

Abstract

This study extends a capital-resource economy framework, following Valente (2005), to investigate the impact of different time discounting methods on sustainability. By comparing exponential and hyperbolic discounting, we characterize two dynamical systems differing only in their discounting methods, represented by non-linear differential equations. The exponential economy exhibits a saddle path equilibrium at steady state, while the hyperbolic economy lacks a steady state, instead following an asymptotic balanced growth path. Analytical and numerical analyses reveal that exponential discounting prioritizes immediate benefits, leading to higher initial individual consumption and resource extraction but potential declines in the long run. Hyperbolic discounting, however, promotes sustainability by favoring future benefits, resulting in increasing individual consumption levels and conservative resource extraction rates. These findings highlight the importance of selecting appropriate discounting methods in economic planning. Aligning discounting methods with long-term objectives can ensure sustainable resource management and economic stability, fostering intergenerational equity and resilience. The choice of discounting method is crucial for achieving sustainable development and effectively addressing future challenges.