

# Covid19 Report

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## Contents

<b>1</b>	<b>The <i>CRISTINA</i> project</b>	<b>1</b>
<b>2</b>	<b>Spain</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

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## 1 The *CRISTINA* project

This report is part of a research project “**Co**Rona vIrus **Spa**Tial **a**NAlysis” (CRISTINA) which examines the time series progress of COVID-19 events in 177 countries of the world.

## 2 Spain

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

2.1 Confirmed Cases

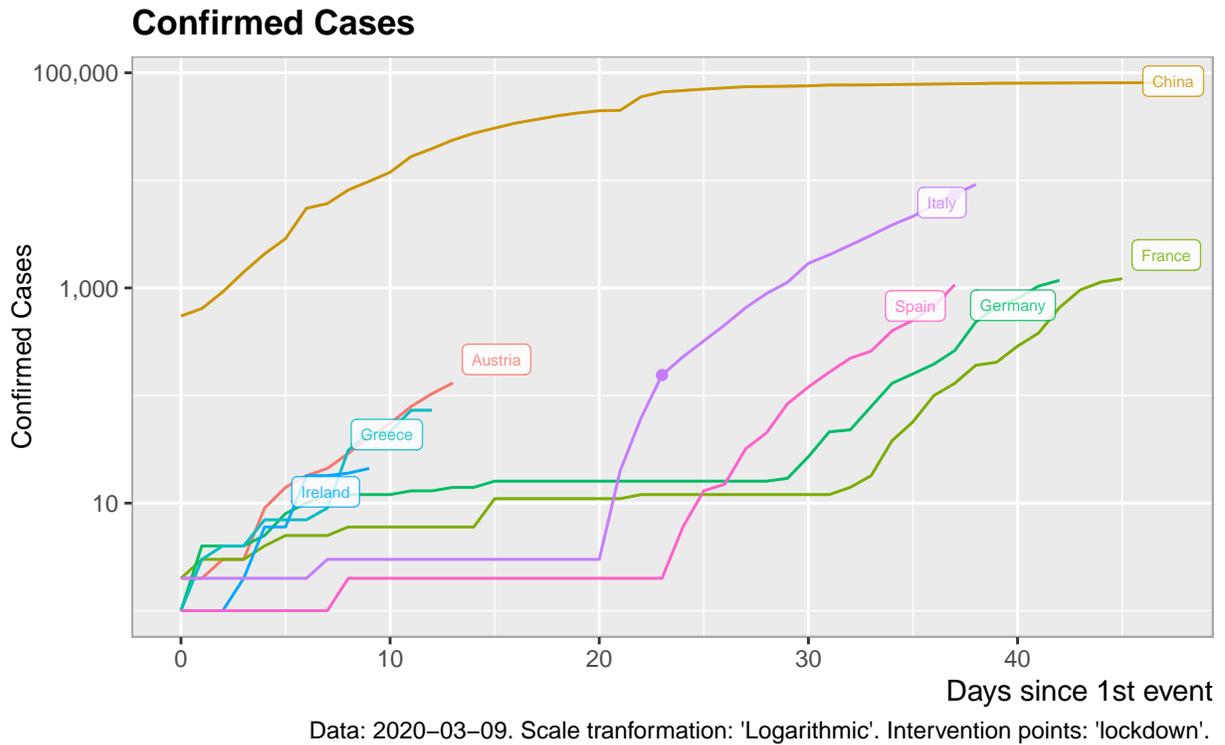


Figure 1: Confirmed Cases

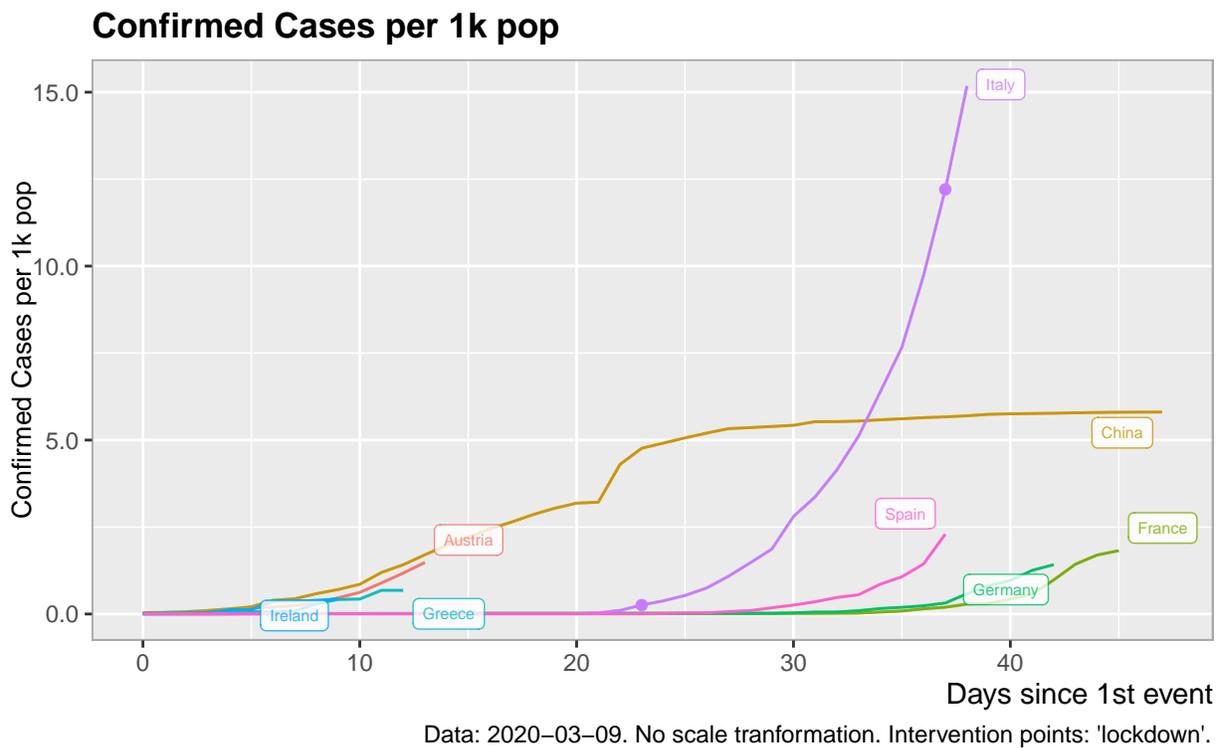


Figure 2: Confirmed Cases by 1000 population

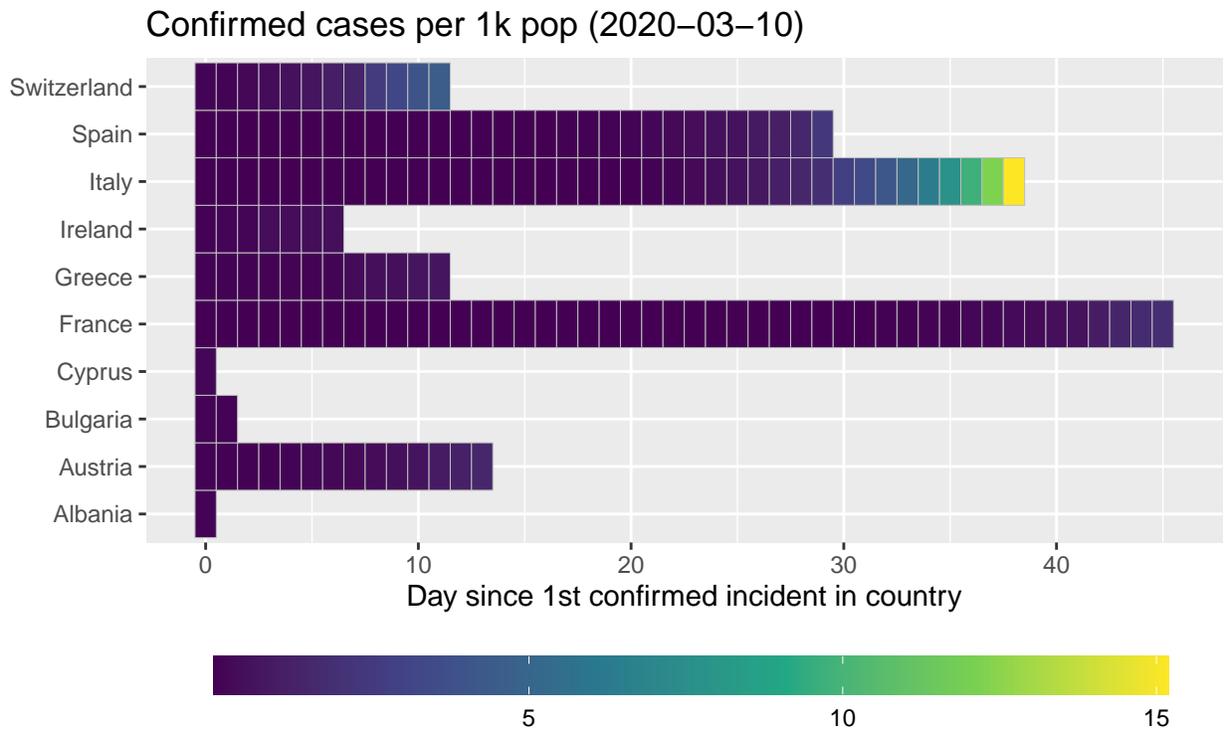


Figure 3: Confirmed Cases by 1000 population

## 2.2 Deaths

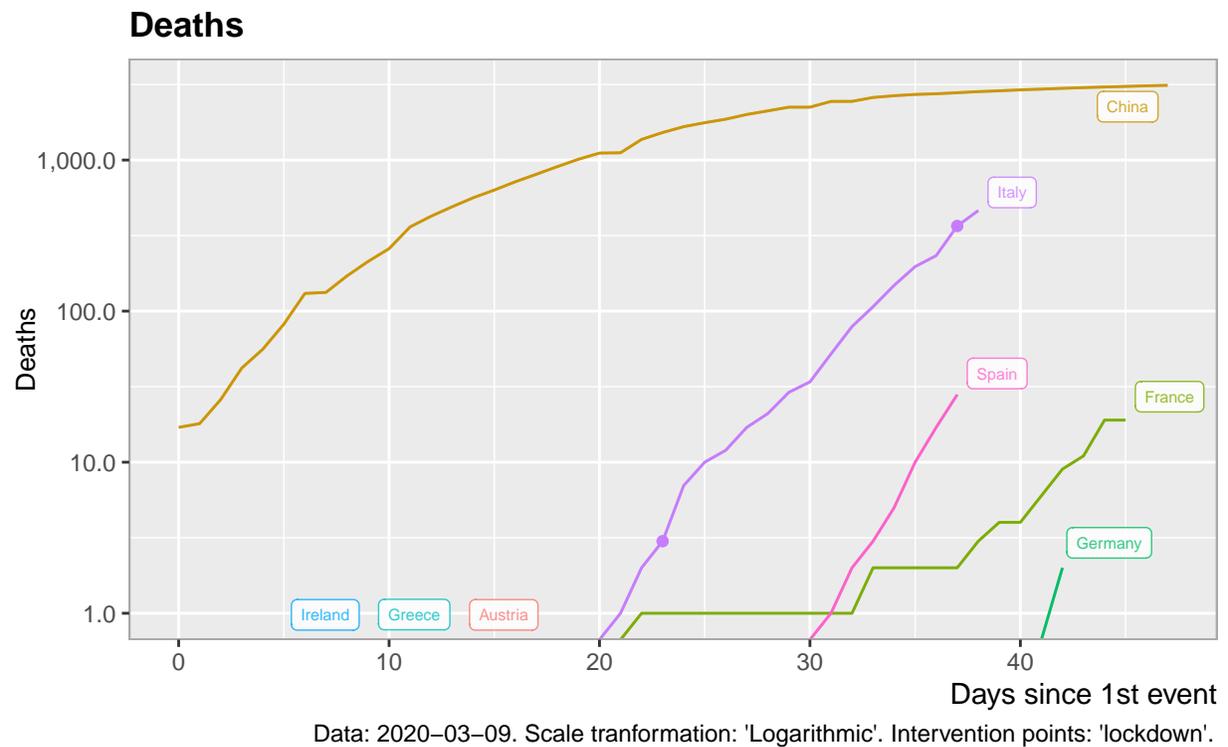


Figure 4: Number of deaths by country

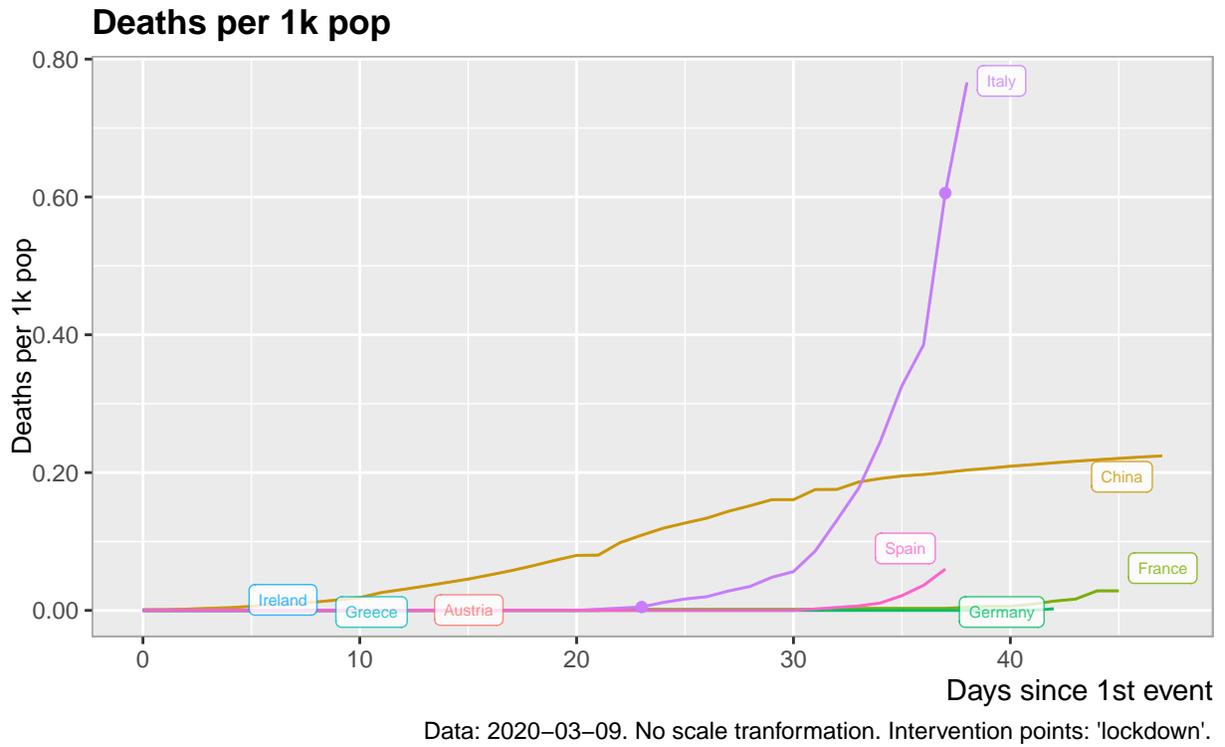


Figure 5: Deaths by 1000 population

### 3 Rate of change over time

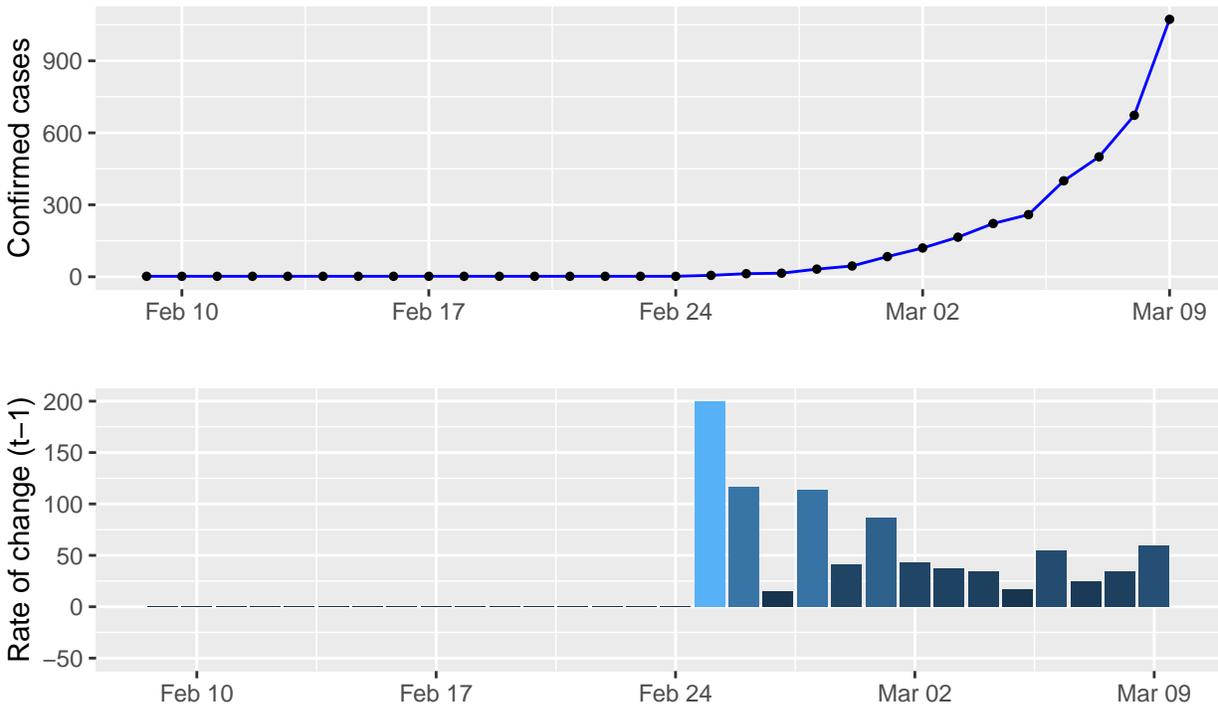


Figure 6: Rate of change of confirmed cases

## 4 Estimations

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

### 4.1 ARIMA projection

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

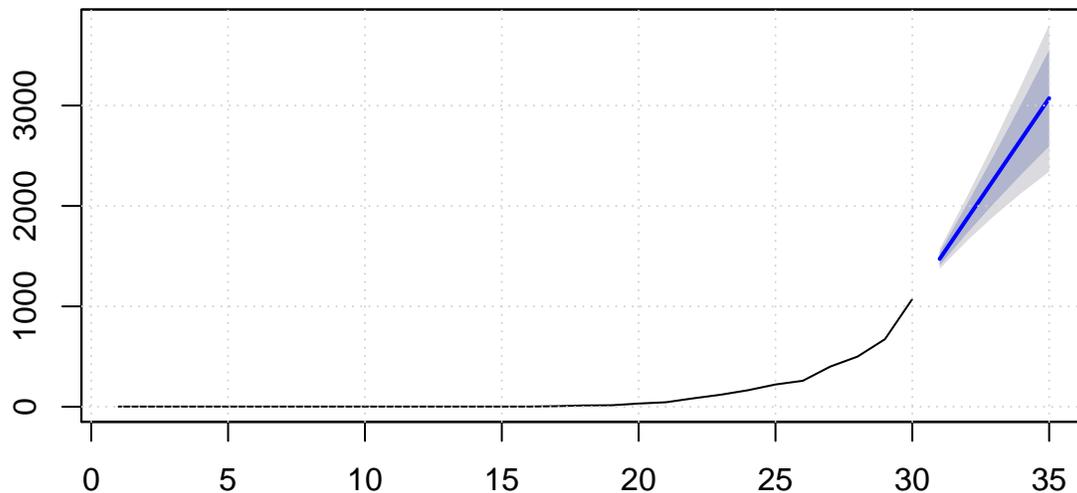


Figure 7: ARIMA projection

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

	Estimation	Confidence 95% (Low)	Confidence 95% (High)
<b>t+1 (2020-03-10)</b>	1473	1374	1572
<b>t+2 (2020-03-11)</b>	1873	1652	2094
<b>t+3 (2020-03-12)</b>	2273	1904	2642
<b>t+4 (2020-03-13)</b>	2673	2133	3213
<b>t+5 (2020-03-14)</b>	3073	2341	3805

- We cannot estimate the detection percentage yet. We need more data.
- With data up to 2020-03-09 in Spain we have 1073 confirmed cases and 28 deaths.
- Estimated doubling time (based on 5 days time window) is approximately 2.1 days

## 4.2 PROPHET projection

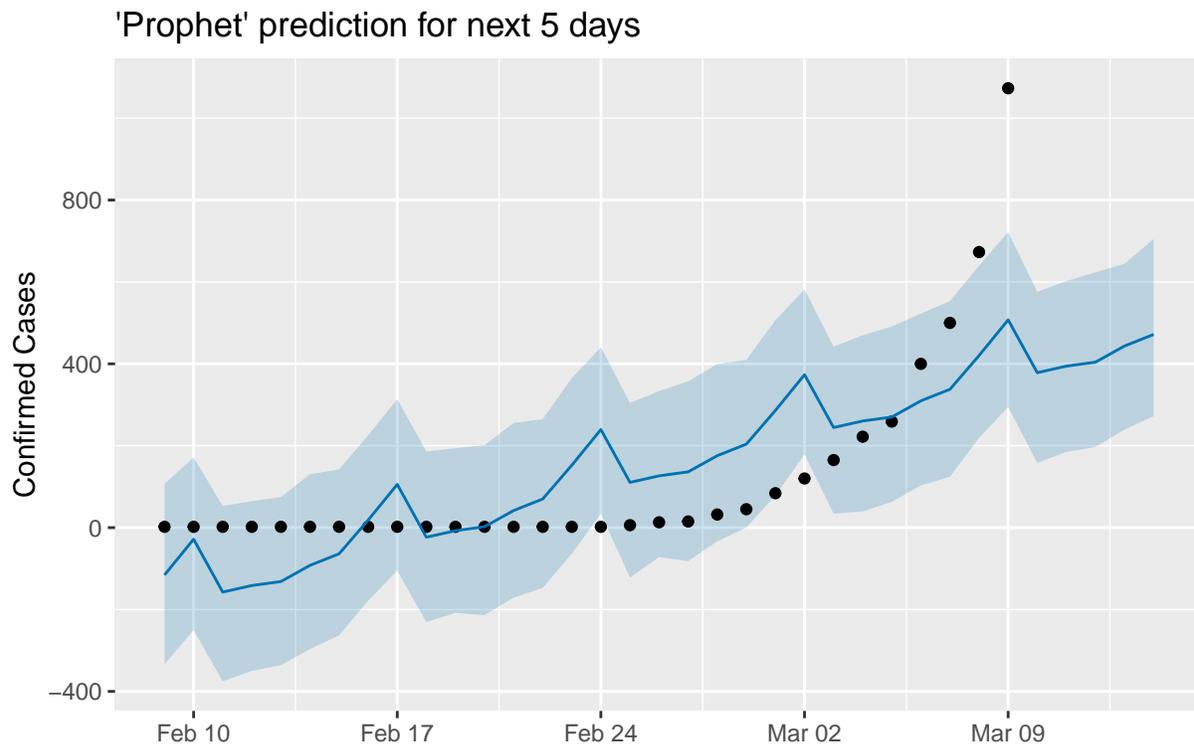


Figure 8: PROPHET Projection of confirmed cases over the next 5 days for Spain

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

	Future_Date	Estimation	Confidence 95% (Low)	Confidence 95% (High)
<b>t+1</b>	2020-03-10	378.4	158.2	575.8
<b>t+2</b>	2020-03-11	394.3	184.9	602
<b>t+3</b>	2020-03-12	404.1	196.9	623.5
<b>t+4</b>	2020-03-13	443.5	239.5	644.5
<b>t+5</b>	2020-03-14	471.8	272.1	704.7