

Resilience and Complexity

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The economy is a dynamic system which is far too complex for us to understand. Human nature is extremely complex and billions of irrational humans form the economy. How can such a system ever be thought to be efficient, in equilibrium and stable – as many prominent economists have claimed? But this system, like every other natural or man-made system, must respect the non-negotiable laws of physics, even if they may be unknown at a given time.

One of the instruments that have enabled the 2008 crisis are sophisticated math models. There was nothing in those models that would even hint catastrophe because models can only tell you what you hard-wire into them. The construction of placebo-generating models has led to a Panglossian approach to finance and the economics which excludes extreme events and catastrophes, allowing bubbles to grow and Ponzi schemes to flourish. So, failure was not contemplated in the models. And there are no model-building laws that would force one to do so.

Models are based on assumptions. Hence, they are disputable and, at the same time, provide an enormous margin of manoeuvre. And, when needed, impunity. There are no universally accepted laws on building math models. Sure, you can dream up an equation and claim that it provides a basis for the pricing of some derivative. And then have people invest based on it. You cannot be held accountable simply because you are using an equation that one day implodes. You cannot take mathematics to court, but you can put in prison an engineer or a doctor who is responsible for the loss of lives. Why is that? Because physics is not an opinion, while financial mathematics, together with its underlying assumptions, is.

Just because you manipulate equations according to strict rules doesn't mean you're doing science. You could just as well be playing an extravagant video game which has no relevance or reflection in anything that is physical and that really exists. The fact that we are still unable to fix the mess, even

though everything went off the rails almost ten years (and many trillions of dollars) ago, just goes to show how little we understand the economy, its systemic aspects and its dynamics.

We must change approach radically. When you face a super-complex system which you don't understand – the crisis proves that we understand the economy very little – do you model very precisely a tiny subset thereof or do you try to get a global coarse picture of the situation? Isn't it true that the closer you look the less you see?

The Principle of Incompatibility states that high complexity is incompatible with high precision. This means that the economy – which is evidently very highly complex – cannot be modelled precisely and that all effort to squeeze decimals out of math models is futile, even though sometimes this gets you into the Nobel zone. In actual fact, the more complex models one is conceiving the more assumptions one must make. And that means more risk and, at the same time, more freedom to steer your model in a desired direction. From a practical and physical standpoint, what is the difference between AAA and AA+?

So, we need to change paradigm. Less hair-splitting, less fiddling with decimals and unlikely probability distributions or Brownian motion. Things have gotten very complex and we must place science not mathematic alchemy at the centre of our thinking.

The Probability of Default (PoD) of a company is the central concept behind a rating and ratings are a key link between the markets and investors. Their importance cannot be overstated. However, the PoD is not a physical quantity and there exist very many ways of computing it.

Each method has its own assumptions – the degrees of freedom are phenomenal. Not only is a PoD a non-physical quantity, it is also highly subjective. In fact, rating agencies themselves claim that ratings are merely opinions. In mechanical engineering, for example, things like mass, strength, energy, stiffness or margin of safety are computed according to non-negotiable laws of physics which are the same all over the World.

The PoD does not obey any such laws. It may have become a sort of a standard, but it is not the result of any law of physics. The economy needs a more modern rating scheme. Something that not only has its roots in physics, but which is also more in line with the turbulent character of our times. Let's not forget that ratings have been conceived a century ago. The world was very different then. Conventional business intelligence and analytics technology have become dangerously outdated and, most importantly, it is not well suited for a turbulent economy. As the complexity of the economy increases, traditional analytics produces results of increasing irrelevance. Mathematically correct but irrelevant.

There is a pressing need for solutions that are architected specifically for turbulence and for an economy dominated by shocks, destabilizing events and instability. Markets are not efficient. In nature there is no such thing as equilibrium.

Therefore, we propose a rating which looks at complexity and resilience. High complexity is, with all likelihood, the most evident and dramatic characteristic of not just the economy but also the hallmark of our lives. Resilience is the capacity to withstand extreme events and is a measurable physical quantity – there are standard tests in engineering to determine the resilience of materials – and

resilience is applicable to companies, stocks, portfolios, funds, systems of companies or national economies. In our turbulent economy, which is fast, uncertain and highly interdependent, extreme and sudden events are becoming quite common.

Such events will become more frequent and more intense, exposing fragile businesses to apparently unrelated events originating thousands of kilometres away. This mandates that companies and investors focus not just on sheer performance but also on resilience, building less complex less fragile businesses. Resilience means survival and sustainability. Resilience is science, not opinions.

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