Ghosh's probabilistic model of hyperinflation

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Abstract

In this paper, I describe my probabilistic model of hyperinflation.
The paper ends with "The End"

Introduction

Hyperinflation is a rare, chaotic and sometimes destructive economic event. Much has been done to prevent hyperinflation in modern economies, primarily by producing models that allow economists to predict and prevent hyperinflation in their economy.

While there are many complicated models of hyperinflation, they don't necessarily have to be complicated as the theory and mathematics of hyperinflation is simple.

In fact, **Cagan (1956)** has a model of hyperinflation with only two (2) equations. However, there are certain drawbacks in Cagan's model, namely, that real consumption and the real interest rate are both zero in his model, which is not only a **financial taboo** but also unlikely to happen, except in theory.

Therefore, in this paper, I describe my **probabilistic model of hyperinflation**, which also begins in the same broad strokes as Cagan (1956), but has a positive real consumption rate and a real interest rate, and therefore is a **practical** model of hyperinflation.

My probabilistic model of hyperinflation

We begin with the **exchange equation** in a log-linearized form

$$m + v = p + c$$

We set $v(i) = \alpha i$ where $\alpha > 0$

and move the terms so that

$$m(t) - p(t) = c(t) - \alpha i(t)$$

Then we use the **Fisher equation**

$$i(t) = r(t) + E[i(t)]$$

so that the **money demand equation** is

$$m(t) - p(t) = c(t) - \alpha r(t) - \alpha E[i(t)] \ldots [1]$$

Next, we assume **adaptive expectations** so that

$$E[i(t)] = \lambda E[i(t-1)] + (1-\lambda)(p(t) - p(t-1)) \ldots [2]$$

The probability distributions in the model

We use

The Gumbel distribution for m(t)

$$m(t) = \frac{e^{\frac{t-a}{b} - e^{\frac{t-a}{b}}}}{b}$$

The Half-Normal distribution for p(t)

$$p(t) = \begin{cases} \frac{2\phi e^{-\frac{t^2\phi^2}{\pi}}}{\pi} & t > 0 \\ 0 & t \leq 0 \end{cases}$$

A constant for c(t)

$$c(t) = \chi$$

The Log-Normal distribution for r(t)

$$r(t) = \begin{cases} \frac{e^{-\frac{(\log(t)-\rho)^2}{2\sigma^2}}}{\sqrt{2\pi}\sigma t} & t > 0 \\ 0 & t \leq 0 \end{cases}$$

The Normal distribution for i(t)

$$i(t) = \frac{e^{-\frac{(t-\mu)^2}{2\nu^2}}}{\sqrt{2\pi}\nu}$$

A solution to the model

There exists at least one (1) solution to this model comprising of the two equations [1] and [2]. Correct to 8-digit precision, the solution is

$$a = 3.9543776, b = 6.3840916$$

$$\phi = 0.22324165$$

$$\chi = 0.064090025$$

$$\rho = 2.4260747, \sigma = 0.046031714$$

$$\mu = 0.14211538, \nu = 0.066025512$$

$$\alpha = 1.1035065$$

$$\lambda = 0.096004354$$

$$t = 0.045472270$$

Conclusion

First, we observe that there are alternative models of hyperinflation. Second, we note that this is a practical model of hyperinflation that doesn't have **inanities** like a zero rate of consumption or zero real interest rate. Finally, we note that there exists a solution to this model, which means that economics, per se, **doesn't prevent** an economy from undergoing hyperinflation.

The End