3)a) The stock of capital at the steady state after adding savings is 124.4292314.
This is reached at the year 822.

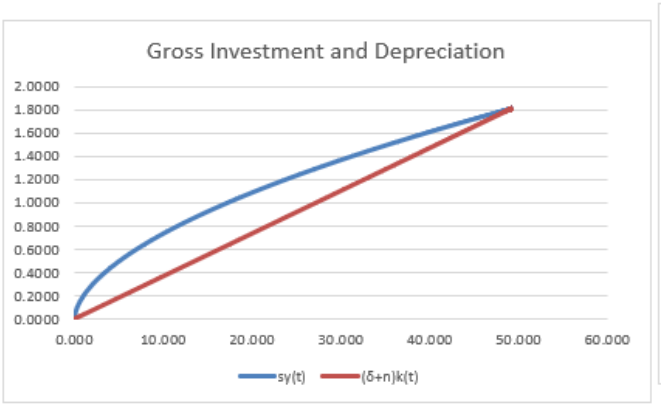
822	60.026	124.429	15.1827	4.5667	0.0367	4.5666	0.036

Report

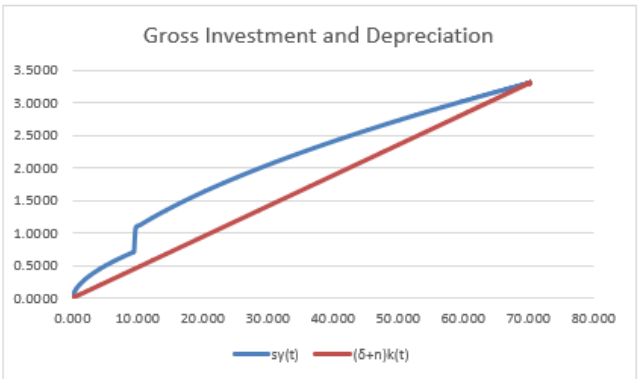
Here, I am simulating the Solow Growth model for Spain. So, initially I downloaded all the data from Penn World Tables and Data bank World Development Indicators. We´re using average depreciation, average Savings rate, capital participation, and labour participation. From this we derived the income, saving, savings to capital, capital lost to depreciation, consumption, change in capital, growth rate for capital per worker.

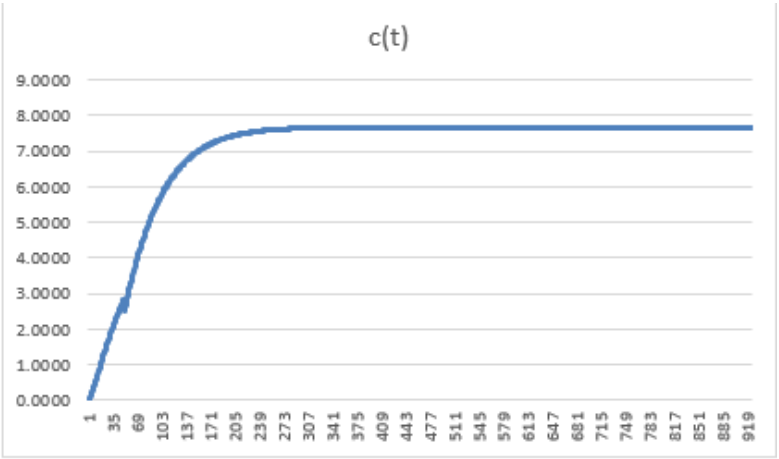
Initially, we visualize a scenario where there is constant technical progress, the steady state is at 49.251 and output is at 9.003 reached at 780 years until which savings, income, and capital are increasing, but once the steady state is achieved the graph becomes flat. We here see that that gross investment and depreciation are both going upward until they intersect which is the steady state. And so is consumption a smooth line upward line until it gores flat. Later, in the 51st year, we try to see the changes caused by an increased fiscal budget of 10%, the theory is that when the savings rate goes up, in the short run people save more and consume less leading to a drop in the first and the second graph below. But this is temporary, as in the long run consumption bounces back and goes up. For the sake of comprehension, I have also calculated the second steady state which takes into consideration the 10% addition. I have also calculated the consumption at which the economy is in a steady state for both the cases.

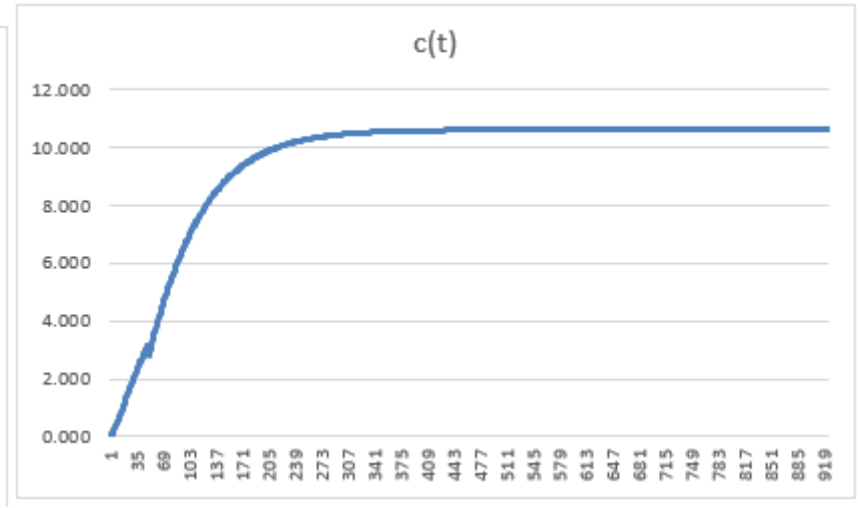
Before

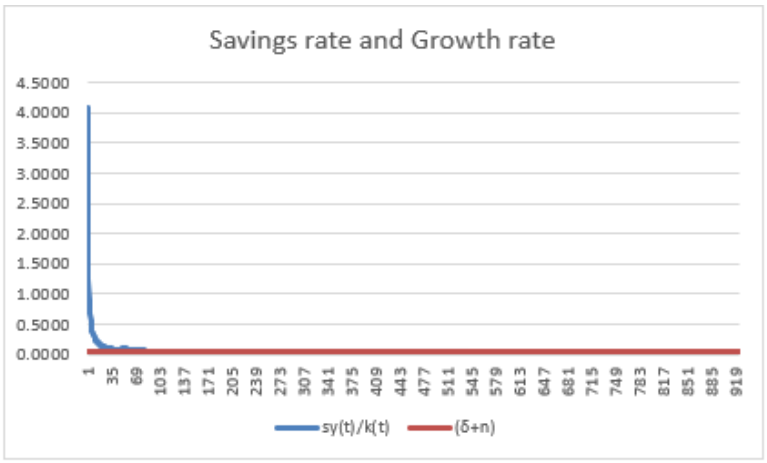

Gross Investment and Depreciation
2.0000
1.8000
1.6000
1.4000
1.2000
1.0000
0.8000
0.6000
0.4000
0.2000
0.0000
0.000
10.000
20.000
30.000
40.000
50.000
60.000
sy(t)
(δ+n)k(t)

After!

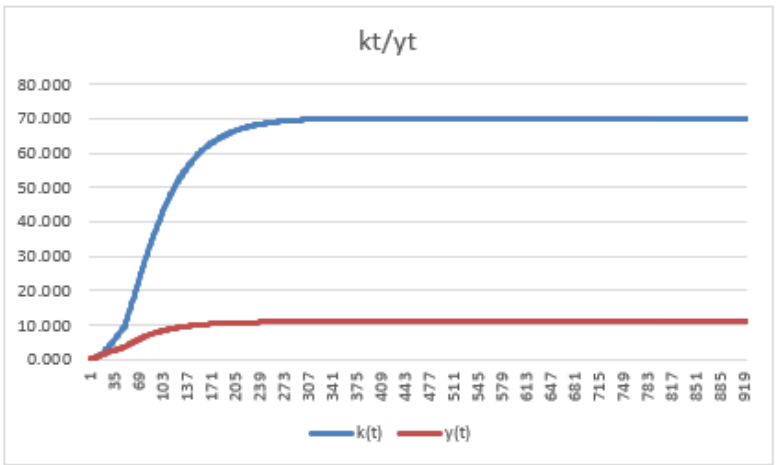

Gross Investment and Depreciation
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0000
0.000
10.000
20.000
30.000
40.000
50.000
60.000
70.000
80.000
sy(t)
(δ+n)k(t)

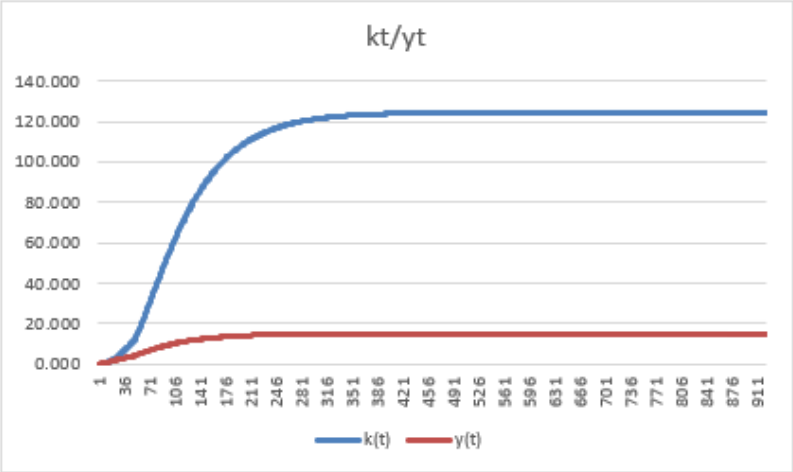

c(t)
9.0000
8.0000
7.0000
6.0000
5.0000
4.0000
3.0000
2.0000
1.0000
0.0000
1
35
69
103
137
171
205
239
273
307
341
375
409
443
477
511
545
579
613
647
681
715
749
783
817
851
885
919





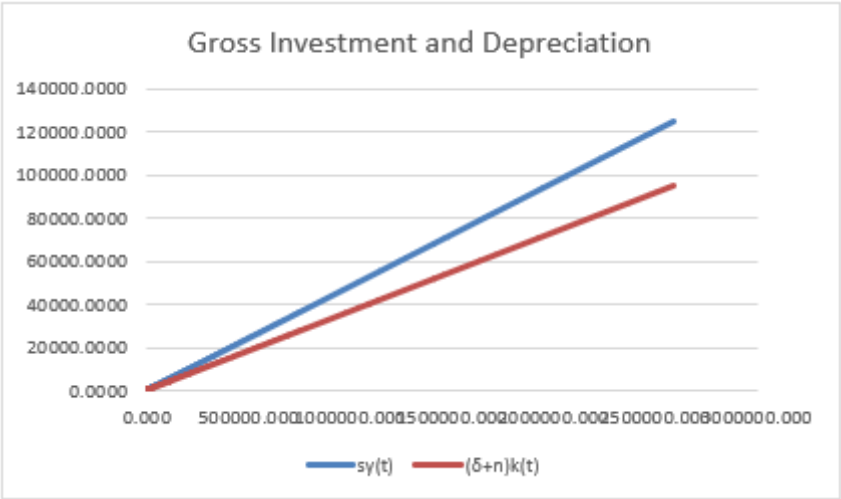
This graph is basically when depreciation has reached a point where more investment does not lead to increase in capital, but it only covers the caused depreciation. From here ahead the economy transitions into steady state. Capital accumulation doesn´t really change anything.

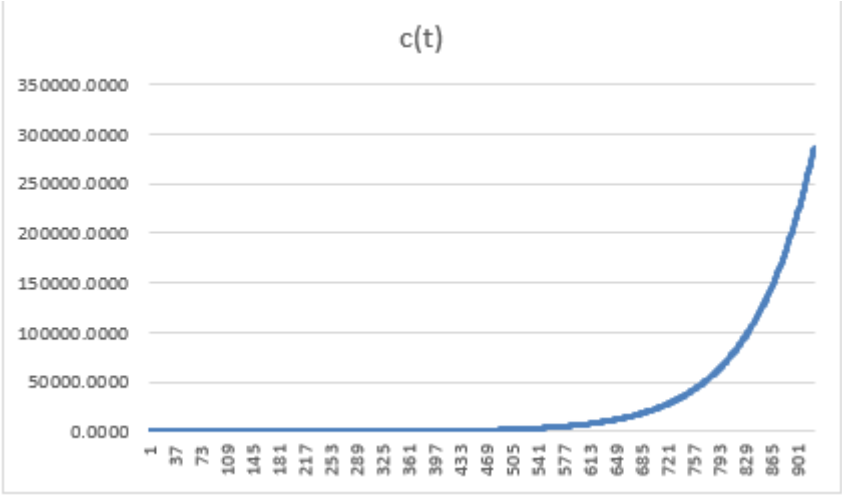


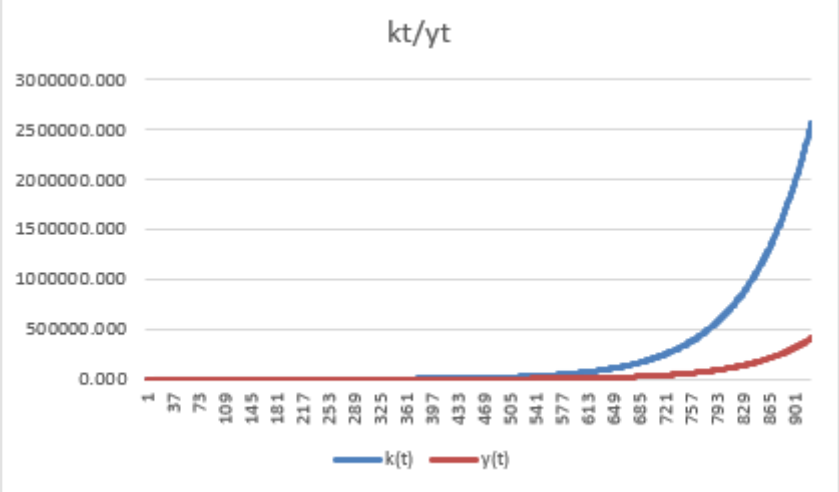


In the fourth graph it shows that an increase in output corresponds to an increase in capital, which aligns with our theory until steady state. The capital and output after we change the savings rate

Next, we include technical change to the simulation. After introducing technical progress, the Solow model shows significant changes across key variables. In the **Gross Investment and Depreciation** graph, investment sy(t) grows faster than depreciation (δ+n)k(t), reflecting increased productivity that amplifies output and raises capital accumulation. **Consumption** c(t) exhibits exponential growth, as higher output driven by technological improvements boosts both savings and consumption. These dynamics illustrate how technological advancements push the economy to a higher growth trajectory, sustaining long-term improvements in living standards.







In this simulation of the Solow Growth Model for Spain, we observe how savings, fiscal policy, and technological progress impact economic growth. Initially, without technical progress, the economy grows until reaching a steady state at 49.251, where investment matches depreciation, and capital accumulation no longer increases output.

A 10% rise in the savings rate temporarily reduces consumption, but in the long run, both consumption and output increase, leading to a higher steady state. When technical progress is introduced, investment outpaces depreciation, and consumption grows exponentially, reflecting higher productivity and sustained long-term growth.

Overall, the simulation highlights how policy changes and technological advancements shape an economy’s growth path, emphasizing the importance of innovation for long-term prosperity.