FirstRand

Physics for the philosophical investor

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A good share of modern physics is based on the laws of thermodynamics, which help us to understand how matter and energy relate to one another in closed systems, such as the universe. The first of these laws suggests that in a closed system matter and energy cannot be created or destroyed but can only change in form. This in itself may not sound particularly contentions. However, this law lies at the heart of one of the deepest and nastiest debates in economics, which also effects every one of us today.

Unlike matter and energy, money is routinely created and destroyed. The act of creating and destroying money is so important that it was a privilege historically reserved for kings. This is because when money is created its value to the economy is greater than the cost to produce it. The difference between the cost of producing money and its value to the economy is called Seigniorage (from the Old French word seigneuriage, denoting the "right of the lord (seigneur) to mint money").

The economic problem with seigniorage is that money is used to value and exchange goods and services, which to physicists are matter and energy. The hopefully obvious disconnect here is that money does not obey the laws of thermodynamics because it can be created and destroyed, yet it is used to value and trade physical things that fundamentally cannot. This leads to inevitable long-run imbalances between stores of monetary wealth and stores of goods and services available to the economy.

Although many of us spend our lives thinking about money, ultimately the world around us is a physical world. More so, the things that sustain life, such as air, water and fossil fuels obey the laws of physics rather than the laws of finance or money. One of the first people to write about this was an English radiochemist, and Nobel laureate in physics, named Frederick Soddy. He suggested that an economy based on money as we know it will not be sustainable because financial assets grow exponentially at compound interest but the real economy is based on exhaustible stocks of natural resources, such as fossil fuels, which do not. In other words, your financial wealth may be growing with the compounding laws of mathematics while the natural resources ultimately sustaining you and your heirs into the future are shrinking.

If you have ever heard the name Warren Buffet, you have probably seen a line graph of his wealth grow over his lifetime. The graph shows a very gradual slope at first then transform into an almost vertical line as his wealth shoots up exponentially around the age of 65. The idea of reaching the level of wealth where mathematical compounding takes off like this is something that inspires many investors. However, what financial compounding graphs don't show you is the change in the natural resources which ultimately sustain underlying economic activity over the same investment periods, including those of Mr Buffet.

This graph would not show an exponential compounding of natural resources, but rather a gradual ebbing, or entropy, away as natural resources are transformed by economic activity (for more detail on entropy see the Second Law of Thermodynamics). Economists such as Robert Costanza have tried to put a money value on the natural resources that sustain economic activity in this way but have not really succeeded by objective measures. What most do however agree on is that their ultimate economic value is infinite because in the long run an economy cannot operate without them.

In a world where money disobeys the laws of thermodynamics the task for the philosophical investor is more difficult than first meets the eye. Not only may we want to reach a point where our money grows exponentially but we also, ultimately, need to do so without using up the natural resources that will sustain our heirs and their investment activities into the future. Even a betting man would probably agree that in the long run the laws of physics will prevail.