MATEMÁTICA 2º GQ

nunesvitald

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1 Multiplicadores de Lagrange

Calcular Máximo e Mínimo de uma função, em um determinado espaço do domínio

1.1 Vetor Gradiente

$f : \Omega \; c \; R^2 \Rightarrow R$
$(x, y) \Rightarrow f(x, y) = x^2 + y^2$

$$E(x) = \Sigma p_i v_i = p_1 x_1 + p_2 x_2 + ... + p_n x_n$$

$$E(x) = \frac{\frac{N}{2}\times 4 + \frac{N}{4}\times 3 + \frac{N}{8}\times 2 + \frac{N}{8}\times 1}{N}$$

$$E(x) = \frac{N(\frac{1}{2}\times 4 + \frac{1}{4}\times 3 + \frac{1}{8}\times 2 + \frac{1}{8}\times 1)}{N}$$

$$E(x) = \frac{1}{2} \times 4 \; + \; \frac{1}{4} \times 3 \; + \; \frac{1}{8} \times 2 \; + \; \frac{1}{8} \times 1$$

$$E(x) = \frac{25}{8}$$

$$2^2 = 4$$

$$E(x) = \frac{1}{2} \times 2^1 \; + \; \frac{1}{4} \times 2^2 \; ... \; + \; \frac{1}{2^n} \times 2^n =$$

$$U_E(G) = \sum_{n=1}^{\infty} \frac{1}{2^N} \cdot ln(2^N) \; = \; \sum_{n=1}^{\infty} \frac{1}{2^N} \, ln(2) \times N \; = \; 2ln(2) \; = 1.39$$

$$E = \sum_{n=1}^{\infty} \left(2^n \cdot \frac{1}{2^n} \right)$$

$$0 \leq p \leq 1$$

$$\text{Deficit} = rB_{t-1} + G_t - T_t$$

Budget constrain: $B_t - B_{t-1} = \text{Deficit}$

Means that the only way that the government can acquire more deficit is via debt variation ($B_t - B_{t-1}$).

Which means that:

$$B_t - B_{t-1} = rB_{t-1} + G_t - T_t$$

$$B_t = rB_{t-1} + G_t - T_t + B_{t-1}$$

$$\boxed{B_t = (1+r)B_{t-1} + G_t - T_t}$$

In this way we have the debt at the year "t" formula

Now, lets imagine a situation:
We are start in the year 0, and the government has budget balance ($T_t - G_t = 0$).
In the year 1, the government reduces '1' in taxes ceteris paribus.
What is going to be the deficit in the year '2'?

Year 0 $\Rightarrow B_0 = 0$
Year 1 $\Rightarrow B_1 = 1$ *T decreased 1
Year 2 $\Rightarrow B_2 = (1+r)1 + 0$
Year 3 $\Rightarrow B_3 = (1+r)(1+r)1 + 0$
Year 4 $\Rightarrow B_4 = (1+r)(1+r)(1+r)1 + 0 = (1+r)^3 1$

Which means that :

$$B_n = (1+r)^{n-1} \cdot B_{t-1} + G_t - T_t$$

Now, we are going to pay all our debt, so $B_5 = 0$:

$$0 = (1+r)^4 1 + G_t - T_t$$

So:

$$T_t - G_t = (1+r)^4 1$$

For our debt to be zero, the surplus must be equal to the accumulated debt