MULTYSTABLE SELF-SUSTAINABLE MARKET FINANTIAL RISK

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We consider simple discrete mapping $A_{m+1} = \dfrac{F}{ae^{-\gamma A_m} + \theta} - D$, $\lambda = ae^{-\gamma A_m}$. It encloses direct and reverse influence of assets to risk value and further to the new (in far-from-equilibrium situation) asset value. The two modifications of this model are considered.

The 1st one is investigating transition between the two short time states (and the crisis of respect is one of them). The 2nd is considering the other form of dynamics where due to we allow funds to develop in time a crisis may arise perfectly unexpectedly for the system players while returns to the capital are kept positive. The bifurcation diagram has classical S-like shape crossed by horizontal isocline (of the slow eqv. of funds)(see the other version)
$$\begin{cases} \tau \dfrac{d}{dt} K = \alpha K \left(k \dfrac{p_p(kK)}{\tilde{\lambda}(\tilde{A}) + d + b} - p_K \right) \\ \varepsilon \dfrac{d}{dt} A = -A + \dfrac{p_p(kK)}{\tilde{\lambda}(\tilde{A}) + d + b} - D + g\xi(t) \end{cases}, \varepsilon << \tau$$
, leading to the [hard] Fitshju-Nagumo type system

$$F = pKk; \frac{\partial p(Q)}{\partial Q} < 0$$

In order to investigate the cross state transitions we from ODE $\dfrac{d}{dt} A = -A + \dfrac{F}{ae^{-\gamma A} + \theta} - D$ transit to Langeven equation $\dfrac{d}{dt} A = -A + \dfrac{F}{ae^{-\gamma A} + \theta} - D + g\xi(t)$ that's why we get Fokker-Plank equation – slightly modified by risk depreciation (the 2nd one in the system below) and after it it's result – a known expectation of revenue or an approximate probability of early death everybody may substitute to the model $\lambda_i(A) \to \lambda_{i+1}(A)$:
$$\begin{cases} \lambda(A) = -(d+b) + \dfrac{F}{\int_0^{+\infty} e^{-bt} e^{-\bar{d}t} \left(\int_{-\infty}^{+\infty} \rho(x,t) dx \right) dt} \\ \tau \dfrac{\partial}{\partial t} \rho = -\dfrac{\partial}{\partial A} (\rho f(A)) + g \dfrac{\partial^2}{\partial A^2} \rho - \lambda(\tilde{A}) \rho; \end{cases}$$
$$\rho(A,0) = \delta(A - A_0)$$
(1) so far we obtain a powerful mathematical object functional <discrete> mapping introduced by (1), where $f(A) = -A + \dfrac{F}{ae^{-\gamma A} + \theta} - D$ - the right side of ODE and the Langeven equation.