Question

April 2021

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What is $z = F(x, y)$? Suppose we work with options. z is the total reserved value, x, y are call and put token produced respectively. Thus, $\frac{\partial z}{\partial x}, \frac{\partial z}{\partial y}$ are costs to produce call and put token respectively. Option price floor is F and price celling is C. Here we simplify it, letting $F = 0, C = 1$. For $x, y, z > 0$, $\frac{\partial z}{\partial x} \in (0, 1), \frac{\partial z}{\partial y} \in (0, 1)$ and $\frac{\partial z}{\partial x} + \frac{\partial z}{\partial y} = 1$. When $x = y$, $\frac{\partial z}{\partial x} = \frac{\partial z}{\partial y} = 0.5$. When $y/x \to 0$, $\frac{\partial z}{\partial x} \to 0, \frac{\partial z}{\partial y} \to 1$. When $y/x \to \infty$, $\frac{\partial z}{\partial x} \to 1, \frac{\partial z}{\partial y} \to 0$. We also restrict that for $k > 0$, $F(kx, ky) = kF(x, y)$. $\frac{\partial kz}{\partial kx} = \frac{\partial z}{\partial x}$ and $\frac{\partial kz}{\partial ky} = \frac{\partial z}{\partial y}$
I tried $\frac{\partial z}{\partial x} = \frac{y}{x+y}$ and $\frac{\partial z}{\partial y} = \frac{x}{x+y}$. Is there a smooth solution?