THEORETICAL GROUND OVER THE COBWEB MODEL

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Abstract: *We propose a theoretical landing of the liniar Cobweb model and effectuation of some numerous simulations whit help of a onformatic product whith multiple applications în economical research, which is Maple. We are ready to supply graphic programs to those who are interested.*
Keywords: *cobweb model, numerous simulations, maple program*

Presentation of Cobweb model

On some markets,also farming ones but also the ones of industrial goods whith a long cicle of farbrication, the offert can't extend imediatlyto meet a greater growth .This way, a harv must be planted first, then growth and recolted after, actions that ask for a certain period of time.

Cobweb model is the one who take în consideration the same time decal of the offert reaction at the modifications of demand from a certain market, through the presumption that the size of the cuantity offered now Q_t^{of} depending on the price from a previous period P_{t-1} în other order of meaning Q_t^{of}=f(P_{t-1}) where the basics show a period of time. The consumer demand on the same product market Q_t^{cer} depends on the curent price, Q_t^{cer}=f(P_t) .

In case of a liniar model of the market forces we will have: Q_t^{cer}=a+bP_t and Q_t^{of}=c+dP_{t-1}

Where a, b, c are the specific function parameters of the demand and supply, and the normal goods b is possibly negative.

The balanceof the market involves equalisation of demand and supply, which says:

$$Q_t^{cer}=Q_t^{of} \Rightarrow a+bP_t=c+dP_{t-1} \Rightarrow P_t=\left(\frac{c-a}{b}\right)+\frac{d}{b}P_{t-1}$$

The last relation shows a difference ecuation first order, because the prices are different with inly one time unit.

In legal terms this ecuation can be generalized like: x_t=α+βx_{t-1},where x shows the variable what modifies în certain time, and α & β are constant mesures like: α=(c-a)/b si β=d/b .

The solution of a different ecuation first order has two components:

1) The balance solution: în Cobweb model it is like the balance of price for a long period of time. As the balance price is the same în every period of time, it means that P_t=P_{t-1}, what means that the balance solution represents a constant mesure în connection with variable adjustement which modifies în time.

We designate P* balance price for long period which mentaines în every period so: P*=P_t=P_{t-1}, and substitute în difference ecuation $P_t=\left(\frac{c-a}{b}\right)+\frac{d}{b}P_{t-1}$ we will have: P*=$\left(\frac{c-a}{b}\right)+\frac{d}{b}$ P*, P*=$\frac{a-c}{d-b}$, în equal mode and with the balance price with only one period.

2) The commplemantary solution:-name the way which the variable, the price of Cobweb model modifies from the balance solution by time. The difference ecuation $P_t=(\frac{c-a}{b})+\frac{d}{b}P_{t-1}$,can be written like $P_t=\frac{d}{b}P_{t-1}$,because the first element is not changing în time. We presume that P_t=Ak^t where A and k are constants; this function aplying for all t values, so P_{t-1}=Ak^{t-1},,and substituting the prices în difference ecuation shorten we obtain: : Ak^t=$\frac{d}{b}$Ak^{t-1} .The value of A can be shown by knowing a certain mesure of the price from a certain period of time.

This way, the final solution of a difference ecuation Cobweb model will be:

P_t =balance solution +complementary solution: $P_t=(\frac{a-c}{d-b})$+A$(\frac{d}{b})^t$

3) Numerical simulasions

The final form of the model depends on the value of raport d/b, which for values different then 0 of A will create three situations:

1) If $|\frac{d}{b}|<1$, then $(\frac{d}{b})^t \rightarrow 0$ as so t $\rightarrow \infty$.This situation is registered on a stabil market, as so the deviation from the balance price is becoming smaller. We impose the absolute size of the report because b is negativ. See figure 1 and 2.

Fig 1 Modelul Cobweb de tip convergent k<1

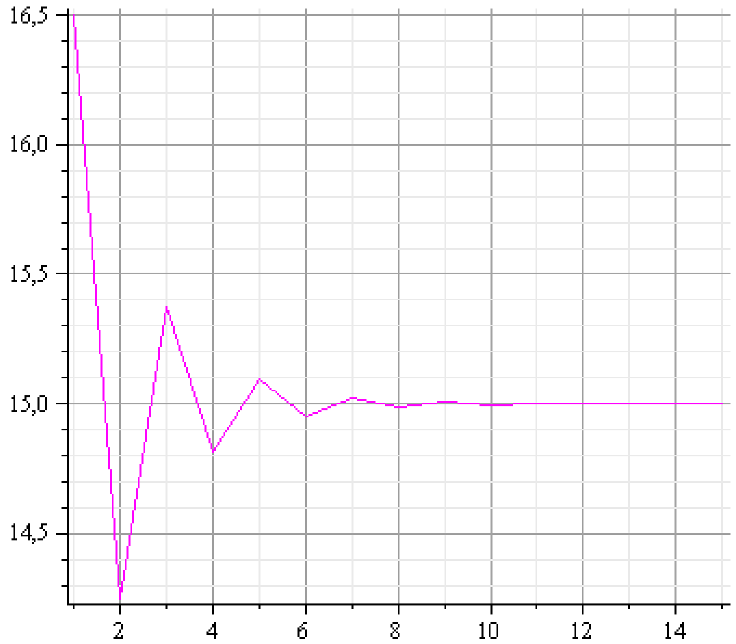
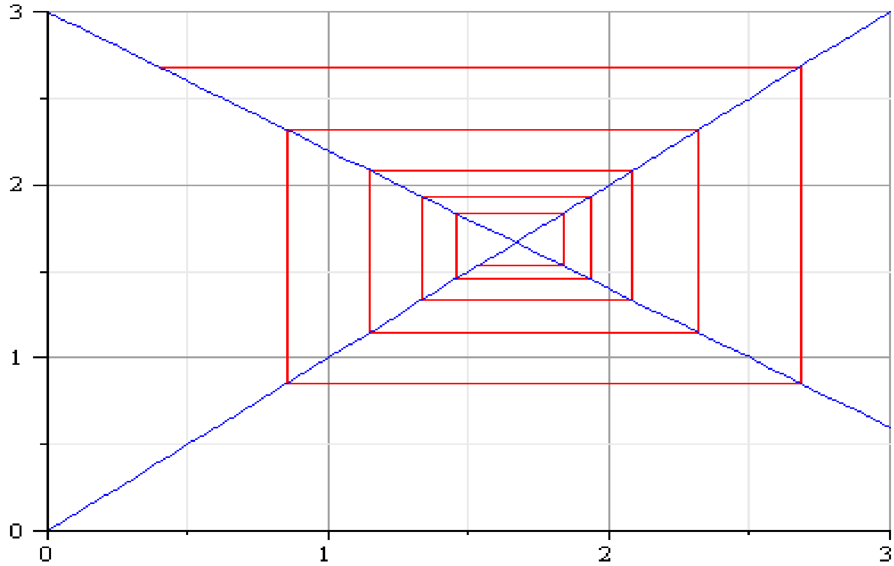
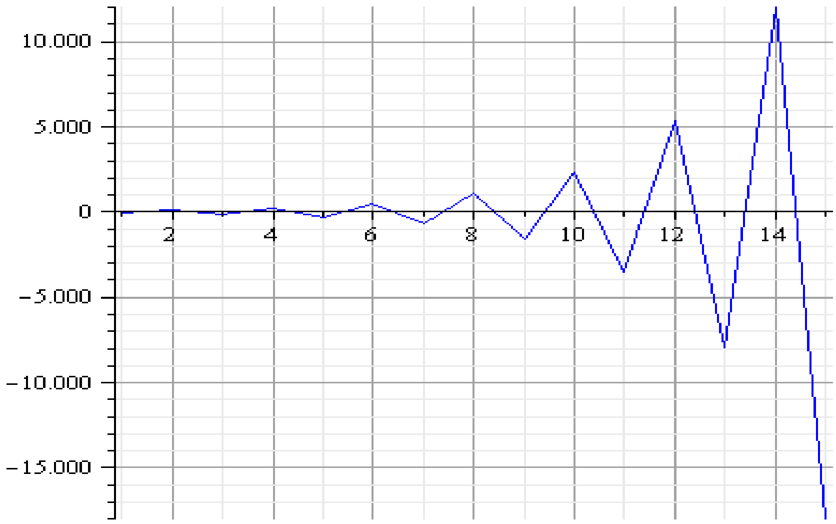


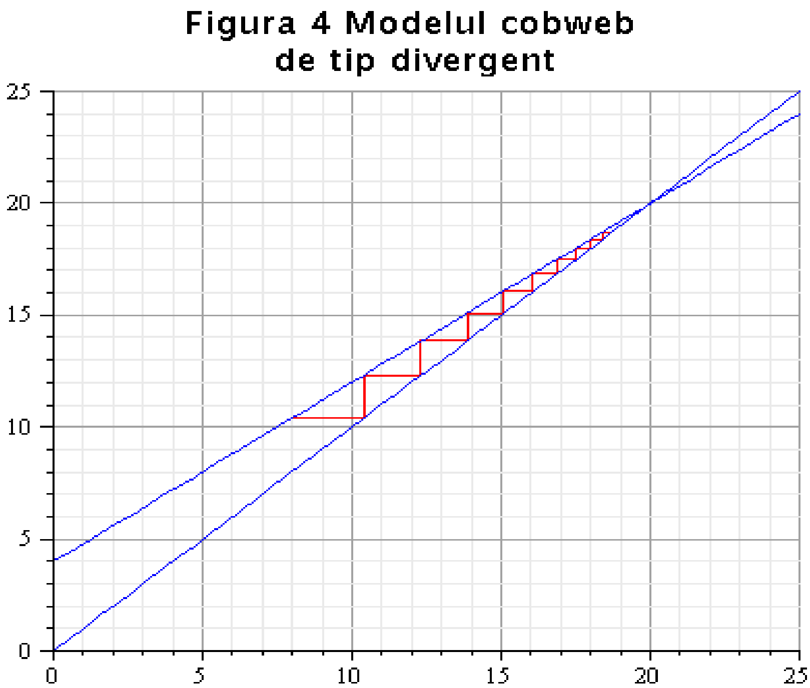
Figura 2 Modelul Cobweb de tip convergent



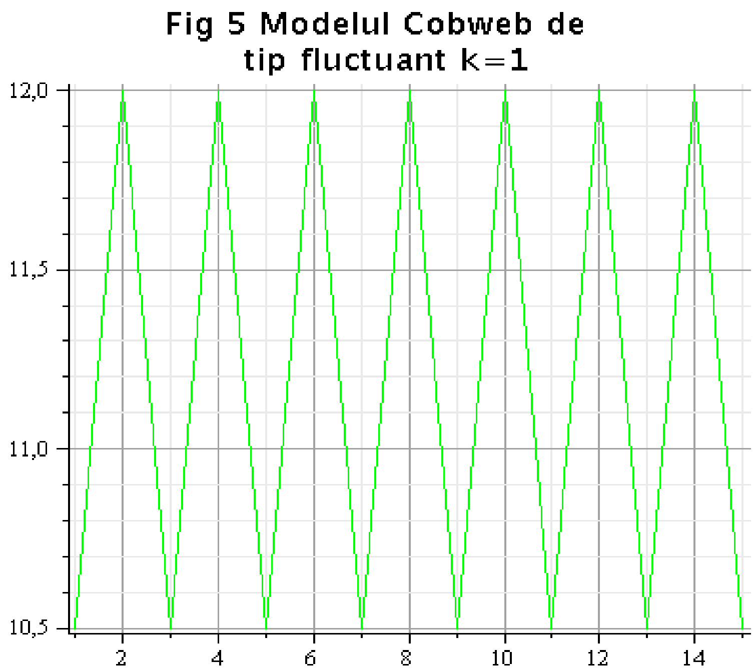
2) If $|\frac{d}{b}|>1$, then $(\frac{d}{b})^t \rightarrow \infty$ as so $t \rightarrow \infty$.This situation is registered on a unstable market. During the time the price will deviate from his balance value, with a bigger size, after a initial deviation. See figure 3 and 4.

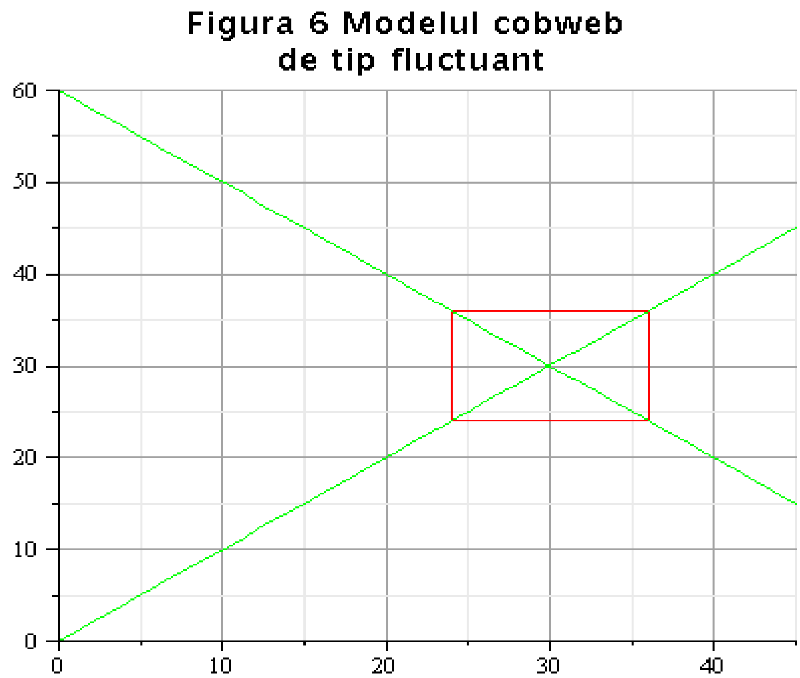
Fig 3 Modelul Cobweb de tip divergent k>1





3) If $|\frac{d}{b}|=1$,then $|(\frac{d}{b})^t|=1$ as so t $\rightarrow\infty$.This situation will be registered on a fluctuant market, the price will change between two levels. See figure 5 and 6.





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