

Risk measurement

Q: Explain why and under which circumstances lower partial moments and the CAPM will give identical results (read: identical characterisations of risk and return)

A: only when we take LPMs of order 2, the threshold is equal to zero, and the distribution is symmetrical. In that case the risk measure is semivariance for LPM and variance for CAPM, and if the return distribution is symmetric, those are identical.

Q: a) calculate the LPM of order 2 (threshold -5%) of assets 1, 2 and 3, as given in Figure 1.

b) Which asset (if any) would an investor with this riskmeasure prefer (no diversification allowed)?

Figure 1:

	Probability	Asset 1	Asset 2	Asset 3
State 1	25%	-15	-7	-3
State 2	50%	-7	+5	+1
State 3	25%	+19	+12	+4

A:

a) We look at returns below the threshold, and take the square (order = 2), when weigh by probability (the formula assumes each period has equal probability. That's not the case here, so you need to count state 2 as 2 periods):

Asset 1: $0.25*(-15 - -5)^2 + 0.5*(-7 - -5)^2 = 25 + 2 = 27$

Asset 2: $0.25*(-7 - -5)^2 = 1$

Asset 3: no returns below the threshold, LPM = 0

b) We cannot tell which asset would be preferred by an LPM investor, as the average return of asset 3 is lower than that of asset 2; maybe the extra return on asset 2 is enough to compensate for the LPM. However, we can safely say asset 1 will not be chosen, as the LPM is higher than that of asset 2, and the expected return is lower.

Q: Describe the difference(s) in the Stochastic Discount Factor in the CAPM compared to First order Stochastic Dominance.

A: in the CAPM, the SDF is a straight line. Under FSD, it can have any form, as long as it's positive. However, in the CAPM the straight line is decreasing, thereby dropping below zero at one point, which is not allowed under FSD.