

BEFORE THE
POSTAL RATE COMMISSION
WASHINGTON, D.C. 20268-0001

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POSTAL RATE COMMISSION
OFFICE OF THE SECRETARY

POSTAL RATE AND FEE CHANGES, 2000

Docket No. R2000-1

RESPONSE OF UNITED STATES POSTAL SERVICE
WITNESS BOZZO TO INTERROGATORIES OF
THE OFFICE OF THE CONSUMER ADVOCATE
(OCA/USPS-T15-44-55)

The United States Postal Service hereby provides the responses of witness Bozzo to the following interrogatories of the Office of the Consumer Advocate: OCA/USPS-T15-44-55, filed on March 10, 2000.

Each interrogatory is stated verbatim and is followed by the response.

Respectfully submitted,

UNITED STATES POSTAL SERVICE

By its attorneys:

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March 24, 2000

**Response of United States Postal Service Witness Bozzo
to Interrogatories of the Office of the Consumer Advocate**

OCA/USPS-T-15-44. These questions pertain to the QICAP variable presented in USPS-LR-I-107, page 3, where it is denoted as "Quantity index for facility capital."

- (a) Is QICAP a stock of investment capital at a facility site?**
- (b) Is QICAP a flow of capital used at a facility site?**
- (c) If the answer to (a) and (b) is negative in both cases, please define exactly the nature of QICAP.**

OCA/USPS-T-15-44 Response.

- (a) No.**
- (b) Yes.**
- (c) Not applicable.**

**Response of United States Postal Service Witness Bozzo
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OCA/USPS-T-15-45. Please also refer to the associated Excel file in the aforementioned Library Reference LR-I-107, where the data for the analysis conducted and presented in your testimony are contained. In the worksheet Excel file, for IDNUM 1 for the time period 193, QICAP has the value 890207; for the time period 293, QICAP has the value 927301. For IDNUM 2 for the time period 193, QICAP has the value 4530367; for the time period, 293 QICAP has the value 4792736.

- (a)** If one should wish to consider capital usage for IDNUM 1 and IDNUM 2 on a consolidated basis, would the total value of QICAP for 193 be 5420574 for the two facilities combined, where values of QICAP have been added for the two facilities for the same time period?
- (b)** If the answer to (a) is "no", please state what the value for QICAP would be. If QICAP could have more than one value or, if the value is indeterminate, please explain in detail, providing values to the extent possible.
- (c)** If one wished to consider a facility with twice the amount of capital in time period 193 as occurred at IDNUM 1, would the value of QICAP be 1780414 for the time period?
- (d)** If the answer to (c) is negative, please state how QICAP would be computed and provide the value, showing all calculations.
- (e)** For the time period 293, is it correct that for facility IDNUM 2 there is 5.17 times the amount of capital as is the case at facility IDNUM 1 (the number is obtained by dividing QICAP for IDNUM 2 for 293 by QICAP for IDNUM 1 for 293). If the answer is "no", please explain in detail.
- (f)** In the case of (e), please indicate whether the capital value represents the stock of capital present or the flow of capital consumed or used; if neither alternative is applicable, please define the meaning of the capital value.
- (g)** For any IDNUM for a given year, would the total capital used be defined by summing the four quarters for the year? If the answer is "no", please provide a detailed answer presenting the correct computation.

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OCA/USPS-T-15-45 Response.

- (a) Adding the values for IDNUM 1 and IDNUM 2 would provide a reasonable estimate of the consolidated capital usage for a given time period. However, the ideal approach would be to apply the multilateral index procedure to the appropriately aggregated data.
- (b) Not applicable.
- (c) Yes.
- (d) Not applicable.
- (e) Yes.
- (f) See the response to OCA/USPS-T-15-44(b).
- (g) Adding the values for the quarters would provide a reasonable estimate of the consolidated capital usage. However, the ideal approach would be to apply the multilateral index procedure to the appropriately aggregated data.

**Response of United States Postal Service Witness Bozzo
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OCA/USPS-T-15-46. Index numbers are usually stated in terms of a base year of 100; the choice of the base year is usually tailored to the problem at hand.

- (a) What is the base year and base year value for QICAP?**
- (b) What are the units of measurement of QICAP?**
- (c) Is QICAP a cardinal number? Please explain explicitly--why or why not.**
- (d) Is QICAP an ordinal number? Please explain explicitly--why or why not.**
- (e) Are all QICAP values in constant dollars?**

OCA/USPS-T-15-46 Response.

- (a) The base period is 1993 quarter 1. The quantity index of facility capital is based to equal its current dollar value in that period.**
- (b) The units of measurement are 1993 quarter 1 dollars.**
- (c) QICAP is a cardinal number, since a doubling of the index would indicate that twice as much facility capital is available.**
- (d) QICAP is not an ordinal number since it does not indicate the order of a series.**
- (e) Yes. See the response to part (b) and also the response to MPA/USPS-T-15-6.**

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To Interrogatories of the Office of the Consumer Advocate**

OCA/USPS-T-15-47. It is our understanding that one of the calculations used to derive QICAP was based on the accounting depreciation technique denoted as "1.5 declining balances".

- (a) Please confirm that this is correct. If not, please state the accounting technique(s) used.**

- (b) Please provide the computations used to produce the numbers using the depreciation approach employed. If you refer to a library reference, please explicitly state the page(s) on which the "1.5 declining balances" or other depreciation approach was presented.**

- (c) Why was the "1.5 declining balances" technique used in place of straight-line depreciation? If some other depreciation technique was used, please state why that technique was used.**

- (d) In the case of each asset--e.g., LSM, BCS, or OCR machine--how was the period of years (i.e., life of asset) chosen for the time period over which the asset was depreciated; what was the time period as measured in years? Please provide the asset lives for depreciation purposes for each of the various types of equipment, referencing which schedule applies by equipment type, e.g., OCR, BCS, FSM, etc.**

- (e) Please provide information for owned buildings and/or other assets similar to that provided in (d).**

- (f) Would a choice of depreciation technique different from that used have led to a different value of QICAP?**

- (g) Please state how yearly investments are accrued and/or treated in the QICAP series.**

OCA/USPS-T-15-47 Response.

- (a) QICAP is based in part on the application of the perpetual inventory model, with asset deterioration occurring at a geometric rate. The rates of geometric deterioration for mail processing equipment and postal support equipment were**

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estimated using the 1.5 declining balance formula. The geometric rate for buildings was not based on the 1.5 declining balance formula. Rather, it was taken from empirical estimates found in the economic literature. See also the report "USPS Annual Total Factor Productivity Methodology," which was provided by Mr. Degen as part of LR-H-272 in Docket No. R97-1.

- (b) The geometric rates of deterioration used were taken from the U.S. Postal Service total factor productivity analysis. The rates, by equipment category, are: mail processing equipment, 8.3% per year; postal support equipment, 11.5% per year; buildings, 2.33% per year.
- (c) I believe the economic literature on asset deterioration supports the use of geometric decay over straight line decay. The 1.5 declining balance form of geometric decay is consistent with that literature.
- (d) As stated in the answer to part (b), the rates were taken from the Postal Service's total factor productivity analysis. In determining the deterioration rates, the total factor productivity analysis looked at the book lives of various assets that make up each asset class. The lives used to estimate the geometric rate of deterioration are 18 years for mail processing equipment and 13 years for postal support equipment.
- (e) As stated in the response to part (a), the rate for buildings was based on the economic literature.
- (f) Yes.

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- (g) **Assets contribute to capital input measured by QICAP once they are put into service. As the asset ages its level of contribution declines, according to the rate of geometric deterioration.**

**Response of United States Postal Service Witness Bozzo
To Interrogatories of the Office of the Consumer Advocate**

OCA/USPS-T-15-48. The following questions focus on QICAP and investment.

- (a) Among the costs of installing a piece of equipment are the engineering, planning, installation, and supervisory costs of in-house personnel and/or vendor and contractor personnel in effectuating the installation of the equipment. Does the QICAP series incorporate any of these costs?**

- (b) Does QICAP include any Operating and Maintenance costs? If not, are Operating and Maintenance costs carried under the direct hours in your Excel spreadsheet associated with each activity, e.g., FSM, LSM, OCR, etc? If your answer is negative to both questions, please explain.**

- (c) Only one QICAP number is available for each quarter for an IDNUM. Does this number refer to the total capital used in all activities analyzed (including machines, buildings, and any other capital) at a site? If the answer is "no", please explain in detail.**

- (d) Does QICAP contain any dollars at a site for activities not explicitly analyzed in your study at the site?**

- (e) Are there individual QICAP series available for each function, i.e., FSM, OCR, LSM, BCS, etc.?**

- (f) If the answer to (e) is "yes", please provide the appropriate QICAP values for each of the functions, e.g., FSM, OCS, LSM, BCS, etc.**

OCA/USPS-T-15-48 Response.

- (a) To the extent that the engineering, planning, installation, and supervisory costs are included in the book value of the asset, QICAP incorporates those costs.

The presumption is that these activities add value to the asset put in place.**

- (b) No, QICAP does not include operating and maintenance costs. The costs of the clerks who operate the machines are included in the mail processing labor cost**

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pools associated with each operation. The electricity used to operate the machines would be included in Cost Segment 15: Building Occupancy. The labor and parts used to maintain the machines would be included in Cost Segments 11 and 16, which are Custodial and Maintenance Service, and Supplies and Services, respectively.

- (c) Yes.
- (d) QICAP is designed to be a measure of facility-level capital usage, so it includes some capital assets used in mail processing and/or support activities that I did not otherwise model in the measures.
- (e) No.
- (f) Not applicable.

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OCA/USPS-T-15-49. It is our understanding that the machinery at the mail facilities is depreciated. Assume that a FSM, BCS, OCR, or other type of machine has been depreciated on the books by a total of 40%.

- (a) Does a machine that has been depreciated by 40% have a productivity level that is 60% of its original rating?

- (b) Assuming that two BCS machines of the same model, features, and capacity were purchased in two different years for different prices (prices differing based on market conditions) are they considered to have the same productivity, *ceteris paribus*, after x years of service?

- (c) If the answer to (b) is "no", how would the productivity of the two machines be compared and measured?

OCA/USPS-T-15-49 Response.

- (a) I cannot confirm or deny your assertion with respect to accounting depreciation. From an economic standpoint, the machines have useful value, which is consistent with the geometric perpetual inventory equation.

- (b) Yes, the two machines are assumed to have the same level of productivity when they are X years old, which would occur in different years according to your scenario. The stock of capital services is calculated in real terms so there are adjustments for changes in purchase prices.

- (c) Not applicable.

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OCA/USPS-T-15-50. These questions focus on the amount of capital equipment in each facility.

- (a)** For each facility and each operation, e.g., FSM, LSM, OCR, etc., are capital equipment data available by facility IDNUM for each piece of equipment, including acquisition date of each piece of equipment, acquisition cost, and basis for depreciation? Please provide the information.
- (b)** Are data available for the yearly costs for pieces of leased equipment, in terms of activity, site, and time period? If so, please provide the information.
- (c)** Are data comparable to (a) and (b) available for owned and leased space, by IDNUM, time period, and activity? If so, please provide the information for the space used in the case of owned facilities, and yearly dollar values of the lease for leased space.
- (d)** For any case with a negative response, please explain.

OCA/USPS-T-15-50 Response.

- (a)** Yes. The requested data will be provided in USPS LR-I-244.
- (b)** No. It is my understanding that there is no Postal Service data system that tracks leased equipment by activity, site, and time period. Therefore, the requested data are not available.
- (c)** No. The FMS data do not identify space or space costs by activity. See also the response to UPS/USPS-T15-8(c).
- (d)** See the responses to parts (b) and (c).

**Response of United States Postal Service Witness Bozzo
To Interrogatories of the Office of the Consumer Advocate**

OCA/USPS-T-15-51. In discussing the translog function in your testimony, lines 10-12 at 40, you discuss homotheticity and its implications.

- (a)** In the course of your work did you consider whether the function was homogenous of degree n , with n assuming values equal to, greater than, and less than one? Please explain.
- (b)** Did you perform any analysis of returns to scale? Please explain.
- (c)** Is your consideration of homotheticity in any way related to homogeneity? Please explain.
- (d)** Do you have any evidence of increasing, constant, or decreasing returns to scale for the activities analyzed? If so, please state them.
- (e)** What are the physical characteristics represented by a homothetic function: i.e., how would we know, absent a statistical test but looking at the physical production line, whether such a function was homothetic?
- (f)** Did you perform any statistical test for homotheticity?

OCA/USPS-T-15-51 Response.

Please note that in the cited portion of my testimony, I am not discussing the translog function. Rather, that section discusses the assumptions on “the cost pool-level production (or cost) functions” under which “the capital and labor variabilities will be identical, in equilibrium” (USPS-T-15, page 40, lines 10-11).

- (a)** Given the relationship between homothetic and homogeneous production (or cost) functions—see the response to OCA/USPS-T-15-39—in considering the implications of an assumption of homotheticity, I implicitly also consider whether the production (or cost) functions are homogeneous. It is well-known that there

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is a close relationship between the degree of homogeneity of production (or cost) functions and returns to scale. See, for example, J. M. Henderson and R. E. Quandt, *Microeconomic Theory: A Mathematical Approach* (McGraw-Hill, 1980), at pages 105-106. Since a production (or cost) function may, in principle, exhibit constant, increasing, or decreasing returns to scale on the margin, I did not impose any prior restrictions on the degree of returns to scale.

(b) The results I report at pages 119 and 120 of USPS-T-15 clearly indicate that the output (piece handling) elasticities for the mail processing operations I studied are less than one, or equivalently the volume-variability factors for the operations are less than 100 percent. It is my understanding that other economists studying Postal Service costs have interpreted volume-variability factors less than 100 percent (e.g., for carrier activities) as indicating the presence of economies of "scale" (or locally increasing returns to "scale"). However, there are technical issues of what precisely constitutes economies of "scale," as opposed to other types of economies (e.g., density, scope, size) that exceed the scope of my testimony.

(c) See the response to part (a).

(d) See the response to part (b).

(e) I assume by "physical characteristics" you mean characteristics of the production process represented by a homothetic production (or cost) function. I am not

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aware of any generalizations in the economic literature regarding the “physical characteristics” of such processes. However, as described in my testimony, homotheticity implies relationships between the level of output and relative factor demands, see USPS-T-15 at page 40, lines 12-14. Those relationships are observable, at least in principle.

(f) No. See also the response to OCA/USPS-T-15-10(a).

**Response of United States Postal Service Witness Bozzo
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OCA/USPS-T-15-52. Please confirm that management labor hours are not included in the labor hour relationships that you have estimated. If you do not confirm, please explain.

OCA/USPS-T-15-52 Response.

The analysis presented in USPS-T-15 pertains directly to a portion of Cost Segment 3.1, which encompasses clerk and mailhandler labor expenses. Thus, the relationships I have estimated exclude labor hours other than those of clerks and mailhandlers. I am not sure what, precisely, you mean by "management labor hours." Please note, however, that labor costs for supervisors and technical personnel are included in Cost Segment 2; labor costs for Postmasters are included in Cost Segment 1. Please see the corresponding sections of LR-I-1 for a description of those cost segments.

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OCA/USPS-T-15-53. You use the manual ratio as a measure of the degree of automation at a facility. Why did you use this variable instead of a measure of the amount of automated equipment at the facility, for example--the value of installed OCR, BCS and other automation machinery?

OCA/USPS-T-15-53 Response.

The interrogatory's assertion that I used the manual ratio *instead of* a measure of the amount of automated equipment is not completely correct. The "amount of automated equipment" is captured in the QICAP variable.

The manual ratio variable indicates the relative utilization of the facility's manual and automated operations. A measure based on the value of installed equipment would not do so.

**Response of United States Postal Service Witness Bozzo
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OCA/USPS-T-15-54. In OCA/USPS-T-15-16 [sic] you state, "The restrictions I have "avoided" are those associated with the use of a functional form for the labor demand models that does not have the translog's approximation properties." What, specifically, are the restrictions avoided to which you refer?

OCA/USPS-T-15-54 Response.

In my response to OCA/USPS-T-15-16, I also quote the following passage, from USPS-T-15 at page 65, lines 11-13, where I state, "The translog [functional form] has general applicability because it provides a second order approximation to a function of arbitrary form." To specify further, it would be necessary to identify a specific functional form that embodies a priori restrictions not imposed by the translog functional form. There are, in principle, infinite such functional forms, so I clearly cannot exhaustively list the restrictions. However, to provide an illustrative example, consider the Cobb-Douglas (log-linear) functional form. The Cobb-Douglas functional form can be expressed as a special case of the translog in which the coefficients on all second-order and cross terms are restricted to be zero. The Cobb-Douglas restrictions further imply that the output elasticities, or volume-variability factors, are identical for all observations. Thus, in employing the translog function without the a priori restrictions of the Cobb-Douglas form, I avoid the restriction that the volume-variability factors are identical for all observations—a restriction that is, as the results presented in LR-I-107 indicate, rejected empirically.

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OCA/USPS-T-15-55. Please refer to USPS-LR-I-178, focusing on the Excel file "Capital Index.xls."

- (a) Is REGPO in column 1 the same as IDNUM? If not, please explain the mappings of REGPO onto the IDNUM's.**

- (b) Please define and explain all other column headings.**

OCA/USPS-T-15-55 Response.

- (a) Yes.**

- (b) The column headings in the referenced spreadsheet file are in plain English apart from the following abbreviations: AHE = Automated Handling Equipment, MHE = Mechanized Handling Equipment, PSE = Postal Support Equipment, P&D = Processing and Distribution. AHE and MHE collectively constitute Mail Processing Equipment, as the term is used in the text accompanying USPS LR-I-244.**

DECLARATION

I, A. Thomas Bozzo, declare under penalty of perjury that the foregoing answers are true and correct, to the best of my knowledge, information, and belief.

A. Thomas Bozzo

Dated: 3/24/00

CERTIFICATE OF SERVICE

I hereby certify that I have this day served the foregoing document upon all participants of record in this proceeding in accordance with section 12 of the Rules of Practice.



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March 24, 2000