Data after March 25 and scenarios after May 3 (end of lockdown)

Map of the projected real GDP growth rate in 2020 of counties in the International Monetary Fund’s World Economic Outlook (April 2020).

$\text{GDP growth rate in 2020 (in percent)}$:

- $>10.0\%$
- $8.0–9.9\%$
- $6.0–7.9\%$
- $4.0–6.9\%$
- $2.0–3.9\%$
- $0.1–1.9\%$
- $0.0\%$ or no information available
- $-0.1–1.9\%$
- $-2.0–3.9\%$
- $-4.0–6.9\%$
- $-6.0–7.9\%$
- $-8.0–9.9\%$
- $<-10.0\%$
Update of model (data as of May 1)

Figure 1: Comparative analysis of data and model results for hospitalizations in 107 Italian provinces as of May 1, 2020. The maps show: a) a sketch of the Italian regions; b, c) the prevalence of cumulative hospitalizations in each Italian province up to May 1, reconstructed data (b) and model simulations (c); d) Ratio between the estimated transmission rate on May 1, and the one estimated at the beginning of the outbreak (February 24).

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Model update and future scenarios

- The spatial model parameters are updated.
- Further decrease of transmission rate wrt March 25 down to 30%-40% of initial transmission (depending on region).
- The blue line is the baseline (going on with lockdown).
- The green and purple solid lines represent scenarios for a release of containment measures determining an effective increase in the overall transmission rates of respectively 20% and 40%.
- Mobility increase can be effectively mitigated by PPE (Personal Protective Equipment).
Protective equipment

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Sensitivity analysis for the prevalence of susceptible (to fraction of asymptomatics)

Definition of symptomatic cases not well established

Baseline scenario with 3 fractions of symptomatic cases
• 50% (Vo’ Euganeo study) blue
• 25% green (likely)
• 10% red
The advantage of early and wide testing

Reported confirmed cases and deaths (14-day rolling numbers) for countries that acted earlier and tested more widely (Singapore and Taiwan, which have never reached ten deaths within any two-week period, are outside the graph’s range). For some of them, geographical insularity may have also helped slow the spread. Early large-scale serology studies suggest that the actual number of infections is 10–20 times the number of reported cases. After turning a corner, bringing cases and deaths down takes many more weeks that it took for cases and deaths to reach a peak. Infection fatality rates, which depend on demographics, cultural factors, the capacity and quality of healthcare systems, public health measures and mitigation measures, are estimated to be 0.5–1% — a multiple of that for seasonal flu in the United States (0.1%). Data updated 11 May 2020. Individual data points can be affected by reporting errors and delays, and by location-specific definitions (and changes to them) for confirmed cases and deaths. Data sources: European Center for Disease Control and Prevention (cases and deaths); Our World in Data (tests). Additional updated graphs are available.

[Diagram showing confirmed cases and deaths over time]

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Our estimate of infection fatality rate (IFR) in Italy = 2% with 25% fraction of symptomatics
Future scenarios: testing and tracing

Goal: trace and isolate exposed and pre-symptomatic cases so as to stay on the baseline epidemiological scenario
- **Green** solid lines: individuals to be isolated daily
- Dashed black lines indicate the estimated number of $E$ and $P$ individuals that can be isolated by **tracing all the infections** generated by the new daily symptomatic cases $C$ (via swab testing)
Conclusions

• Only a spatial model including mobility can effectively project the epidemic trajectories
• In this way it is possible to estimate the demand for critical care facilities in our hospitals
• There are many shortcomings in the model:
  • age structure
  • social contact structure (household, school, work, etc.)
  • insufficient spatial granularity for some compartments (lack of available data)
• Although data were made available in relatively short time at the beginning, there has been an insufficient response to the request of the scientific community that data be widely available