U.S. airlines were deregulated in 1975, allowing them to charge whatever prices they wished and to choose routes for their flights more freely than previously. One anticipated gain from deregulations was cost reduction, to be derived in part by allowing airlines to reduce excess capacity. Baltagi, Griffin and Vadali estimate that airlines did, indeed, reduce excess capacity following deregulations[1]. Their analysis combined data on variable costs and factor shares to efficiently estimate excess capacity for 23 airlines in the years 1971-1986. Data file **deregulate.dta** contain the following variables:

Variable	Description
airline	A number indicating the airline in the observation.
pf	The price of fuel
pl	The price of labor
pm	The price of materials
reg	=1 if the observation is from the regulated period =0 otherwise
stage	Average length of the airline's flights that year
vc	Variable cost (fuel+labor+materials)
y	An index of annual passenger miles flown by the airline
year	The year of the observation

(a) Regress the log of costs on the regulation dummy, year and the natural logs of three price variables and of *stage* (i) using OLS (ii) using firm-specific fixed effects without cluster (iii) with cluster

(b) What is the interpretation of regulation dummy's coefficient?

(c) What is the interpretation of year's coefficient?

(d) Briefly explain why we can conclude that the estimated standard errors reported for OLS are probably incorrect as well as the ones in fixed effects regression without cluster errors?

(e) What does the fixed effects regression imply about the effect of deregulation on airlines' variable cost?

(f) How do you counter the objection that technical change would have reduced airline costs even without the deregulation?

(g) Add the squares of the logged regressors to the fixed effects regression in (a). What does this regression suggest about the conclusions in (e)?

(h) Are the added terms in regression (g), taken together, jointly statistically significant? Show the needed test results.

(i) Some have argued that deregulation enables airlines to better plan their flight. This could mean that more efficient flight lengths were chosen after deregulation. How does this affect the interpretations in (e) and (g), and how would you take this consideration into account?