

Clarification - Final Exam 06/07, Q.2)

As Paolo pointed out, there is an inconsistency in the information given in question 2 of the final exam paper 2006/2007. For those of you who didn't hear his comment, statement (i) implies that $A3R_{fi}$ would hold. However, this is at odds with the conditional heteroskedasticity specified in (iii). In fact, $A3R_{fi}$ would be at odds with anything that says that **any** features of the X and ϵ distributions (any moments, quantiles, tail-probabilities, etc.) happen to be related. The reason is that "full independence" means precisely that the full distribution of ϵ does not depend on X (and the other way around) - so obviously no feature of the ϵ distribution can do so either.

However, please note that $A3R_{fi}$ does **not** imply no-heteroscedasticity or no-serial-correlation! In fact even under $A3R_{fi}$ the variance-covariance-matrix of the errors can take **any** form - its structure can just not depend on anything in X . For example, if the specified error structure was

$$E(\epsilon_i^2 | K_i, L_i) = \gamma_1 + \gamma_2 A_i$$

where A_i is the age of company i (and A_i is not part of X obviously), then we would have heteroscedasticity, but at the same time $A3R_{fi}$ could hold.

Another way to correct the question would be to have (i) saying " ϵ_i is mean independent of K_j, L_j , for all i and $j = 1, \dots, N$ ". This would mean $A3R_{mi}$ holds, which would not be at odds with the specified conditional heteroscedasticity. Please make sure you understand this! The reason is that "mean independence" says (only), that the *mean* of ϵ_i is independent of X . But the variance of ϵ_i (and any other feature of the distribution of ϵ_i) might still depend on X .

And, just to reassure you, here is what Vassilis says concerning the marking: "*The question could be answered for full points without noticing this discrepancy — in particular noticing that consistency and unbiasedness require A3 assumptions, while heteroskedasticity and serial correlation are A4 ones that typically only affect efficiency. Anyone who noticed that given parts (i) and (iii) could not be reconciled would get bonus points.*"

Best of Luck!