assignment6

March 19, 2021

$$E(U(x)) = \mu - \frac{\alpha}{2}(\sigma^2 + \mu^2)$$
$$U(x_{CE}) = \mu - \frac{\alpha}{2}(\sigma^2 + \mu^2)$$
$$x_{CE} = \frac{1 \pm \sqrt{1 - 2\alpha\mu + \alpha^2(\mu^2 + \sigma^2)}}{\alpha}$$
$$\pi_A = E(x) - x_{CE} = \mu - \frac{1 \pm \sqrt{1 - 2\alpha\mu + \alpha^2(\mu^2 + \sigma^2)}}{\alpha}$$

$$x \sim \mathcal{N}(1 + z\mu + (1-z)r, z^2\sigma^2)$$
$$E(U(x)) = 1 + z\mu + (1-z)r - \frac{\alpha}{2}(z^2\sigma^2 + (1 + z\mu + (1-z)r)^2)$$

To maximize $E(U(x))$, we can get

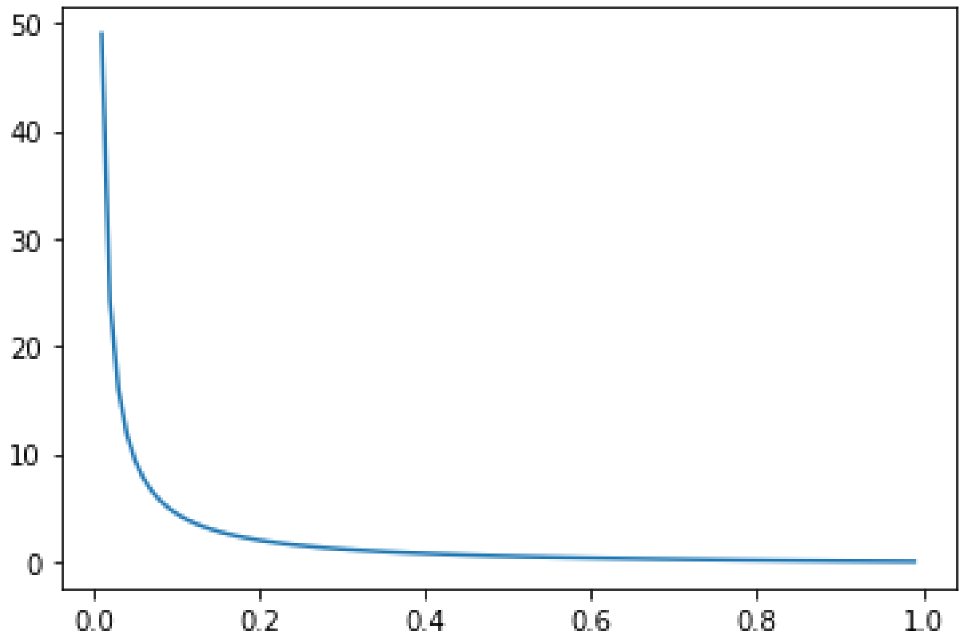
$$z^* = \frac{(\mu - r)(1 - \alpha(1+r))}{\alpha(\sigma^2 + (\mu - r)^2)}$$

[1]:
```
import matplotlib.pyplot as plt
import numpy as np
```

[2]:
```
def f(x):
    mu = 0.05
    r = 0.03
    sigma_sq = 0.04
    return (mu - r) * (1 - x *(1 + r)) / (x * (sigma_sq + (mu - r) ** 2))
X = np.arange(0.01, 1, 0.01)


plt.plot(X, f(X))
```

[2]: `[<matplotlib.lines.Line2D at 0x1168351d0>]`


50
40
30
20
10
0
0.0
0.2
0.4
0.6
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1.0

[ ]: