

Modeling the Compound Interest Dynamics Using Fractional Differential Equations

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Abstract : Banking sector covers different activities including lending money to customers. However, it is commonly known that customers pay money they have borrowed including an added amount called interest. Compound interest rate is an approach used in determining the interest to be paid. The instant compounded amount to be paid by a debtor is obtained through a differential equation whose main parameters are the rate and the time. The rate used by banks in a country is often defined by the government of the said country. In Switzerland, for instance, a negative rate was once applied. In this work, a new approach of modeling the compound interest is proposed using Hadamard fractional derivative. As a result, it appears that depending on the fraction value used in derivative the amount to be paid by a debtor might either be higher or lesser than the amount determined using the classical approach.

Keywords : compound interest, fractional differential equation, hadamard fractional derivative, optimization

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