Copeman Academy

Mathematical Ecomomics

Case Study Carona Virus, Special interest South Africa

Mission

To build Microeconomic and Macroeconomic models for policy makers. Microeconomic models are aimed at policy makers controlling popuataions of less that 10,000. Macro models are at the sector level and apply to populations of 1,000,000 plus. Both models work on the principle of compartments

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*'Tis impossible to be sure of any thing but **Death and Taxes**,*

- *The Cobler of Preston by Christopher Bullock (1716)*
-

Introduction

Early in March after following the John Hopkins numbers for a month, I made this page

http://www.turbocash.net/CA/economics/cases/coronavirus/

Then I decided no one was listening to me so I stopped posting. I can pick it up again if I can get collaborators. A friend of mine lives not far from the world's leading centre in disease control in San Antonio and I could not even get him to listen to me.

The models I have made are based on the San Antonio models and the historical work of Cambridge Economists noteably of Jochen Runde with respect to the use of weigthts on Keynesian probiliabty. (in layman's terms - balancing overanalyzing with suspect data)

The WHO and western politicians are focusing on the virus and not on the GDP impact (which also kills) - at some stage **policy makers will have to put a GDP value on a life,** avoiding that quantification or pretending it is avoidable, is not helpful.

Simple visualisation

To understand the policy requirements, first get a visual understanding of what quarantine, social distancing and recovery mean.

https://www.washingtonpost.com/graphics/2020/world/corona-simulator/

After these visuals if you are still following then you are ready to take on these concepts:

We can't beat the virus without a vaccinne.

Dropping GDP kills people

The solution to minimise deaths is compartments

Testing is a tracing function, we have lost that luxury.

In the context of compartments, "flattening the curve"does not necessarily minimise deaths! (Do not take this out of context!)

Data urgently required

Death forecasting is the least reliable part of the model. We study **more the effect of the death-impact on GDP** than from the medical viewpoint. (economics is a dark science)

What is the death- impact of Covid-19 on HIV or TB hosts?

What is the recovery by age group of hospitalised cases ?

It is still possible that the whole hospitalization process serves little purpose other than to spread the virus and makes little impact on recovery.! (deeth death ag between Wuhan and Italy/New York)

The above effects policy on the treatment curve. We may be putting in the effort at the wrong places.

What is the effect of short term immune boosting. The effort required may be long before admission, by the time a patient is admitted treatment is ineffectual.

SIR and ISLM and Input-Output analysis.

Íf you are still following read this:

http://systems-sciences.uni-graz.at/etextbook/sw2/sir.html

I will defer the discussion on why monetary and fiscal "thrashing" may make politicians look like the are doing something, but are likely to be ineffectual and in fact make it worse by distorting the price and delivery of commodities)!

I will defer the discussion in the use of compartments until you have the basics of the epidemiology in place and have the stomach to understand that the best option we have at the front is for volunteers to risk their lives to become "recovered". -!?&

If you have read the above you are ready for your first simplified model (Key to understanding the rest.) This simple SIR model is useful for understanding dynamics in populations of 1,000 to 10,000.

https://drive.google.com/file/d/133WCbN4OCsGHm8iqC_UPsemfnIMJMlId/edit

SIR is important because looking at data I have identified this as a manageable block in order to achieve zero transmissions.

Testing and tracing

These are importnat factors in reducing R zero. I have so far not modeled these because As I anticipated, the tests are too expensive for South Africans. The mathematics of tracing is too complex for South Africans. At 1,000 cases we are already overun on tracing. (needs work using graph theory to pick up the elements uniqie to SA)

To pause the virus using compartments we are going to need 50 Million/10,000 = We will need 5,000 policy makers. About the size of a municipal ward.

As recoveries increase, we will be able to use sampling to replace tracing.

The test that we are doing are not focusing on recoveries. The test to prove that you have HAD the virus and recovered is urgent. These hosts are most useful because they are the least likely to spread the virus in the inevitable cross compartment transactions of the future.

Policy

There is no point in putting effort into this unless you suggest policy and implement it in your given domain. Policy varies quite considerably for every domain, based on the knowns.

Ideas that deal with the future are outlandish - three weeks ago the idea of blocking the airports was outlandish. If only that was our only problem now.

Facebook banned me because I kept repeating the message to get people to "Look forward"- even now this is our greatest failing. You will see that three weeks ago I was calling for closure of incomings noone listened. Two weeks ago I tried to make contact with SUN and UCT and SANLAM and Old Mutual and they had no teams measuring the impact between virus and the economy.

We are still doing the same mistake - we are trying to save the economy - this is no longer possible. We should cancel all income payments and direct public resources towards a Universal grant. In the last few days, we killed possibly thousands, by allowing movement. (needs work modelling the compartments and the effect of isolating compartments)

We need to work hardest on the interface between the economy and the virus and the impact of each sector. My current estimate is that to achieve a lockdown rate of 90% you have to strangle GDP by 80%. Keynesian interventions, both monetary and fiscal are likely to be ineffectual as they work counter to the efforts to curb the virus. (needs work)

The things matter over the next few weeks:

defining the compartments and appointing leadership

enforcing the isolation

food

security

early treatment

Forecast

Here is my current forecast for South Africa (as at 26 March)*

It should be noted that this is entirely my own work as I have to date not been able to acquire help in the modeling.

Week ending Friday	27th Mar	3rd Apr	10th Apr	17th Apr
Cases	1,200	4,000	12,000	30,000
Deaths	1	10	50	300
Recovers**	15	60	500	2,000

* Assumes, no increased vulnerability for HIV;

Presidents Lockdown is 90% successful (marshall law)

**Recovered are underestimated by non reporting of cases

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