

# **Hardwiring Sustainability into Financial Mathematics and Implications for Money Mechanics**

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**Palgrave Macmillan & Springer Nature**

European Central Banks Event

28<sup>th</sup> of March 2023



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## Abstract

This paper discusses the necessity to hardwire sustainability into financial mathematics for effective change of trajectory for humanity and planet. All initiatives that fall short of transforming our equations of value and return in financial and monetary economics, while positive and encouraging, will ultimately prove to be a distraction. To achieve the hardwiring of sustainability into financial mathematics, we start by introducing space as a dimension of analysis, and by entrenching our responsibility for impact on and in space, our physical context, into the value framework of finance theory and practice. This is necessary due to the omission of space and context parameters from our models and equations, a fact that may explain the current suboptimal outcome we face. As we introduce the analytical dimension of space, and its many layers, we define the nature of that relationship through the Space Value of Money principle, a complementary principle still missing in our framework. Once we have established this new and yet missing principle, we can adjust our equations of value and return to reflect the essence of the principle: ‘a dollar invested in space must at the very least have a dollar’s worth of positive impact on space.’ What follows is a set of new equations that complement the discounting of future expected cash flows, with the compounding of the space impact of cash flows. The ensuing financial mathematics accounts for the impact of cash flows on the many layers of space we operate in or affect along with the present value of cash flows. If investors must abide by the space value of money principle, and apply the equations that follow, then so must money creators, whether commercial or central banks. This leads to significant implications for money mechanics. Specifically, this new financial mathematics reveals three key challenges with debt-based money: calendar time, monetary gravity, and monetary hunger. The paper proposes an alternative money creation logic, space value creation, and proposes Public Capitalisation Notes (PCN) as a possible monetisation instrument – which leads to the concept of Value Easing, an alternative to Quantitative and Credit Easing, that can be used to fund the transition and other evolutionary challenges/investments.

**Keywords:** Sustainability, Financial Mathematics, Money, Risk, Time, Space, Impact

**JEL:** E4, G0, G3, C9, Q5

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<sup>1</sup> This paper is a theoretical discussion built around the main propositions of ‘The Space Value of Money: Rethinking Finance Beyond Risk and Time’ (Papazian, 2022). <https://doi.org/10.1057/978-1-137-59489-1>

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Is the fulfilment of these ideas a visionary hope? Have they insufficient roots in the motives which govern the evolution of political society? Are the interests which they will thwart stronger and more obvious than those which they will serve?

... At the present moment people are unusually expectant of a more fundamental diagnosis; more particularly ready to receive it; eager to try it out, if it should be even plausible. But apart from this contemporary mood, the ideas of economists and political philosophers, both when they are right and when they are wrong, are more powerful than is commonly understood. Indeed the world is ruled by little else. Practical men, who believe themselves to be quite exempt from any intellectual influences, are usually the slaves of some defunct economist. Madmen in authority, who hear voices in the air, are distilling their frenzy from some academic scribbler of a few years back. I am sure that the power of vested interests is vastly exaggerated compared with the gradual encroachment of ideas. Not, indeed, immediately, but after a certain interval; for in the field of economic and political philosophy there are not many who are influenced by new theories after they are twenty-five or thirty years of age, so that the ideas which civil servants and politicians and even agitators apply to current events are not likely to be the newest. But, soon or late, it is ideas, not vested interests, which are dangerous for good or evil.

**John Maynard Keynes**

The General Theory of Employment, Interest and Money, 1936, 383-384

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