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ECON-UB 0011

**Lab Report #2: Equity Returns & Certainty Equivalents**

a)

b)

Mean = **8.5265**

Standard Deviation = **20.4968**

Skewness = **-0.3322**

Kurtosis = **2.8928**

c)

The excess returns distribution has a general bell-shaped curve around the mean of 8.5265, which makes it look normal; however, it still demonstrates a slight negative skewness as evidenced by the dense concentration of points within the 10-30 range, which makes it slightly abnormal.

d)

The mean excess return is positive because if the investor is investing money in equity, a much riskier asset class than a bond that yields the risk-free rate, then the investor must be compensated for that higher level of risk (which is accounted for by variance/standard deviation and all of the other moments).

2.

a)



- ƒ (x) = log(x) is **concave**

-Therefore, Jensen’s inequality says that **E[ƒ(x)] < ƒ[E[x]]**

- E[ƒ(x)] = .5 \* log(100) + .5 \* log(200) = **2.1505**

- ƒ[E[x]] = log[ .5 \* 100 + .5 \* 200] = **2.1761**

b)



- ƒ (x) = xα for α = 2 is **convex**

-Therefore, Jensen’s inequality says that **E[ƒ(x)] > ƒ[E[x]]**

-E[ƒ(x)] = .5ƒ(100)+ .5ƒ(200) = .5(10,000) + .5(40,000) = **45,000**

-ƒ[E[x]] = ƒ[ .5(100) + .5(200)] = **22,500**

c)

- ƒ (x) = x(1-α)/(1-α)) for α = 2 is **concave**

- Therefore, Jensen’s inequality says that **E[ƒ(x)] < ƒ[E[x]]**

- E[ƒ(x)] = .5 ƒ(100) + .5 ƒ(200) = **-.0075**

- ƒ[E[x]] = ƒ(.5 \* 100 + .5 \* 200) = **-.00667**

3.

a)

M = a + wb = 150

Var(c) = E(x2) – E(x)2

= a2(1 – w) + (a + b)2w – (a + wb)2

=w(1-w)b2 = 502

**b = 166.67**

**a = 133.33**

b)

E[U(c)] = sum( p(z)u[c(z)]) = (1-w)(a(1-α)/(1-α)) + (w)[ (a+b)(1-α)/(1-α) ]

= **-7.150 x 10^-10**

c) E[U(c)] = E[U(μ)] = U(μ) = μ(1-α)/(1-α)

= μ(1-α)/(1-α) = -7.150 x 10^-10

= **μ = .0073**

Risk Penalty = log(cbar/μ)

cbar = E(c) = .9(133.33) + .1(166.67) = 136.667

= log(136.667/.0073) = **4.272**

d)

If w = 0.9, the consumption outcome probabilities for consumption level a and consumption level a + b would be swapped and thus E[U(c)] would increase since the a+b outcome, which has higher utility, now has a larger weight in the weighted sum calculation of the expected utility. Therefore with a higher expected utility, the certainty equivalent would also be higher (because it would have to compensate for the increased in expected utility).

e)

The certainty equivalent for w = .9 is higher because it has a higher corresponding expected utility when compared to the certainty equivalent/expected utility of the scenario with w = .1. To put it plainly, the certainty equivalent is calculated as the consumption level that would make an agent indifferent to choosing a risky outcome with a consumption of c-bar versus the riskless outcome that the certainty equivalent is associated with. Thus, if the c-bar increases due to the weighting shift of w=.9, the certainty equivalent must move in the same direction to offset the difference.