

# Covid19 Report

**Dimitris Kavroudakis**

Assistant Professor of *Geographical Analysis*,  
Department of Geography, University of the Aegean  
dimitrisk@aegean.gr  
www.dimitrisk.gr

2020-03-10

## Contents

<b>1</b>	<b>The <i>CRISTINA</i> project</b>	<b>1</b>
<b>2</b>	<b>Italy</b>	<b>1</b>
2.1	Confirmed Cases . . . . .	2
2.2	Deaths . . . . .	3
<b>3</b>	<b>Rate of change over time</b>	<b>4</b>
<b>4</b>	<b>Estimations</b>	<b>5</b>
4.1	ARIMA projection . . . . .	5
4.2	PROPHET projection . . . . .	6

---

## 1 The *CRISTINA* project

This report is part of a research project “**CoRona vIrus SpaTial aNAlysis**” (*CRISTINA*) which examines the time series progress of COVID-19 events in 177 countries of the world.

## 2 Italy

A series of visualizations for the progress of COVID-19 for **Italy**. We use absolute numbering scale and logarithmic scale to visualize the progress of “*confirmed cases*”, “*deaths*” and “*recovered cases*”. We also indicate the government interventions as dots on top of each line.

2.1 Confirmed Cases

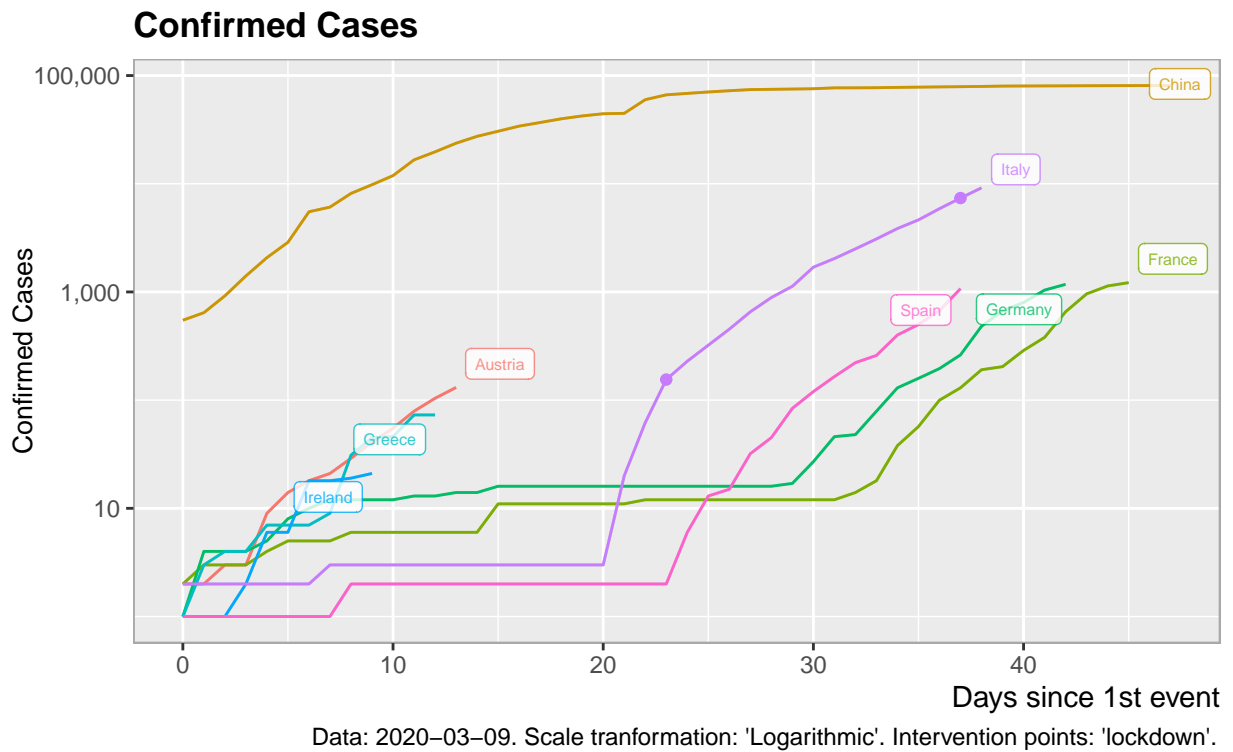


Figure 1: Confirmed Cases

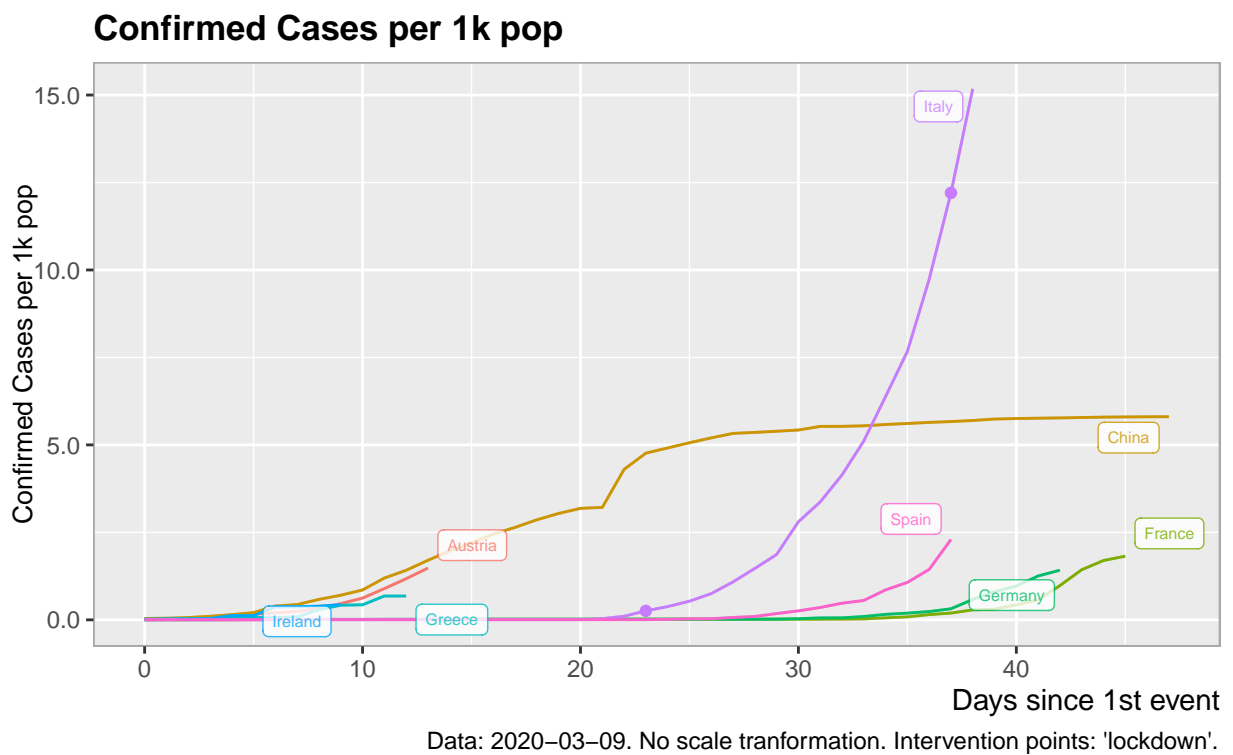


Figure 2: Confirmed Cases by 1000 population

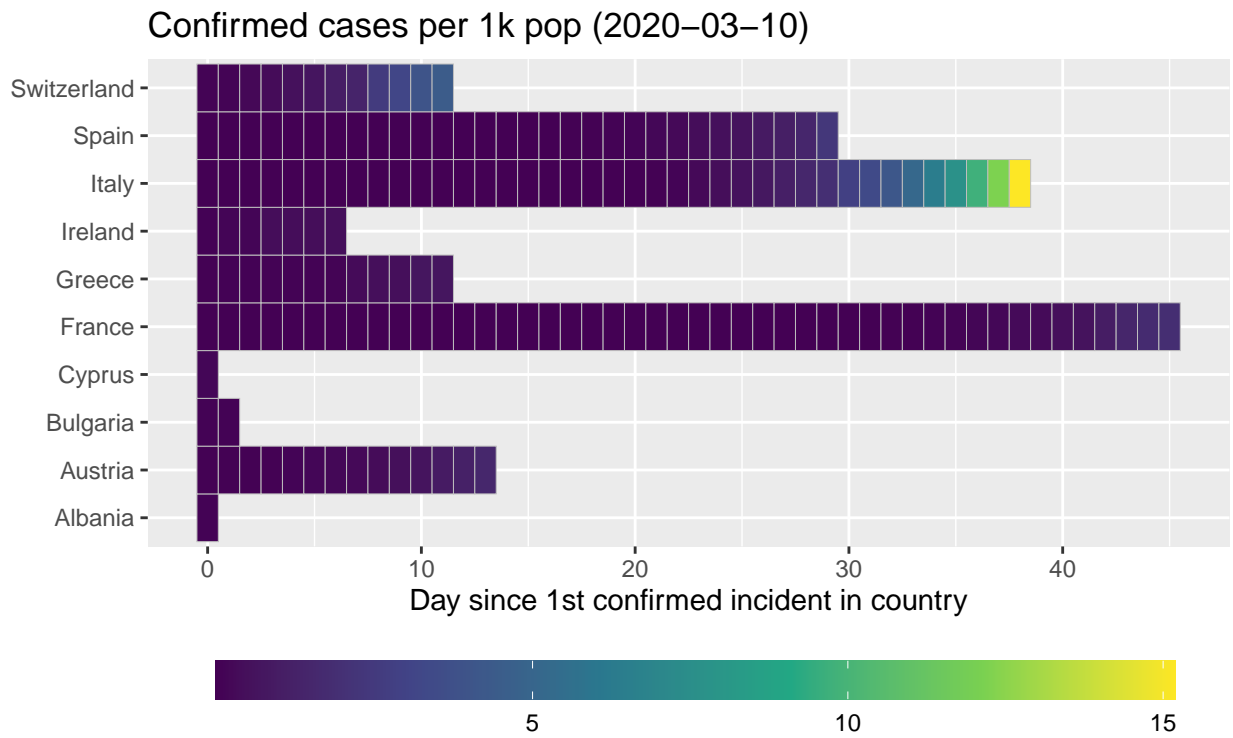
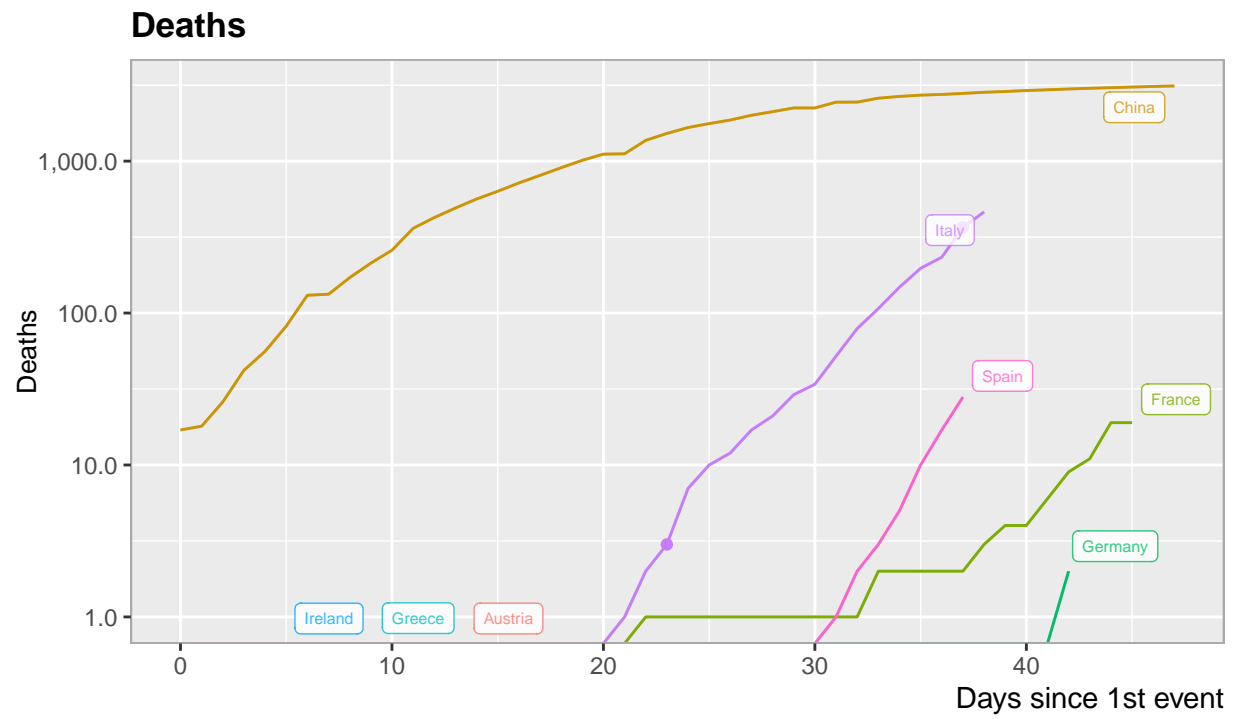


Figure 3: Confirmed Cases by 1000 population

## 2.2 Deaths



Data: 2020-03-09. Scale tranformation: 'Logarithmic'. Intervention points: 'lockdown'.

Figure 4: Number of deaths by country

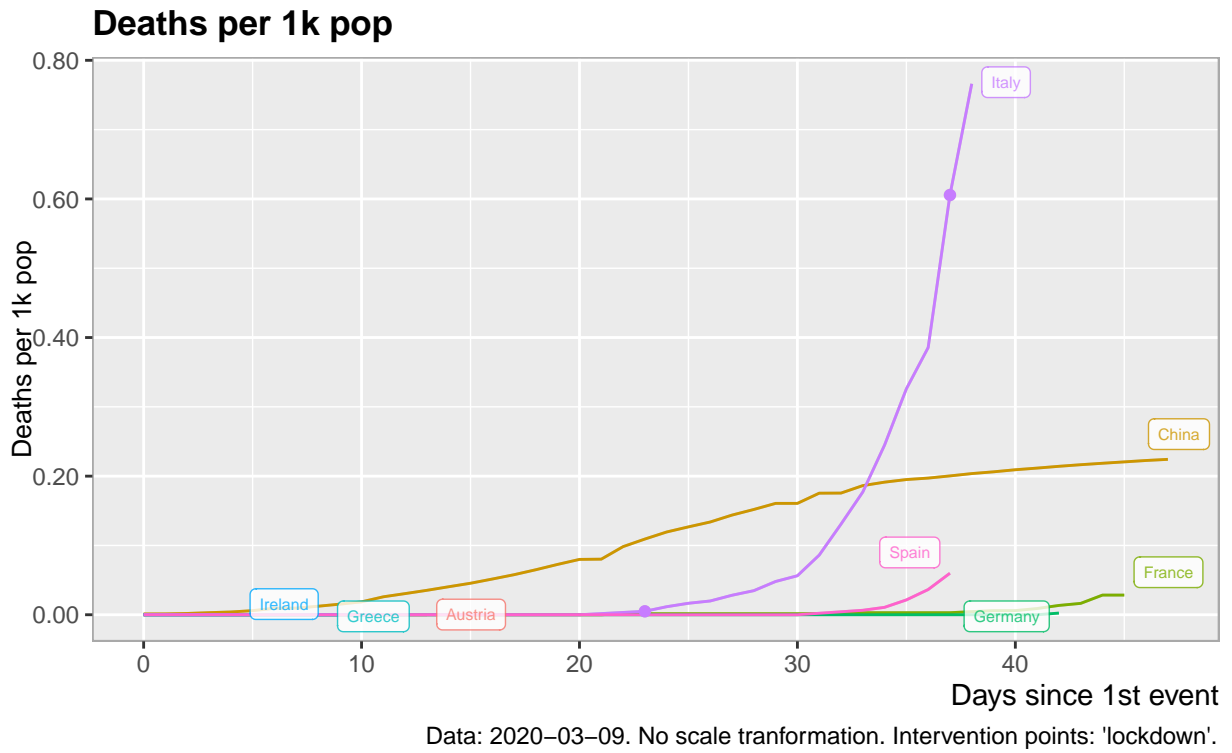


Figure 5: Deaths by 1000 population

### 3 Rate of change over time

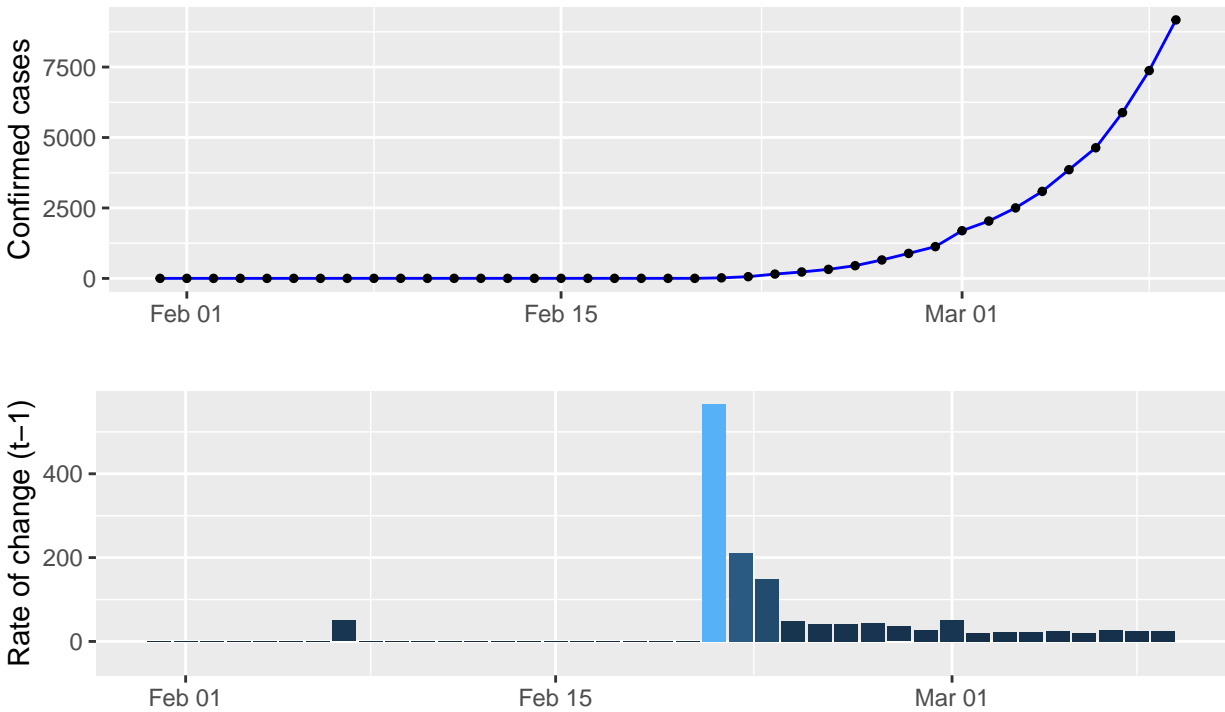


Figure 6: Rate of change of confirmed cases

## 4 Estimations

We estimate the future projection of *confirmed cases* for the next 5 days in Italy with two methods.

### 4.1 ARIMA projection

#### Projection of 'confirmed' cases for 5 ahead

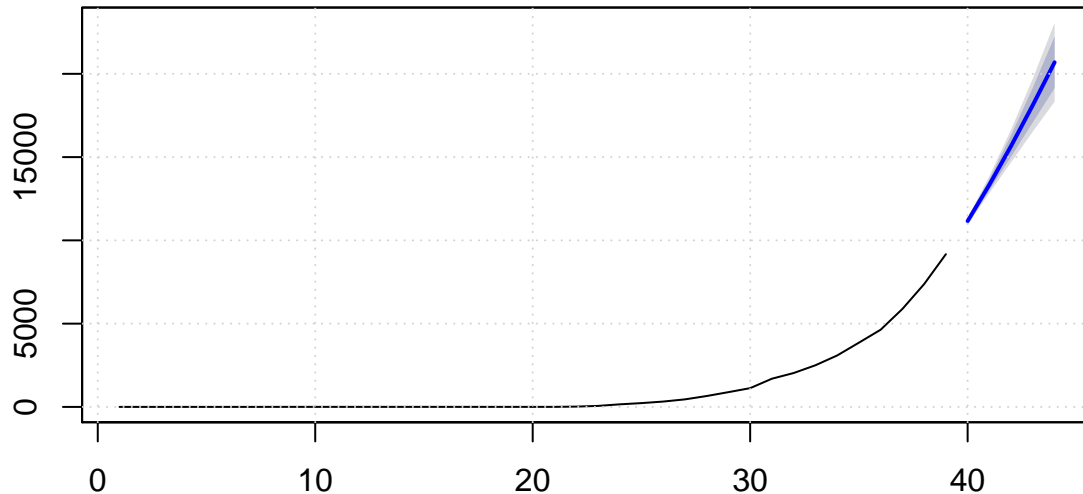


Figure 7: ARIMA projection

Table 1: ARIMA of 'confirmed cases' for 5 days ahead

	Estimation	Confidence 95% (Low)	Confidence 95% (High)
<b>t+1 (2020-03-10)</b>	11158	10945	11371
<b>t+2 (2020-03-11)</b>	13344	12834	13855
<b>t+3 (2020-03-12)</b>	15670	14688	16652
<b>t+4 (2020-03-13)</b>	18130	16536	19725
<b>t+5 (2020-03-14)</b>	20691	18324	23058

- The estimated proportion of cases detected is 0.28%.
- With data up to 2020-03-09 in Italy we have 9172 confirmed cases and 463 deaths.
- Estimated doubling time (based on 5 days time window) is approximately 3.2 days

## 4.2 PROPHET projection

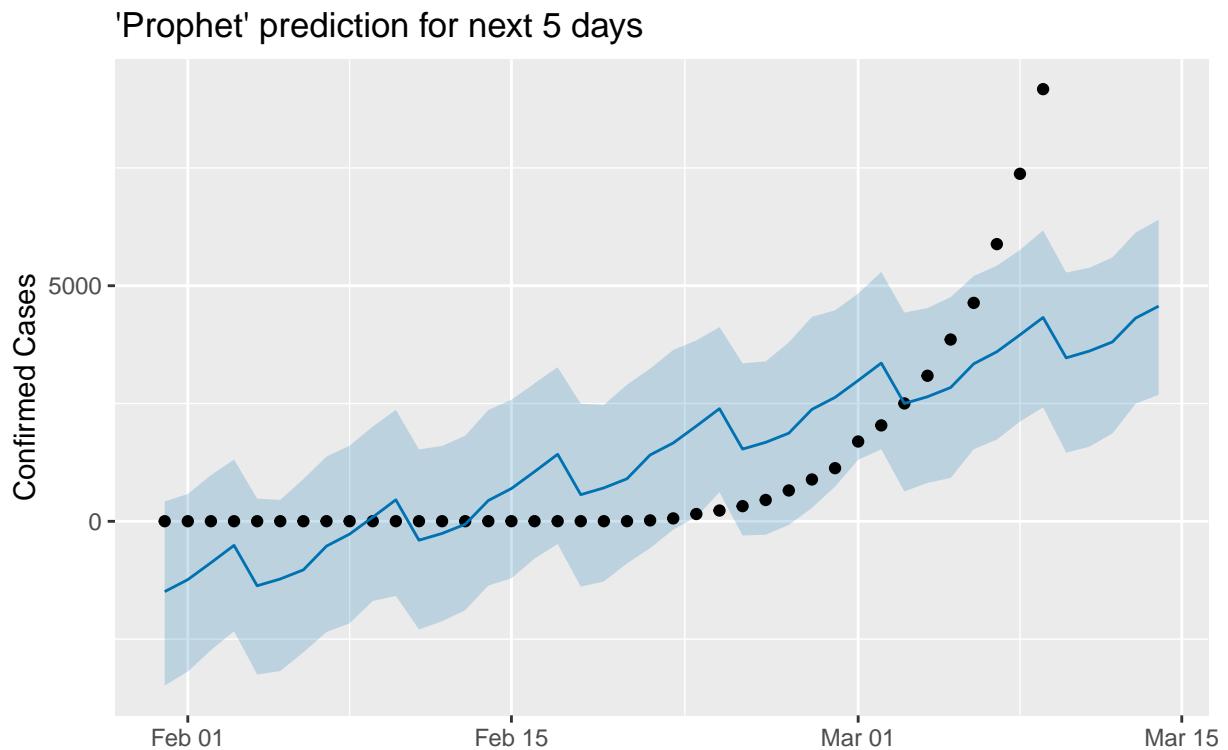


Figure 8: PROPHET Projection of confirmed cases over the next 5 days for Italy

Table 2: PROPHET of 'confirmed cases' for 5 days ahead for Italy

	Future_Date	Estimation	Confidence 95% (Low)	Confidence 95% (High)
<b>t+1</b>	2020-03-10	3469	1457	5280
<b>t+2</b>	2020-03-11	3613	1583	5381
<b>t+3</b>	2020-03-12	3807	1863	5600
<b>t+4</b>	2020-03-13	4312	2494	6126
<b>t+5</b>	2020-03-14	4567	2686	6400