**Answer to the first theoretical question**

***Questions:***

The variable that describes the capital stock is interpreted differently in the Harrod-Domar and Solow models. So, explain the economic processes in the following cases:

a) If we admit that we are in an economy where the number of workers does not change and we are in equilibrium, what would be the effect of an increase in capital stock in the context of the Solow model? You can illustrate your answer with a graph.

b) If the capital-output ratio corresponds to a growth rate different from the desired rate, how does the system adjust to an equilibrium position, according to the Harrod-Domar model?

***Answers:***

A) In the Solow model, starting from equilibrium and when there is no growth in the population and in the number of workers, an exogenous increase in K would lead to a consequent increase in k (k= K/L, that is, capital/labour ratio). In the usual Solow diagram (below), this corresponds to the transition from k \* to k2. Since the production function, f (k), the investment function, s.f (k), and the required investment function, (n + δ) k (the amount of investment required to keep k constant), have not changed, the steady state remains in k\*. At the new level k2, as seen at the top of the Figure, the necessary investment (depreciation) exceeds the investment actually made so that, as represented at the bottom of the Figure, the physical capital stock per worker will decrease (dk/dt <0) until the economy returns to the original steady state k \*.



Fonte da Figura: Snowdon and Vane (2005), *Modern Macroeconomics*, p.608.

B) Remember the Harrod-Domar model, where $g=\frac{s}{v}-δ, $where $g=$ growth rate of income (Y), $s=sY,$ $v=\frac{K}{Y}, δ=$ depreciation rate. In the Harrod-Domar model, the capital-output ratio (v) describes a technological relationship between investment (in equilibrium, $I=S$) and the growth of income that is assumed to be constant, which is the rate at which K is converted into output. The ratio K/L is also constant, as these factors, capital and labour, are complementary rather than substitutable, contrary to what is assumed in the Solow model. Economic growth is determined by the savings rate, s, converted into capital investment and the rate, v, at which that capital investment is converted into new income, Y. Thus, if a given v corresponds to a rate of growth different from the desirable rate of growth, given s, there is no automatic adjustment mechanism, endogenous to the model, to bring v in line with a desirable rate of growth (if v increases or decreases, s is converted into less or more income, respectively). So, the savings rate and the conversion of savings into investment (which are not automatic processes) can be altered by changes in social behaviour or by the effect of economic policy (incentives, for example), and v can be altered by the effects of industrial and technological policy that may make capital more efficient at generating new income, but neither is an automatic process and all may be slower than Solow’s assumed automatic market adjustment.