What is a model ?

Swiss Risk Association 2016
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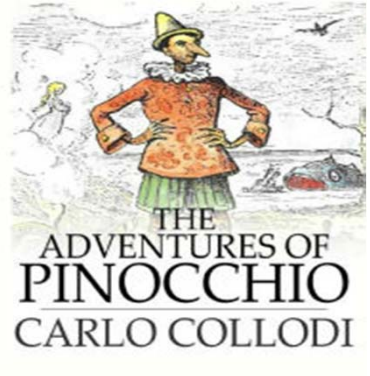
Manfred Plank

John Kenneth Galbraith

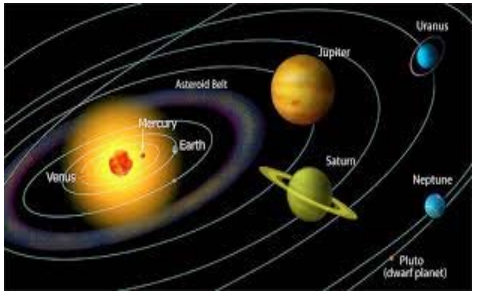
"The only function of economic forecasting is to make astrology look respectable"

What is the difference between?



$$C = S_0 N(d_1) - e^{-rt} K N(d_2)$$

$$m_1 \ddot{\vec{r}} = G \frac{m_1 m_2}{\vec{r} \cdot \vec{r}} \frac{\vec{r}}{\sqrt{\vec{r} \cdot \vec{r}}}$$



What is a model and what is a theory?

Black Scholes Option Pricing Model

$$C = S_0 N(d_1) - e^{-rt} K N(d_2)$$

- Models are analogies which describe a given object relative to another object
- Models need explanations and justifications
- Model become crap when you look at them too closely
- A good model can by used to interpolate, but not to extrapolate

Newton's Theory of Gravitation

$$m_1 \ddot{\vec{r}} = G \frac{m_1 m_2}{\vec{r} \cdot \vec{r}} \frac{\vec{r}}{\sqrt{\vec{r} \cdot \vec{r}}}$$

- Theories describe realities as they are - up to a given level of accuracy
- Theories do not need explanations or justifications, but confirmations
- Theories describe unconditionally the laws of nature. There is a deep unity between the mathematical abstraction and the real world object/phenomenon it represents
- A theory can be used to interpolate and extrapolate

Key facts we all should accept about models

- No matter how hard you try you will never be able to breathe life into a model – Pinocchio is a puppet and remains a puppet
- Nobody can write down a model which fully describes human behavior and as a result frees the user of the necessity to think, use common sense and being accountable for the decisions taken
- When we confuse a finance model with a finance theory we in principle say that the behavior of human beings is determined by mathematical formulas - which will end in a disaster
- Simple models are a strength and complex models are a weakness
- Only a robust model is good model; i.e. the model is simple enough that the user can make adjustments for everything which was omitted
- **Whether a theory in physics is right or not is decided by the experiment**. For financial models we do not have experiments which would help us to detect the “useful" models

- **Key unanswered question is how do we identify and quantify model risk and in a second step manage and control risks associated with models?**

Closing Observation - Seeing That versus Seeing As