

**EB-2007-0606/0615**  
**TECHNICAL CONFERENCE - NOVEMBER 26, 2007**

**QUESTIONS FROM PEG / BOARD STAFF**

**Questions for Drs. Bernstein and Carpenter, consultants on behalf of Enbridge**

General:

1. Please provide the complete working papers for your indexing research.
2. Given your revenue per customer cap formula do you recommend a balancing account? If not, please explain.
  - a. Are you aware of other jurisdictions that use a revenue per customer cap mechanism that do not have a balancing account?

3. Ref: Ex B-3-6, page 2, footnote 8

“The year 2004 was not part of the sample period because revenue data from EIA was incompatible with PEG’s cost of gas data. In that year EIA’s data pertaining to total bundled revenues (which includes the revenues associated with the gas commodity itself as well as distribution services) was less than PEG’s cost of gas for nearly half the firms in the sample.”

- a. Was this a problem for any utility in any year of the 1997-2003 period that you used? If so, what did you do about it?
- b. Does the cost of gas that a utility reports in a given year necessarily correspond to its reported revenue in the same years? For example, is the cost of gas that a utility purchases in November and December of one year likely to be collected in the revenues of *that* year or the *following* year?

4. Ref: Ex B-3-6, page 3

With regards to the price cap index that you design you state that “the average inflation-adjusted prices for regulated services decline annually by 0.52% under GD”.

- a. Did you mean to say that they *increase* annually in inflation adjusted terms?

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5. Ref: Ex B-3-6, page 9

Regarding your calculation of the revenue cap, you state that “a cap on revenue growth equals the cap on price growth augmented by the industry’s output growth rate”.

- a. Since the same output index is used to calculate TFP, does the output index fall out of the formula so that you could calculate X without using the output index? In that event, isn’t your X factor for the revenue cap index highly sensitive to the trend in U.S. input growth?
- b. You state on p. 3 that “Since [output growth] is relatively flat, there is little difference between the price cap and revenue cap X factors”. You then report on p. 5 that the growth of your revenue cap is just a little bit more rapid than the growth in the price cap. Does this fact surprise you?
- c. Could you, in principle, have used U.S. data only to calculate TFP and then have used the output growth rate of Enbridge in the revenue cap formula? Wouldn’t that have resulted in more rapid revenue growth for Enbridge?

6. Ref: Ex B-3-6, page 11

“This implies for example that industry-wide historic productivity improvements and input price changes should be reflected in the X factor, but firm-specific productivity improvements and input price changes should not”.

PEG was asked by parties to this proceeding to decompose the trend in TFP into a cost efficiency trend and an average use adjustment. It then computed the cost efficiency trend using the U.S. data and the AU adjustment using *Ontario* data. Using this approach, Enbridge has a substantially more negative AU factor than Union and this lowers their X factor.

- a. Is it fair to say that in your research X reflects the average use trends in the United States rather than those in Ontario?
- b. Does PEG’s calculation of the AU using Ontario data violate your stated principle about industry-wide data? Is it, effectively, wrong

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for Enbridge and Union to have different AU factors even if the demands for their services are quite different?

7. Ref: Ex B-3-6, pages 11-12

The calculation of the X factors rely on PEG's data pertaining to 36 U.S. gas utilities for the period 1994-2004 and data obtained from the U.S. department of Energy, Energy Information (EIA) for the period 1997-2003. EIA data pertains to revenue, volumes and number of customers by customer class.

- a. Please explain why you decided to use EIA data pertaining to revenue, volumes and number of customers by customer class.
- b. Please state the basis for not using GASDAT data to expand your sample period for EIA data to 1994-2004?
  - i. Please update the analysis and all tables to reflect the expanded sample period?

8. Ref: Ex B-3-6, page 12

"The output quantity index that you use in your calculations is a revenue share-weighted index".

- a. Please explain how you calculated the revenue shares that you use in these calculations.
- b. Your method appears to calculate prices for gas delivery services that are based on the revenues for bundled service. The price for service to all industrial and generation customers is thus based on the price for service to industrial customers that take bundled service. Is that reasonable?
- c. A spot check of the revenue shares for other (e.g. industrial customers) that results from your approach suggests that they are quite high. For example, the share of these customers of Alabama Gas in 1998 is 54%. Does that seem reasonable based on your experience in the gas industry?
  - i. Please compute the average revenue share for "other" service that results from this approach.

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- d. Please explain the “revenue share weights” column in your tables.
  - e. Your index logic in the Appendix is the rationale for your calculations. Does it suggest that the output index should ideally have a subindex for each major class of billing determinants? For example, should it include the number of customers served in each rate class as well as its delivery volume?
  - f. The revenue weighted output indexes that PEG uses includes the number of customers as a subindex. Do your output indexes do the same? If not, please explain.
  - g. What is the share of EGD’s base rate revenues that are drawn from fixed charges?
9. Ref: Ex B-3-6, page 14
- “In order to calculate the PD component of the X factor requires Canadian TFP growth, which annually averaged 1.4%.....”
- a. Please update the analysis and all tables to reflect the most recent Statistics Canada data available (this would include the MFP data and GDP IPI).
10. Ref: Ex B-3-6, page 14
- “The average annual rate of output and input quantity growth [of the sampled U.S. utilities] was relatively low”.
- a. Low relative to what?
  - b. Is the pace of input quantity growth of the U.S. utilities materially different from that of Enbridge?
11. Ref: Ex B-3-6, page 17
- “With these industry input price growth rates, the IPD over the 1997-2003 period is 1.05% and 0.85% for the GD and COS approaches respectively. The relatively large difference in input price trends for the industry and economy is problematic”.

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- a. Please confirm that you take the difference between the input price trend of the U.S. utilities and the input price trend of Canada's private business sector.
- b. Please explain why you used U.S. price trends to calculate the industry price trends rather than a Canadian index.
- c. Please confirm that the input price index of the sampled U.S. utilities is sensitive to the following special circumstances:
  - i. Trends in state and federal tax payments
  - ii. Rapid growth in U.S. health care costs
  - iii. Fluctuations in contributions to retirement programs
  - iv. Fluctuations in U.S. construction costs
- d. Is it possible that these business conditions are materially different for U.S. utilities than for Canadian utilities?

12. Ref: Ex B-3-6, page 18

You have presented a formula for the calculation of this cap that includes a revenue-weighted output index. This index appears twice in your formula in a manner such that the effect of output growth seems to cancel out.

- a. Is it possible to calculate your revenue per customer cap without this index?

13. Ref: Ex B-3-6, page 19

You state that in the calculation of the revenue per customer cap, "customer growth is calculated as an index using revenue shares as weights". This index has a growth pattern that differs considerably from the variable that PEG uses, which is the total number of customers. For example, the index dips by over 2% in 2002 whereas the PEG variable exhibits steady growth.

- a. Please explain how you did this.

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- b. Please explain the weights that are placed on the commercial customers and the “other” customers of Alabama Gas using your methodology in 1998.
- c. Is Enbridge planning to use a revenue-weighted output index in the implementation of its revenue/customer cap? If not, shouldn't the customer growth term that you use in your X factor calculations match the customer treatment that Enbridge uses?
- d. You stated at the November 14<sup>th</sup> meeting that this was a “Tornqvist” index. Isn't a Tornqvist index computed using revenue shares that correspond exactly to the quantities used in the index?

14. Ref: Ex B-3-5, pages 9 and 10

PEG has used its econometric research to help guide the selection of appropriate peer groups for Enbridge and Union. It found that even a large utility like Enbridge has opportunities to earn scale economies that can materially increase its TFP growth. You report in Tables 3 and 4 the results of econometric models that include a line miles variable, as you recommend. In these models, you report that the sum of output elasticities for Enbridge is around 0.88, meaning that 1% output growth requires only 0.88% cost growth.

- a. Do you agree on the basis of your own research that Enbridge does indeed have material opportunities to realize economies of scale? If yes, should output growth be an important criterion for peer group selection?

15. Ref: Ex B-3-5, pages 11-17

You discuss in your report the problem of autocorrelation in the sample.

- a. PEG corrected for the problem of heteroskedasticity in its econometric research but not for the problem of autocorrelation. Please confirm that in your research you attempted to correct for the problem of autocorrelation but not for the problem of heteroskedasticity.
- b. On p. 11 you state that “in the case PEG's model, the [Durbin Watson statistic] reported by the Gauss software package for the specification recommended in PEG's June 20 report is 0.274 and 0.269 for the GD

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and COS cases respectively. These DWs indicate that PEG's model suffers from positive autocorrelation".

- i. Are these the DWs that PEG reported?
- ii. Have you computed your own DW statistics? If yes, do these statistics properly take account of the panel character of the data?
- c. In econometric textbooks, autocorrelation is characterized as a problem that affects the *variance* of parameter estimates but does not *bias* them. In our November 14<sup>th</sup> meeting you stated that autocorrelation is a matter of bias *as well as* variance. Please confirm whether autocorrelation is a matter of bias *as well as* variance.
- d. Is the use of a large panel data set another way to reduce the variance of elasticity estimates?
- e. Please confirm that the sum of the estimated output elasticities for Enbridge is 0.87 in both of your autocorrelation-corrected models.

16. Ref: Ex B-3-5, pages 3, 18 and 20

In this report, you restate your concern about the problem of multicollinearity in the data that PEG uses to estimate its cost model. You also state on p. 18 that "another way of testing the reliability of an econometric model is to examine whether it is robust over meaningful subsets of the sample." In the "Summary of Conclusions" of your report you state on p. 3 that "PEG's model is inherently unstable, which can be seen when it is estimated over various sub-samples of the 36 U.S. LDC data set that PEG relies on". You state on p. 20 that "the nonsensical results for the *gas only* sample suggest that [the model's] applicability to Enbridge and Union is extremely questionable."

- a. Is it fair to say that, in econometric textbooks, multicollinearity is often described as a small sample problem, that a commonly prescribed remedy is to use the *largest* sample possible, and that a large *panel* data set is especially recommended?
- b. If there is indeed extensive multicollinearity in the sample, is it not then quite possible that the elasticity estimates for subsamples are quite different from those for the full sample?

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- c. You state on p. 3 that “the econometric cost model suffers from several statistical maladies that when corrected completely change the results.” Cannot it not be said that the marked change in results that occurs when a full sample is used reflects a correction for the problem of multicollinearity?
- d. Please confirm that in the models that you estimated using only northeast data the sum of the estimated elasticities for Enbridge was around 0.73.

17. Ref: Ex B-3-5, pages 2-5

PEG has simplified the functional form of its cost models in an effort to obtain more accurate parameter estimates. Specifically, it has removed the output interaction terms while keeping all other interaction terms and the quadratic terms.

- a. Do you believe that a translog functional form is *mandatory* in econometric cost research? If not, why not?
  - i. What would be some circumstance under which simpler functional forms would be used?
- b. Is the translog form used in the vast majority of scholarly econometric work, or is it more accurate to say that it is used occasionally?
- c. Do you use a full translog functional form in all of your econometric research?
- d. Do you use a full translog specification in *most* of your econometric research?