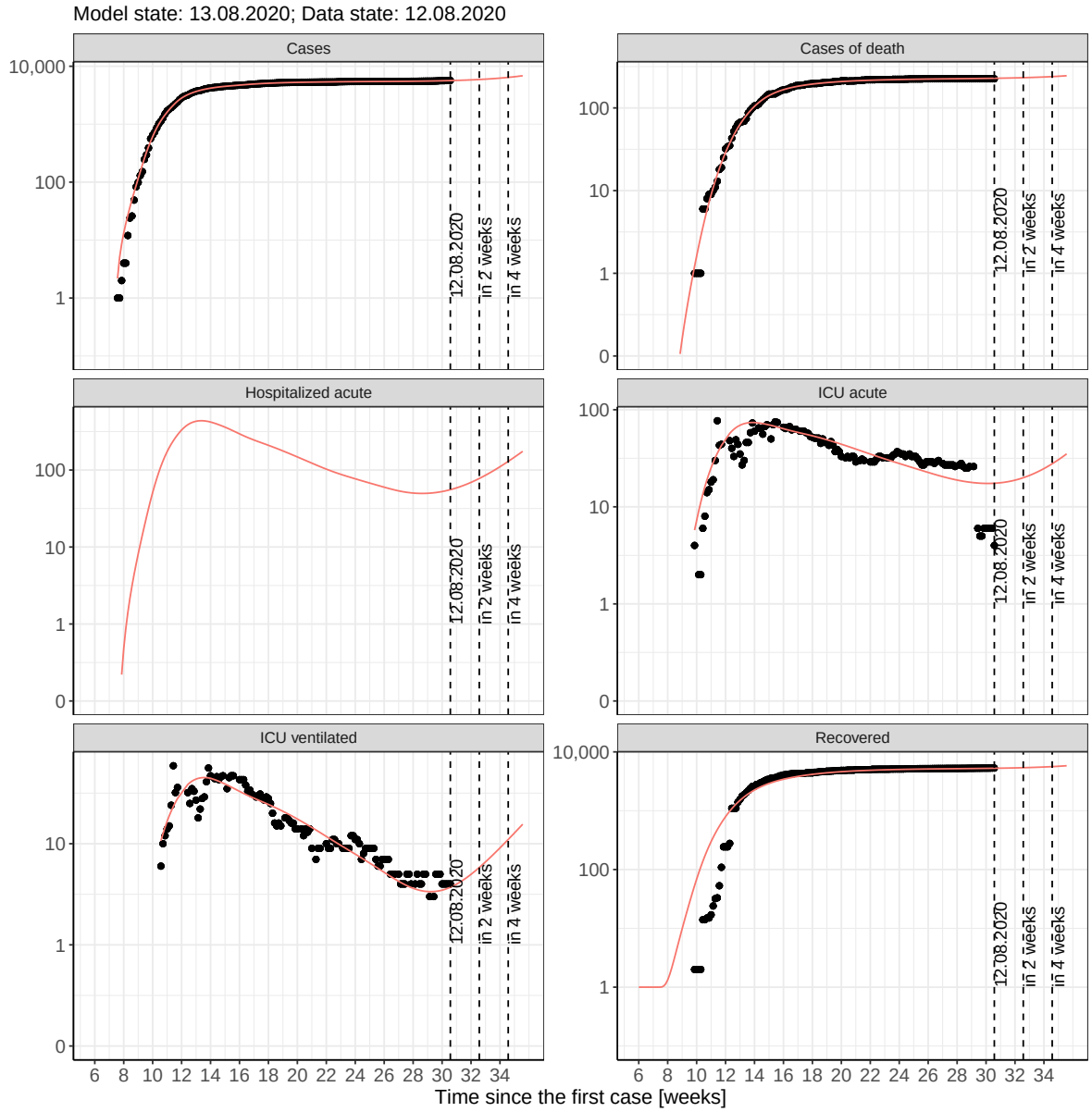


Figure 148: Semi-logarithmic representation of the model prediction (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Saxony for the next 4 weeks under the assumption that the R(t) estimate remains the same. Points: Reported case numbers; Red lines: Model predictions.

14.2.2 Predictions for the next 4 weeks assuming different scenarios (with the R(t) value above 1.2) from 13.08.2020

Fig. 149 and 150 represent the model prediction for the next 4 weeks for Saxony on a linear (149) and a semi-logarithmic (150) scale. In this simulation different scenarios of the possible development (R(t) = 1.4, 1.6, 1.8 and staying the same) from 13.08.2020 were tested.

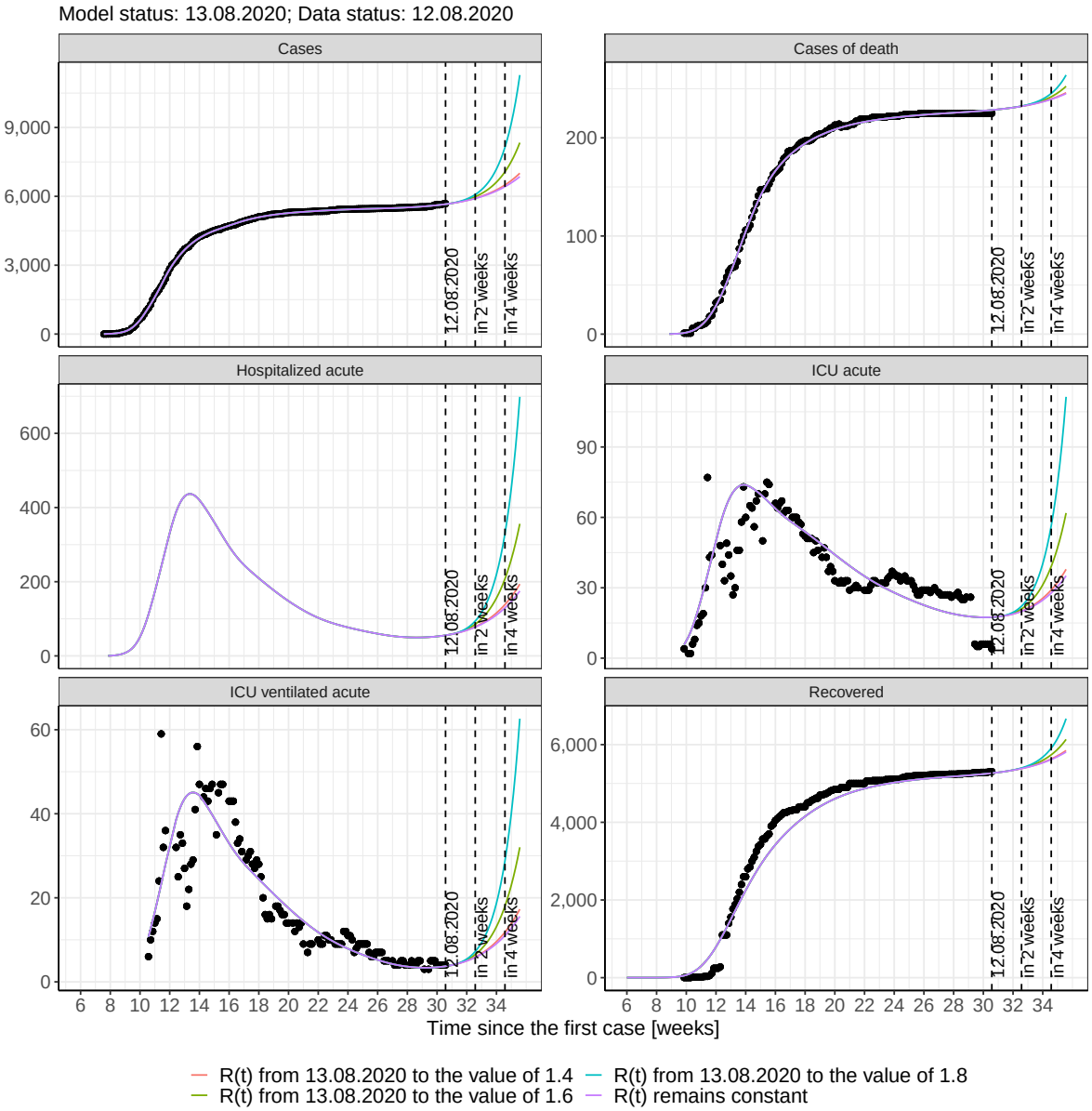


Figure 149: Linear representation of model prediction (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Saxony assuming various scenarios from the 13.08.2020. Points: Reported case numbers; Lines: Model predictions.

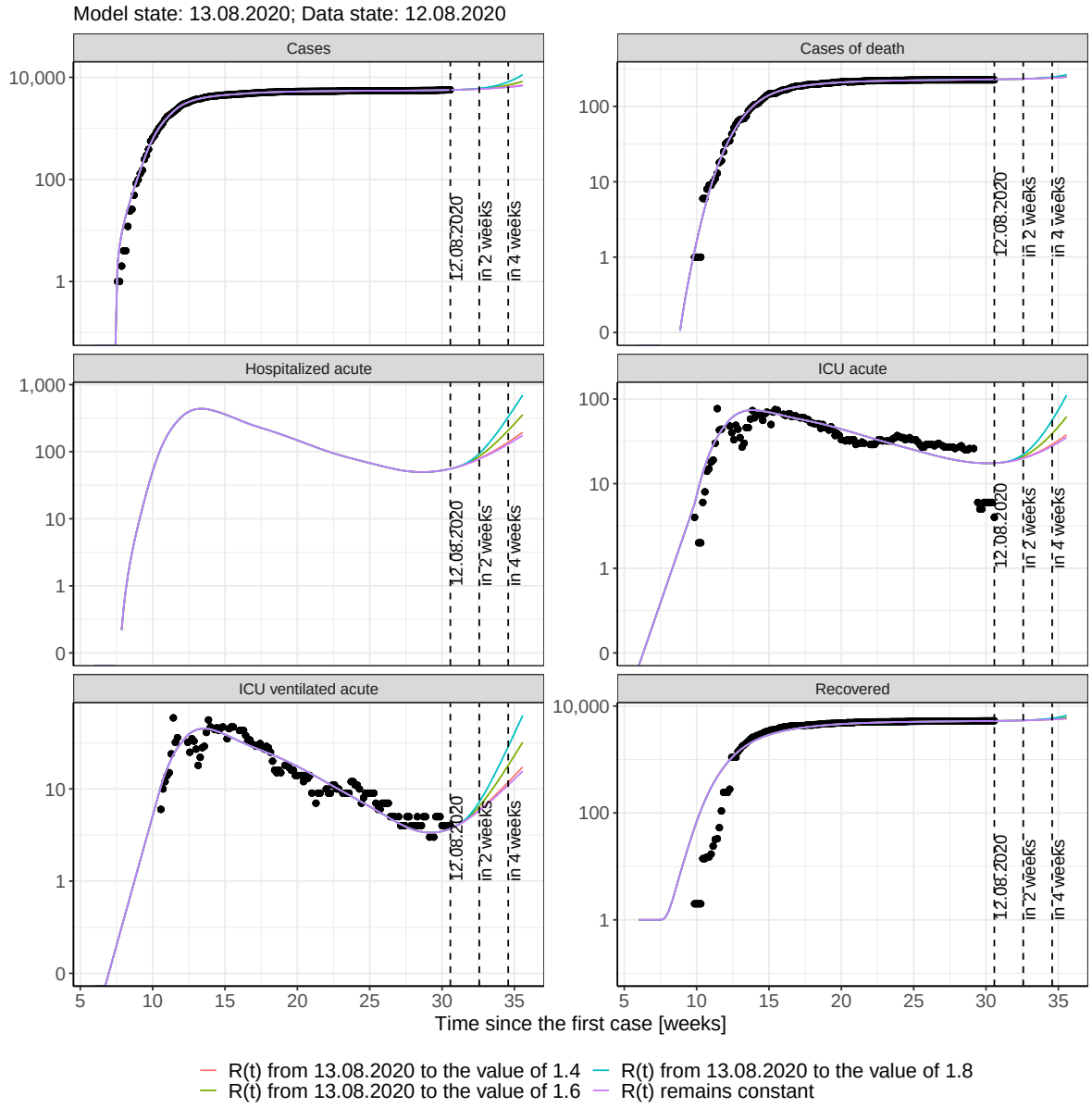


Figure 150: Semi-logarithmic representation of model predictions (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Saxony assuming various scenarios from the 13.08.2020. Points: Reported case numbers; Lines: Model predictions.

Fig. 151 and 152 represent the model prediction for the next 16 weeks for Saxony on a linear (151) and a semi-logarithmic (152) scale. In this simulation different scenarios of the possible course from the 13.08.2020 were tested.

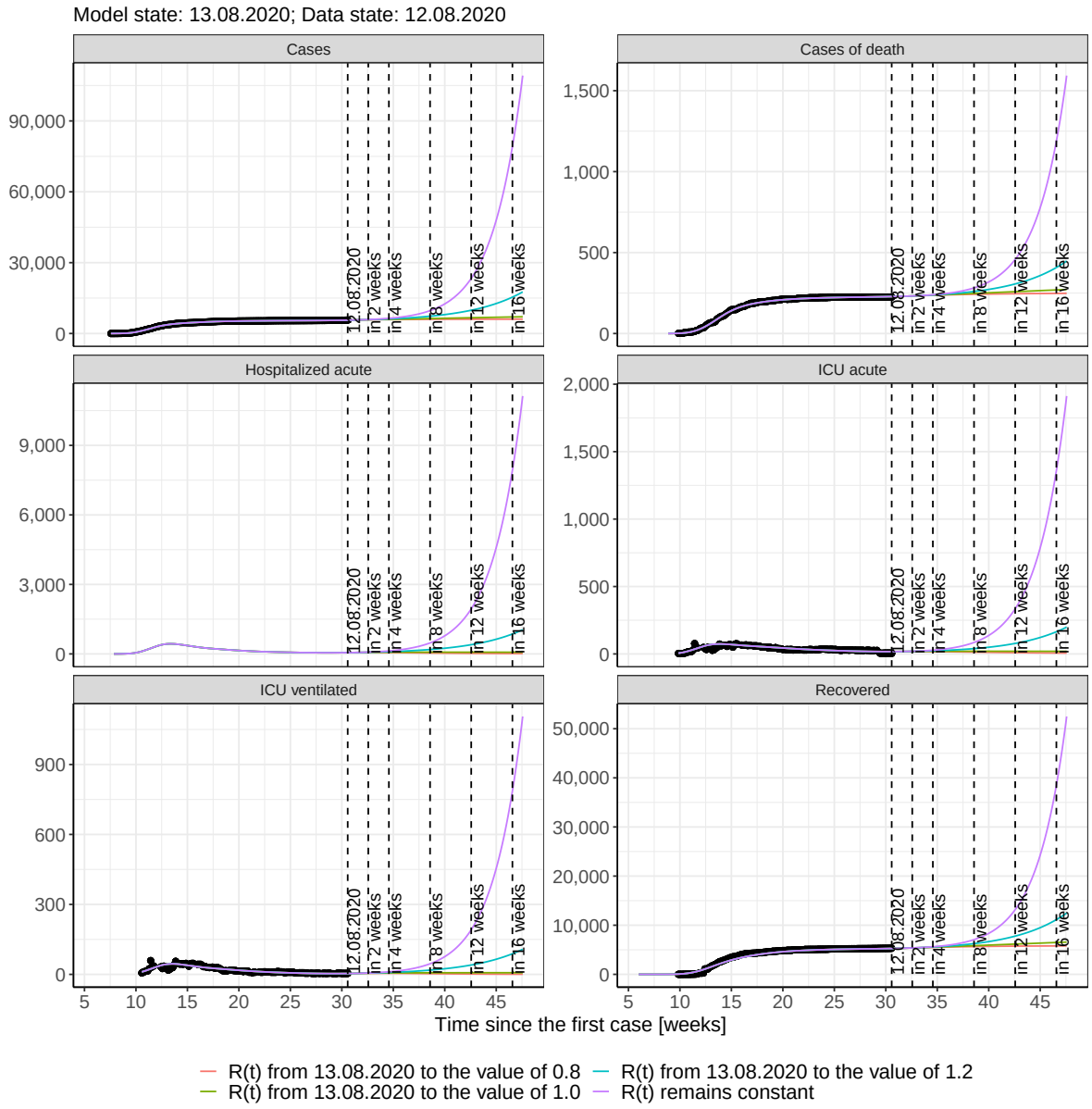


Figure 151: Linear representation of model predictions (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Saxony assuming various scenarios from the 13.08.2020. Points: reported case numbers; lines: model prediction.

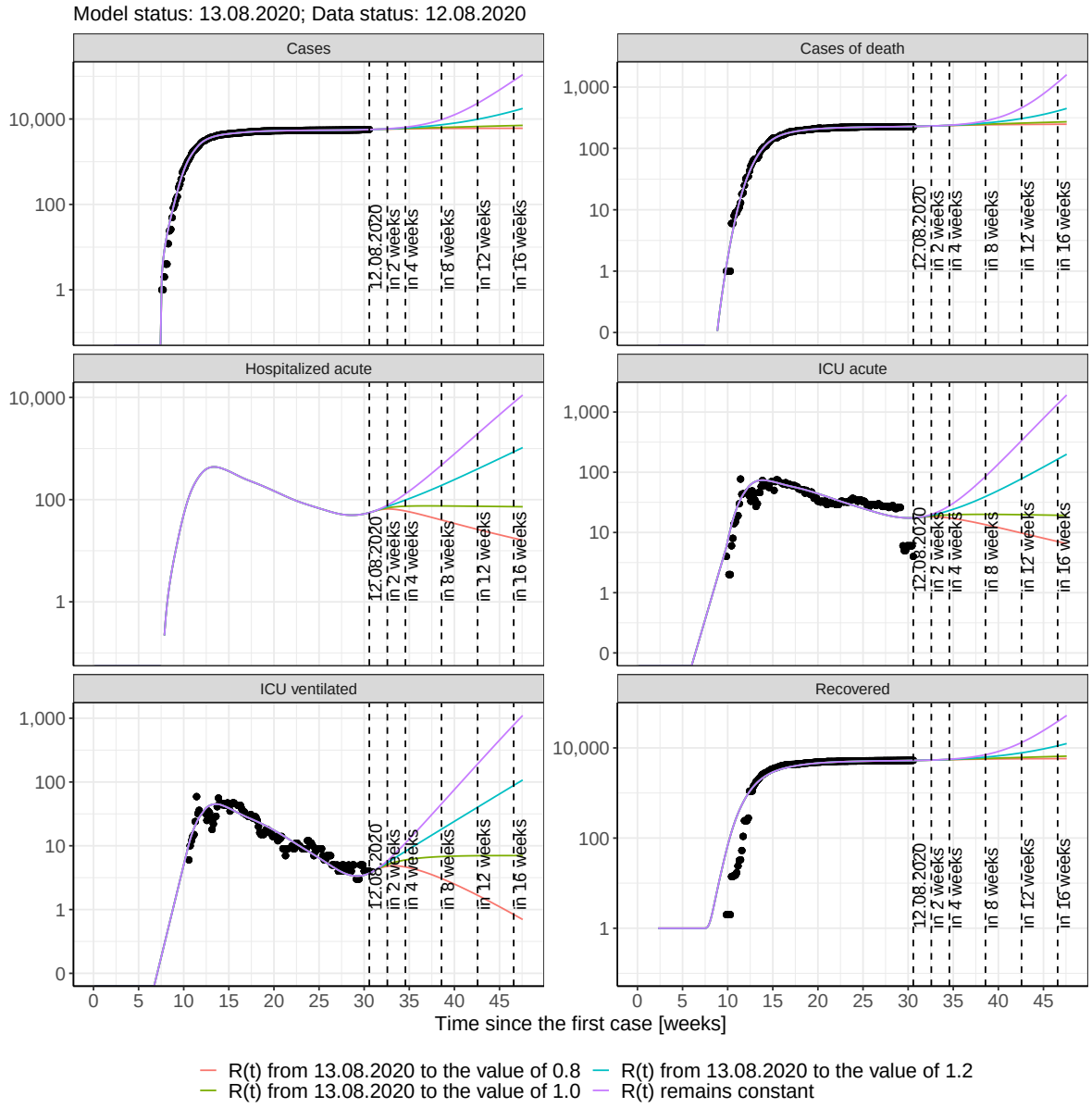


Figure 152: Semi-logarithmic depiction of the model prediction (cases, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Saxony assuming various scenarios after 13.08.2020. Points: reported case numbers;lines: model predictions.

The tables show the modeling results for four conceivable scenarios: Scenario 1: The R(t) estimated value after 13.08.2020 remains the same as today's value (Tab. 50); Scenario 2: The R(t) estimated value after 13.08.2020 takes the value of 0.8 (Tab. 51); Scenario 3: The R(t) estimated value takes the value of 1 after the 13.08.2020 (Tab. 52); Scenario 4: The R(t) estimated value takes the value of 1.2 after the 13.08.2020 (Tab. 53) Model status from 13.08.2020; Data status: 12.08.2020.

Table 50: Saxony - R(t) remains unchanged after the 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	5671	229	5271	56	18	4
14.08.2020	5684	229	5277	58	18	4
15.08.2020	5698	229	5284	59	18	4
16.08.2020	5712	229	5291	60	18	4
17.08.2020	5728	229	5299	61	18	4
18.08.2020	5744	230	5306	63	18	4
19.08.2020	5761	230	5314	64	18	4
20.08.2020	5779	230	5323	66	18	5
21.08.2020	5798	230	5332	67	19	5
22.08.2020	5817	231	5341	69	19	5
23.08.2020	5838	231	5351	71	19	5
24.08.2020	5860	231	5361	73	19	5
25.08.2020	5883	232	5372	75	20	6
26.08.2020	5908	232	5383	78	20	6
27.08.2020	5934	232	5395	80	20	6
28.08.2020	5961	233	5407	83	21	6
29.08.2020	5989	233	5420	86	21	7
30.08.2020	6019	234	5434	89	21	7
31.08.2020	6051	234	5448	92	22	7
01.09.2020	6084	235	5464	95	22	8
02.09.2020	6119	235	5480	98	23	8
03.09.2020	6156	236	5496	102	24	8
04.09.2020	6195	236	5514	106	24	9
05.09.2020	6236	237	5532	110	25	9
06.09.2020	6279	237	5552	115	25	10
07.09.2020	6324	238	5572	119	26	10
08.09.2020	6372	239	5594	124	27	10
09.09.2020	6423	239	5616	130	28	11

Table 51: Saxony - R(t) takes on the value of 0.8 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	5670	229	5271	56	18	4
14.08.2020	5682	229	5277	57	18	4
15.08.2020	5693	229	5284	59	18	4
16.08.2020	5704	229	5291	60	18	4
17.08.2020	5715	229	5298	61	18	4
18.08.2020	5725	230	5306	62	18	4
19.08.2020	5735	230	5314	62	18	4
20.08.2020	5745	230	5321	63	18	4
21.08.2020	5755	230	5329	64	18	5
22.08.2020	5764	231	5337	64	18	5
23.08.2020	5773	231	5346	65	18	5
24.08.2020	5782	231	5354	65	18	5
25.08.2020	5790	232	5362	65	18	5
26.08.2020	5798	232	5371	65	18	5
27.08.2020	5806	232	5379	66	18	5
28.08.2020	5814	233	5388	65	18	5
29.08.2020	5822	233	5396	65	18	5
30.08.2020	5829	233	5404	65	18	5
31.08.2020	5836	233	5413	65	18	5
01.09.2020	5843	234	5421	64	18	5
02.09.2020	5850	234	5430	64	18	5
03.09.2020	5856	234	5438	63	18	5
04.09.2020	5863	235	5446	63	18	5
05.09.2020	5869	235	5454	62	18	5
06.09.2020	5875	235	5462	62	18	5
07.09.2020	5881	236	5470	61	18	5
08.09.2020	5886	236	5478	61	17	5
09.09.2020	5892	236	5486	60	17	5

Table 52: Saxony - R(t) takes on the value of 1.0 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	5670	229	5271	56	18	4
14.08.2020	5683	229	5277	58	18	4
15.08.2020	5695	229	5284	59	18	4
16.08.2020	5707	229	5291	60	18	4
17.08.2020	5719	229	5298	61	18	4
18.08.2020	5731	230	5306	62	18	4
19.08.2020	5743	230	5314	63	18	4
20.08.2020	5755	230	5322	64	18	4
21.08.2020	5768	230	5330	65	18	5
22.08.2020	5780	231	5338	66	18	5
23.08.2020	5792	231	5347	67	18	5
24.08.2020	5804	231	5356	68	19	5
25.08.2020	5816	232	5365	68	19	5
26.08.2020	5828	232	5374	69	19	5
27.08.2020	5840	232	5384	70	19	5
28.08.2020	5852	233	5393	70	19	5
29.08.2020	5864	233	5403	71	19	5
30.08.2020	5876	233	5413	71	19	5
31.08.2020	5888	234	5423	72	19	5
01.09.2020	5901	234	5433	72	19	6
02.09.2020	5913	234	5443	73	19	6
03.09.2020	5925	235	5453	73	19	6
04.09.2020	5937	235	5464	73	19	6
05.09.2020	5949	235	5474	73	19	6
06.09.2020	5961	236	5485	74	19	6
07.09.2020	5973	236	5495	74	20	6
08.09.2020	5985	237	5506	74	20	6
09.09.2020	5997	237	5517	74	20	6

Table 53: Saxony - R(t) takes on the value of 1.2 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	5671	229	5271	56	18	4
14.08.2020	5683	229	5277	58	18	4
15.08.2020	5696	229	5284	59	18	4
16.08.2020	5710	229	5291	60	18	4
17.08.2020	5724	229	5299	61	18	4
18.08.2020	5738	230	5306	62	18	4
19.08.2020	5752	230	5314	63	18	4
20.08.2020	5767	230	5322	65	18	5
21.08.2020	5783	230	5331	66	18	5
22.08.2020	5799	231	5340	68	19	5
23.08.2020	5815	231	5349	69	19	5
24.08.2020	5832	231	5359	70	19	5
25.08.2020	5849	232	5368	72	19	5
26.08.2020	5867	232	5379	73	19	5
27.08.2020	5885	232	5389	75	20	6
28.08.2020	5904	233	5400	76	20	6
29.08.2020	5923	233	5412	78	20	6
30.08.2020	5943	234	5423	80	20	6
31.08.2020	5964	234	5435	81	20	6
01.09.2020	5985	234	5448	83	21	6
02.09.2020	6007	235	5461	85	21	7
03.09.2020	6029	235	5474	86	21	7
04.09.2020	6052	236	5487	88	22	7
05.09.2020	6076	236	5502	90	22	7
06.09.2020	6100	237	5516	92	22	8
07.09.2020	6125	237	5531	94	22	8
08.09.2020	6151	238	5546	96	23	8
09.09.2020	6177	238	5562	98	23	8

14.2.3 Prediction for the next 4 weeks under the assumption of different scenarios from 13.08.2020

Fig. 153 shows the absolute changes in case numbers compared to the previous day for the next 4 weeks for different R(t) values. If no bars are shown on the plot it means that the number of cases has not changed compared to the previous day.

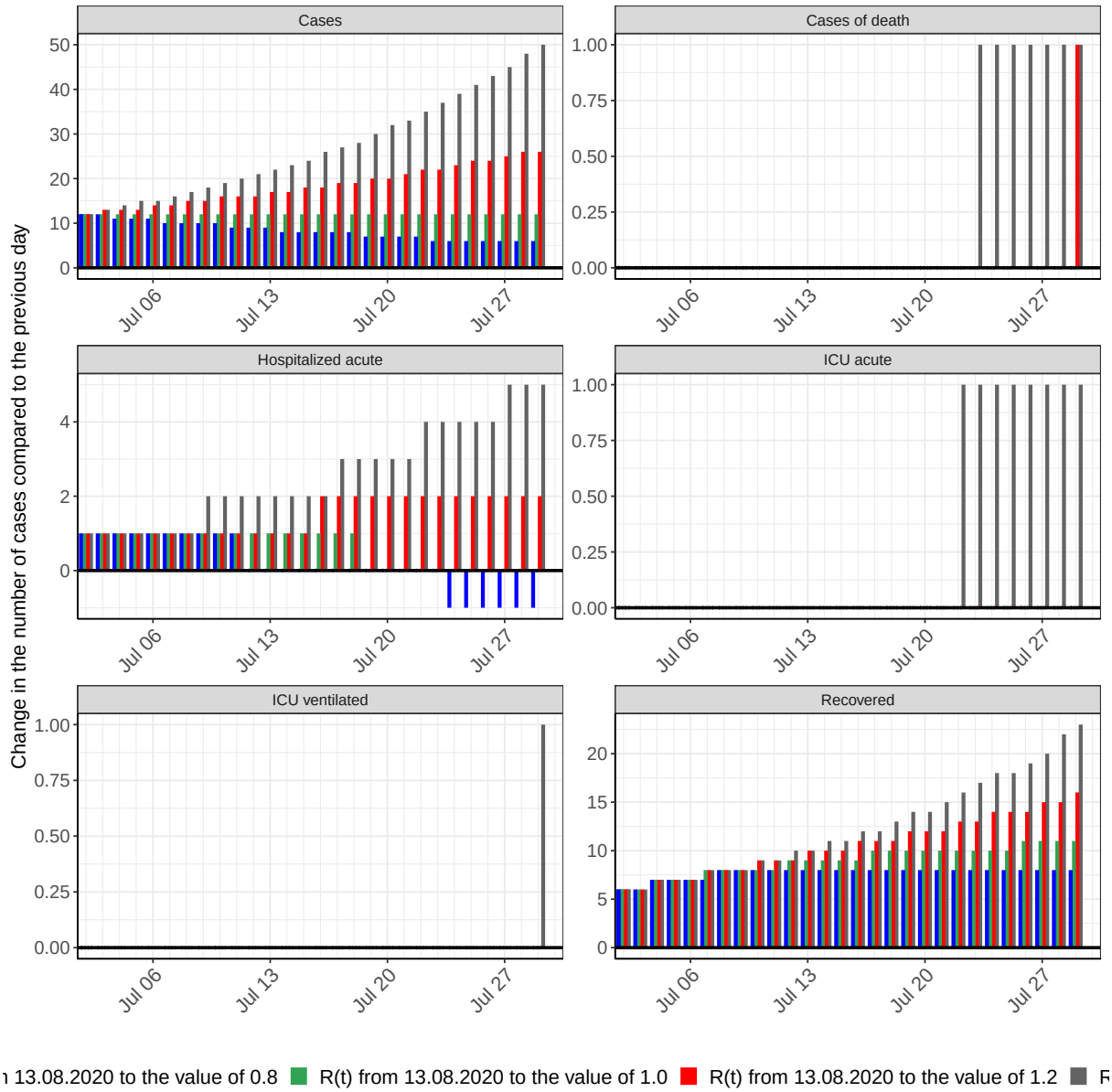


Figure 153: Simulation of daily new cases for the next 4 weeks - Saxony

15 Saxony-Anhalt

15.1 Model description

Fig. 154 depicts the results of the modeling (lines) compared to the observed data (points) for Saxony-Anhalt on a linear (A) and semi-logarithmic (B) scale.

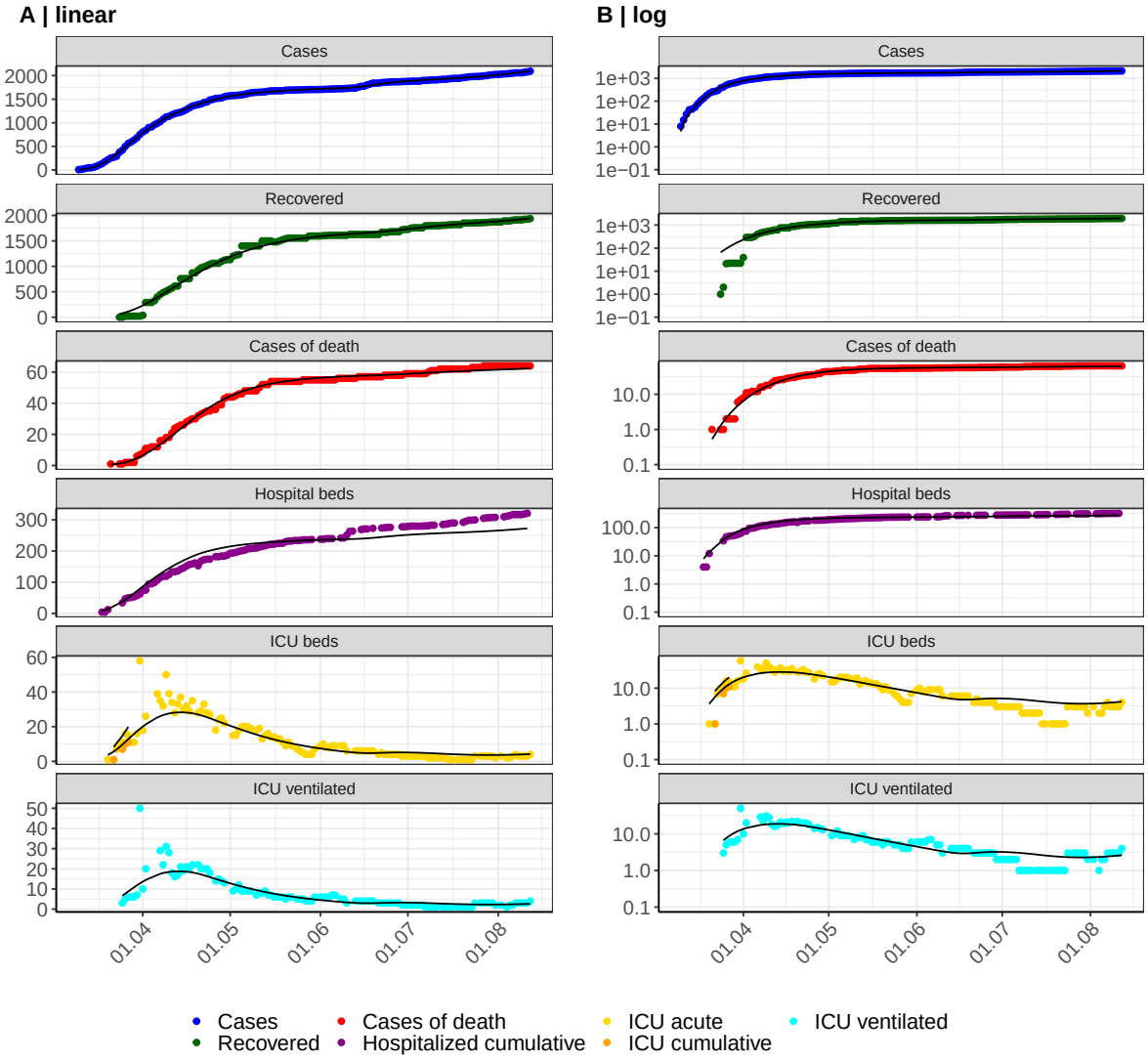


Figure 154: Model description of the reported case numbers, occupancy of hospital beds, recovery and deaths in Saxony-Anhalt. Points: reported data; lines: model description.

Fig. 155 shows the goodness-of-fit for Saxony-Anhalt. The values calculated by the model are plotted against the observed data. If the model fit is good, the points scatter randomly along the lines of identity.

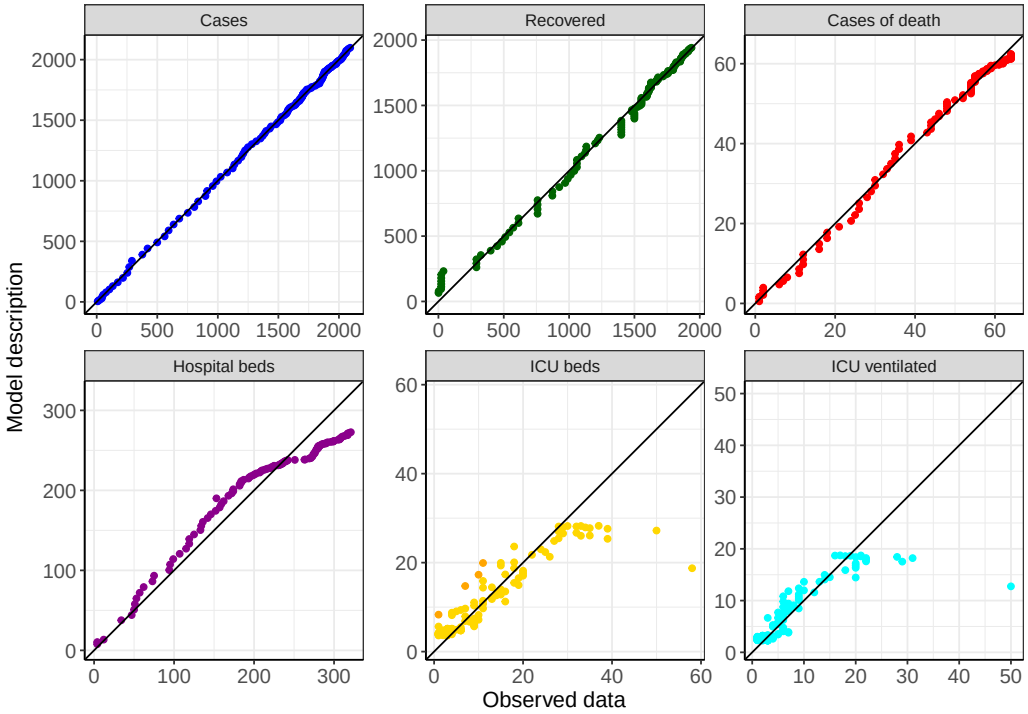


Figure 155: Goodness-of-fit plots for Saxony-Anhalt. Lines: lines of identity.

Fig. 156 shows the influence of non-pharmaceutical interventions (NPI) on R(t) for Saxony-Anhalt (red line) in comparison with the other federal states (grey lines).

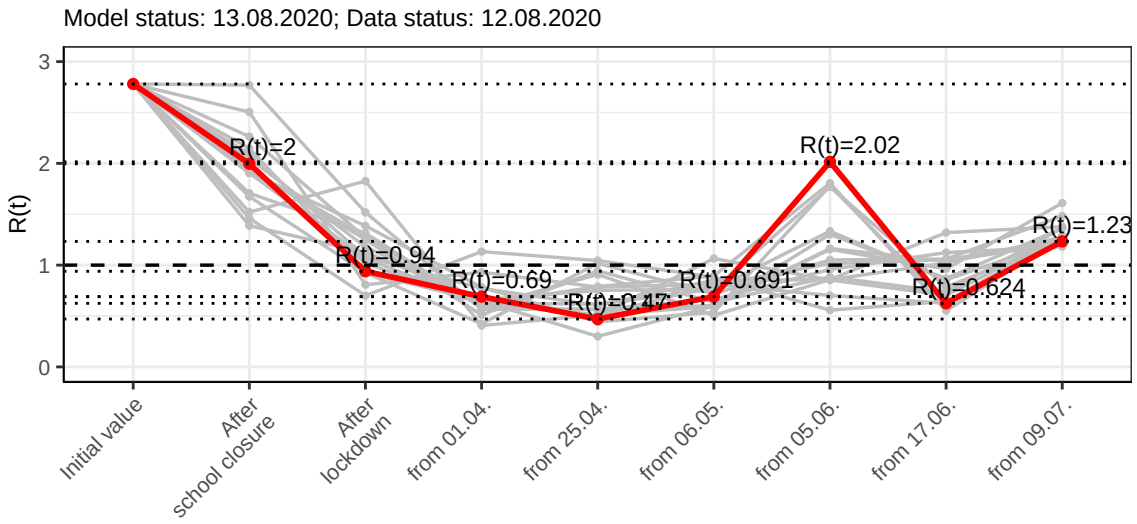


Figure 156: R(t) values before and after the NPIs for Saxony-Anhalt

Fig. 157 shows the R(t) estimated value for Saxony-Anhalt (red line) over time in comparison with the other federal states (grey lines).

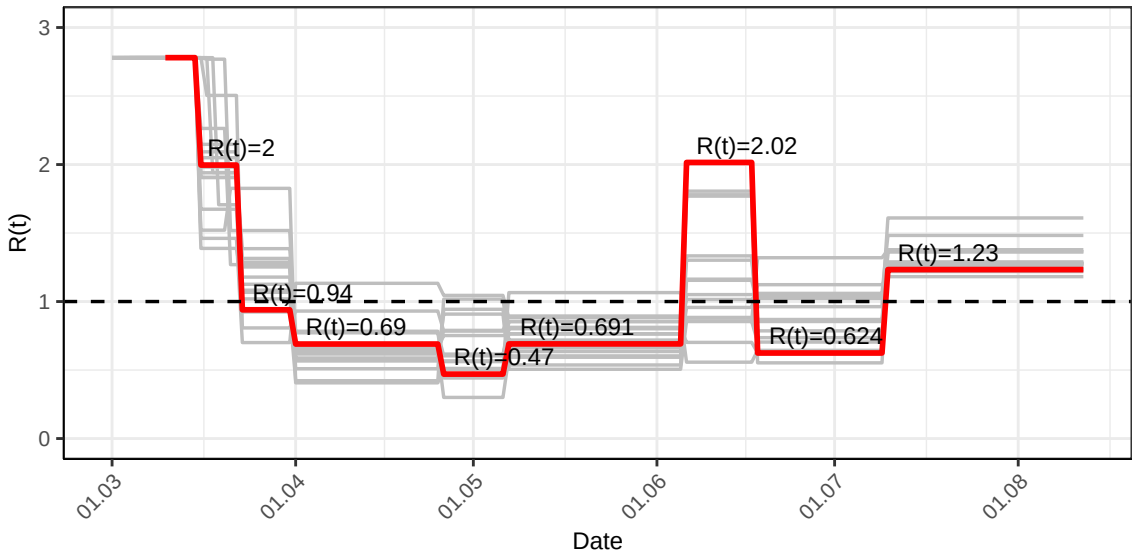


Figure 157: R(t) values over time for Saxony-Anhalt

15.2 Model predictions

15.2.1 Prediction for the next 4 weeks assuming that R(t) estimate will not change (R(t) = 1.23)

Fig. 158 and 159 depict the the model predictions for the next 4 weeks for Saxony-Anhalt on a linear (158) and a semi-logarithmic (159) scale. The modeling was carried out under the assumption that the R(t) estimated value would remain the same.

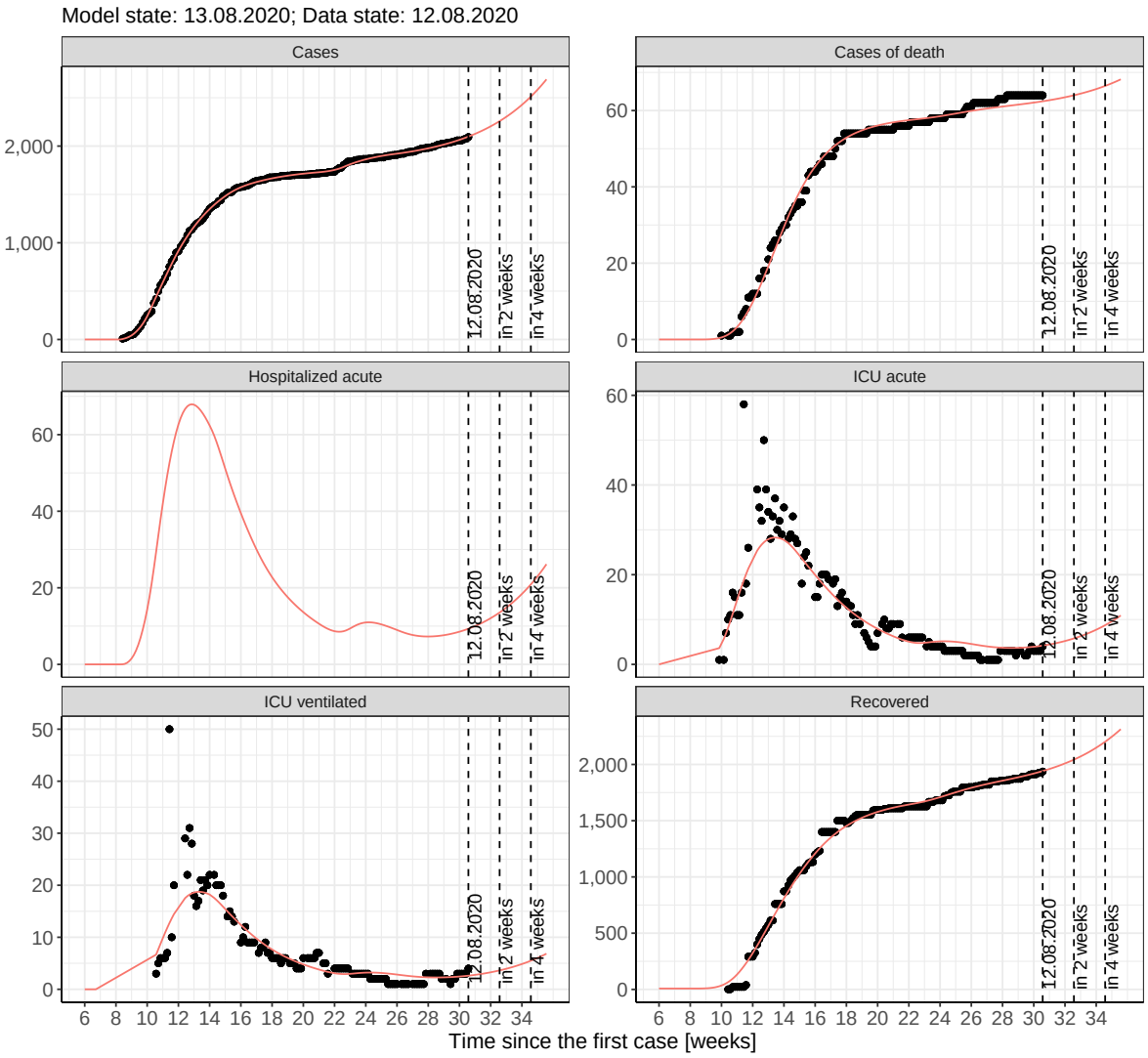


Figure 158: Representation of the model predictions for Saxony-Anhalt for the next 4 weeks under the assumption that the R(t) estimate remains the same on linear scale (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths). Points: Reported case numbers; Red lines: Model predictions.

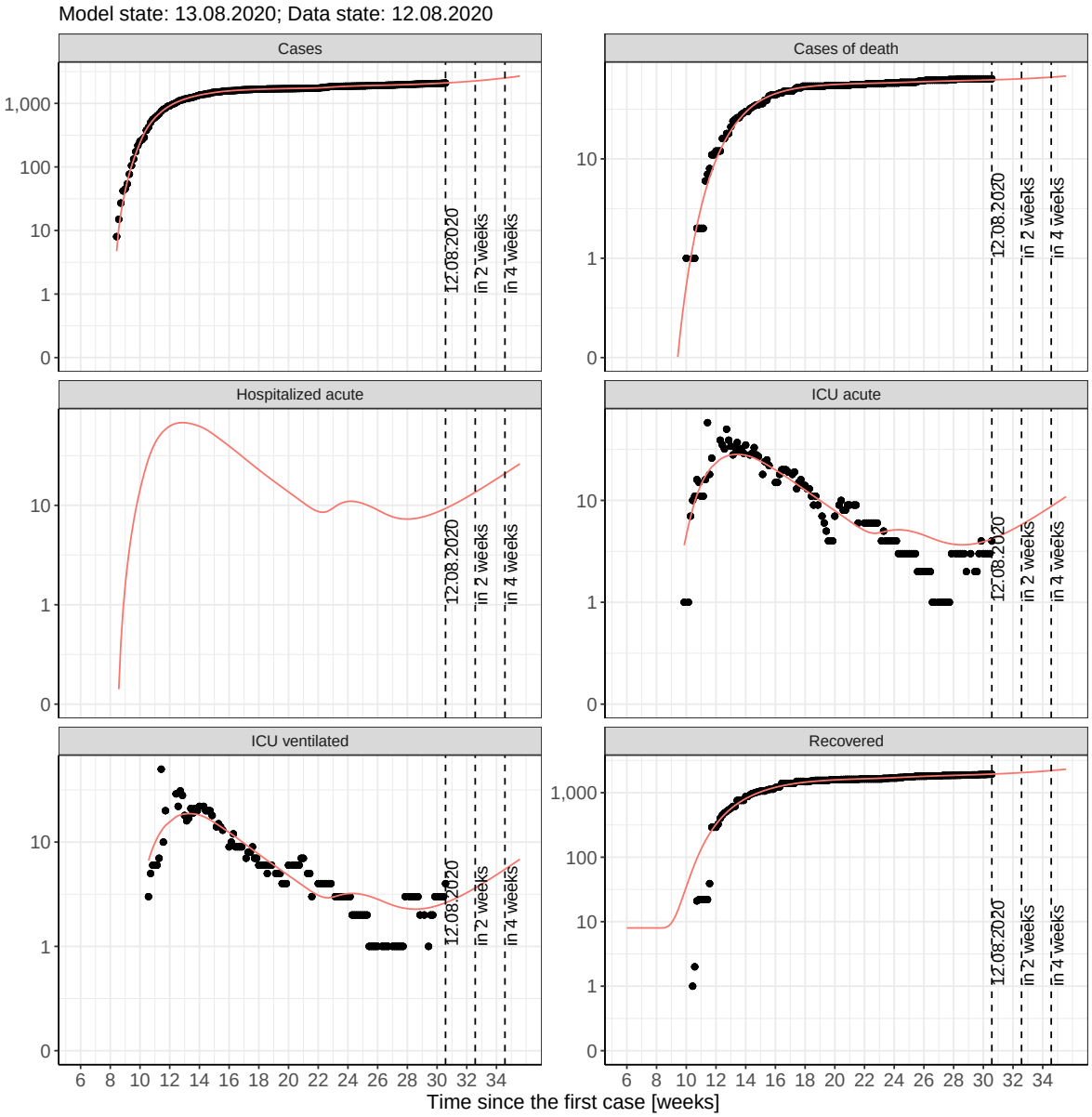


Figure 159: Semi-logarithmic representation of the model prediction (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Saxony-Anhalt for the next 4 weeks under the assumption that the R(t) estimate remains the same. Points: Reported case numbers; Red lines: Model predictions.

15.2.2 Predictions for the next 4 weeks assuming different scenarios (with the R(t) value above 1.2) from 13.08.2020

Fig. 160 and 161 represent the model prediction for the next 4 weeks for Saxony-Anhalt on a linear (160) and a semi-logarithmic (161) scale. In this simulation different scenarios of the possible development (R(t) = 1.4, 1.6, 1.8 and staying the same) from 13.08.2020 were tested.

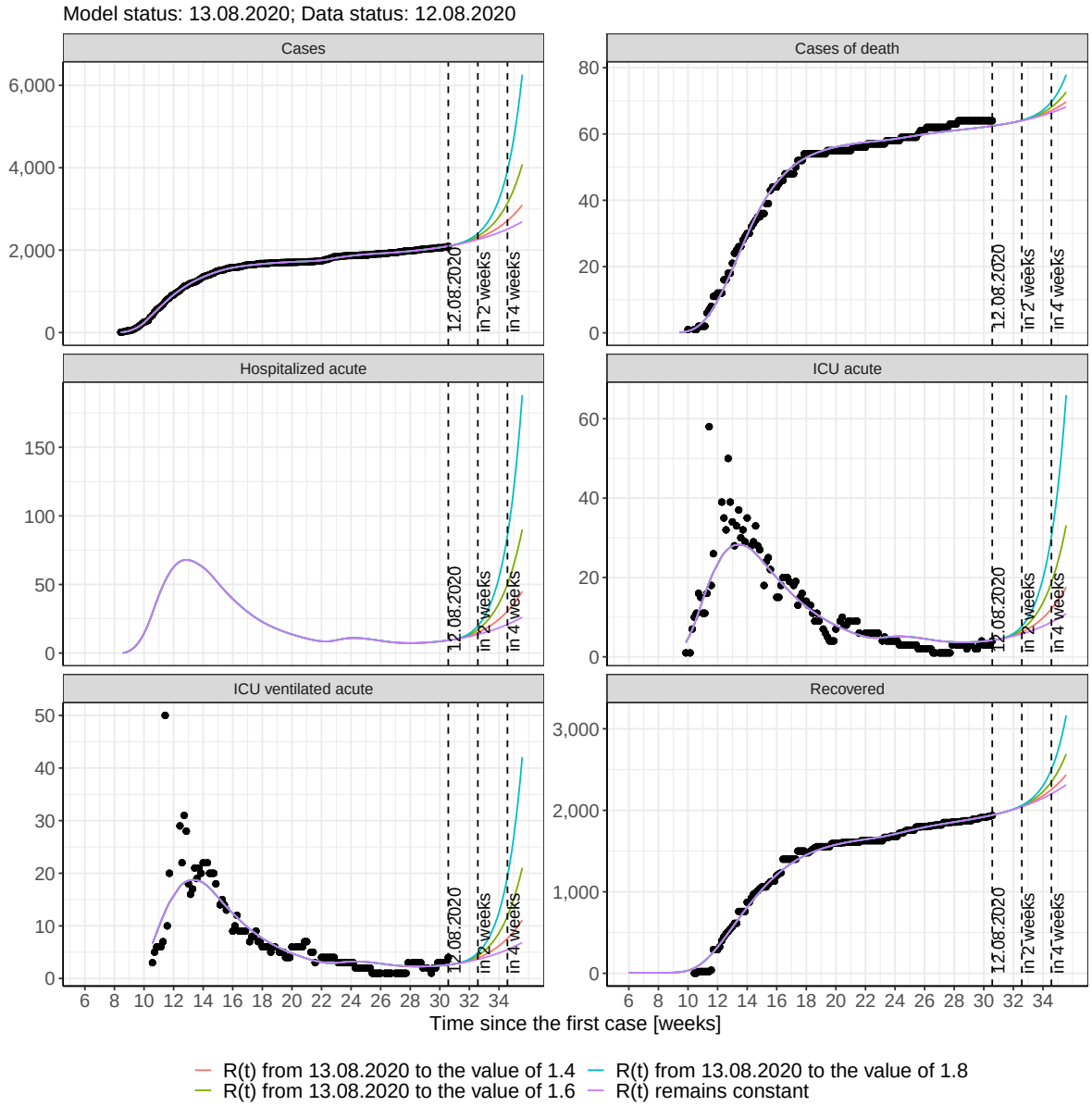


Figure 160: Linear representation of model prediction (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Saxony-Anhalt assuming various scenarios from the 13.08.2020. Points: Reported case numbers; Lines: Model predictions.

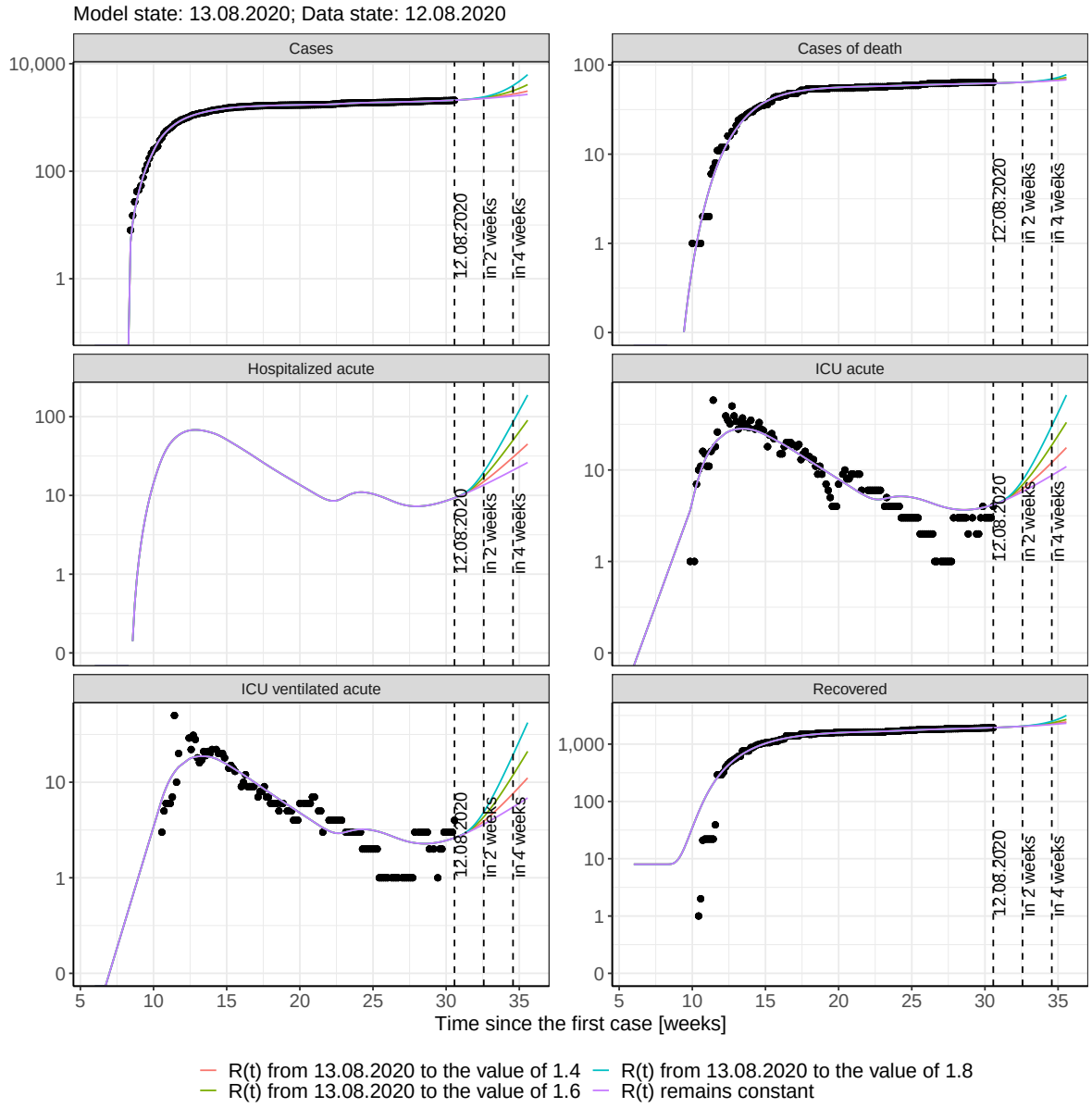


Figure 161: Semi-logarithmic representation of model predictions (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Saxony-Anhalt assuming various scenarios from the 13.08.2020. Points: Reported case numbers; Lines: Model predictions.

Fig. 162 and 163 represent the model prediction for the next 16 weeks for Saxony-Anhalt on a linear (162) and a semi-logarithmic (163) scale. In this simulation different scenarios of the possible course from the 13.08.2020 were tested.

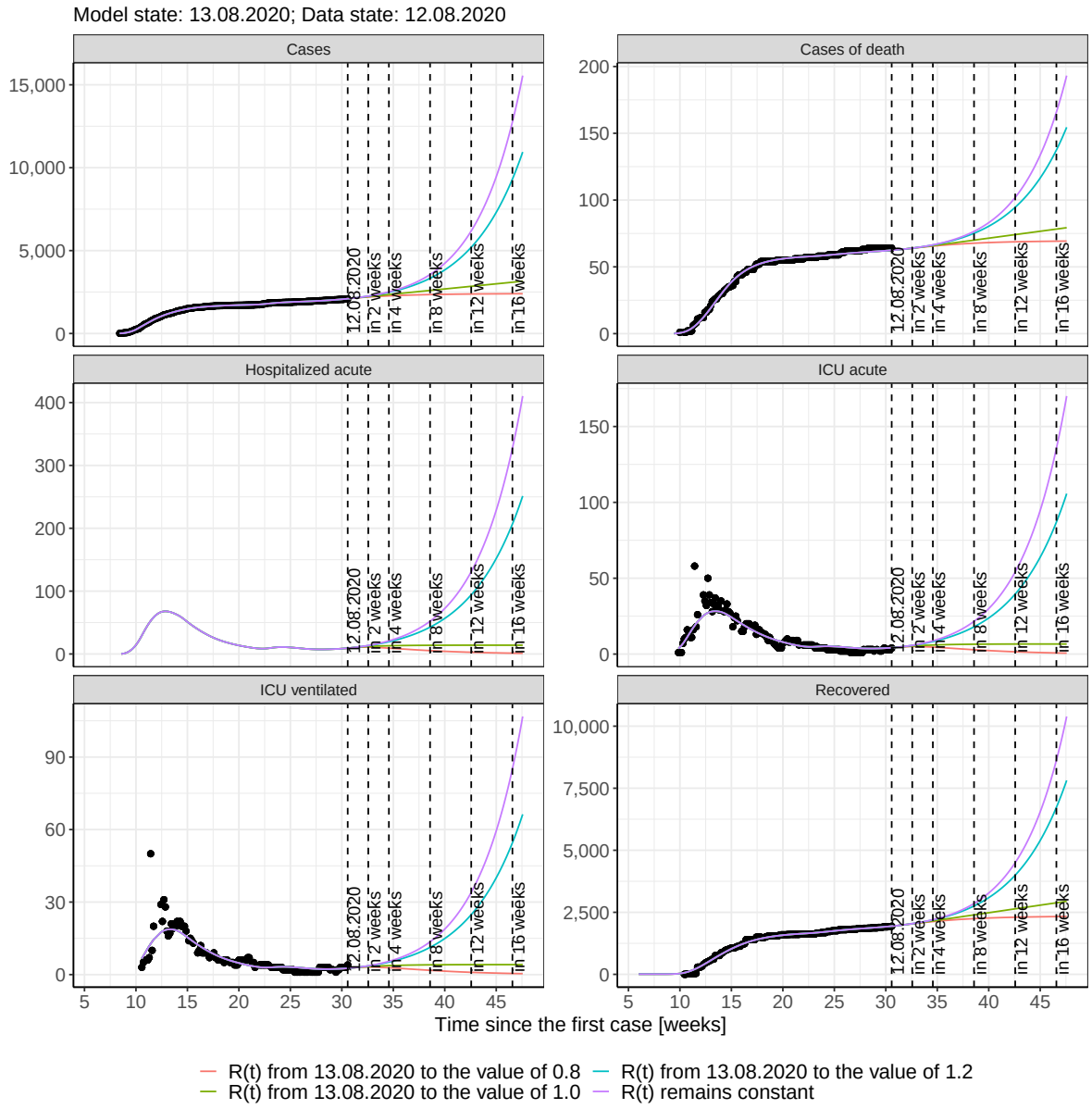


Figure 162: Linear representation of model predictions (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Saxony-Anhalt assuming various scenarios from the 13.08.2020. Points: reported case numbers; lines: model prediction.

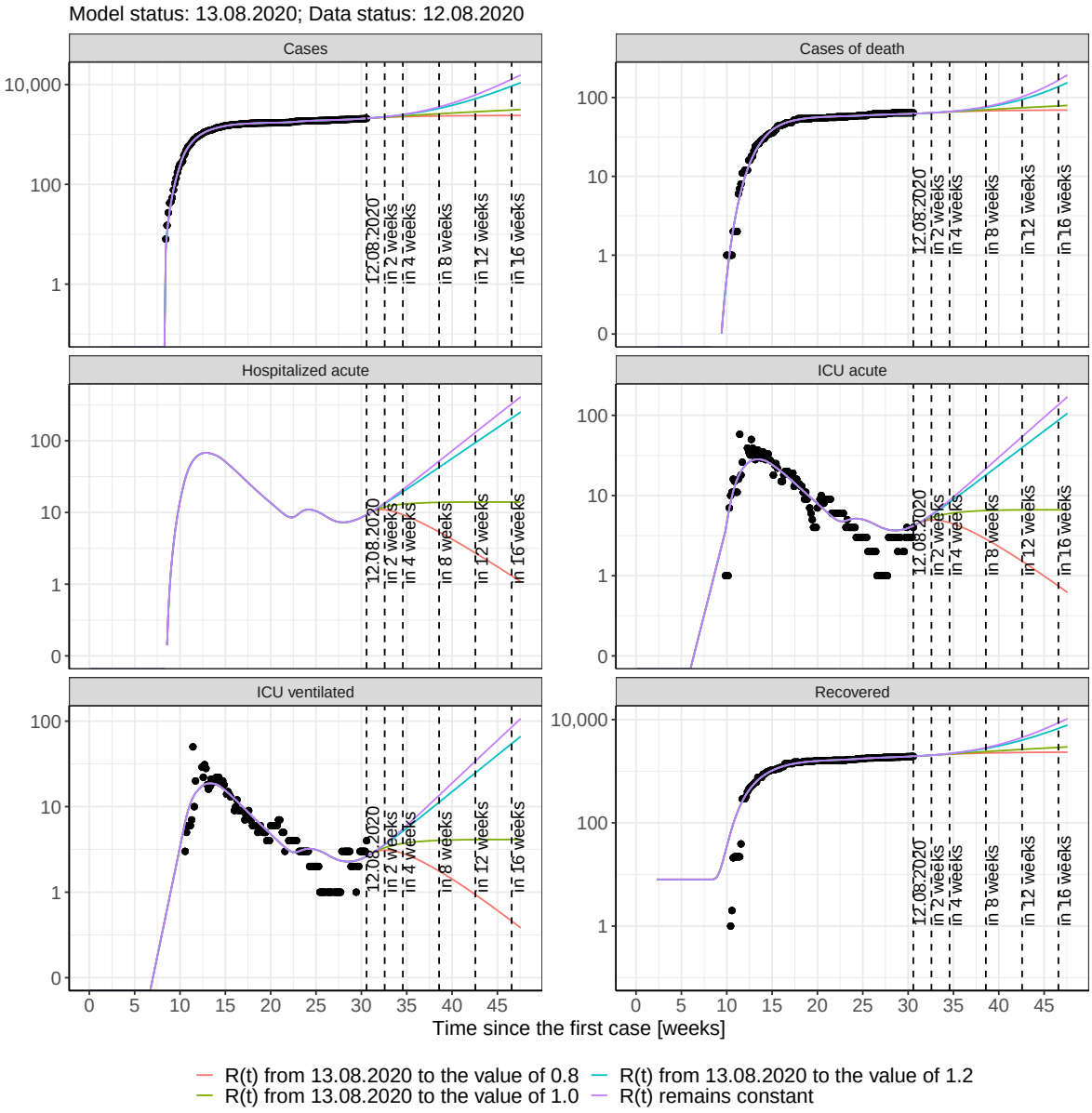


Figure 163: Semi-logarithmic depiction of the model prediction (cases, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Saxony-Anhalt assuming various scenarios after 13.08.2020. Points: reported case numbers;lines: model predictions.

The tables show the modeling results for four conceivable scenarios: Scenario 1: The R(t) estimated value after 13.08.2020 remains the same as today's value (Tab. 54); Scenario 2: The R(t) estimated value after 13.08.2020 takes the value of 0.8 (Tab. 55); Scenario 3: The R(t) estimated value takes the value of 1 after the 13.08.2020 (Tab. 56); Scenario 4: The R(t) estimated value takes the value of 1.2 after the 13.08.2020 (Tab. 57) Model status from 13.08.2020; Data status: 12.08.2020.

Table 54: Saxony-Anhalt - R(t) remains unchanged after the 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	2107	63	1947	10	4	3
14.08.2020	2117	63	1953	10	4	3
15.08.2020	2126	63	1960	10	4	3
16.08.2020	2137	63	1966	10	5	3
17.08.2020	2147	63	1973	11	5	3
18.08.2020	2158	63	1980	11	5	3
19.08.2020	2169	63	1987	11	5	3
20.08.2020	2180	63	1994	11	5	3
21.08.2020	2192	63	2002	12	5	3
22.08.2020	2204	63	2009	12	5	3
23.08.2020	2217	64	2017	12	5	3
24.08.2020	2230	64	2026	13	5	3
25.08.2020	2244	64	2034	13	6	4
26.08.2020	2258	64	2043	14	6	4
27.08.2020	2272	64	2052	14	6	4
28.08.2020	2287	64	2062	14	6	4
29.08.2020	2303	64	2071	15	6	4
30.08.2020	2319	65	2081	15	6	4
31.08.2020	2335	65	2092	16	7	4
01.09.2020	2352	65	2102	16	7	4
02.09.2020	2370	65	2113	17	7	4
03.09.2020	2388	65	2125	17	7	5
04.09.2020	2407	65	2137	18	7	5
05.09.2020	2427	66	2149	18	8	5
06.09.2020	2447	66	2162	19	8	5
07.09.2020	2468	66	2175	20	8	5
08.09.2020	2489	66	2188	20	8	5
09.09.2020	2512	66	2202	21	9	5

Table 55: Saxony-Anhalt - R(t) takes on the value of 0.8 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	2107	63	1947	10	4	3
14.08.2020	2116	63	1953	10	4	3
15.08.2020	2124	63	1960	10	4	3
16.08.2020	2132	63	1966	10	5	3
17.08.2020	2140	63	1973	10	5	3
18.08.2020	2148	63	1979	11	5	3
19.08.2020	2155	63	1986	11	5	3
20.08.2020	2162	63	1993	11	5	3
21.08.2020	2169	63	2000	11	5	3
22.08.2020	2176	63	2007	11	5	3
23.08.2020	2183	64	2014	11	5	3
24.08.2020	2189	64	2021	11	5	3
25.08.2020	2195	64	2028	11	5	3
26.08.2020	2202	64	2035	11	5	3
27.08.2020	2207	64	2042	11	5	3
28.08.2020	2213	64	2049	11	5	3
29.08.2020	2219	64	2056	11	5	3
30.08.2020	2224	64	2063	11	5	3
31.08.2020	2229	65	2069	11	5	3
01.09.2020	2234	65	2076	10	5	3
02.09.2020	2240	65	2083	10	5	3
03.09.2020	2244	65	2089	10	5	3
04.09.2020	2249	65	2096	10	5	3
05.09.2020	2254	65	2102	10	5	3
06.09.2020	2258	65	2108	10	5	3
07.09.2020	2262	65	2114	10	5	3
08.09.2020	2266	65	2120	9	5	3
09.09.2020	2271	66	2126	9	5	3

Table 56: Saxony-Anhalt - R(t) takes on the value of 1.0 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	2107	63	1947	10	4	3
14.08.2020	2116	63	1953	10	4	3
15.08.2020	2125	63	1960	10	4	3
16.08.2020	2134	63	1966	10	5	3
17.08.2020	2143	63	1973	10	5	3
18.08.2020	2152	63	1979	11	5	3
19.08.2020	2161	63	1986	11	5	3
20.08.2020	2170	63	1993	11	5	3
21.08.2020	2179	63	2000	11	5	3
22.08.2020	2188	63	2008	11	5	3
23.08.2020	2197	64	2015	12	5	3
24.08.2020	2206	64	2023	12	5	3
25.08.2020	2215	64	2030	12	5	3
26.08.2020	2224	64	2038	12	5	3
27.08.2020	2232	64	2046	12	5	3
28.08.2020	2241	64	2054	12	5	3
29.08.2020	2250	64	2062	12	5	3
30.08.2020	2259	64	2070	12	6	3
31.08.2020	2268	65	2078	12	6	3
01.09.2020	2277	65	2086	13	6	4
02.09.2020	2286	65	2095	13	6	4
03.09.2020	2295	65	2103	13	6	4
04.09.2020	2304	65	2111	13	6	4
05.09.2020	2313	65	2120	13	6	4
06.09.2020	2322	65	2128	13	6	4
07.09.2020	2331	66	2136	13	6	4
08.09.2020	2340	66	2145	13	6	4
09.09.2020	2348	66	2153	13	6	4

Table 57: Saxony-Anhalt - R(t) takes on the value of 1.2 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	2107	63	1947	10	4	3
14.08.2020	2117	63	1953	10	4	3
15.08.2020	2126	63	1960	10	4	3
16.08.2020	2136	63	1966	10	5	3
17.08.2020	2146	63	1973	11	5	3
18.08.2020	2157	63	1980	11	5	3
19.08.2020	2168	63	1987	11	5	3
20.08.2020	2179	63	1994	11	5	3
21.08.2020	2190	63	2001	12	5	3
22.08.2020	2202	63	2009	12	5	3
23.08.2020	2214	64	2017	12	5	3
24.08.2020	2226	64	2025	13	5	3
25.08.2020	2239	64	2034	13	6	3
26.08.2020	2252	64	2042	13	6	4
27.08.2020	2266	64	2051	14	6	4
28.08.2020	2280	64	2060	14	6	4
29.08.2020	2294	64	2070	14	6	4
30.08.2020	2309	65	2079	15	6	4
31.08.2020	2324	65	2089	15	6	4
01.09.2020	2340	65	2100	16	7	4
02.09.2020	2356	65	2110	16	7	4
03.09.2020	2372	65	2121	16	7	4
04.09.2020	2389	65	2132	17	7	5
05.09.2020	2406	66	2144	17	7	5
06.09.2020	2424	66	2156	18	8	5
07.09.2020	2443	66	2168	18	8	5
08.09.2020	2462	66	2181	19	8	5
09.09.2020	2481	66	2194	19	8	5

15.2.3 Prediction for the next 4 weeks under the assumption of different scenarios from 13.08.2020

Fig. 164 shows the absolute changes in case numbers compared to the previous day for the next 4 weeks for different R(t) values. If no bars are shown on the plot it means that the number of cases has not changed compared to the previous day.

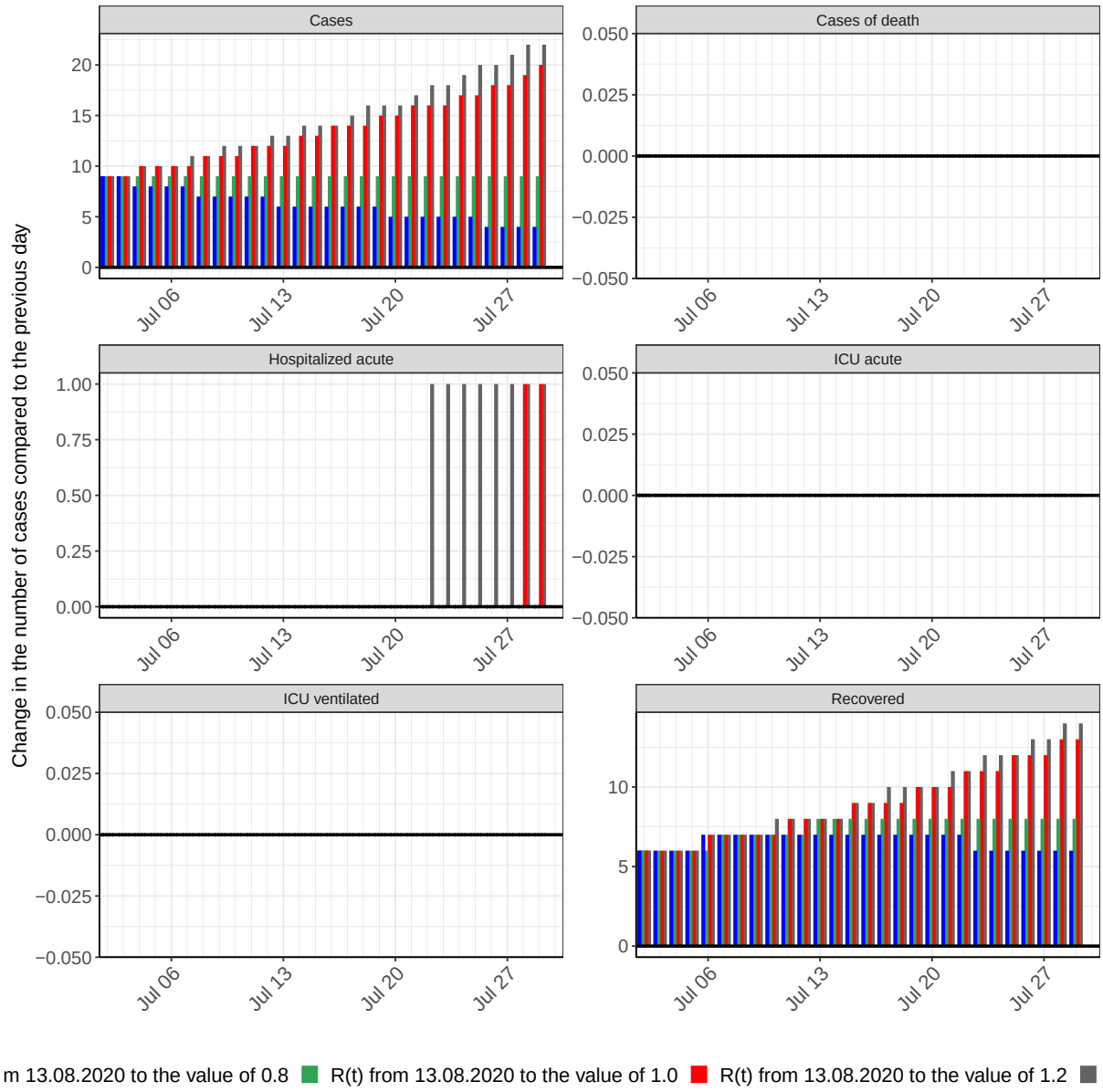


Figure 164: Simulation of daily new cases for the next 4 weeks - Saxony-Anhalt

16 Schleswig-Holstein

16.1 Model description

Fig. 165 depicts the results of the modeling (lines) compared to the observed data (points) for Schleswig-Holstein on a linear (A) and semi-logarithmic (B) scale.

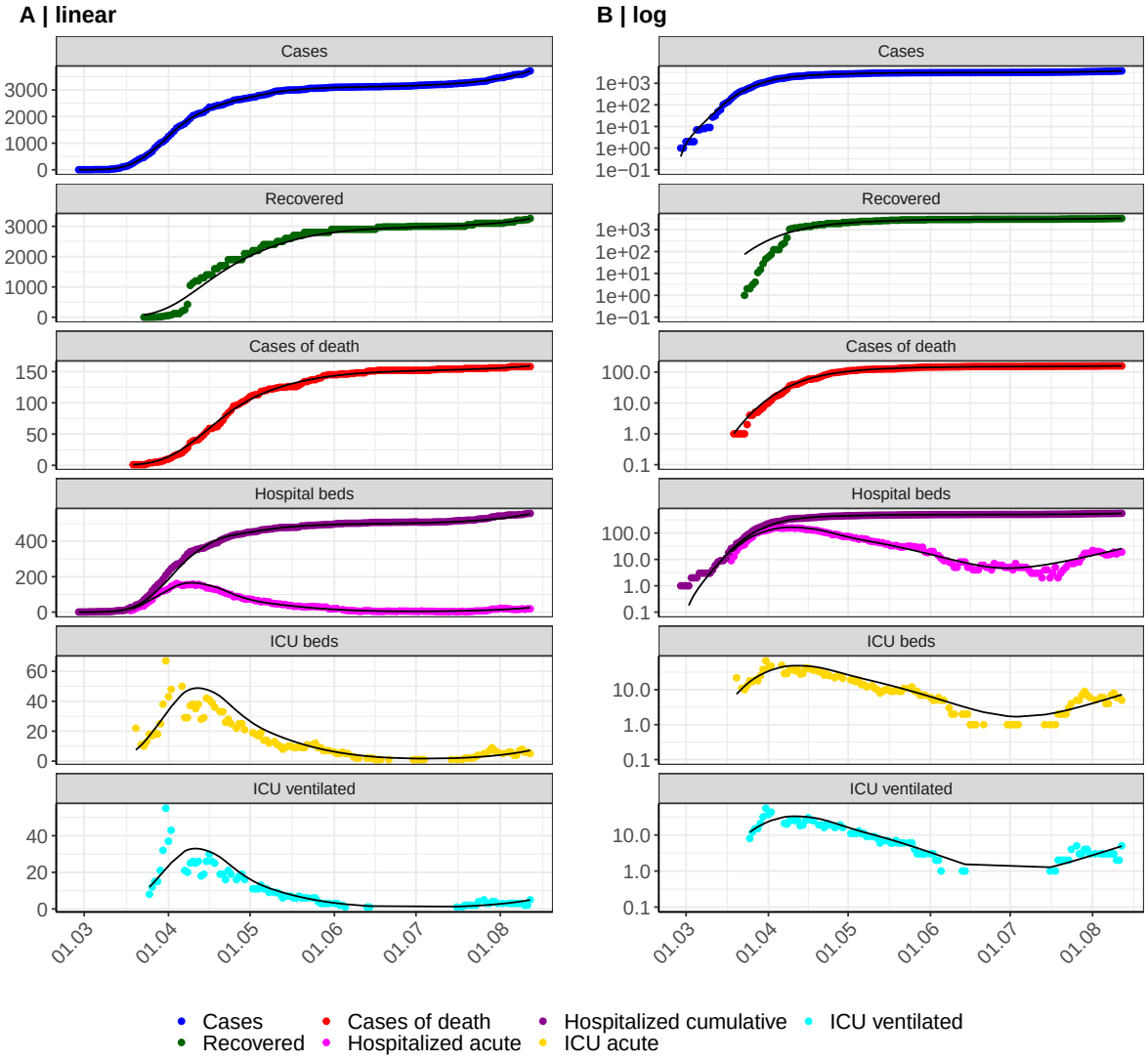


Figure 165: Model description of the reported case numbers, occupancy of hospital beds, recovery and deaths in Schleswig-Holstein. Points: reported data; lines: model description.

Fig. 166 shows the goodness-of-fit for Schleswig-Holstein. The values calculated by the model are plotted against the observed data. If the model fit is good, the points scatter randomly along the lines of identity.

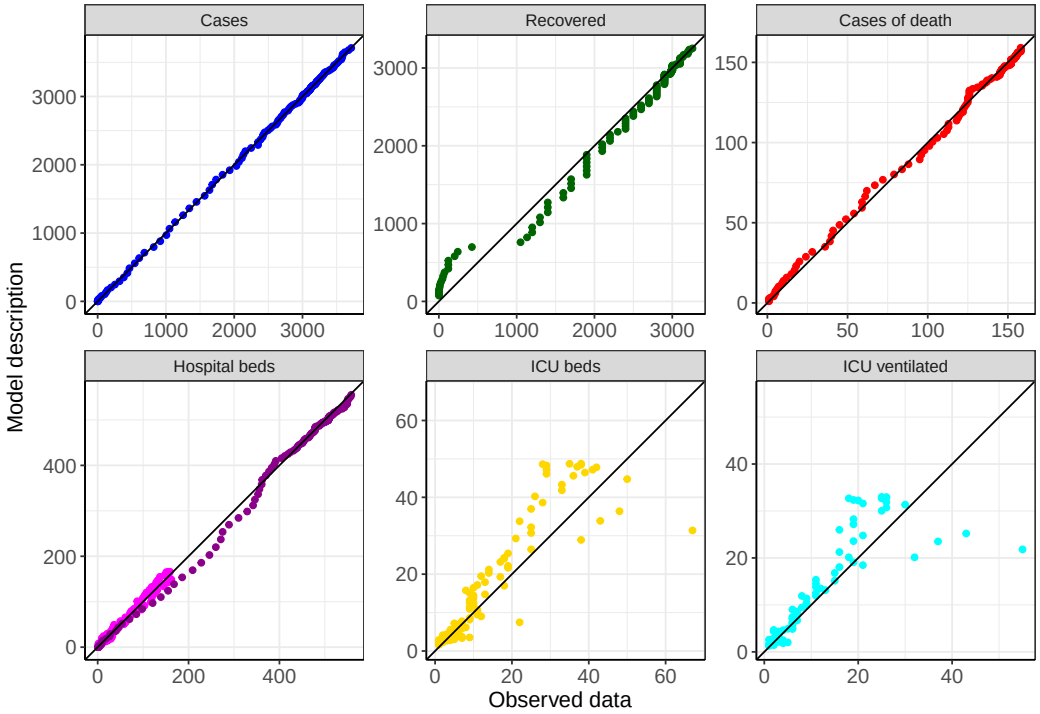


Figure 166: Goodness-of-fit plots for Schleswig-Holstein. Lines: lines of identity.

Fig. 167 shows the influence of non-pharmaceutical interventions (NPI) on R(t) for Schleswig-Holstein (red line) in comparison with the other federal states (grey lines).

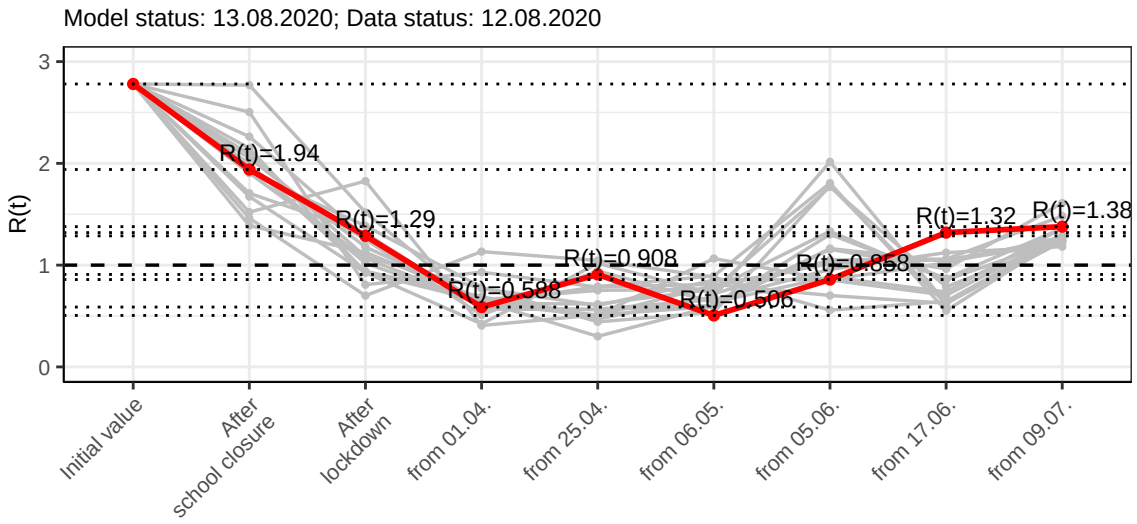


Figure 167: R(t) values before and after the NPIs for Schleswig-Holstein

Fig. 168 shows the R(t) estimated value for Schleswig-Holstein (red line) over time in comparison with the other federal states (grey lines).

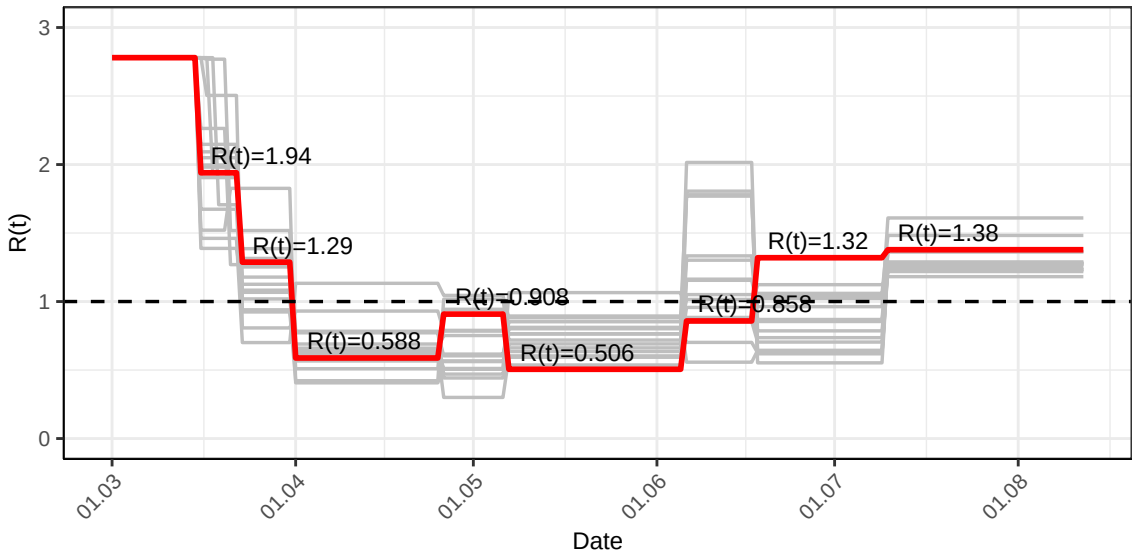


Figure 168: R(t) values over time for Schleswig-Holstein

16.2 Model predictions

16.2.1 Prediction for the next 4 weeks assuming that R(t) estimate will not change (R(t) = 1.38)

Fig. 169 and 170 depict the the model predictions for the next 4 weeks for Schleswig-Holstein on a linear (169) and a semi-logarithmic (170) scale. The modeling was carried out under the assumption that the R(t) estimated value would remain the same.

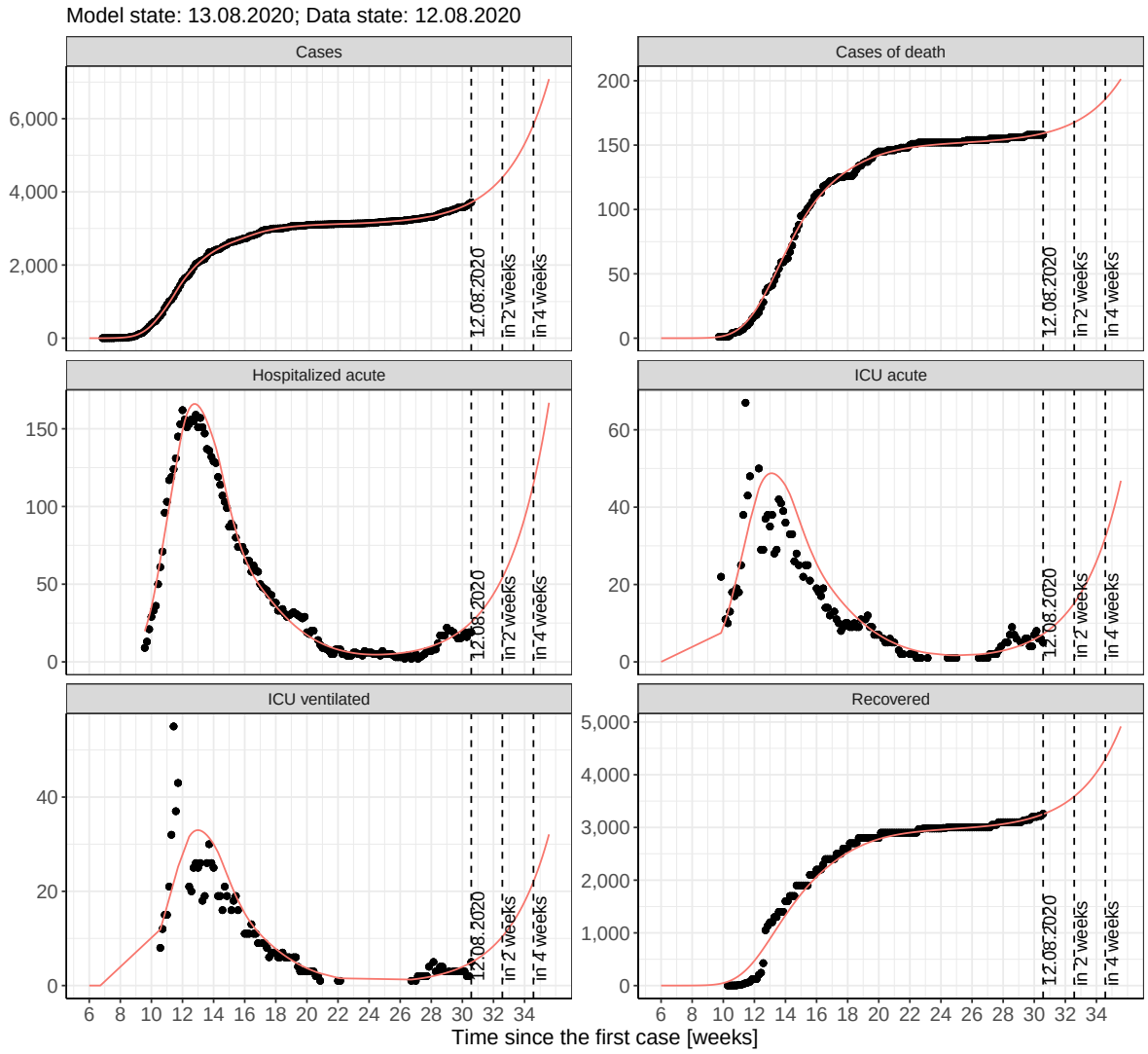


Figure 169: Representation of the model predictions for Schleswig-Holstein for the next 4 weeks under the assumption that the R(t) estimate remains the same on linear scale (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths). Points: Reported case numbers; Red lines: Model predictions.

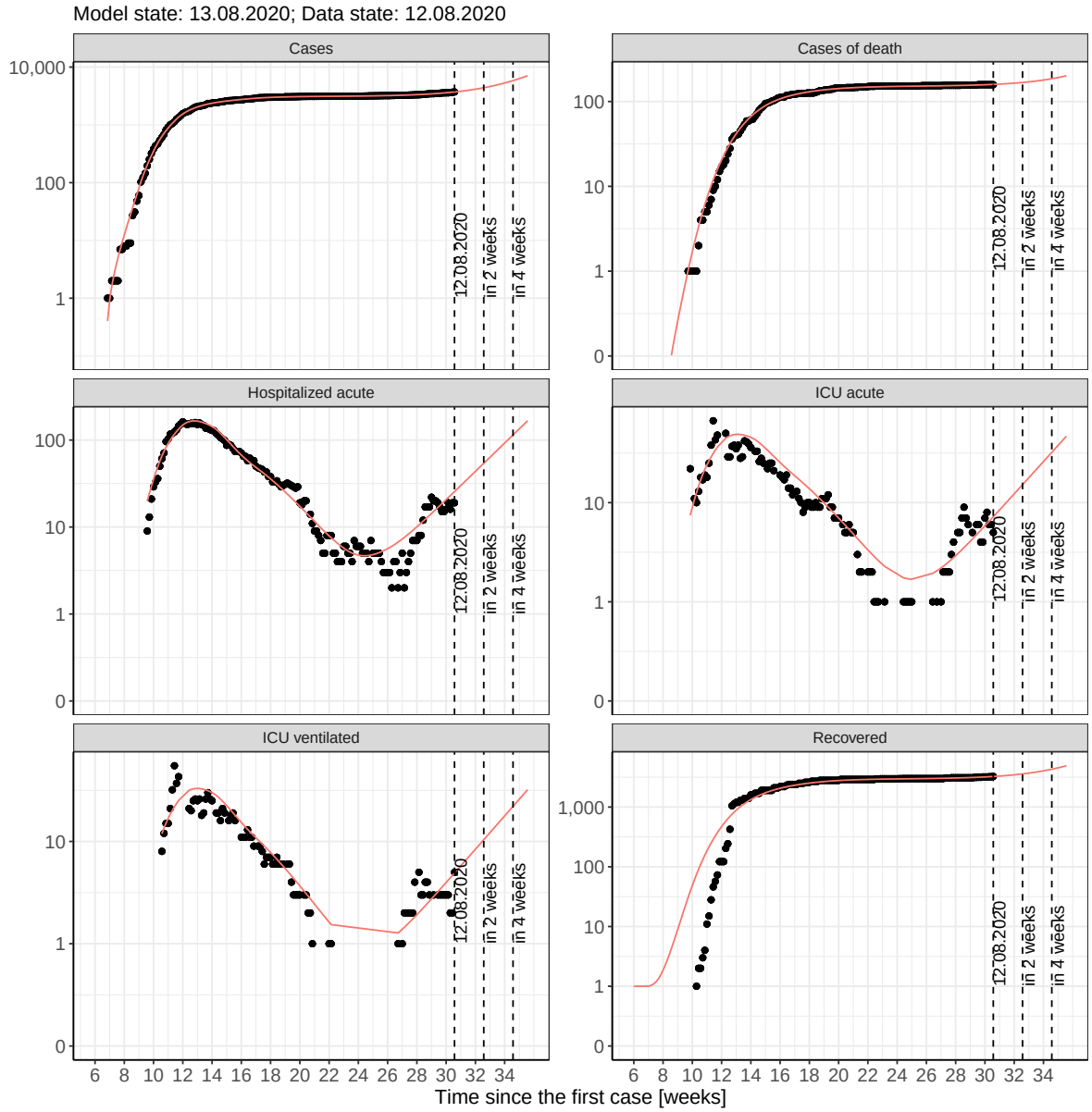


Figure 170: Semi-logarithmic representation of the model prediction (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Schleswig-Holstein for the next 4 weeks under the assumption that the R(t) estimate remains the same. Points: Reported case numbers; Red lines: Model predictions.

16.2.2 Predictions for the next 4 weeks assuming different scenarios (with the R(t) value above 1.2) from 13.08.2020

Fig. 171 and 172 represent the model prediction for the next 4 weeks for Schleswig-Holstein on a linear (171) and a semi-logarithmic (172) scale. In this simulation different scenarios of the possible development (R(t) = 1.4, 1.6, 1.8 and staying the same) from 13.08.2020 were tested.

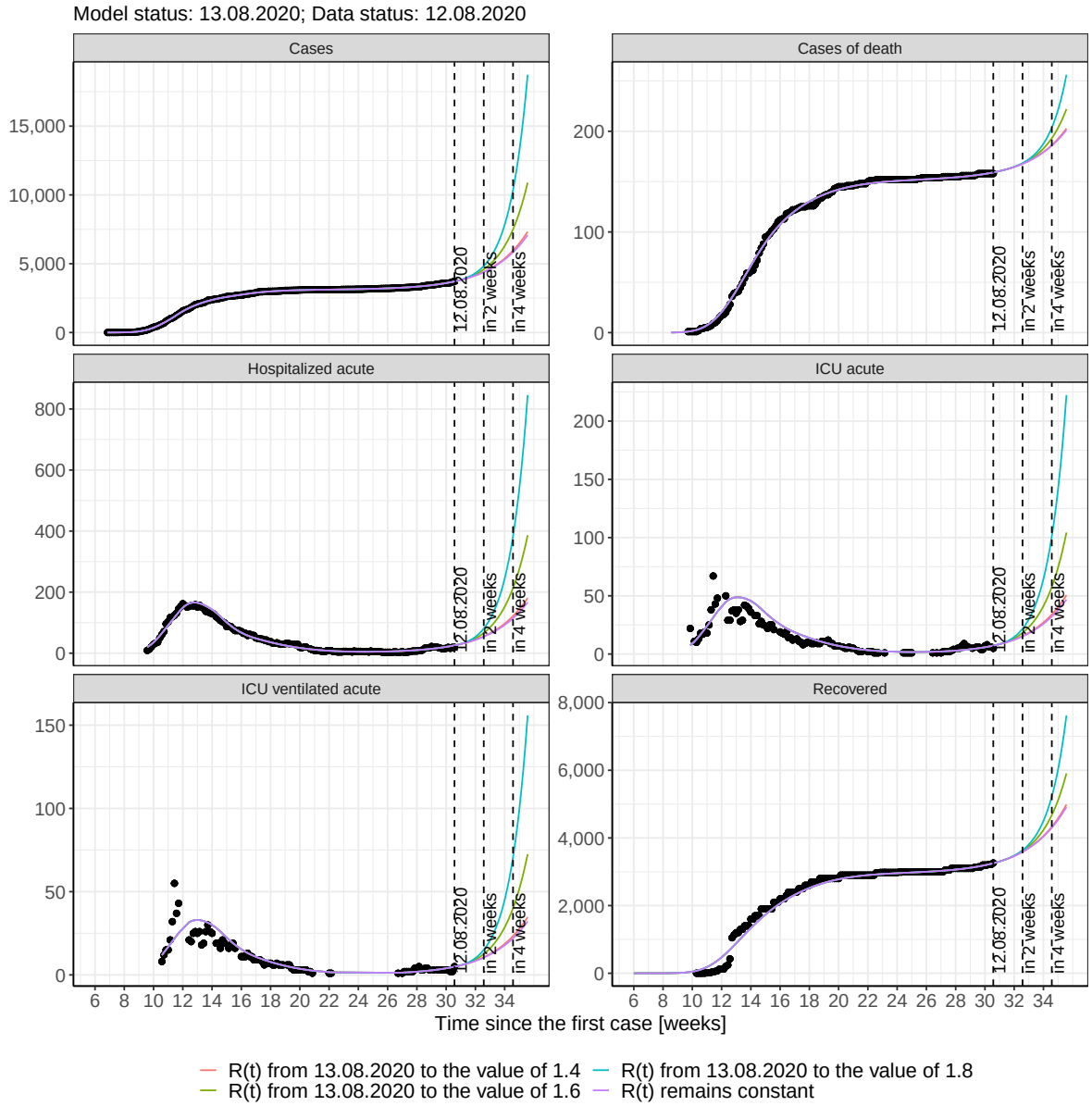


Figure 171: Linear representation of model prediction (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Schleswig-Holstein assuming various scenarios from the 13.08.2020. Points: Reported case numbers; Lines: Model predictions.

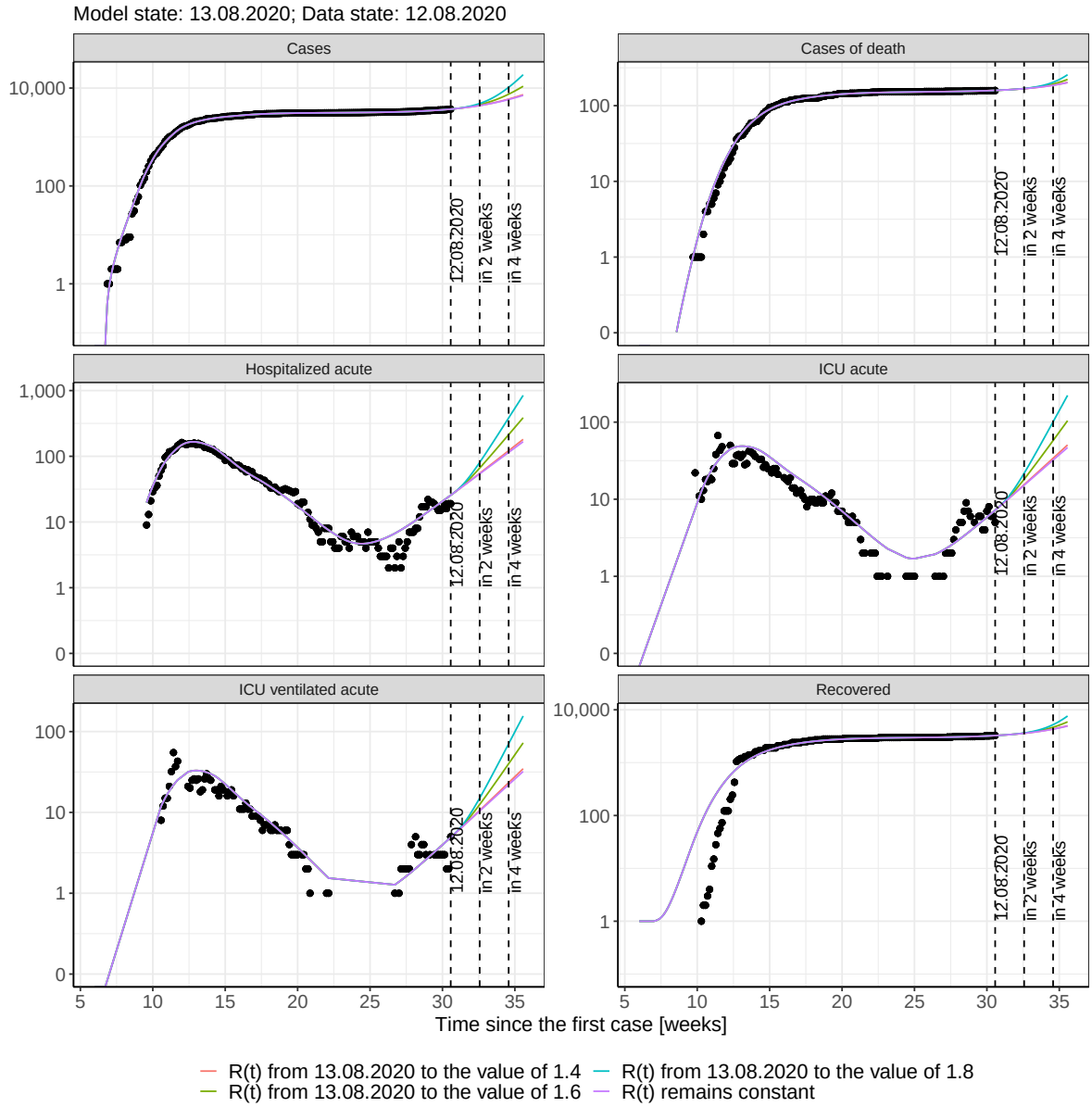


Figure 172: Semi-logarithmic representation of model predictions (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Schleswig-Holstein assuming various scenarios from the 13.08.2020. Points: Reported case numbers; Lines: Model predictions.

Fig. 173 and 174 represent the model prediction for the next 16 weeks for Schleswig-Holstein on a linear (173) and a semi-logarithmic (174) scale. In this simulation different scenarios of the possible course from the 13.08.2020 were tested.

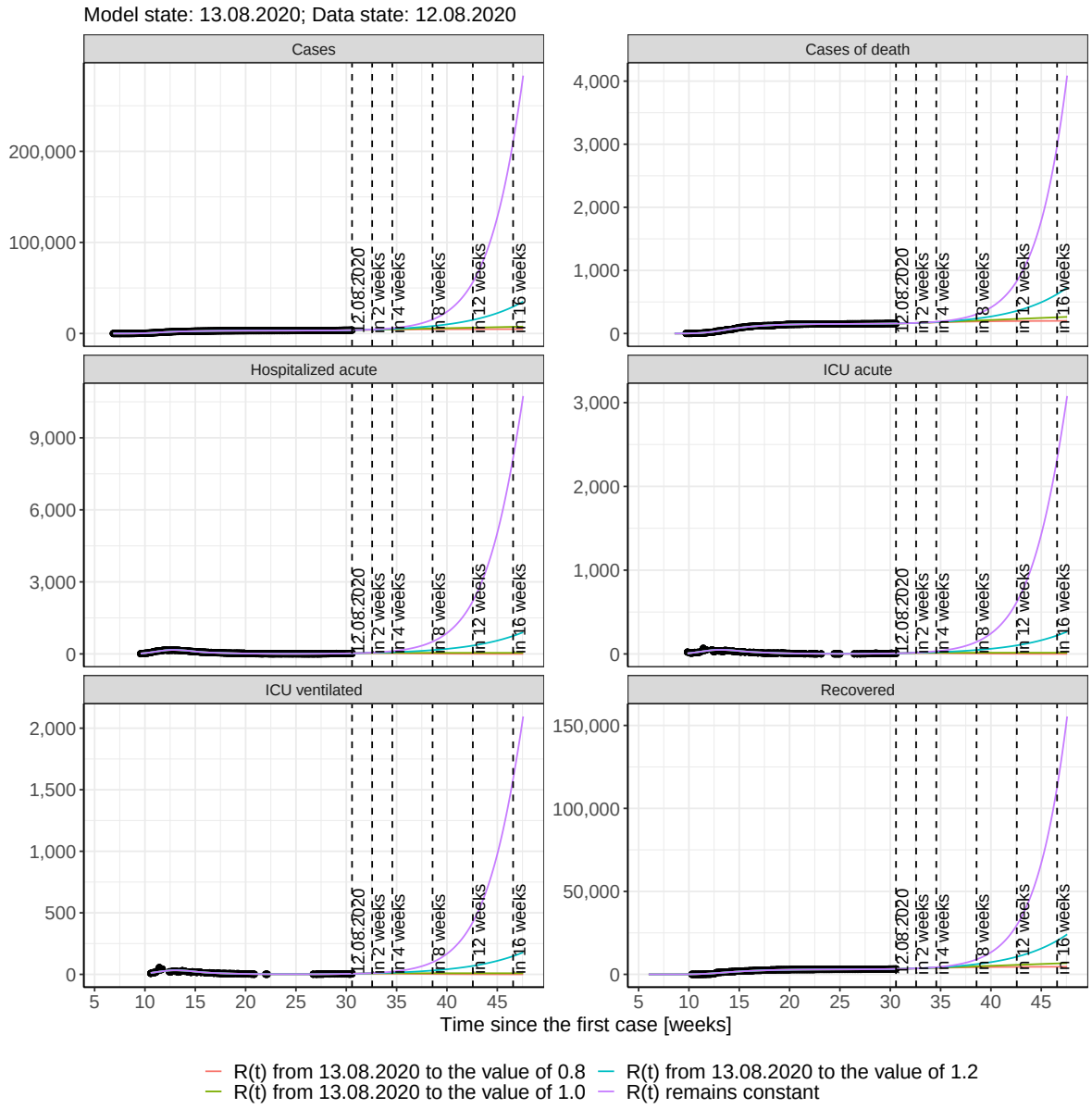


Figure 173: Linear representation of model predictions (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Schleswig-Holstein assuming various scenarios from the 13.08.2020. Points: reported case numbers; lines: model prediction.

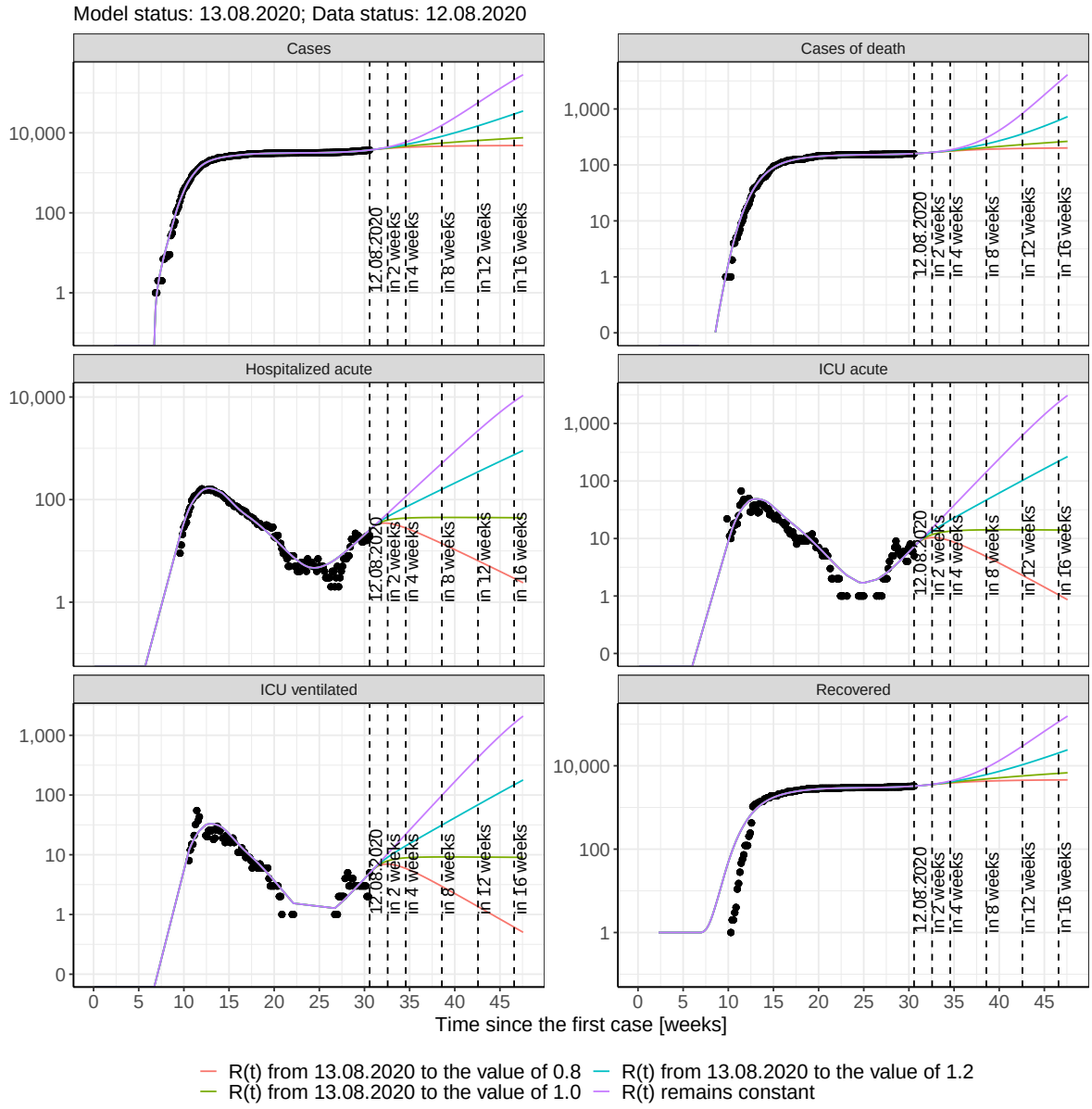


Figure 174: Semi-logarithmic depiction of the model prediction (cases, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Schleswig-Holstein assuming various scenarios after 13.08.2020. Points: reported case numbers;lines: model predictions.

The tables show the modeling results for four conceivable scenarios: Scenario 1: The R(t) estimated value after 13.08.2020 remains the same as today's value (Tab. 58); Scenario 2: The R(t) estimated value after 13.08.2020 takes the value of 0.8 (Tab. 59); Scenario 3: The R(t) estimated value takes the value of 1 after the 13.08.2020 (Tab. 60); Scenario 4: The R(t) estimated value takes the value of 1.2 after the 13.08.2020 (Tab. 61) Model status from 13.08.2020; Data status: 12.08.2020.

Table 58: Schleswig-Holstein - R(t) remains unchanged after the 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	3744	160	3268	27	8	5
14.08.2020	3779	160	3286	28	8	5
15.08.2020	3817	160	3304	30	8	6
16.08.2020	3856	161	3324	32	9	6
17.08.2020	3898	161	3344	33	9	6
18.08.2020	3942	162	3366	35	10	7
19.08.2020	3988	163	3389	37	10	7
20.08.2020	4037	163	3413	39	11	8
21.08.2020	4088	164	3438	41	12	8
22.08.2020	4143	165	3465	44	12	8
23.08.2020	4200	165	3493	46	13	9
24.08.2020	4261	166	3523	49	14	9
25.08.2020	4324	167	3555	51	14	10
26.08.2020	4392	168	3588	54	15	10
27.08.2020	4463	169	3623	57	16	11
28.08.2020	4538	170	3660	60	17	12
29.08.2020	4617	170	3699	64	18	12
30.08.2020	4701	172	3740	67	19	13
31.08.2020	4789	173	3784	71	20	14
01.09.2020	4882	174	3830	75	21	14
02.09.2020	4980	175	3878	79	22	15
03.09.2020	5084	176	3929	83	23	16
04.09.2020	5193	178	3983	88	25	17
05.09.2020	5309	179	4040	92	26	18
06.09.2020	5430	181	4100	98	27	19
07.09.2020	5559	182	4163	103	29	20
08.09.2020	5694	184	4230	109	30	21
09.09.2020	5837	186	4301	115	32	22

Table 59: Schleswig-Holstein - R(t) takes on the value of 0.8 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	3743	160	3268	27	8	5
14.08.2020	3774	160	3286	28	8	5
15.08.2020	3804	160	3304	30	8	6
16.08.2020	3834	161	3323	31	9	6
17.08.2020	3862	161	3343	32	9	6
18.08.2020	3890	162	3364	33	9	6
19.08.2020	3917	163	3385	33	10	7
20.08.2020	3944	163	3407	34	10	7
21.08.2020	3969	164	3429	34	10	7
22.08.2020	3994	164	3452	35	10	7
23.08.2020	4018	165	3475	35	10	7
24.08.2020	4042	166	3499	35	10	7
25.08.2020	4064	166	3522	35	10	7
26.08.2020	4086	167	3546	35	10	7
27.08.2020	4108	168	3570	34	10	7
28.08.2020	4129	168	3593	34	10	7
29.08.2020	4149	169	3617	34	10	7
30.08.2020	4169	170	3640	33	10	7
31.08.2020	4188	170	3664	33	10	7
01.09.2020	4207	171	3687	32	10	7
02.09.2020	4225	172	3710	32	10	7
03.09.2020	4242	172	3733	31	10	7
04.09.2020	4260	173	3755	31	10	6
05.09.2020	4276	174	3777	30	10	6
06.09.2020	4292	174	3799	30	10	6
07.09.2020	4308	175	3821	29	9	6
08.09.2020	4323	176	3842	29	9	6
09.09.2020	4338	176	3862	28	9	6

Table 60: Schleswig-Holstein - R(t) takes on the value of 1.0 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	3743	160	3268	27	8	5
14.08.2020	3776	160	3286	28	8	5
15.08.2020	3808	160	3304	30	8	6
16.08.2020	3841	161	3323	31	9	6
17.08.2020	3874	161	3344	32	9	6
18.08.2020	3906	162	3364	34	10	6
19.08.2020	3939	163	3386	35	10	7
20.08.2020	3971	163	3409	36	10	7
21.08.2020	4004	164	3432	36	10	7
22.08.2020	4036	164	3456	37	11	7
23.08.2020	4069	165	3481	38	11	7
24.08.2020	4102	166	3506	39	11	8
25.08.2020	4134	166	3532	39	11	8
26.08.2020	4167	167	3558	40	12	8
27.08.2020	4199	168	3585	40	12	8
28.08.2020	4232	169	3612	41	12	8
29.08.2020	4264	169	3640	41	12	8
30.08.2020	4297	170	3668	42	12	8
31.08.2020	4329	171	3696	42	13	8
01.09.2020	4362	172	3724	42	13	8
02.09.2020	4394	173	3753	42	13	9
03.09.2020	4427	173	3782	43	13	9
04.09.2020	4459	174	3812	43	13	9
05.09.2020	4492	175	3842	43	13	9
06.09.2020	4524	176	3871	43	13	9
07.09.2020	4556	177	3901	43	13	9
08.09.2020	4589	178	3931	44	13	9
09.09.2020	4621	179	3962	44	13	9

Table 61: Schleswig-Holstein - R(t) takes on the value of 1.2 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	3744	160	3268	27	8	5
14.08.2020	3778	160	3286	28	8	5
15.08.2020	3813	160	3304	30	8	6
16.08.2020	3849	161	3324	31	9	6
17.08.2020	3886	161	3344	33	9	6
18.08.2020	3924	162	3365	34	10	7
19.08.2020	3963	163	3388	36	10	7
20.08.2020	4004	163	3411	37	11	7
21.08.2020	4045	164	3435	39	11	8
22.08.2020	4088	164	3460	40	11	8
23.08.2020	4132	165	3487	42	12	8
24.08.2020	4177	166	3514	43	12	8
25.08.2020	4223	167	3543	45	13	9
26.08.2020	4271	167	3572	47	13	9
27.08.2020	4320	168	3603	48	14	9
28.08.2020	4371	169	3635	50	14	10
29.08.2020	4423	170	3668	51	15	10
30.08.2020	4477	171	3702	53	15	10
31.08.2020	4532	172	3737	55	16	11
01.09.2020	4588	173	3773	56	16	11
02.09.2020	4647	174	3811	58	17	11
03.09.2020	4707	175	3849	60	17	12
04.09.2020	4768	176	3889	62	18	12
05.09.2020	4832	177	3930	64	18	13
06.09.2020	4897	178	3973	65	19	13
07.09.2020	4964	179	4016	67	20	13
08.09.2020	5033	180	4062	69	20	14
09.09.2020	5104	182	4108	71	21	14

16.2.3 Prediction for the next 4 weeks under the assumption of different scenarios from 13.08.2020

Fig. 175 shows the absolute changes in case numbers compared to the previous day for the next 4 weeks for different R(t) values. If no bars are shown on the plot it means that the number of cases has not changed compared to the previous day.

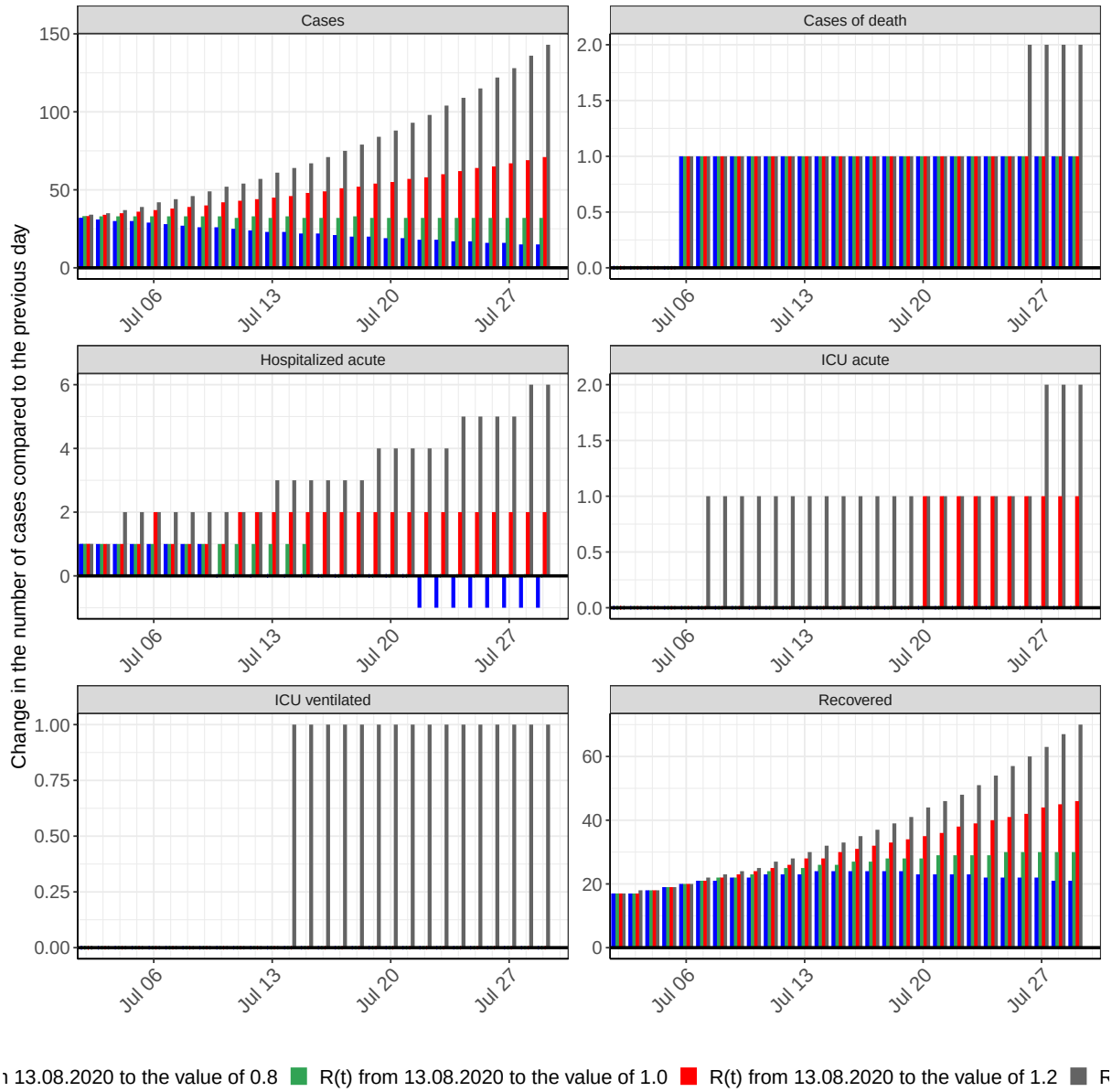


Figure 175: Simulation of daily new cases for the next 4 weeks - Schleswig-Holstein

17 Thuringia

17.1 Model description

Fig. 176 depicts the results of the modeling (lines) compared to the observed data (points) for Thuringia on a linear (A) and semi-logarithmic (B) scale.

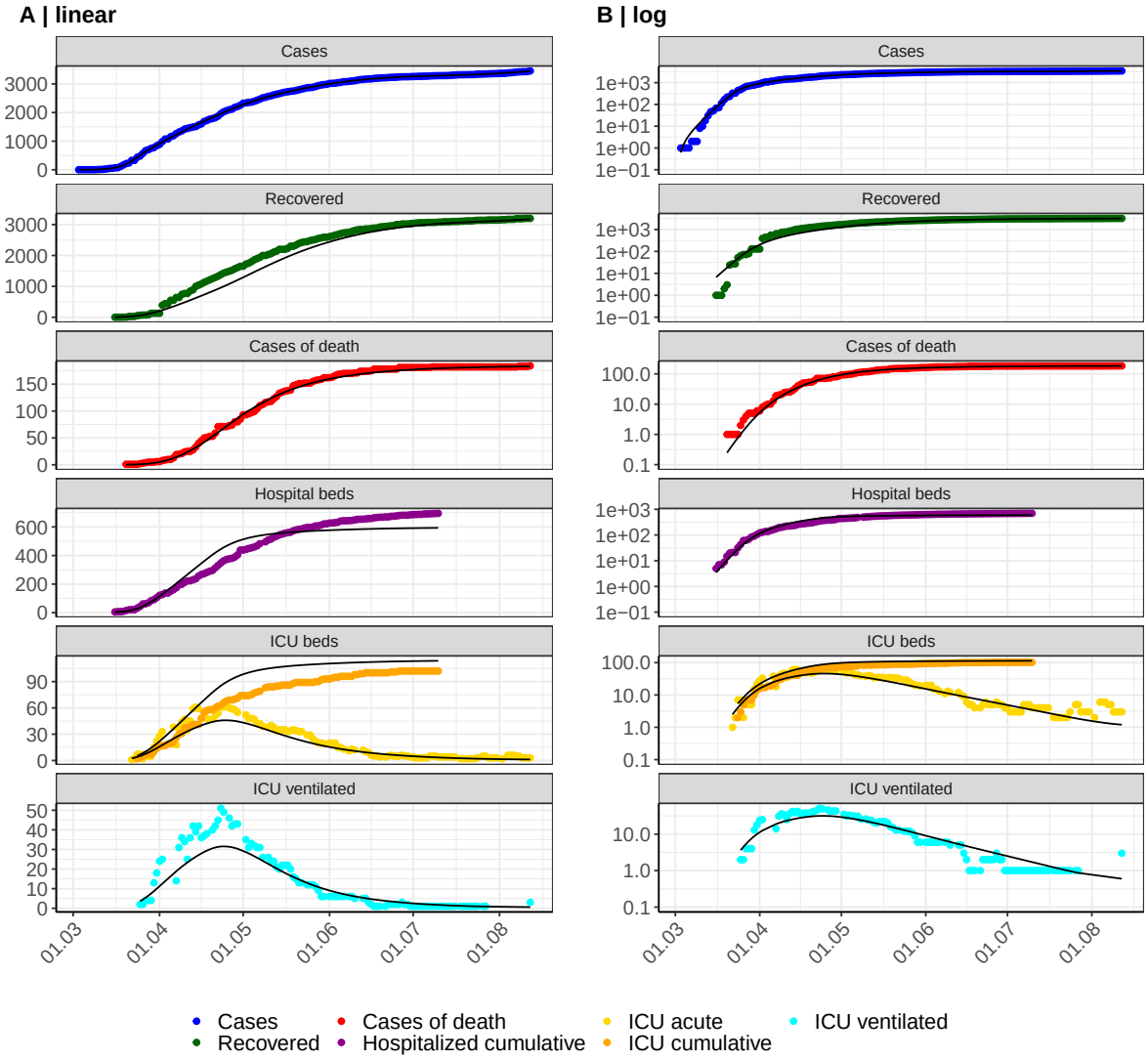


Figure 176: Model description of the reported case numbers, occupancy of hospital beds, recovery and deaths in Thuringia. Points: reported data; lines: model description.

Fig. 177 shows the goodness-of-fit for Thuringia. The values calculated by the model are plotted against the observed data. If the model fit is good, the points scatter randomly along the lines of identity.

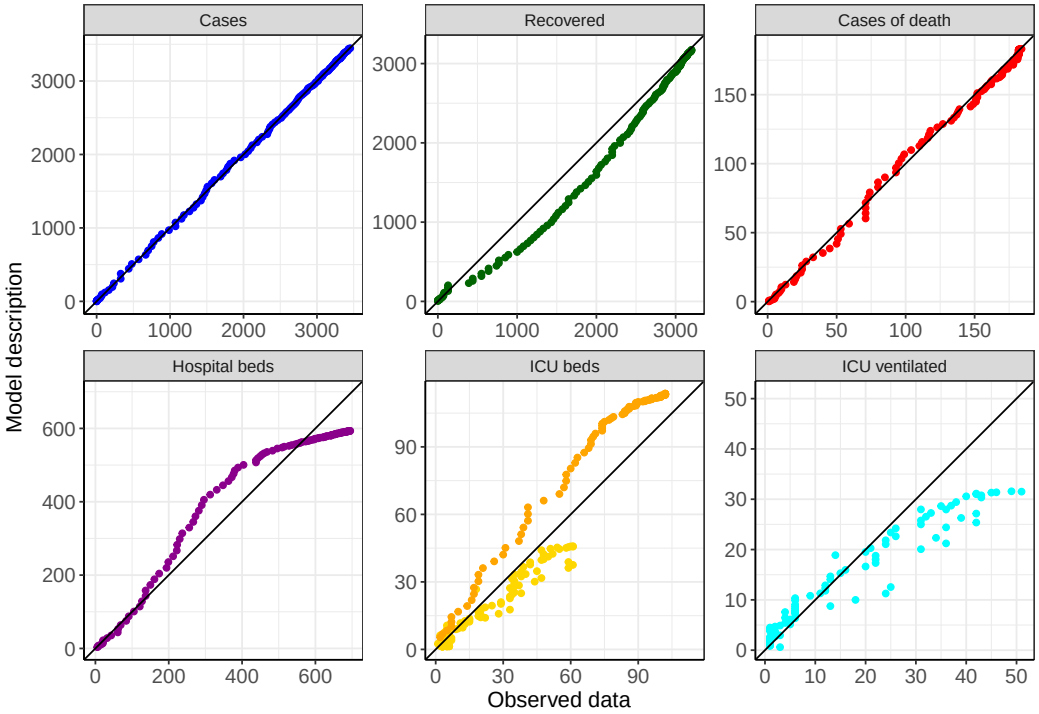


Figure 177: Goodness-of-fit plots for Thuringia. Lines: lines of identity.

Fig. 178 shows the influence of non-pharmaceutical interventions (NPI) on R(t) for Thuringia (red line) in comparison with the other federal states (grey lines).

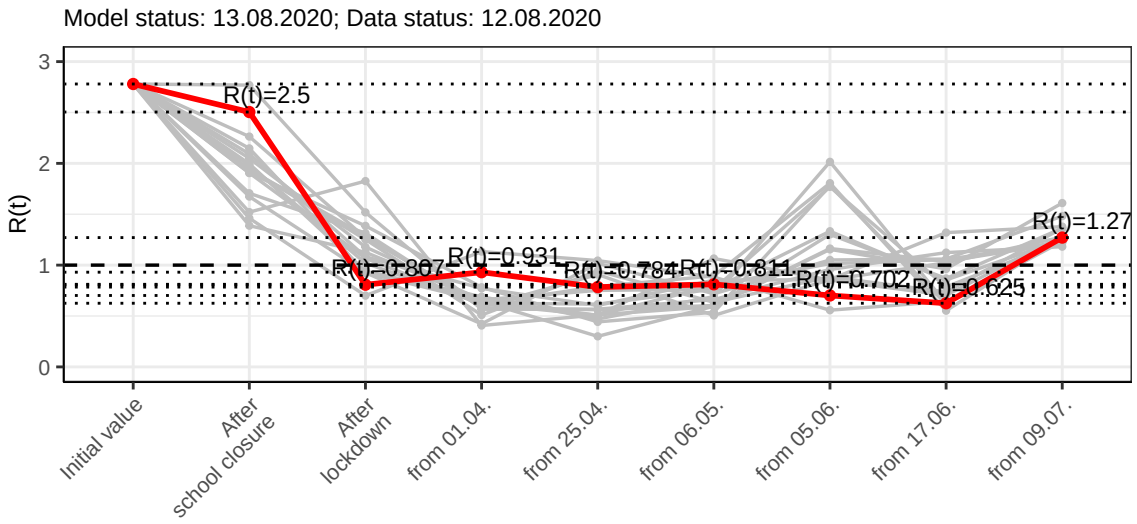


Figure 178: R(t) values before and after the NPIs for Thuringia

Fig. 179 shows the R(t) estimated value for Thuringia (red line) over time in comparison with the other federal states (grey lines).

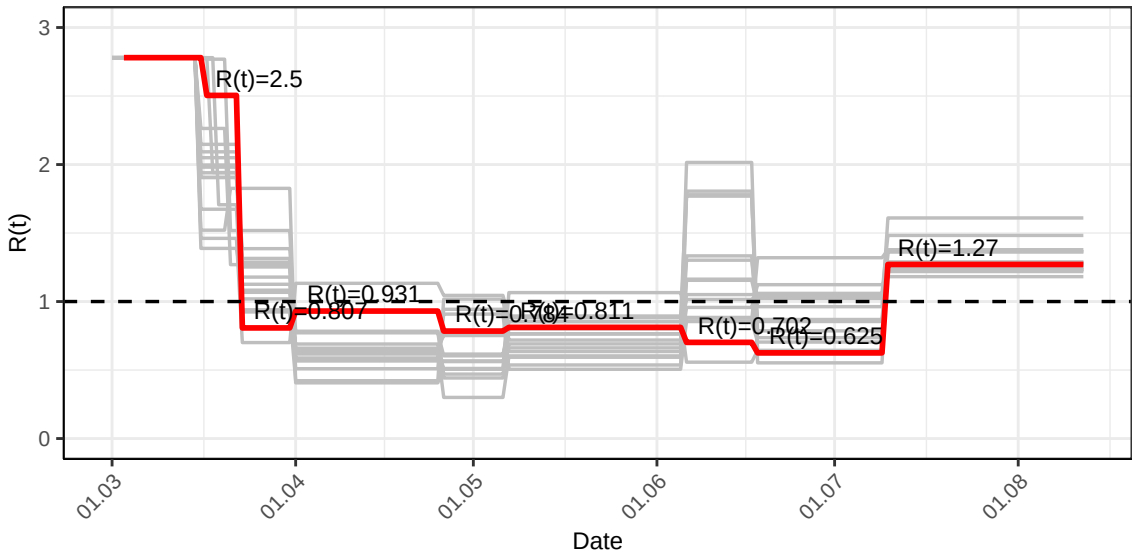


Figure 179: R(t) values over time for Thuringia

17.2 Model predictions

17.2.1 Prediction for the next 4 weeks assuming that R(t) estimate will not change (R(t) = 1.27)

Fig. 180 and 181 depict the the model predictions for the next 4 weeks for Thuringia on a linear (180) and a semi-logarithmic (181) scale. The modeling was carried out under the assumption that the R(t) estimated value would remain the same.

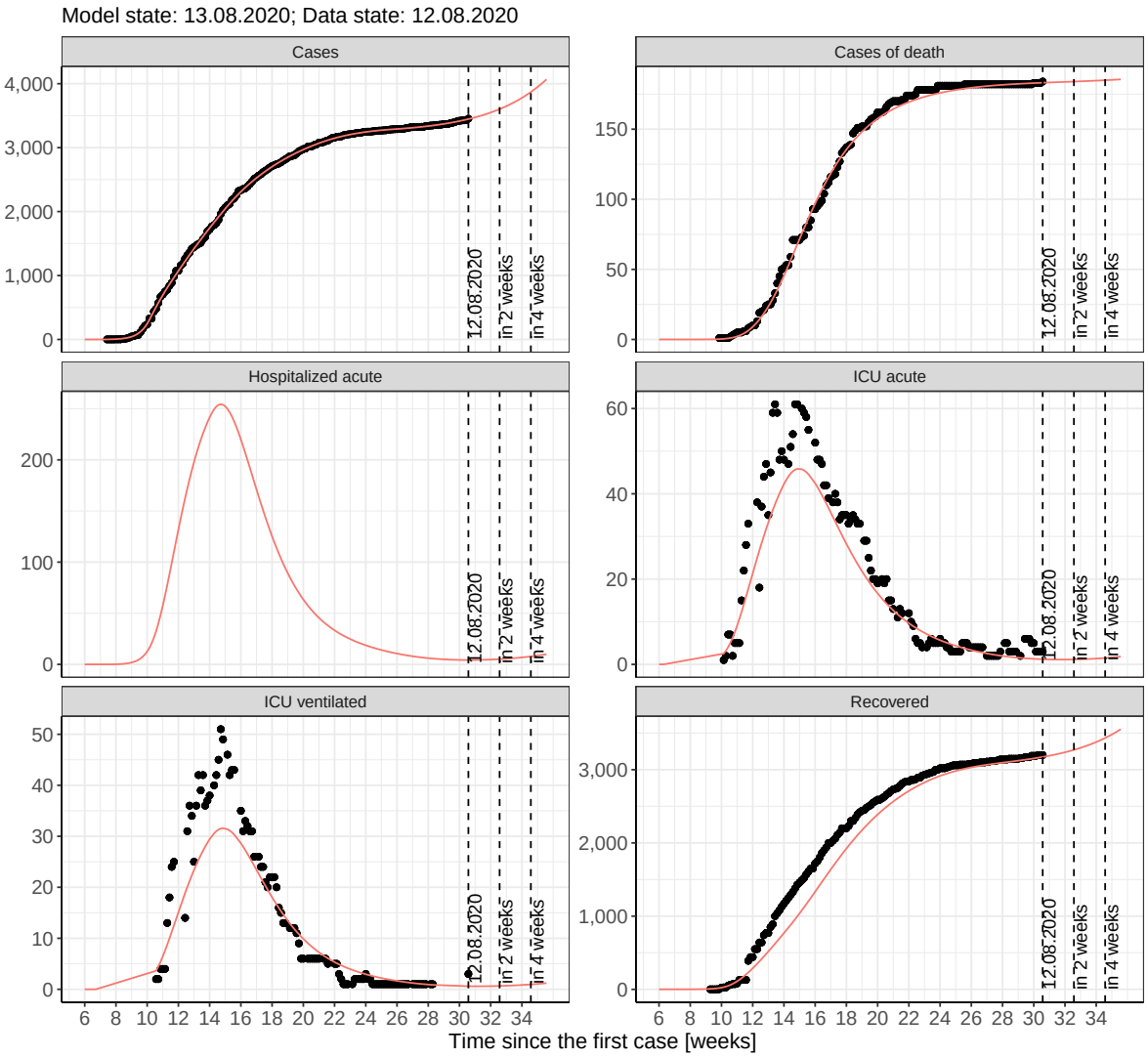


Figure 180: Representation of the model predictions for Thuringia for the next 4 weeks under the assumption that the R(t) estimate remains the same on linear scale (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths). Points: Reported case numbers; Red lines: Model predictions.

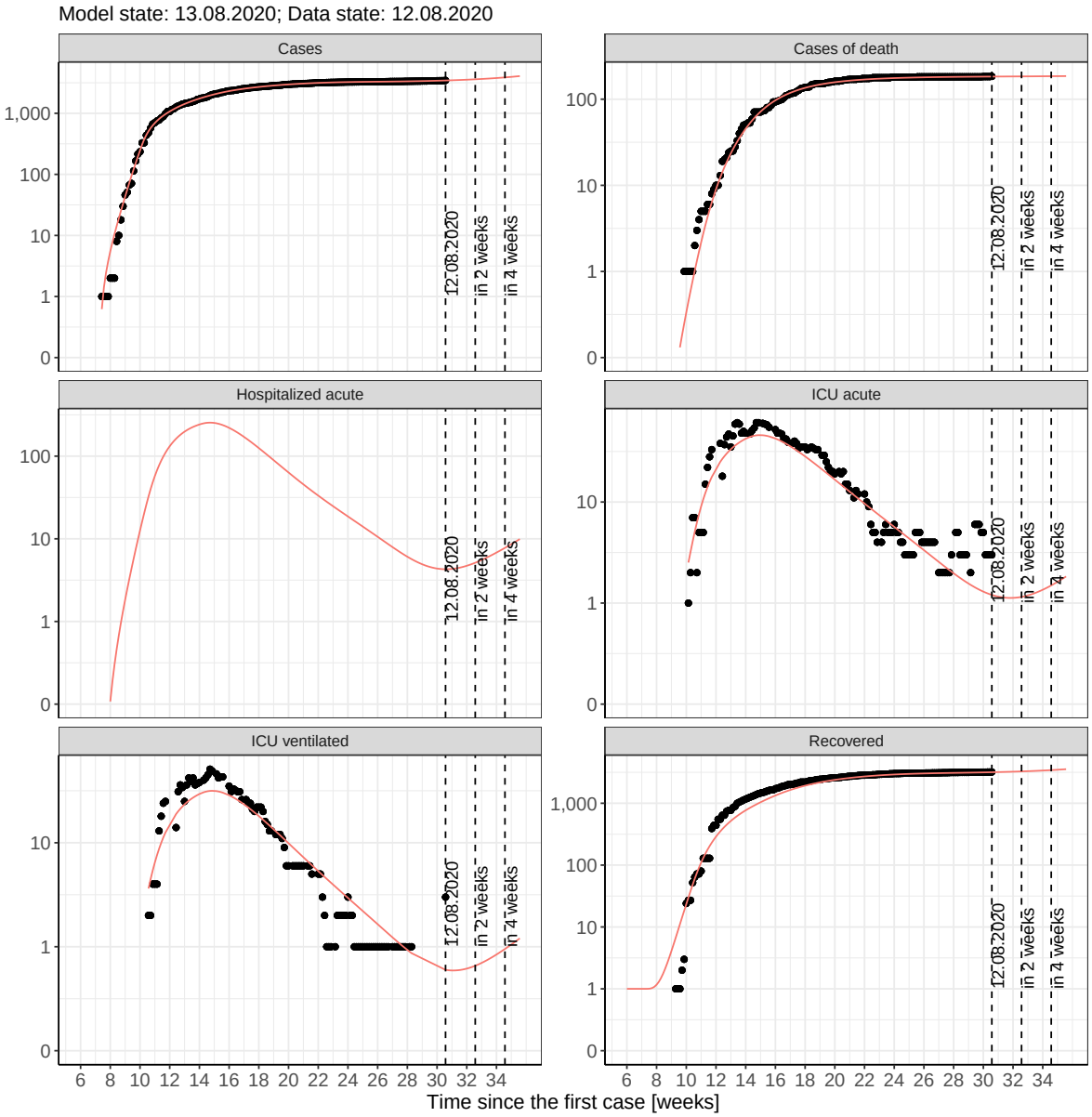


Figure 181: Semi-logarithmic representation of the model prediction (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Thuringia for the next 4 weeks under the assumption that the R(t) estimate remains the same. Points: Reported case numbers; Red lines: Model predictions.

17.2.2 Predictions for the next 4 weeks assuming different scenarios (with the R(t) value above 1.2) from 13.08.2020

Fig. 182 and 183 represent the model prediction for the next 4 weeks for Thuringia on a linear (182) and a semi-logarithmic (183) scale. In this simulation different scenarios of the possible development (R(t) = 1.4, 1.6, 1.8 and staying the same) from 13.08.2020 were tested.

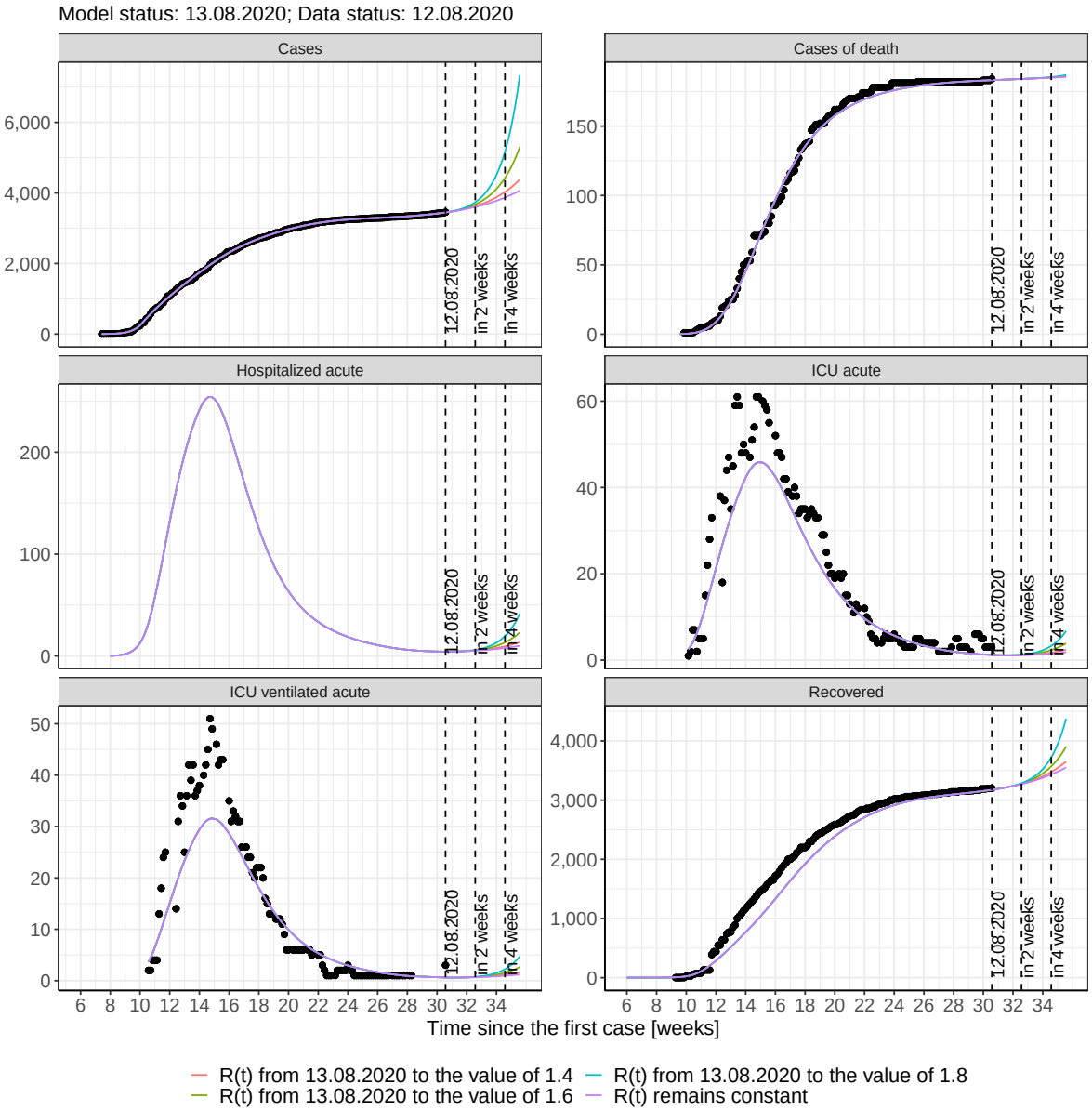


Figure 182: Linear representation of model prediction (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Thuringia assuming various scenarios from the 13.08.2020. Points: Reported case numbers; Lines: Model predictions.

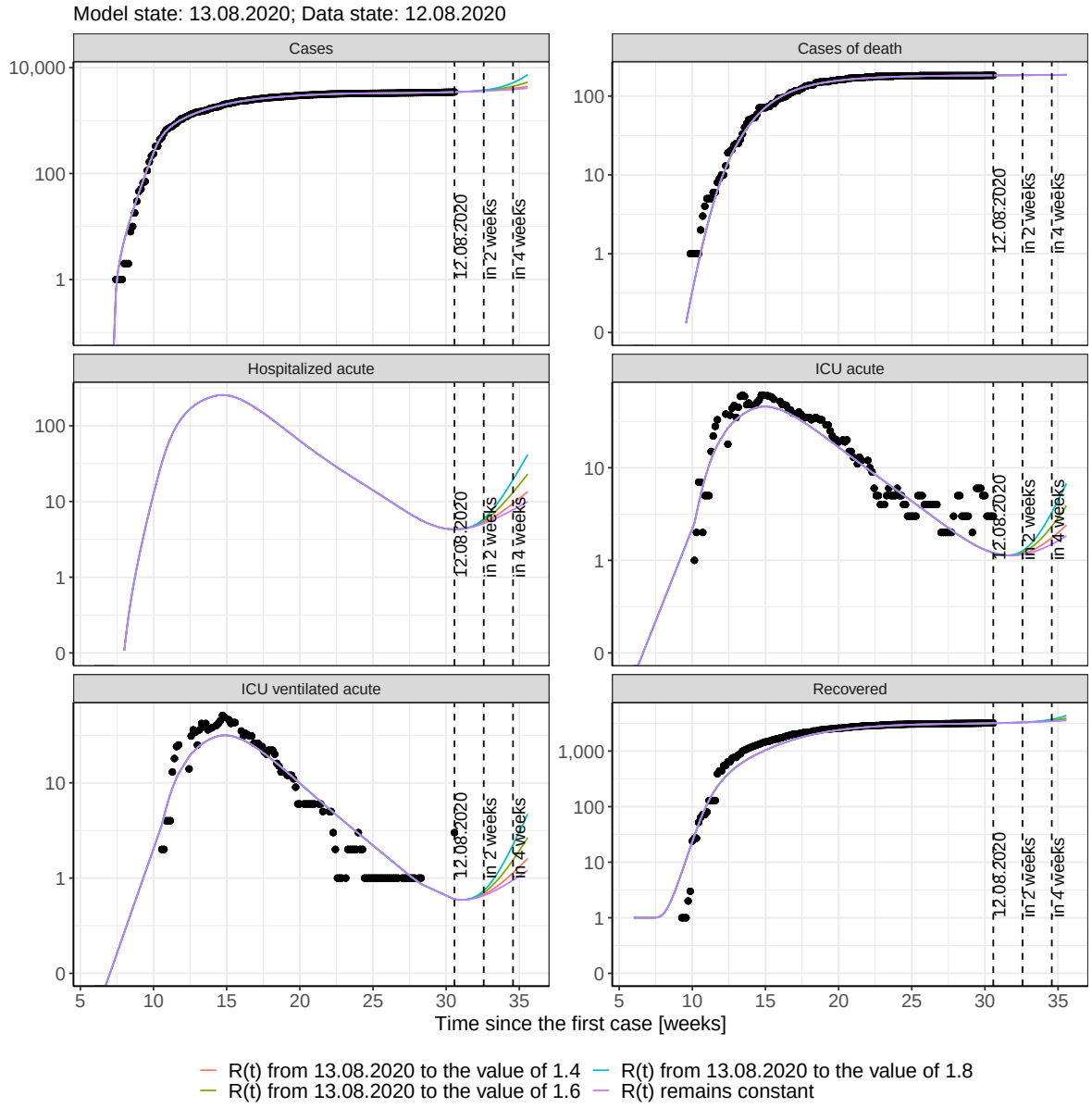


Figure 183: Semi-logarithmic representation of model predictions (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Thuringia assuming various scenarios from the 13.08.2020. Points: Reported case numbers; Lines: Model predictions.

Fig. 184 and 185 represent the model prediction for the next 16 weeks for Thuringia on a linear (184) and a semi-logarithmic (185) scale. In this simulation different scenarios of the possible course from the 13.08.2020 were tested.

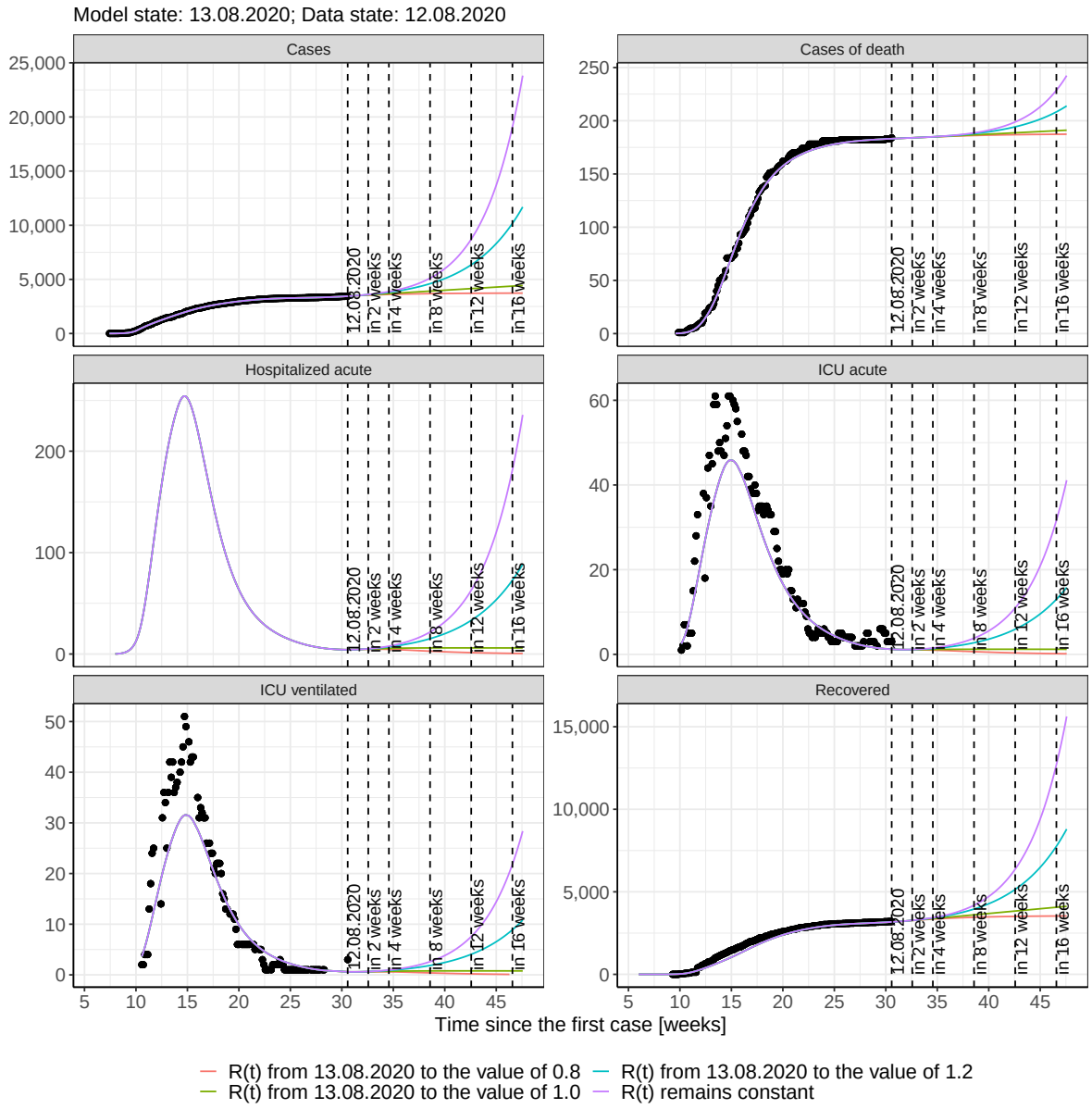


Figure 184: Linear representation of model predictions (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Thuringia assuming various scenarios from the 13.08.2020. Points: reported case numbers; lines: model prediction.

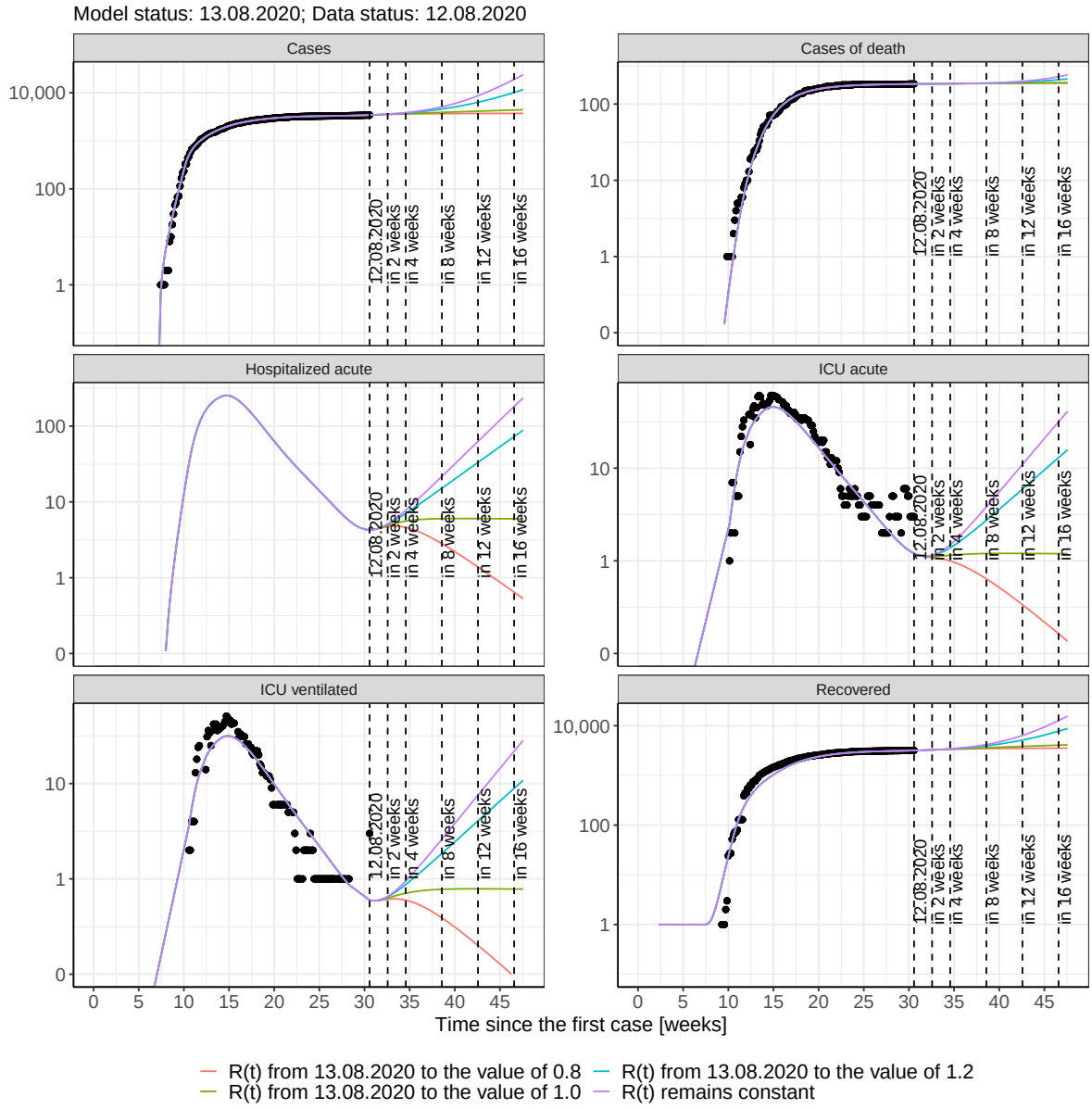


Figure 185: Semi-logarithmic depiction of the model prediction (cases, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Thuringia assuming various scenarios after 13.08.2020. Points: reported case numbers;lines: model predictions.

The tables show the modeling results for four conceivable scenarios: Scenario 1: The R(t) estimated value after 13.08.2020 remains the same as today's value (Tab. 62); Scenario 2: The R(t) estimated value after 13.08.2020 takes the value of 0.8 (Tab. 63); Scenario 3: The R(t) estimated value takes the value of 1 after the 13.08.2020 (Tab. 64); Scenario 4: The R(t) estimated value takes the value of 1.2 after the 13.08.2020 (Tab. 65) Model status from 13.08.2020; Data status: 12.08.2020.

Table 62: Thuringia - R(t) remains unchanged after the 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	3455	183	3180	4	1	1
14.08.2020	3464	183	3185	4	1	1
15.08.2020	3474	183	3191	4	1	1
16.08.2020	3483	183	3197	4	1	1
17.08.2020	3493	183	3203	4	1	1
18.08.2020	3504	184	3210	4	1	1
19.08.2020	3514	184	3216	4	1	1
20.08.2020	3526	184	3223	5	1	1
21.08.2020	3537	184	3231	5	1	1
22.08.2020	3549	184	3238	5	1	1
23.08.2020	3562	184	3246	5	1	1
24.08.2020	3575	184	3254	5	1	1
25.08.2020	3589	184	3262	5	1	1
26.08.2020	3603	184	3271	5	1	1
27.08.2020	3618	184	3280	5	1	1
28.08.2020	3633	184	3289	5	1	1
29.08.2020	3649	184	3299	6	1	1
30.08.2020	3665	184	3309	6	1	1
31.08.2020	3682	184	3319	6	1	1
01.09.2020	3700	184	3330	6	1	1
02.09.2020	3719	184	3342	6	1	1
03.09.2020	3738	184	3353	6	1	1
04.09.2020	3758	185	3365	7	1	1
05.09.2020	3778	185	3378	7	1	1
06.09.2020	3800	185	3391	7	1	1
07.09.2020	3822	185	3405	7	1	1
08.09.2020	3846	185	3419	8	1	1
09.09.2020	3870	185	3433	8	1	1

Table 63: Thuringia - R(t) takes on the value of 0.8 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	3455	183	3180	4	1	1
14.08.2020	3463	183	3185	4	1	1
15.08.2020	3471	183	3191	4	1	1
16.08.2020	3478	183	3197	4	1	1
17.08.2020	3486	183	3203	4	1	1
18.08.2020	3493	184	3209	4	1	1
19.08.2020	3500	184	3216	4	1	1
20.08.2020	3507	184	3222	4	1	1
21.08.2020	3514	184	3229	5	1	1
22.08.2020	3520	184	3235	5	1	1
23.08.2020	3526	184	3242	5	1	1
24.08.2020	3532	184	3249	5	1	1
25.08.2020	3538	184	3255	5	1	1
26.08.2020	3544	184	3262	5	1	1
27.08.2020	3549	184	3268	5	1	1
28.08.2020	3555	184	3275	5	1	1
29.08.2020	3560	184	3282	5	1	1
30.08.2020	3565	184	3288	5	1	1
31.08.2020	3570	184	3294	5	1	1
01.09.2020	3575	184	3301	5	1	1
02.09.2020	3579	184	3307	5	1	1
03.09.2020	3584	184	3313	5	1	1
04.09.2020	3588	184	3319	5	1	1
05.09.2020	3593	185	3325	5	1	1
06.09.2020	3597	185	3331	5	1	1
07.09.2020	3601	185	3337	5	1	1
08.09.2020	3605	185	3342	5	1	1
09.09.2020	3609	185	3348	5	1	1

Table 64: Thuringia - R(t) takes on the value of 1.0 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	3455	183	3180	4	1	1
14.08.2020	3464	183	3185	4	1	1
15.08.2020	3472	183	3191	4	1	1
16.08.2020	3480	183	3197	4	1	1
17.08.2020	3489	183	3203	4	1	1
18.08.2020	3497	184	3210	4	1	1
19.08.2020	3506	184	3216	4	1	1
20.08.2020	3514	184	3223	5	1	1
21.08.2020	3522	184	3229	5	1	1
22.08.2020	3531	184	3236	5	1	1
23.08.2020	3539	184	3243	5	1	1
24.08.2020	3548	184	3251	5	1	1
25.08.2020	3556	184	3258	5	1	1
26.08.2020	3564	184	3265	5	1	1
27.08.2020	3573	184	3273	5	1	1
28.08.2020	3581	184	3280	5	1	1
29.08.2020	3590	184	3288	5	1	1
30.08.2020	3598	184	3296	5	1	1
31.08.2020	3606	184	3303	5	1	1
01.09.2020	3615	184	3311	5	1	1
02.09.2020	3623	184	3319	5	1	1
03.09.2020	3632	184	3327	5	1	1
04.09.2020	3640	185	3335	5	1	1
05.09.2020	3648	185	3343	5	1	1
06.09.2020	3657	185	3351	5	1	1
07.09.2020	3665	185	3359	5	1	1
08.09.2020	3673	185	3367	6	1	1
09.09.2020	3682	185	3375	6	1	1

Table 65: Thuringia - R(t) takes on the value of 1.2 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	3455	183	3180	4	1	1
14.08.2020	3464	183	3185	4	1	1
15.08.2020	3473	183	3191	4	1	1
16.08.2020	3482	183	3197	4	1	1
17.08.2020	3492	183	3203	4	1	1
18.08.2020	3502	184	3210	4	1	1
19.08.2020	3512	184	3216	4	1	1
20.08.2020	3522	184	3223	5	1	1
21.08.2020	3533	184	3230	5	1	1
22.08.2020	3544	184	3238	5	1	1
23.08.2020	3555	184	3245	5	1	1
24.08.2020	3567	184	3253	5	1	1
25.08.2020	3579	184	3261	5	1	1
26.08.2020	3591	184	3269	5	1	1
27.08.2020	3604	184	3278	5	1	1
28.08.2020	3617	184	3287	5	1	1
29.08.2020	3631	184	3296	5	1	1
30.08.2020	3644	184	3305	6	1	1
31.08.2020	3659	184	3315	6	1	1
01.09.2020	3673	184	3324	6	1	1
02.09.2020	3688	184	3335	6	1	1
03.09.2020	3704	184	3345	6	1	1
04.09.2020	3720	185	3356	6	1	1
05.09.2020	3736	185	3367	6	1	1
06.09.2020	3753	185	3378	7	1	1
07.09.2020	3770	185	3390	7	1	1
08.09.2020	3788	185	3402	7	1	1
09.09.2020	3806	185	3415	7	1	1

17.2.3 Prediction for the next 4 weeks under the assumption of different scenarios from 13.08.2020

Fig. 186 shows the absolute changes in case numbers compared to the previous day for the next 4 weeks for different R(t) values. If no bars are shown on the plot it means that the number of cases has not changed compared to the previous day.

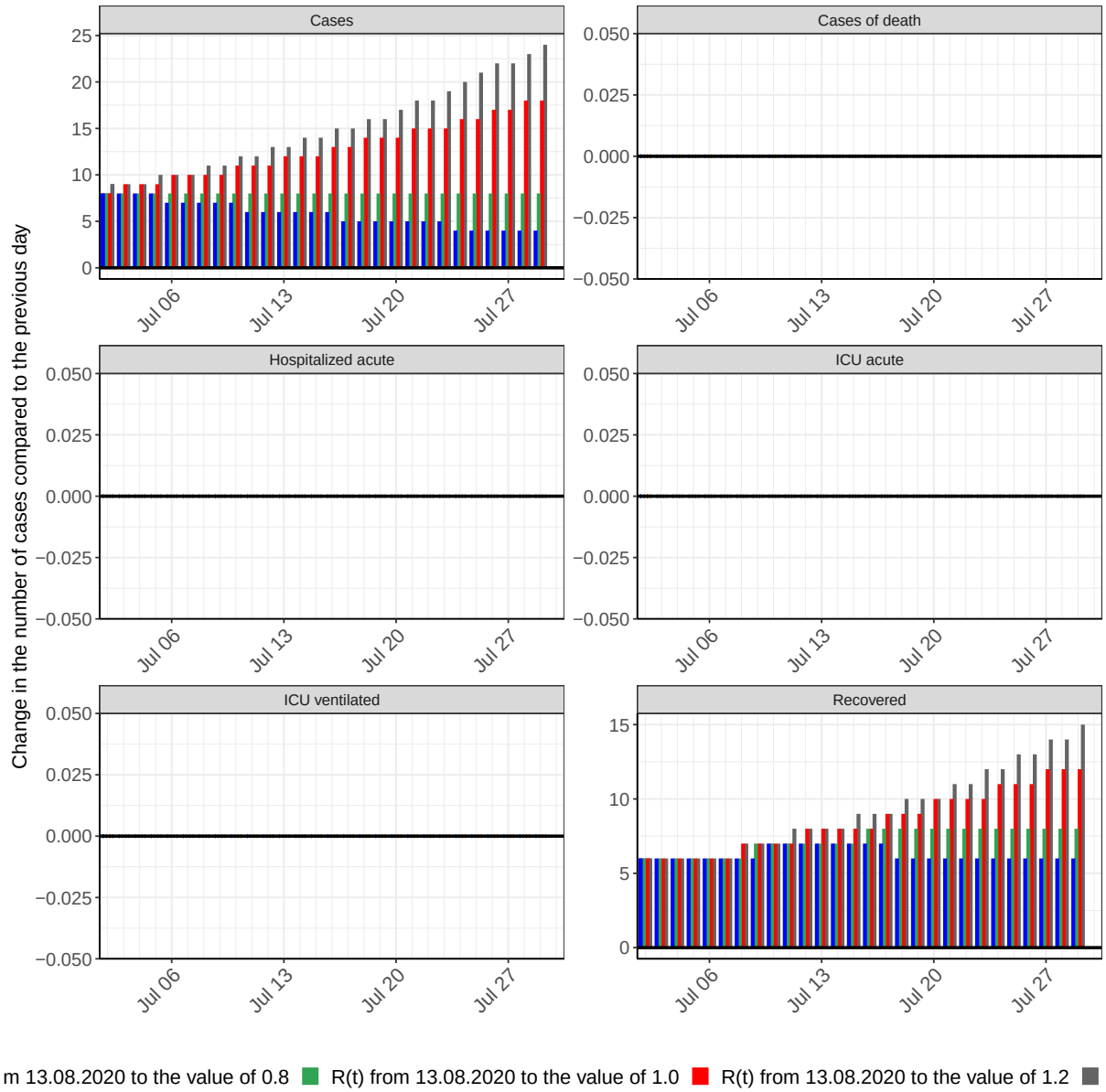


Figure 186: Simulation of daily new cases for the next 4 weeks - Thuringia

18 Germany

18.1 Model description

Fig. 187 depicts the results of the modeling (lines) compared to the observed data (points) for Germany on a linear (A) and semi-logarithmic (B) scale.

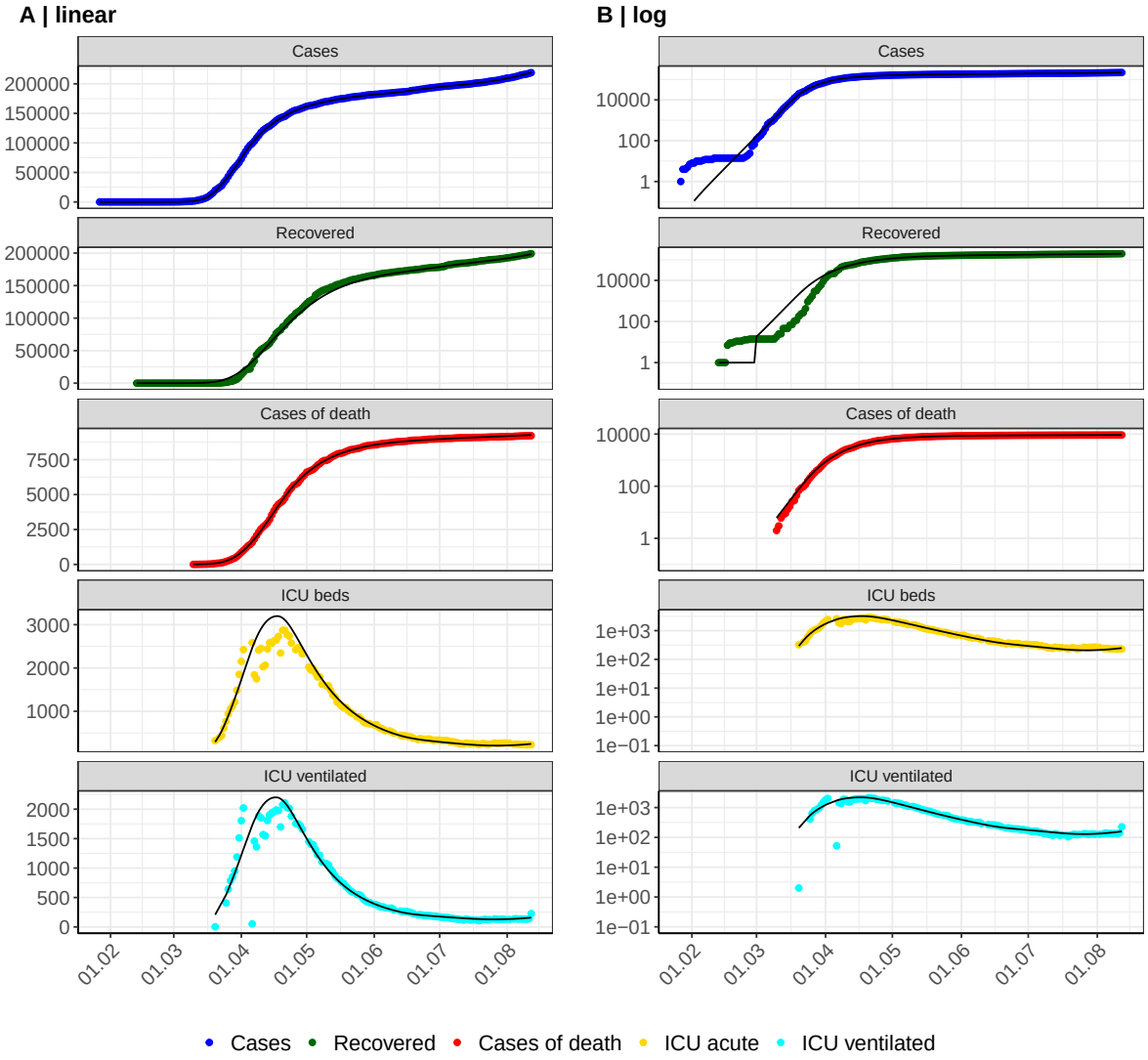


Figure 187: Model description of the reported case numbers, occupancy of hospital beds, recovery and deaths in Germany. Points: reported data; lines: model description.

Fig. 188 shows the goodness-of-fit for Germany. The values calculated by the model are plotted against the observed data. If the model fit is good, the points scatter randomly along the lines of identity.

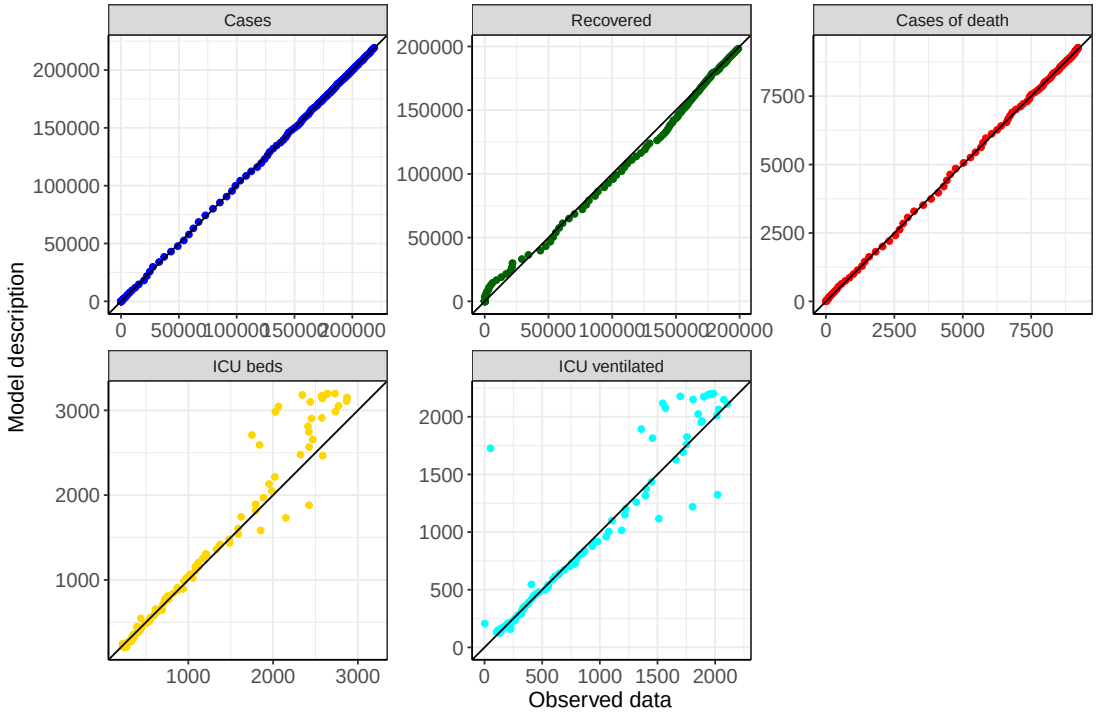


Figure 188: Goodness-of-fit plots for Germany. Lines: lines of identity.

Fig. 189 shows the influence of non-pharmaceutical interventions (NPI) on R(t) for Germany (red line) in comparison with the other federal states (grey lines).

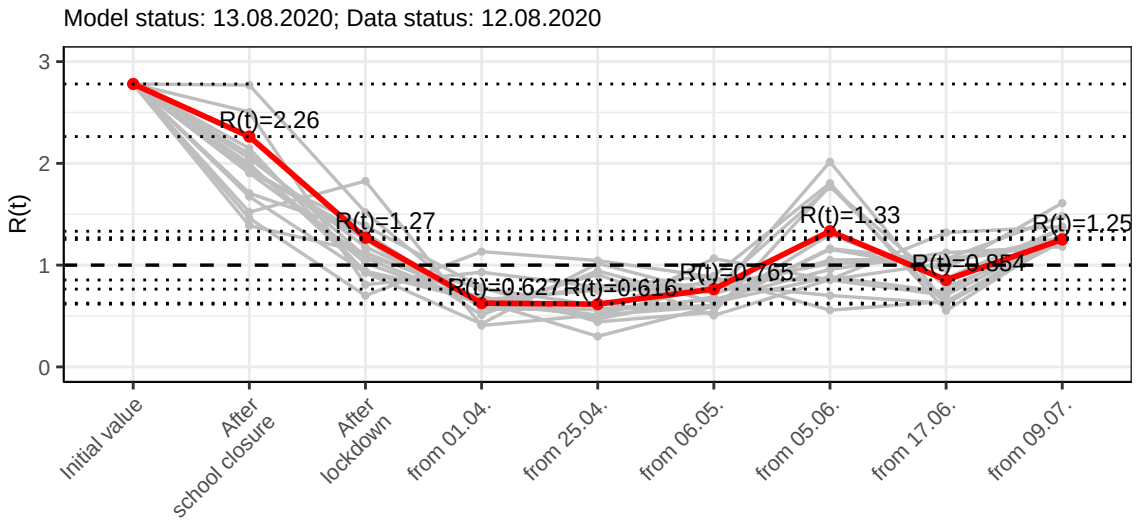


Figure 189: R(t) values before and after the NPIs for Germany

Fig. 190 shows the R(t) estimated value for Germany (red line) over time in comparison with the other federal states (grey lines).

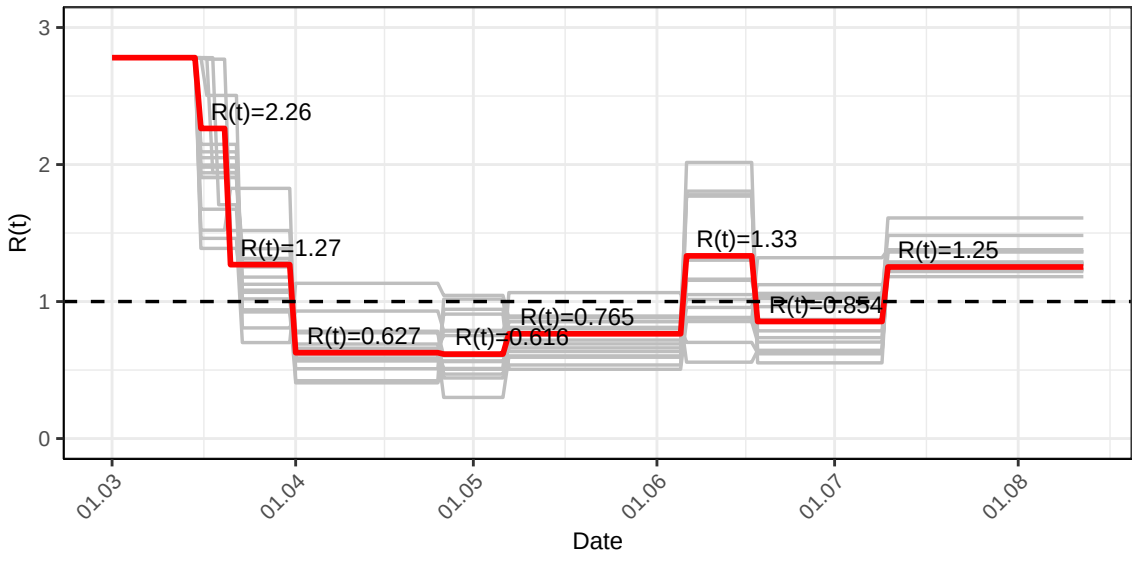


Figure 190: R(t) values over time for Germany

18.2 Model predictions

18.2.1 Prediction for the next 4 weeks assuming that R(t) estimate will not change (R(t) = 1.25)

Fig. 191 and 192 depict the the model predictions for the next 4 weeks for Germany on a linear (191) and a semi-logarithmic (192) scale. The modeling was carried out under the assumption that the R(t) estimated value would remain the same.

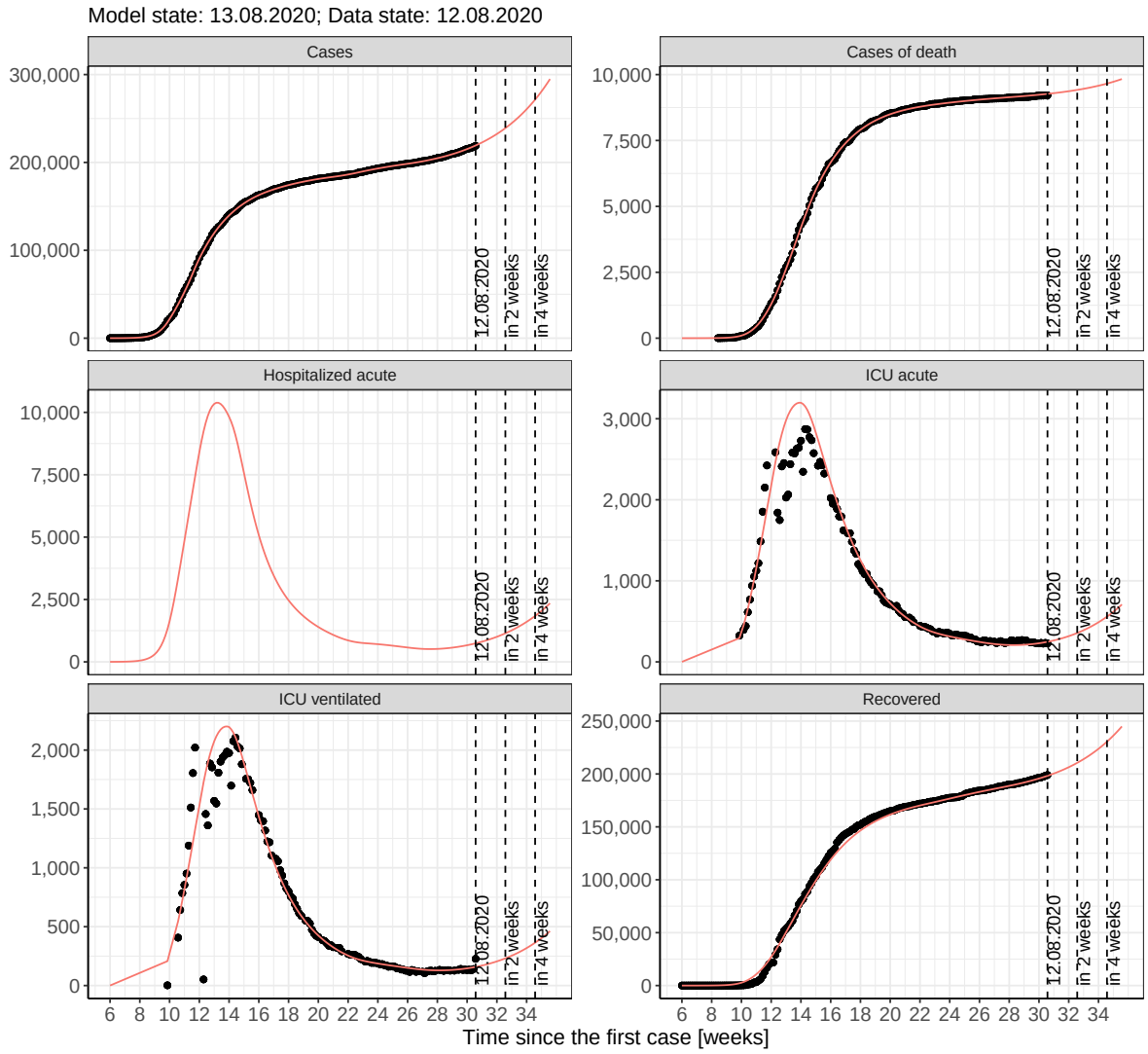


Figure 191: Representation of the model predictions for Germany for the next 4 weeks under the assumption that the R(t) estimate remains the same on linear scale (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths). Points: Reported case numbers; Red lines: Model predictions.

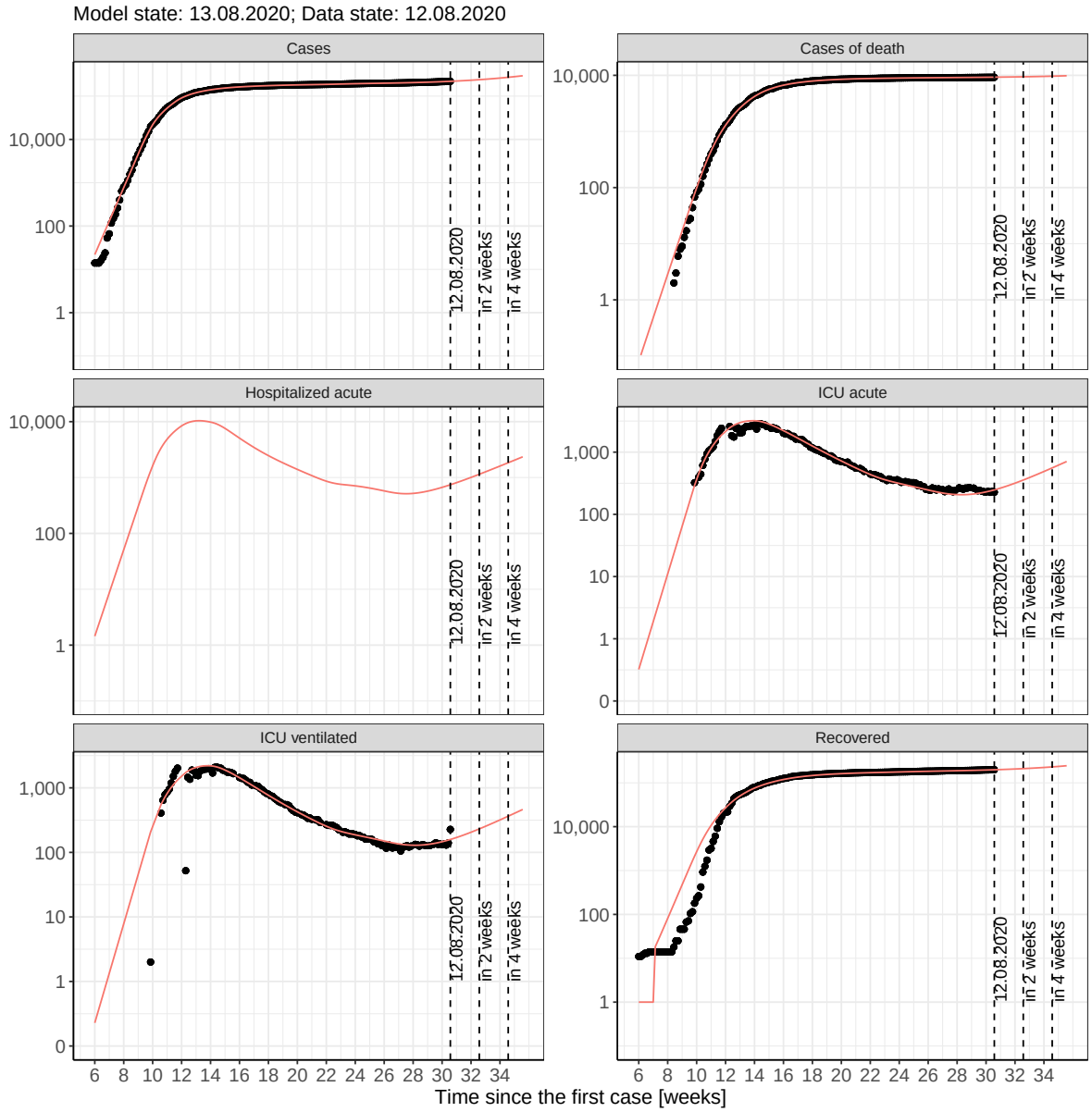


Figure 192: Semi-logarithmic representation of the model prediction (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Germany for the next 4 weeks under the assumption that the R(t) estimate remains the same. Points: Reported case numbers; Red lines: Model predictions.

18.2.2 Predictions for the next 4 weeks assuming different scenarios (with the R(t) value above 1.2) from 13.08.2020

Fig. 193 and 194 represent the model prediction for the next 4 weeks for Germany on a linear (193) and a semi-logarithmic (194) scale. In this simulation different scenarios of the possible development (R(t) = 1.4, 1.6, 1.8 and staying the same) from 13.08.2020 were tested.

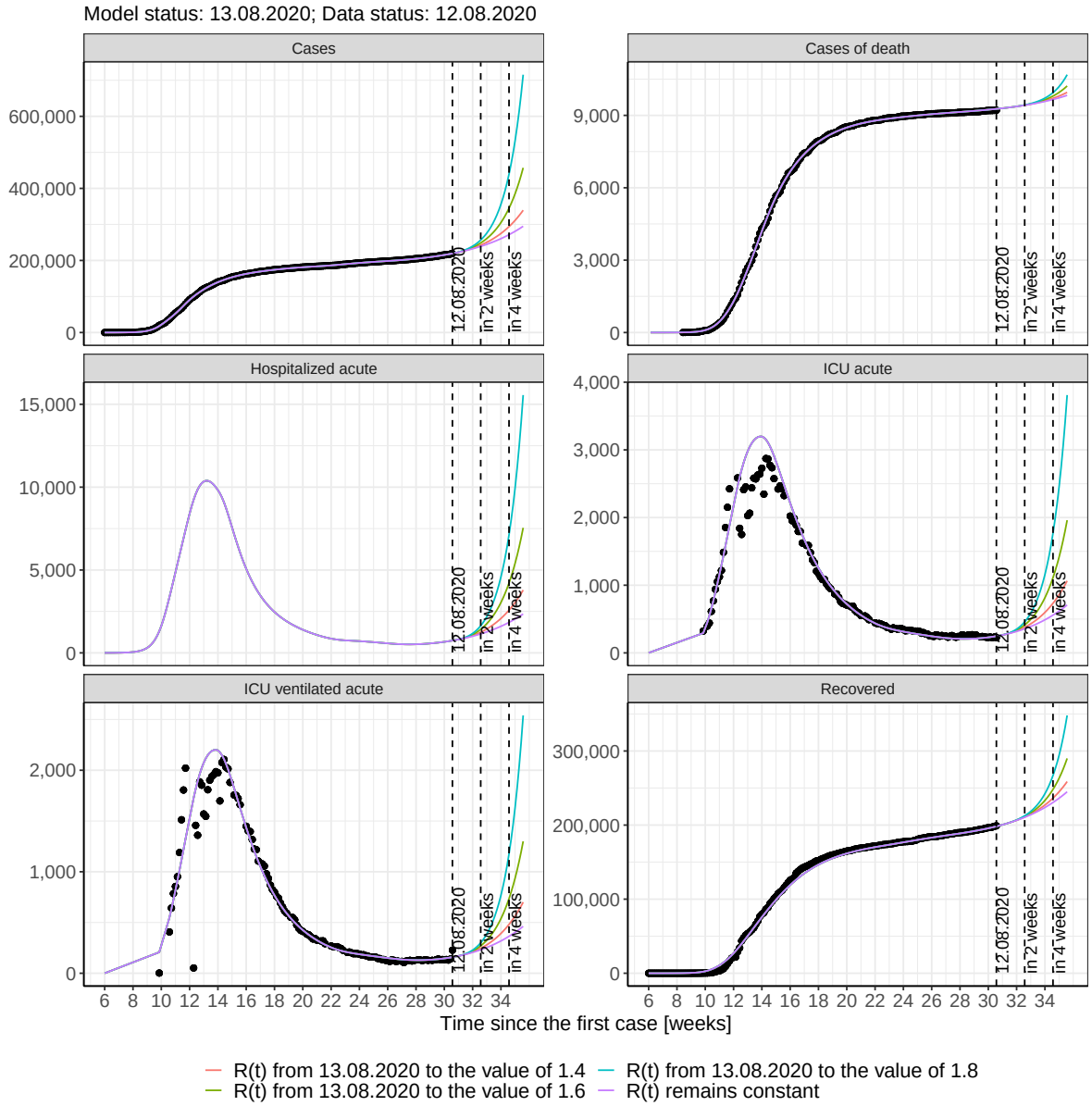


Figure 193: Linear representation of model prediction (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Germany assuming various scenarios from the 13.08.2020. Points: Reported case numbers; Lines: Model predictions.

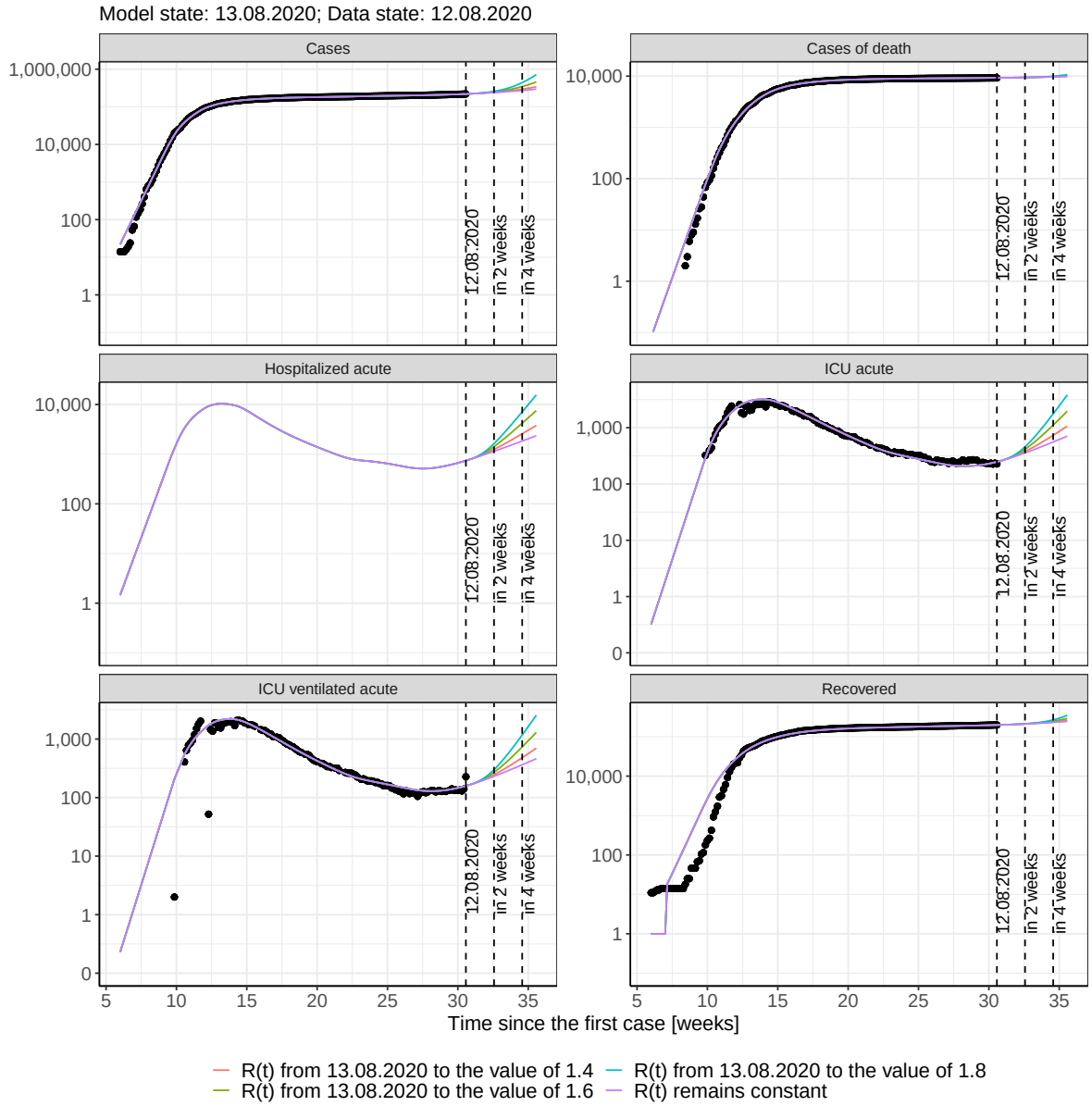


Figure 194: Semi-logarithmic representation of model predictions (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Germany assuming various scenarios from the 13.08.2020. Points: Reported case numbers; Lines: Model predictions.

Fig. 195 and 196 represent the model prediction for the next 16 weeks for Germany on a linear (195) and a semi-logarithmic (196) scale. In this simulation different scenarios of the possible course from the 13.08.2020 were tested.

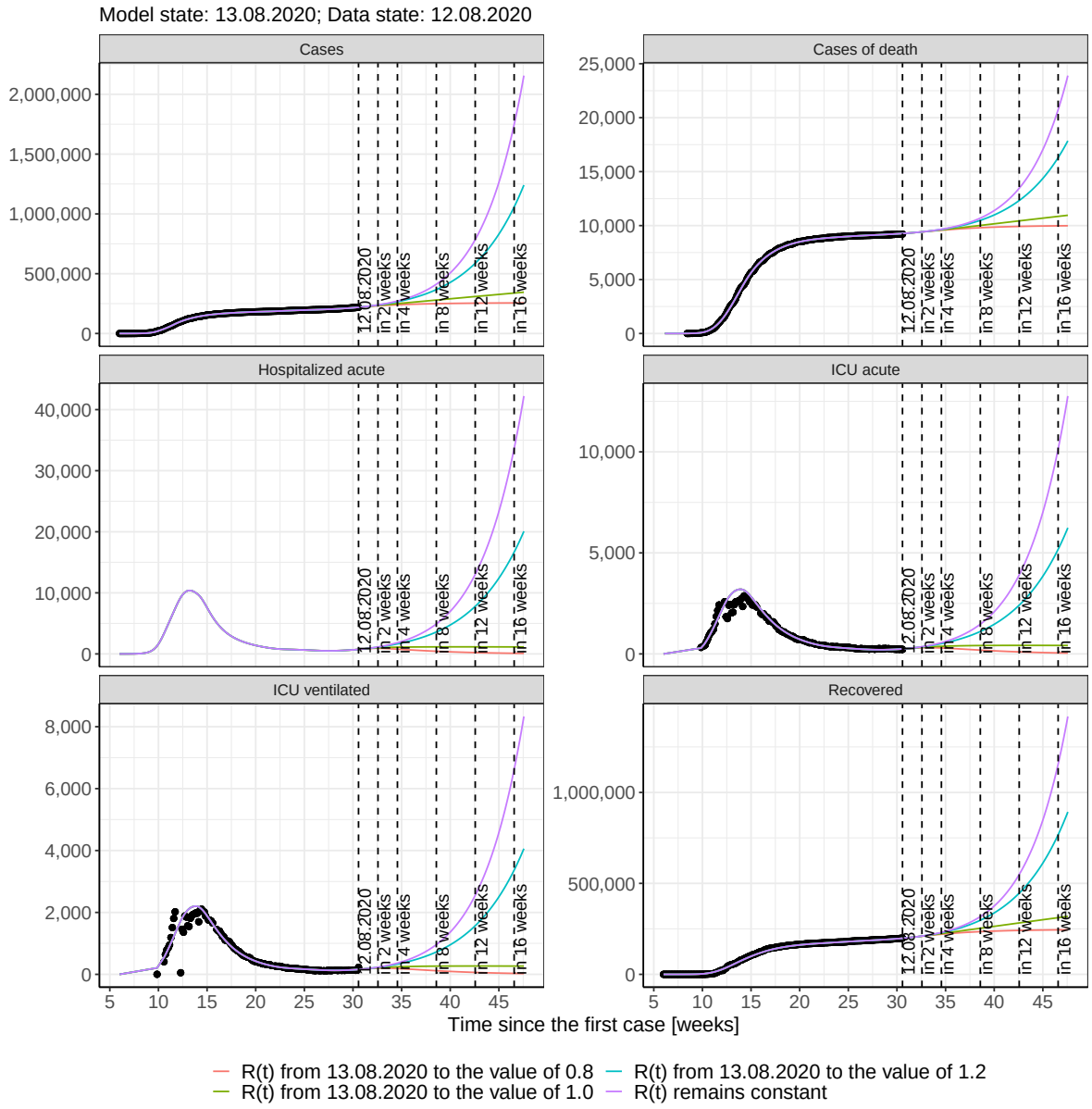


Figure 195: Linear representation of model predictions (case numbers, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Germany assuming various scenarios from the 13.08.2020. Points: reported case numbers; lines: model prediction.

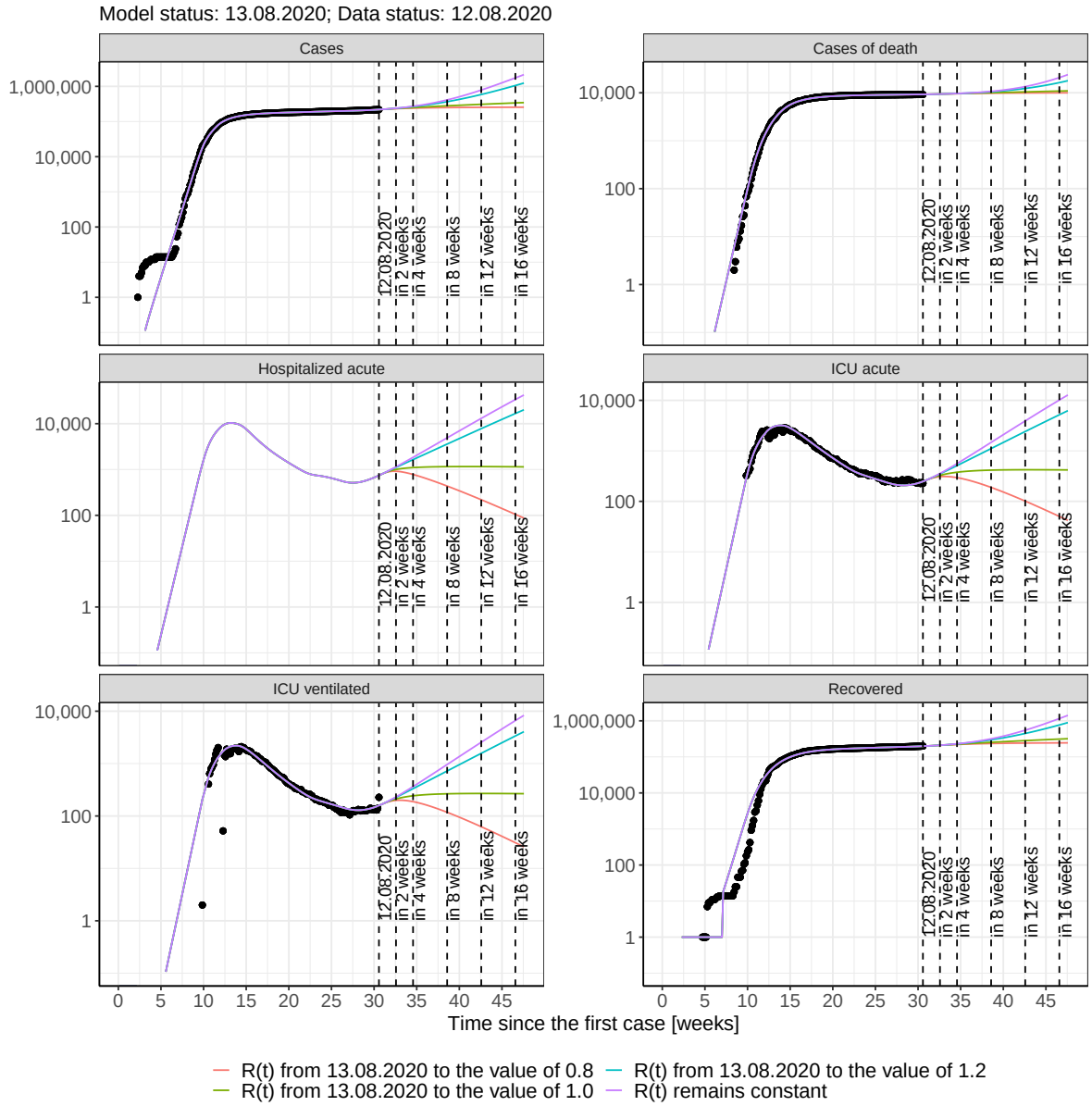


Figure 196: Semi-logarithmic depiction of the model prediction (cases, recovered, ICU ventilated, ICU beds, hospital beds, deaths) for Germany assuming various scenarios after 13.08.2020. Points: reported case numbers;lines: model predictions.

The tables show the modeling results for four conceivable scenarios: Scenario 1: The R(t) estimated value after 13.08.2020 remains the same as today's value (Tab. 66); Scenario 2: The R(t) estimated value after 13.08.2020 takes the value of 0.8 (Tab. 67); Scenario 3: The R(t) estimated value takes the value of 1 after the 13.08.2020 (Tab. 68); Scenario 4: The R(t) estimated value takes the value of 1.2 after the 13.08.2020 (Tab. 69) Model status from 13.08.2020; Data status: 12.08.2020.

Table 66: Germany - R(t) remains unchanged after the 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	220410	9277	198950	764	253	162
14.08.2020	221560	9286	199670	786	258	166
15.08.2020	222750	9295	200410	809	265	170
16.08.2020	223980	9305	201180	834	271	174
17.08.2020	225260	9315	201980	860	278	179
18.08.2020	226590	9325	202800	886	285	184
19.08.2020	227960	9335	203650	914	292	189
20.08.2020	229380	9346	204530	943	300	194
21.08.2020	230850	9357	205450	974	308	200
22.08.2020	232380	9369	206390	1005	317	205
23.08.2020	233960	9380	207370	1038	326	211
24.08.2020	235600	9393	208380	1072	336	218
25.08.2020	237300	9406	209430	1108	346	224
26.08.2020	239060	9419	210520	1145	356	231
27.08.2020	240880	9432	211650	1183	367	238
28.08.2020	242770	9446	212810	1223	379	246
29.08.2020	244730	9461	214020	1265	391	254
30.08.2020	246760	9476	215270	1308	403	262
31.08.2020	248860	9491	216570	1353	416	270
01.09.2020	251040	9508	217910	1399	429	279
02.09.2020	253290	9524	219300	1448	443	289
03.09.2020	255630	9541	220740	1498	458	298
04.09.2020	258050	9559	222230	1550	473	308
05.09.2020	260560	9578	223780	1604	489	318
06.09.2020	263160	9597	225380	1660	505	329
07.09.2020	265850	9617	227040	1718	522	340
08.09.2020	268640	9637	228760	1778	540	352
09.09.2020	271530	9659	230540	1841	558	364

Table 67: Germany - R(t) takes on the value of 0.8 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	220370	9277	198950	764	253	162
14.08.2020	221420	9286	199670	786	258	166
15.08.2020	222430	9295	200410	807	264	170
16.08.2020	223410	9305	201170	828	270	174
17.08.2020	224370	9315	201950	848	275	177
18.08.2020	225300	9325	202750	865	281	181
19.08.2020	226200	9335	203560	880	286	184
20.08.2020	227080	9346	204380	893	290	187
21.08.2020	227930	9356	205220	903	294	190
22.08.2020	228760	9367	206060	910	298	192
23.08.2020	229560	9378	206910	915	301	194
24.08.2020	230340	9390	207760	917	304	196
25.08.2020	231100	9401	208610	918	306	198
26.08.2020	231840	9412	209460	916	308	199
27.08.2020	232560	9424	210310	913	309	199
28.08.2020	233250	9435	211150	908	310	200
29.08.2020	233930	9447	211990	901	311	200
30.08.2020	234590	9458	212820	894	311	200
31.08.2020	235220	9470	213640	885	311	200
01.09.2020	235840	9481	214450	876	310	199
02.09.2020	236450	9493	215250	865	309	198
03.09.2020	237030	9504	216040	854	308	197
04.09.2020	237600	9516	216820	843	306	196
05.09.2020	238150	9527	217590	831	304	195
06.09.2020	238690	9538	218340	818	302	193
07.09.2020	239210	9549	219080	806	300	192
08.09.2020	239720	9560	219800	793	297	190
09.09.2020	240210	9570	220510	780	295	188

Table 68: Germany - R(t) takes on the value of 1.0 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	220390	9277	198950	764	253	162
14.08.2020	221480	9286	199670	786	258	166
15.08.2020	222560	9295	200410	808	264	170
16.08.2020	223650	9305	201180	831	270	174
17.08.2020	224740	9315	201960	853	276	178
18.08.2020	225830	9325	202770	874	282	182
19.08.2020	226910	9335	203600	894	288	186
20.08.2020	228000	9346	204450	914	294	190
21.08.2020	229080	9357	205310	932	300	194
22.08.2020	230170	9368	206190	948	306	198
23.08.2020	231250	9379	207090	964	311	201
24.08.2020	232340	9391	208010	978	317	205
25.08.2020	233420	9403	208930	991	322	208
26.08.2020	234510	9415	209870	1003	327	211
27.08.2020	235590	9427	210830	1014	331	214
28.08.2020	236670	9440	211790	1025	336	217
29.08.2020	237750	9452	212760	1034	340	220
30.08.2020	238830	9465	213740	1043	344	223
31.08.2020	239920	9478	214730	1051	348	225
01.09.2020	241000	9491	215730	1058	352	227
02.09.2020	242080	9505	216730	1065	356	230
03.09.2020	243160	9518	217740	1072	359	232
04.09.2020	244240	9532	218750	1078	363	234
05.09.2020	245310	9545	219770	1083	366	236
06.09.2020	246390	9559	220790	1088	369	238
07.09.2020	247470	9573	221820	1093	372	240
08.09.2020	248550	9587	222850	1097	374	241
09.09.2020	249620	9601	223890	1102	377	243

Table 69: Germany - R(t) takes on the value of 1.2 after 13.08.2020

Datum	Cases	Cases of death	Recovered	Hospitalized acute	ICU acute	ICU ventilated
13.08.2020	220400	9277	198950	764	253	162
14.08.2020	221540	9286	199670	786	258	166
15.08.2020	222710	9295	200410	809	264	170
16.08.2020	223910	9305	201180	833	271	174
17.08.2020	225150	9315	201970	858	277	179
18.08.2020	226420	9325	202790	884	284	183
19.08.2020	227730	9335	203640	910	291	188
20.08.2020	229070	9346	204510	937	299	193
21.08.2020	230460	9357	205420	964	307	198
22.08.2020	231880	9368	206350	992	315	204
23.08.2020	233340	9380	207310	1021	323	209
24.08.2020	234850	9392	208300	1051	332	215
25.08.2020	236390	9405	209320	1081	340	221
26.08.2020	237990	9418	210370	1112	350	227
27.08.2020	239620	9431	211460	1144	359	233
28.08.2020	241310	9445	212580	1176	369	239
29.08.2020	243040	9459	213730	1210	379	246
30.08.2020	244820	9473	214910	1244	389	253
31.08.2020	246650	9488	216140	1280	400	260
01.09.2020	248540	9504	217390	1316	411	267
02.09.2020	250470	9520	218690	1353	422	274
03.09.2020	252460	9536	220020	1391	433	282
04.09.2020	254510	9553	221390	1431	445	290
05.09.2020	256620	9570	222800	1471	458	298
06.09.2020	258790	9588	224260	1513	470	306
07.09.2020	261020	9606	225750	1555	484	314
08.09.2020	263310	9625	227290	1599	497	323
09.09.2020	265670	9644	228870	1644	511	332

18.2.3 Prediction for the next 4 weeks under the assumption of different scenarios from 13.08.2020

Fig. 197 shows the absolute changes in case numbers compared to the previous day for the next 4 weeks for different R(t) values. If no bars are shown on the plot it means that the number of cases has not changed compared to the previous day.

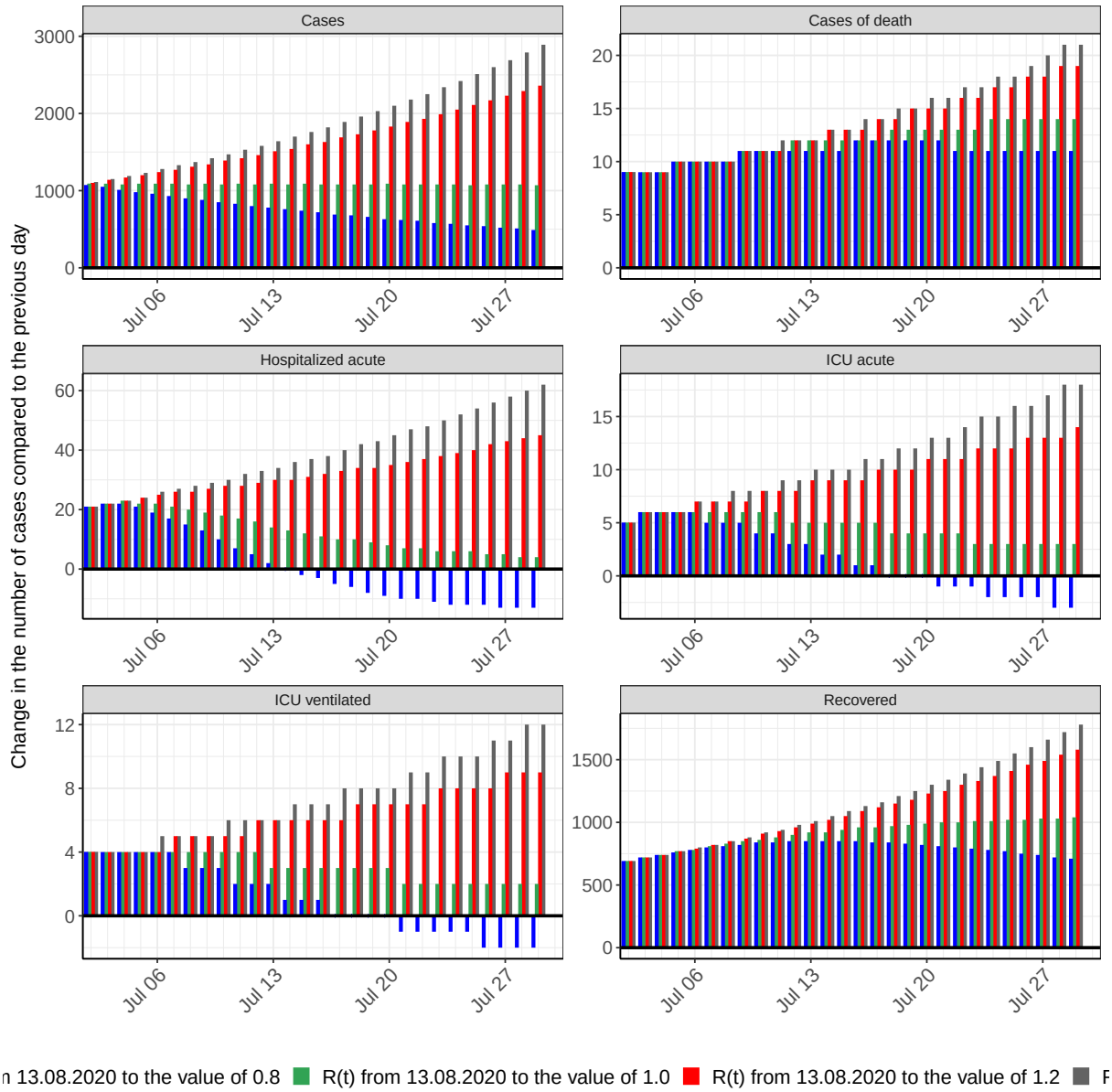


Figure 197: Simulation of daily new cases for the next 4 weeks - Germany