

### TRANSIT DEMAND AND EQUIPMENT REPLACEMENT

Dear Consultant:

Some members of the Mythaca Bus Company Board of Directors have questions they want answered and ideas that need to be tested. The MBC staff has hired you to do the analyses.

The maximum size of your working group should be two students. Signatures as usual.

1. **Transit demand elasticity.** In the year 2000, the Mythaca Bus Company carried 9331 cash-paying riders per day when the cash fare was \$0.50. After a cash fare increase to \$0.75, the cash-paying ridership fell to 7955 in 2001.
  - A. (10 points) Use the *shrinkage ratio* equation to compute the demand elasticity of cash-paying MBC riders with respect to fare.
  - B. (5 points) Is the transit demand elastic or inelastic with respect to fare? On what do you base your conclusion?
  - C. (15 points) Some members of the MBC Board of Directors want to offer fare-free service to students, faculty, and staff of Mythaca State University in 2004. In 2002, 4586 of the MBC riders were from the MSU community. Use the *shrinkage ratio* equation to estimate the number of MSU riders in 2004 when the fare is zero for them. How much money should MSU pay MBC to compensate for lost fare revenues?
  
2. **Transit performance measures.** Look at the “2002 Indiana Public Transit Annual Report”, which is a pdf file at [http://www.state.in.us/dot/modetrans/bus/tran\\_5.html](http://www.state.in.us/dot/modetrans/bus/tran_5.html). All the information you need should be on pages 3-6 of the report, but you are welcome to look at the rest of the report.
  - A. (5 points) Has the membership of Peer Group 1 or 2 changed since Table 10.4 was compiled? If it has, what are the changes? Can you justify them in quantitative terms?
  - B. (5 points) Gary, Indiana experienced a significant drop in ridership compared to 2001. Calculate Gary's *shrinkage ratio* value using change in ridership (demand) and change in TVM provided (supply).
  - C. (20 points) The state DOT thinks that Farebox Recovery Ratio is a good measure of a transit agency's economic performance, TVM per Capita is a good measure of service provided, and Ridership per Capita is a good measure of service accepted. Use these three performance measures with equal weights to rank the Group 1 transit systems in Indiana for 2002.
  
3. **Equipment choice and replacement policy.**
  - A. (15 points) At what price of fuel would the PW of LCC for the two buses in CNotes Table 10.6 be equal?
  - B. (15 points) A piece of machinery costs \$10,000 and has no salvage value after it is installed. The manufacturer's warranty will pay all first year maintenance and repairs. In the second year, maintenance and repairs will be \$1000 and will increase on a \$1000 arithmetic gradient in subsequent years. If interest is 8 percent, compute the useful life of the equipment by finding the year that has the minimum EUAC.