George Mason University | School of Public Policy

Study on Universal Postal Service and the Postal Monopoly

Appendix F

Section 2

Methodologies for Costing the USO and Valuating the Letter and Mailbox Monopolies

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Contents

1   Introduction

The Postal Accountability and Enhancement Act (PAEA) requires the Postal Regulatory Commission (PRC) to provide to Congress an in depth report on the origins and implications of the monopoly protections enjoyed by the United States Postal Service and the impact of the Universal Service Obligations (USO) that are uniquely placed upon it. As detailed in other parts of this study, there are substantial historical and legal dimensions to these issues. Here, we focus on the methodological issues that arise when one attempts to quantify the economic magnitudes of the values of the letter and mailbox monopolies enjoyed by the Postal Service as well as the cost to the Postal Service of meeting its USO requirements. More specifically, we seek to understand how to quantify the following concepts involving the Postal Service:

- COST OF THE USO: What is the cost to the Postal Service of maintaining the current level of mandated USO services?

- VALUE OF THE LETTER MONOPOLY: What is the value to the Postal Service of the prohibition on competition in the delivery of letters?

- VALUE OF THE MAILBOX MONOPOLY: What is the value to the Postal Service of the prohibition on the use of customers' mailboxes by competitors?

Due to liberalization initiatives in Europe, there have been a large number of studies attempting to quantify USO costs in various countries.[1] Our methodology has important similarities and differences with those employed elsewhere. However, the overarching distinguishing feature of our methodological approach is that it is specifically tailored to the current, post PAEA, situation of the Postal Service. This regulatory environment has no close parallel elsewhere. Therefore, the questions our methodology has been developed to address differ substantially from those used in studies designed for use in other countries.

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[1] List of citations. See also Appendix F1 of this study.

The importance of the post-PAEA status quo in our analysis results from the fact that the questions addressed are inherently *counterfactual*. That is, they necessarily require the comparison of a status quo situation with some specified hypothetical alternative: e.g., a situation in which the Postal Service no longer enjoyed its mailbox monopoly. Obviously, the nature of the desired calculation may be quite different when the status quo situation involves PAEA style price cap regulation or the "cost plus" form of regulation previously practiced by the PRC.

Our methodological discussion begins with determining the costs associated with the Postal Service's USO. This is the exercise with the closest parallels internationally because no other country has a mailbox monopoly and many other countries are in the process of eliminating their letter monopolies. However, as we shall see, the principles of counterfactual analysis we develop for USO costing carry over to the monopoly valuation exercises discussed later.

2   Basic Issues

2.1 Defining the status quo benchmark

Our analysis is predicated on the assumption that the determination of USO costs and the valuation of the Letter and Mailbox monopolies is made possible by a comparison of a hypothetical market outcome with the current situation of the Postal Service. This status quo benchmark includes all of the provisions of PAEA: e.g., the regulatory regime, the framework of postal wage determination, etc. This does not mean that we will not occasionally provide calculations indicative of what might happen if one hypothetical situation were replaced by another; e.g., what the effects might be of following the elimination of the USO with liberalization. For the most part, however, we avoid such flights of fancy. It is difficult enough to deal with one counterfactual at a time.

2.2 Specifying the relevant counterfactual(s)

Determining the "cost" of a particular obligation or the "value" of some monopoly franchise requires a comparison between two situations: one with and one without the obligation or monopoly position in question. By definition, at least one of these

situations will be *counterfactual*. That is, it will require assumptions about how the firm would behave in some hypothetical situation. Often (but not always) the other situation of interest involves the firm's current, status quo situation.

To take a concrete example, suppose that one were interested in evaluating the impact of removing the requirement that the Postal Service deliver six days per week to most residential addresses. The starting point for the comparison would naturally be the current operations of the Postal Service, which reflect the six day per week constraint. But, how does one specify the counterfactual alternative to which the status quo is to be compared? There are multiple aspects to this decision. First, one must determine whether there are any other constraints on Postal Service operations that are also being relaxed; e.g., expanding curbside or cluster delivery options, etc. Next, it is necessary to make some assumption about how the counterfactual level of delivery frequency will be determined. For example, one might assume that the change to be evaluated would be that of moving to the *requirement* of a three day per week delivery frequency. Alternatively, one might wish to make a comparison of the status quo with what an unconstrained Postal Service would choose to do. In that case, it would first be necessary to specify what delivery frequency the Postal Service would choose to make if it were totally unconstrained with respect to delivery frequency. The end result might also be a counterfactual situation with three day per week delivery, but the nature of the conceptual exercise is quite different. The latter case necessarily calls for an additional layer of speculation.[2]

2.2.1   The important role of PAEA Price Caps

It will be come clear that the counterfactual profit comparisons discussed in Section 5, below, clearly depend upon the extent of PRC regulation that would remain if the Mailbox and/or Letter monopolies were removed. At one extreme, one could take the position that the removal of both monopolies would be accompanied by the removal of *any* regulation of the Postal Service: i.e., liberalization *and* price deregulation. This does

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[2] The possibilities for alternative scenarios can obviously expand quite rapidly if one is required to take a position on what an unconstrained Postal Service might choose to do. For example, does one assume that the Postal Service acts to maximize profits?

not seem to us to be a likely scenario for the U.S. anytime soon. Judging from the experience in Sweden, the UK and, even, New Zealand, it seems likely that some form of price cap regulation would accompany even full liberalization. Therefore our analysis will conduct the relevant profit comparisons under the assumption that PAEA Price Cap regulation of the Postal Service remains in place.

This assumption plays an important role throughout our analysis. Whenever one specifies a counterfactual market outcome from which to make a profit comparison, it is necessary to take into account the likely response of the Postal Service to the changed situation. These predicted responses will typically be quite different under post-PAEA Price Cap regulation than under the previous PRC regulatory regime because of the pricing flexibility granted to the Postal Service under PAEA. For example, the Postal Service can respond much more quickly to the threat of entry in the post-PAEA environment. In addition, the Postal Service's contribution losses from the required price cuts may sometimes be at least partially offset by price increases elsewhere without violating the constraint imposed by its price/revenue cap. In general, when PAEA Price Caps are part of the hypothetical liberalized market equilibrium, the impact on Postal Service profits will tend to be less than under the pre-PAEA regulatory regime.

2.3 How are "costs" and "value" to be measured?

Once one has carefully specified the relevant counterfactuals to be compared, one must decide exactly what measurable aspects of the two situations are to be compared. For example, when the purpose of the exercise in question is to measure "USO costs," it is tempting to assume that the relevant magnitudes for comparison are Postal Service expenditures in the two situations, with and without the USO constraint. However, this comparison would *not* answer the question: The question "What is the economic impact of the USO on the Postal Service?" should be addressed by measuring the increase in Postal Service *profits* that would occur if the USO constraint under discussion were eliminated. This is the most relevant magnitude to measure because it identifies the amount that USO can be said to "burden" the Postal Service. This *profitability cost*

measure of the cost of the USO has therefore won widespread theoretical support.[3] Attempts have also been made to calculate USO profitability costs in practice.[4]

The profitability impact is more obviously the relevant magnitude to quantify when assessing the economic value of a monopoly position held by the Postal Service. In this case, the primary methodological issue is to make clear that the differences to be measured or estimated are *Postal Service* profits with and without the monopoly protection in question. That is, we are not attempting to estimate the amount of money that could be raised by auctioning off a letter or mailbox monopoly to the highest bidder. Our calculations are anchored to the existing realities of Postal Service obligations: labor rules, pension obligations, etc.

Our emphasis on profitability measures of USO costs and monopoly values underscores the importance of keeping in mind that the starting point of our analyses is the post-PAEA postal environment in the U. S. Of particular importance is the price cap regulation to which PAEA subjects the Postal Service. Specifically, the fact that this price cap regime is *not* designed to regularly adjust prices so that the Postal Service is held to a "breakeven" level of economic profits. Under a regulatory regime that imposed a breakeven constraint on a more or less continuing basis, the profitability cost of any USO provision would be zero, by definition. If a change in the structure of the USO constraint were to increase postal profits, the regulator would respond by lowering prices to restore budget balance. Another, more complicated approach would be required to properly measure USO costs and monopoly values in such a situation.[5]

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[3] The profitability approach was introduced in Cremer, H., Grimaud, A., and Laffont, JJ., "The Cost of Universal Service in the Postal Sector" in *Current Directions In Postal Reform*, Crew, M., and Kleindorfer, P., (eds.), Kluwer, 2000 and Panzar, J., "A Methodology for Measuring the Costs of Universal Service," *Information Economics and Policy, 12 3* September, 2000.

[4] See Appendix F1 for examples.

[5] For a discussion, Panzar, J., "Funding Universal Service Obligations: The Costs of Liberalization," in *Future Directions in Postal Reform* in Crew, M., and Kleindorfer, P., (eds.), Kluwer, 2001.

3   A Heuristic Framework

Figure 1 provides a useful heuristic framework for visualizing the types of calculations required to obtain profitability measures of USO costs and monopoly valuations. The horizontal axis measures "quality of service". The vertical axis measures "the degree of monopoly." Of course, neither concept can be measured as a continuous variable along a single dimension. As discussed elsewhere in our study, the USO of the Postal Service involves various dimensions of service quality and any changes might involve a quite complicated set of options. Similarly, the extent of the Postal Service monopoly is, itself, a complicated notion, not easily quantified. Nevertheless, the diagram is a useful abstraction. Movements to the right involve a more stringent USO involving a higher quality of service. Similarly, upward movement denotes a greater degree of monopoly restrictions.
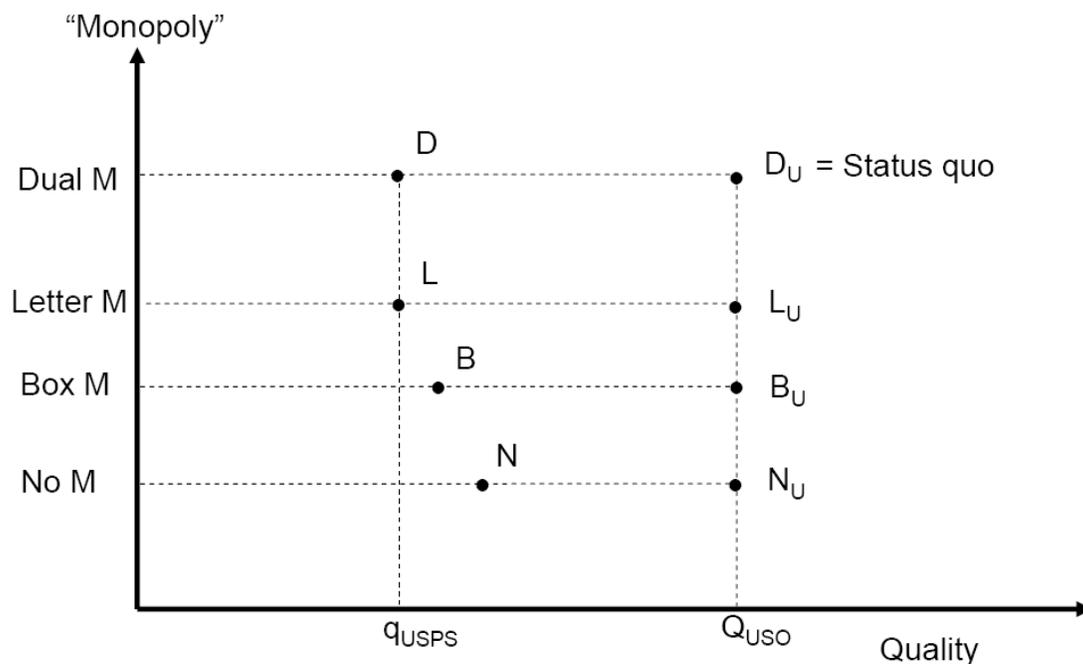

Figure 1: Heuristic Framework

With these conventions in mind, the diagram can be used to "locate" the postal policy options of interest. We begin with the status quo situation, at the point labeled D_U. The Postal Service is assumed to enjoy both the mailbox monopoly and the letter monopoly

and to be bound by current statutory and procedural USO descriptions symbolized by the level Q_{USO}. From that starting point, removing *only* the mailbox monopoly while maintaining existing USO requirements would result in a vertical movement to L_U. Similarly, removing *only* the letter monopoly under existing USO requirements would be represented by the point B_U. Finally, the point N_U depicts the operating situation of a Postal Service without any monopoly protections but subject to existing USO requirements.

Next, consider changes in the level of mandated service quality/USO requirements.[6] First consider a reduction in a status quo USO obligation e.g., from six days per week to three days per week. If monopoly protections remained the same, this would be depicted in the diagram as a horizontal movement from the status quo D_U (with quality level Q_{USO}) to the point D, which is associated with a lower quality of service level, q_{USPS}.[7] Providing the same level of service quality in the absence of the mailbox monopoly would result in hypothetical Postal Service operations at L.

The last two points on the diagram depict hypothetical Postal Service operations without the letter monopoly. Point B reflects a situation in which the Postal Service, with only a mailbox monopoly, is allowed to operate under a less severe USO requirement than Q_{USO}. Point N illustrates the analogous situation under full market liberalization.[8]

There is an important third dimension to Figure 1 that is not shown. Associated with each point in the {"Monopoly", "Quality"} plain is a level of profit that can be earned by the Postal Service under those competitive conditions and USO requirements. Diagrammatically, these profit levels would be measured as the "height" above the page.

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[6] Elsewhere, we use "quality of service" as one of seven components of universal service and universal service obligations. Here, the term "quality" is used to encompass all such obligations.

[7] As noted earlier, one may either view the USO/quality level q_{USPS} as being specified by Congress or a regulatory authority or as the unconstrained choice of the Postal Service.

[8] Again, the quality/USO standard may be a result of Postal Service decisions or regulatory constraint. However, in competitive scenarios one must also consider the possibility that market forces may dictate a higher than legally required level of service quality. This is the situation depicted in the diagram at points *B* and *N*. That is, the diagram assumes that competition would force a hypothetical Postal Service protected by only a mailbox monopoly to operate at a higher level of service quality than q_{USPS}; the quality outcome in a liberalized market would be higher yet.

We shall not attempt to depict profit levels on a 3D diagram, but it is important to remember that it is *profit differences* that are the quantitative magnitudes of interest.

4   Costing the USO

We are now in a position to illustrate how to apply this conceptual framework to the problem of measuring the quantitative impact of a policy decision such as a change in the stringency of the USO. As noted above, the first step in such an analysis is to identify the relevant counterfactual. That is, one must begin by specifying the situations that are to be compared. This step sounds obvious, but is often controversial and always requires a thorough understanding of the context of the policy issues involved. Once one has identified the operating scenarios relevant for comparison, it remains to carefully specify how the Postal Service profit levels in the two situations are to be measured and compared. As discussed above, of all the operational magnitudes that might differ between the two situations, the *profit* difference is the one that most accurately reflects the cost of the USO requirement at issue.

4.1 The USO is a set of constraints

At the most basic level, the USO consists of a *set of constraints* imposed on the Postal Service's economic decisions relating to the products and services it provides. These may take the form of quality of service constraints and/or pricing constraints. Examples of quality of service constraints include the provision of six days per week delivery and rural service at 1983 levels. Examples of pricing constraints include uniform pricing for letters and books; reduced rates for non-profit mail; and free mail for the blind.

As we have emphasized, it is of fundamental importance to identify the qualitative type of the comparison to be made: i.e., D_U to D versus N_U to N. However, substantial modeling decisions must be made even after resolving such conceptual issues. Remember, there are many dimensions of service quality that make up the USO and a complete counterfactual comparison must specify alternative standards for *all* of them. There is likely to be substantial controversy over what alternative levels are "reasonable." The only practicable solution would seem to be to specify particularly salient values for

the important dimensions and perform the calculations for as many of the relevant combinations as possible.

4.2 The relevant counterfactuals for costing the USO

Our earlier discussion identified eight different stylized Postal Service operating scenarios. In principle, one could compare each of the alternatives involving the status quo level of the USO (i.e., points D_U, L_U, B_U, and N_U) with any of the points involving a relaxed USO requirement (i.e., points D, L, B, and N). However, it should be clear that most such comparisons can be ruled out on *a priori* grounds. For example, a comparison of the operating outcomes between D_U and L would confound two effects: the relaxation of the status quo USO standard and the elimination of the mailbox monopoly. Thus it makes sense to consider comparing only the results of *horizontal* movements: i.e., D_U to D, L_U to L, B_U to B, or N_U to N.

Depending upon circumstances, any of these horizontal comparisons might be of interest. However, we argue that the hypothetical movement from D_U to D is most relevant in the post-PAEA U.S. postal environment. Since PAEA did not remove either the Letter or mailbox monopoly, it seems most reasonable that any counterfactual analysis involving the USO should be conducted under the assumption that those monopoly protections remain in place. In contrast, in a liberalized postal environment such as that emerging in Europe, the comparison of interest would be between N_U and N. (Of course, our methodological approach is applicable to that comparison as well.)

4.3 USO costs result from carefully specified profit comparisons

As discussed earlier, there is a level of Postal Service profit associated with each point combination of USO constraint and level of protected monopoly. Determining the profitability cost of changing any specified USO constraint therefore requires comparing the level of Postal Service profitability in two situations. In Figure 1, levels of Postal Service profitability were only implicit, making it difficult to visualize the required comparison. Figure 2 remedies this problem by directly plotting the relationship between Postal Service profitability and the stringency of the USO. However, since Figure 2 is only a two dimensional diagram, this still requires an expositional compromise. The

relationship between Postal Service profits and service quality can only be depicted if a particular level of monopoly protection is assumed. In the diagram, the curve, Profit (Q; Dual M), illustrates such a hypothetical relationship under the assumption that both the Mailbox and Letter monopolies enjoyed by the Postal Service remain in place. Alternatively, if one were interested in USO profit comparisons in a liberalized market, it would be useful to plot a curve such as Profit (Q; No M). This curve depicts a hypothetical relationship between Postal Service profits and service quality in the absence of any monopoly protections. Comparing these two hypothetical curves, we see that they reflect the plausible relationships discussed above. First, in either case, the level of quality associated with the status quo USO constraint results in a lower level of Postal Service profits than would be possible if the level of quality were reduced. Second, Postal Service profit opportunities are lower in the absence of monopoly restrictions. That is, the Profit (Q; Dual M) curve lies above the Profit (Q; No M) curve for all levels of Q.
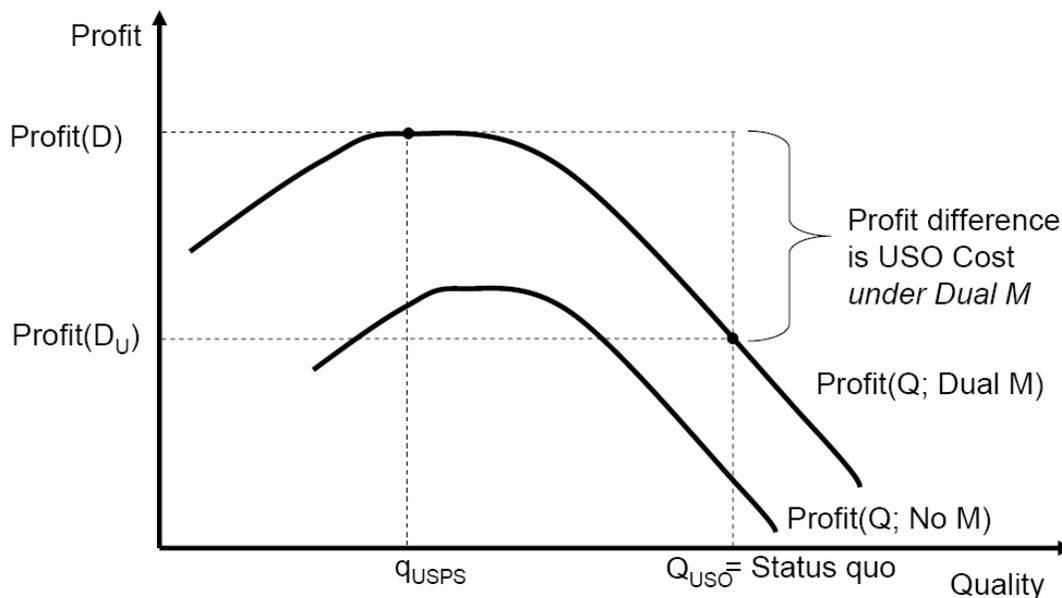

Figure 2: Profitability and USO

We are now able to use Figure 2 to illustrate the calculation of USO profitability costs. We begin by identifying the service quality level associated with the status quo level of USO requirements, Q_{USO}. Next, we determine the associated level of Postal Service profitability under the current level of monopoly protection. This is the amount indicated

by the Profit (Q; Dual M) curve: i.e., Profit (Q_{USO} ; Dual M) = Profit (D_U). We then compare this status quo level of Postal Service profits with the level that would be achieved if the status quo USO requirements were removed or relaxed so that the quality of service level provided fell to q_{USPS}.[9] This profit level is given by the height of the Profit (Q; Dual M) curve evaluated at that counterfactual level of output: i.e., Profit (q_{USPS} ; Dual M) = Profit (D). The difference between these two profit levels results in the profitability measure of removing the USO in the current monopoly environment:

$COST_{USO}(Q_{USO}$ to q_{USPS}; Dual M) = Profit (Q_{USO} ; Dual M) - Profit (q_{USPS} ; Dual M)

$$= Profit (D_U) - Profit (D)$$

This measure of the USO cost will be the primary focus of our quantitative analysis because we believe that it is the most relevant measure for the current post-PAEA regulatory environment in the U.S. However, as we indicated earlier, our basic methodology can also be used to quantify USO costs in a liberalized environment such as that emerging in the European Union (EU). It is useful to illustrate this procedure with a simple diagram as well. Figure 3 replicates Figure 2, but shifts the focus to the conceptual measure of USO costs in a liberalized environment.

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[9] As discussed earlier, this counterfactual level of service quality can have two interpretations. First, it may be viewed as the level of service quality chosen by the Postal Service in the absence of *any* USO requirements imposed upon it. For example, if the current six day per week residential delivery obligation were eliminated and delivery frequency was left entirely to the discretion of the Postal Service, it might freely chose to deliver 3 days per week. Instead, one could view a counterfactual three day per week delivery requirement as resulting from an alternative quality of service standard typically imposed upon a price-cap regulated enterprise. In Figure 2, q_{USPS} is one of the quality levels that maximizes profit for a monopoly Postal Service, so either interpretation would be consistent with the diagram.
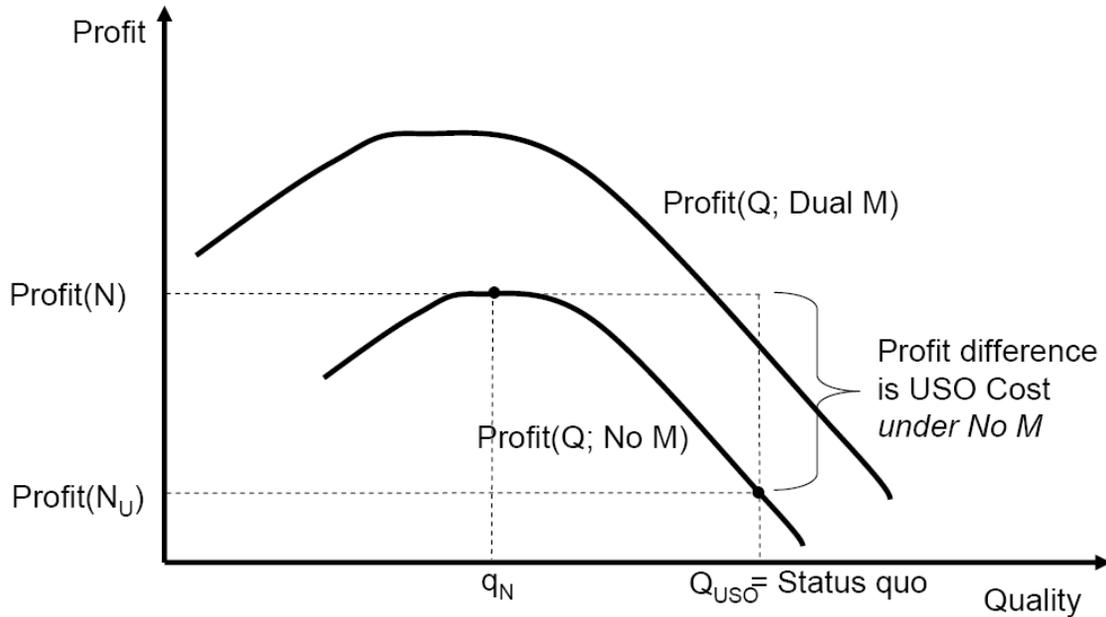
Figure 3: Profitability and USO in a liberalized environment

As before, the first step is to use the Profit (Q; No M) curve to determine the level of profit that the Postal Service would earn under the status quo USO requirement, but *without* the protection of either the mailbox monopoly or the letter monopoly. This level is given by Profit (Q_{USO}; No M) = Profit (N_U). An important difference between this measurement and the one carried out above is that the starting point for USO costing itself requires a counterfactual valuation. That is, it already entails a change from the status quo operating point D_U. Leaving this difficulty aside for the moment, we proceed as above. The next step is to determine the level of service quality that the Postal Service would provide in a liberalized environment. Here, it is also important to be clear about how q_N, the resulting level of service quality is determined. It is possible that this level may result from the binding of certain residual quality of service constraints imposed on the incumbent by its regulator. However, it is also quite possible to argue for using a q_N that would be chosen by the Postal Service in order to be competitive. However, it is not the particular value of q_N that drives the analysis, but the associated level of profit.[10] Under liberalization, this is given by Profit (q_N; No M) = Profit (N). Finally, the USO

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[10] As was the case in Figure 2, Figure 3 depicts a situation in which the summits of the "profit hills" are relatively flat, so the amount of the USO costs are not crucially affected by the choices of counterfactual levels of service quality.

cost under liberalization is obtained by taking the difference between these two counterfactual profit levels:

$$\text{COST}_{USO}(Q_{USO} \text{ to } q_N; \text{ No M}) = \text{Profit } (Q_{USO} ; \text{ No M}) - \text{Profit } (q_N ; \text{ No M})$$

$$= \text{Profit } (N_U) - \text{Profit } (N)$$

4.4   Decomposing profit changes into cost and revenue effects.

The previous subsection has detailed the conceptual methodology for measuring USO costs in terms of profitability costs. Unfortunately, the profit curves used in the diagrammatic analyses are not observable to the analyst. Therefore, in order to estimate the profitability costs associated with various USO obligations, we must, of necessity, attempt to estimate changes in profitability by breaking down Postal Service profit into its two constituent parts: costs and revenues.

We demonstrate this approach in terms of our primary focus, the comparison of Postal Service monopoly profit levels with and without the current USO. We begin by rewriting the relevant profit levels in terms of revenues and costs:

$$\text{PROFIT}(D) - \text{PROFIT}(D_U) = [\text{Rev}(D) - \text{Cost}(D)] - [\text{Rev}(D_U) - \text{Cost}(D_U)]$$

$$= [\text{Cost}(D) - \text{Cost}(D_U)] + [\text{Rev}(D) - R(D_U)]$$

$$= \text{cost savings } + \text{ foregone revenues}$$

This identity makes it possible to break-up the required calculations into two parts: the cost and revenue changes resulting from relaxation of the status quo USO requirement. This simple restatement also clearly indicates the importance of focusing on profitability costs. Otherwise, one might be tempted to interpret Postal Service cost savings as measuring the "cost" of the status quo USO.

4.4.1   Decomposing cost savings resulting from quality of service changes

To illustrate the methodology, we assume that Postal Service costs are a function of volumes (V) and service quality (Q); e.g., delivery frequency. Then any cost savings resulting from a relaxed USO result from changes in V, Q, or both. To more readily separate these effects, suppose costs have fixed (F) and marginal components (c) that

may vary with quality: i.e., Cost(V,Q) = F(Q) + c(Q)V. Then it is straightforward to decompose the cost impact of a quality reduction into two parts: a "quality effect" and a "quantity effect:"

$$Cost(D) - Cost(D_U) = \{F(D) - F(D_U) + [(c(D) - c(D_U)]V(D)\} + c(D_U)[(V(D) - V(D_U)]$$

The terms in curly brackets on the right hand side of the above equation measures the "quality effect." It indicates the change in costs that would occur if the quality of service changed as hypothesized, but Postal Service volumes remained at their initial level. In contrast, the last term on the right hand side of the equation measures the added cost of providing additional volumes at the new quality of service level. This conceptual separation may facilitate estimation. It may prove easier to approximate the impact of service quality changes holding volume constant and then, in a separate step, add in the effect of adding (or subtracting) volume at the new level of unit costs.

4.4.2   Decomposing revenue changes resulting from quality of service changes

The relaxation of an existing USO constraint may have a direct effect on revenues; for example, through the elimination of a discount for mail purchases of non profit organizations. The revenue effect may also be indirect, resulting from volume changes at a given price; e.g., if volume were projected to fall should delivery frequency be reduced from six days per week to three days per week. In either case, it may aid estimation to decompose the resulting revenue change into a price effect (P) and a volume effect (V):

$$Rev(D) - Rev(D_U) = P(D)[V(D) - V(D_U)] + V(D_U)[P(D) - P(D_U)]$$

The first term on the right hand side of the above equation reflects the change in revenues resulting from a quality-induced change in volume at a given price. The second term captures the revenue effects of any price changes at the status quo volume level.

This breakdown makes it easier to track the revenue impact of any USO relaxation. If the change effects service quality, but not price, then the revenue impact is directly measured by "pricing out" the resulting change in volume. This is a natural approach for calculating the effect of decreasing delivery frequency: i.e., the revenue impact would equal the volume decrease multiplied by an unchanged price. At the other extreme, the removal of a particular discount for a service with an inelastic demand would result in a

revenue change closely approximated by multiplying the price change by the (approximately) constant volume.

It is important to recognize that any analysis involving the "price effects" associated with the relaxation of a USO pricing constraint must take cognizance of the impact on PAEA price caps. Thus, while the natural response of the Postal Service to the removal of a mandated discount may be to raise the price to the level of "similar" services, such an upward adjustment may not be permitted under the relevant price cap. This means that the simple "re-pricing" calculations described above may best be viewed as an upper bound on the true USO cost. In the extreme case, in which raising one price literally means lowering another, the USO costs of such discounts may be zero, *given* the continuing presence of PAEA price cap regulation.

4.5 *Thoughts on measuring the impact of uniform pricing requirements*

Over the years, the Postal Service has been limited in the extent to which it can vary its prices across its service areas.[11] Such *uniform pricing* provisions are viewed as important components of the incumbent post's USO in many jurisdictions.[12] The term *uniform pricing constraint* is used to describe two related, but distinct, types of restrictions. The first, and most general, interpretation is that a uniform national rate is required for certain categories of mail. This condition is certainly satisfied by the Postal Service's pricing of single piece mail. However, it is doubtful that this uniformity is actually required by law in the U.S.[13] The second, less restrictive, interpretation is that *zonal*, or distance-based, prices are allowed, but the *rate schedule* must be geographically uniform. For example, if the Postal Service introduces "in town" and "out of town" rates, uniform pricing would require that the two rates be the same throughout the country. Similarly, any "over two thousand mile" rate would have to be the same for pieces mailed in Boston destined for Los Angeles or mailed in the Maine woods and destined for the Olympic Peninsula.

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[11] See the extensive discussion in Appendix B.

[12] See Appendix E for such international comparisons.

[13] See Appendix B for a discussion of this issue.

Regardless of which version of the uniform pricing constraint is the subject of analysis, one must begin by carefully specifying the relevant counterfactual market situation assumed to pertain after the removal of the constraint. As discussed above, most of our analyses of USO costs are carried out assuming that USO constraints are removed from the status quo situation. In terms of Figure 1, the postulated change is from point D_U to point D. It should be clear that the profitability cost of the uniform pricing constraint would be relatively minimal in such a situation. In the counterfactual situation without the uniform pricing constraint, the Postal Service would likely choose to adjust prices so as to bring them more in line with costs (where those differ) and/or to better exploit elasticity differences between the now separated markets. Such marginal pricing changes could be expected to yield only moderate profit gains. However, in the case at hand, there is also the constraint that the price adjustments must continue to satisfy the original revenue cap.

The situation is conceptually quite different when attempting to measure the costs imposed by a USO obligation *after* liberalization: i.e., a comparison between Postal Service profits at D and N. In that situation, entrants can be expected to engage in "cherry picking" by undercutting the Postal Service's uniform price in low cost areas, secure in the knowledge that, even if allowed to respond, the Postal Service cannot compete without lowering price in the (unthreatened) high cost area as well. The result may be a substantial profitability cost associated with the counterfactual situation (at N) in which the Postal Service could selectively match the entrant's price in the low cost area. However, it is important not to overstate this case. Even if the Postal Service is prevented by a uniform pricing constraint from directly competing with an entrant's differentiated pricing strategy, it may be able to blunt its impact by introducing Drop Ship discounts for large mailers that have the same effect as would a cost-differentiated delivery pricing strategy.

4.6 Illustrative example: USO costing of delivery frequency requirements

In this subsection we illustrate our profitability cost methodology in the context of a hypothetical reduction in delivery frequency from six days per week to five days per week in the context of an incumbent with a single product and two delivery segments A

and B. We also use the example to contrast the profitability cost measures with those that would result from applying the Net Avoided Cost (NAC) and Entry Pricing methodologies. The "facts" of the case are presented in Table 1. Status quo (D_U) operations are reflected in columns Rev D6 and Costs D6.

Table 1: Cost and Revenue Illustration

Segment	Rev D6	Costs D6	Rev D5	Costs D5	Rev N6	Cost N6
A	85	90	76.5	75	85	90
B	155	150	139.5	125	93	100
Total	240	240	216	200	178	190

That is, under the dual monopoly and a six day per week delivery USO the incumbent receives revenues of 240 and incurs the same amount of costs, so that its economic profits are zero. Columns Rev D5 and Costs D5 reflect the incumbents operating results in the counterfactual situation (D) in which the monopoly operator chooses to deliver only five days per week in the absence of any USO constraint. In that case, the incumbent is assumed to receive 216 in revenue while incurring costs of only 200, thereby earning an economic profit of 16. (Ignore the last two columns of the table for the time being.)

There are two types of USO functions in this example. The first is simply the obligation two deliver to both segments (e.g., regions) whether or not they can cover their costs. The second involves the service quality constraint of six day per week delivery. Beginning with the latter, our profitability measure of delivery frequency USO costs is quite directly calculated in this example: $PROFIT(D) – PROFIT(D_U) = 16$. In more complicated situations, it may be more convenient to express this result using the decomposition formula derived above: i.e.,

$$PROFIT(D) – PROFIT(D_U) = [Cost(D) – Cost(D_U)] + [Rev(D) – R(D_U)] = 40 – 24 = 16.$$

We turn now to the ubiquitous delivery component of the USO in this example. Suppose the incumbent were relieved of the obligation to serve Segment A *at a delivery frequency of six days per week*. If it merely abandoned Segment A its profits would

increase by $5 = 90 - 85$.[14]   However, this is not the relevant market counterfactual, and 5 is not the correct measure of the profitability cost of ubiquity.   Even if relieved of the obligation to serve Segment A at a delivery frequency of six days per week, the incumbent certainly has the *option* of serving Segment A at a frequency of five days per week.   If it pursued this option, its Segment A revenues would fall to 76.5 and its Segment A costs would fall to 75; making the segment profitable.   The incumbent's total profits after reducing service frequency would be $6.5 = 5 + 1.5$.   This is the true profitability cost of the obligation to serve Segment A *at a frequency of six days per week.*   However, the USO cost of the obligation to serve Segment A (at least one day per week) is zero because the incumbent would choose to do so voluntarily.

   The simplicity and clarity of this characterization of USO profitability cost is in sharp contrast to estimates based upon the Net Avoided Cost (NAC) approach.[15]   The NAC measure of USO ubiquity costs would be simply 5, the losses avoided by shutting down the unprofitable delivery segment.   The NAC of reducing delivery frequency to five days per week is merely the difference in the firm's costs incurred, with no recognition of the accompanying change in revenues.   In this example, that change is 40 ($240 - 200$), which is significantly different from the profitability cost measure of 16.

5   Valuing monopoly positions

In addition to measuring the cost of the Postal Service's USO, PAEA also mandates that the PRC estimate the values of the monopoly positions enjoyed by the Postal Service: i.e., the prohibition on the delivery of letters by alternative carriers (the letter monopoly) and the prohibition on the use of recipient mailboxes by third parties (the mailbox monopoly).   Here, it does not seem at all surprising that the appropriate magnitudes to compare are Postal Service profits with and without one or both levels of monopoly protection.

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[14] This assumes that the abandonment of delivery to Segment A has no effect on revenues or costs elsewhere in the system.

[15] See Cremer, et. al. for a further critique.

5.1 Specifying the relevant counterfactuals

Referring back to Figure 1, it is again apparent that in each case there are at least two profitability comparisons that could be undertaken, depending upon whether or not it is assumed that the status quo USO requirements remain imposed upon the Postal Service after liberalization. We take the position that consistency argues for valuing monopoly positions for a given level of service quality (USO) constraints.   Otherwise the calculation in question would include changes in the USO as well as the degree of monopoly protection. Thus, valuing changes in monopoly positions involve comparing the changes in Postal Service profits resulting from "vertical" movements in Figure 1.

There are two types of consistent monopoly valuation calculations. The first type involves measuring the change in Postal Service profits when the Letter and/or Mailbox monopolies are removed but the status quo USO requirements remain in place. In our opinion, this is the primary focus of the PAEA mandated valuation. Figure 4 illustrates the profitability comparisons involved.
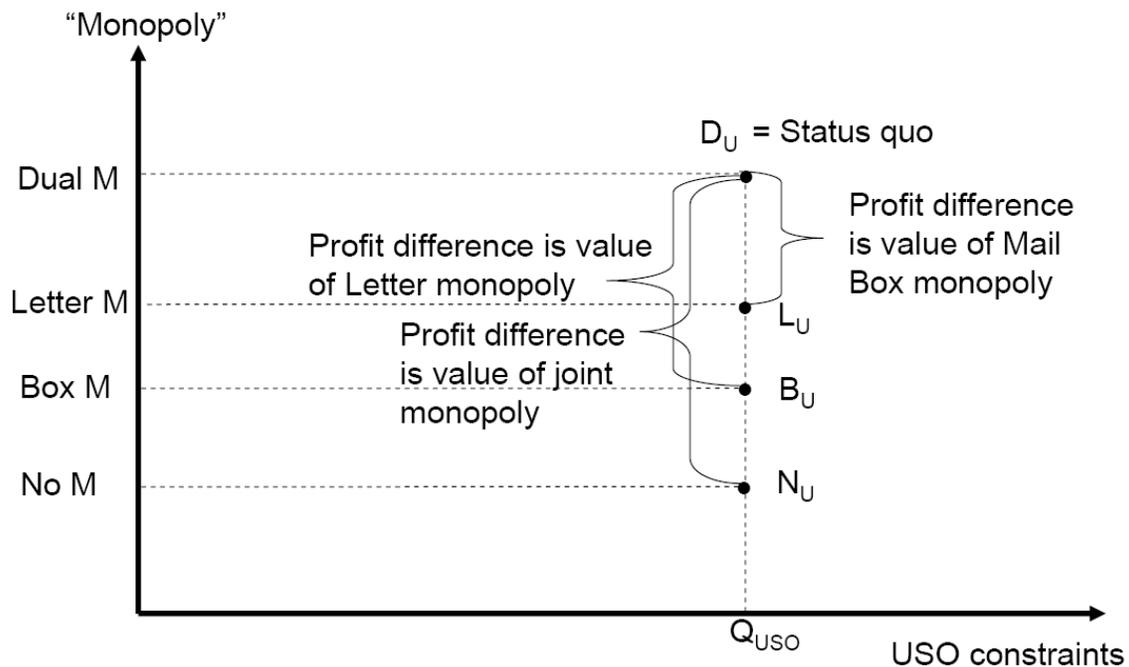

Figure 4: Profitability Comparisons

The value of the mailbox monopoly is equal to the profits of the Postal Service at the status quo point D_U less the profits that the Postal Service would be expected to earn at

the point L_U. There, the Postal Service satisfies the same USO constraint but has only the benefit of the letter monopoly. That is,

$$\text{Value of mailbox monopoly (USO)} = \text{PROFIT}(D_U) - \text{PROFIT}(L_U)$$

Similarly, the value of the letter monopoly is equal to the profits of the Postal Service at the status quo point D_U less the profits that the Postal Service would be expected to earn at the point B_U. There, the Postal Service satisfies the same USO constraint but has only the benefit of the mailbox monopoly. That is,

$$\text{Value of letter monopoly (USO)} = \text{PROFIT}(D_U) - \text{PROFIT}(B_U)$$

Finally, the *combined* value of the Letter and Mailbox monopolies equal to the profits of the Postal Service at the status quo point D_U less the profits that the Postal Service would be expected to earn at the point N_U. There, the Postal Service satisfies the same USO constraint in the absence of any monopoly protection. That is,

$$\text{Value of Dual Monopoly (USO)} = \text{PROFIT}(D_U) - \text{PROFIT}(N_U)$$

It is important to point out that there may well be important interactions between the letter monopoly and the mailbox monopoly. For example, the letter monopoly may be significantly more valuable in the presence of the mailbox monopoly than without it. That is, it may well be the case that

$$\text{PROFIT}(D_U) - \text{PROFIT}(B_U) > \text{PROFIT}(L_U) - \text{PROFIT}(N_U)$$

It is also possible that the mailbox monopoly may be more valuable in the absence of the letter monopoly than when both are present: i.e.,

$$\text{PROFIT}(B_U) - \text{PROFIT}(N_U) > \text{PROFIT}(D_U) - \text{PROFIT}(L_U)$$

Finally, there is certainly no reason to believe that the value of the joint monopoly is equal to the sum of the status quo values of the two individual monopolies: i.e.,

$$\text{PROFIT}(D_U)-\text{PROFIT}(N_U) \neq [\text{PROFIT}(D_U)-\text{PROFIT}(B_U)]+[\text{PROFIT}(D_U)-\text{PROFIT}(L_U)].$$

We do not think it would constitute a policy relevant comparison, but the Letter and Mailbox monopolies can also be consistently valued in the absence of any USO requirement. Referring again to Figure 1, the value of the mailbox monopoly in the absence of the USO is equal to the profits of the Postal Service at point D less the profits

that the Postal Service would be expected to earn at point L. There, the Postal Service operates without a USO constraint but has only the benefit of the letter monopoly. That is,

Value of mailbox monopoly (w/o USO) = PROFIT(D) – PROFIT(L)

Similarly, the value of the letter monopoly without the USO is equal to the profits of the Postal Service at point D less the profits that the Postal Service would be expected to earn at point B. There, the Postal Service operates without the initial USO constraint but has only the benefit of the mailbox monopoly. That is,

Value of letter monopoly (w/o USO) = PROFIT(D) – PROFIT(B)

Finally, the *combined* value of the Letter and Mailbox monopolies is equal to the profits of the Postal Service at point D less the profits that the Postal Service would be expected to earn at point N, where the Postal Service is not bound by the USO constraint but operates in the absence of any monopoly protection. That is,

Value of Dual Monopoly (w/o USO) = PROFIT(D) – PROFIT(N).

Again, one should not be tempted to "add up" these monopoly valuations. The value of one monopoly taken alone may be greater than or less than its value when combined with the other. Similarly, the sum of the values of removing the monopolies one at a time will not generally be equal to the value of removing both simultaneously.

5.2 *Practical aspects of monopoly valuation: the entry pricing approach*

The preceding discussion provides a consistent conceptual approach to be used in valuing the Postal Service's Letter and/or Mailbox monopolies. However, in order to even begin to quantify these magnitudes requires one to forecast what market outcomes would be in a liberalized regime. This is an ambitious undertaking in and of itself. As noted above, there have been many attempts at "USO costing" over the past decade. But, given the focus on liberalization elsewhere in the world, there has not been much (if any) effort devoted to quantifying the value of existing monopoly positions. Fortunately for us, it turns out that one USO costing methodology developed for that purpose, Entry Pricing, is actually far more relevant to monopoly valuation than it is for USO costing.

The essence of the Entry Pricing approach is to attempt to forecast the market shares that entrants would capture under various liberalization scenarios.[16] Forecasting such a hypothetical equilibrium market outcome requires the analyst to make a very large number of assumptions about the capabilities of (as yet unidentified) entrants and the nature of the incumbent's response to the entrants' strategies. In any practical application of entry pricing, many (if not most) of the needed assumptions will be controversial. Therefore, it is important that the analysis clearly identify the key assumptions that drive the results. It is also very important to perform as much "sensitivity analysis" as is practical.

5.3 Constructing scenarios for valuing the letter monopoly

Entry pricing models used to attempt to measure USO costs begin by attempting to estimate the shares obtained by entrants in various postal markets. Such share estimates are sometimes "derived" using assumptions about the cost conditions facing potential entrants. They can also be assumed directly, as model parameters. Regardless of whether such volume losses are directly parameterized or indirectly derived on the basis of other assumptions, they are not of interest in and of themselves. Rather, it is the effect of entry on the *contributions* that the Postal Service receives from the markets in questions.

The relationship between contribution losses and volume losses depends crucially on the regulatory environment in which the incumbent operates. First, suppose the incumbent were not permitted to lower prices in response to entry. In that case, since entrants would presumably target high margin services, the loss of volume would be directly related to the loss in contribution. Alternatively, if the incumbent were allowed to cut prices in response to entry, contribution losses might be large even though volume losses were minimal. On the other hand, if the incumbent were allowed to selectively cut

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[16] See, for example, Rodriguez, F, Smith, S. and Storer, D., "Estimating the Cost of the Universal Service Obligation in Postal Service," in *Emerging Competition in Postal and Delivery Services*, Crew, M., and Kleindorfer, P., (eds.), Kluwer, 1999. Of course, given the European focus of this literature, the liberalization at issue is the removal or relaxation of a letter monopoly, not of the unique American mailbox monopoly.

prices in those areas where entry occurred, it might be possible for the incumbent to *deter* entry into its profitable markets. In such a circumstance, removal of the statutory monopoly might result in substantial loss of relatively unprofitable volume but little loss in contribution.

These examples reveal the importance of the assumptions made with respect to the continuation of PAEA price cap constraints when attempting to estimate the effects of removing the letter monopoly on Postal Service profitability. The typical "first step" in an Entry Pricing analysis – forecasting volume losses – is only rarely the "last step." Volume changes will accurately track contribution changes only when Postal Service prices do not change. This may have been a possibility under traditional cost-based PRC regulation. However, it is not a plausible outcome under the price cap regime in place after PAEA.

The decomposition approach introduced in Section 4 provides a useful methodological framework for dealing with the price response issue. Again focusing on the single product case for simplicity, the comparison of interest for valuing the Dual Monopoly is

$$\text{PROFIT}(N_U) - \text{PROFIT}(D_U) = \{[P(N_U) - c]V(N_U) - F\} - \{[P(D_U) - c]V(D_U) - F\}.$$

Since no change of service quality takes place in this comparison, it is assumed above that $c(D_U) = c(N_U) = c$ and $F(D_U) = F(N_U) = F$. This equation can be rewritten as:

$$\text{PROFIT}(N_U) - \text{PROFIT}(D_U) = [P(N_U) - c][V(N_U) - V(D_U)] + V(D_U)[P(N_U) - P(D_U)].$$

The above equation provides a concise illustration of the issues involved in calculating the effects of removing the letter monopoly in the presence of the status quo USO: i.e., the profit effect of moving from D_U to N_U in Figures 1 or 4. The first product on the right hand side multiplies the products contribution per piece after entry times the forecasted change in Postal Service volume resulting from entry. If Postal Service prices are assumed to remain unchanged following entry, this "volume diversion term" captures the entire effect on Postal Service profits and the value of the letter monopoly. The second product multiplies the status quo level of Postal Service volume times the change in Postal Service price resulting from entry. If the Postal Service is allowed to respond aggressively to entry so that Postal Service volumes are relatively unaffected, then this

"price response term" plays the major role in determining the impact on Postal Service profits.

It is important to point out that, even in the simplest case, two of the important terms in the above decomposition equation must be forecast on the basis of some assumptions about the nature of post entry market equilibrium: $P(N_U)$ and $V(N_U)$. Most applications of the entry pricing approach focus on forecasting the change in volume. However, given the pricing flexibility permitted by PAEA, it is important to think carefully about how Postal Service prices are likely to change in response to entry.

5.4 Constructing scenarios for valuing the mailbox monopoly

Valuing the mailbox monopoly presents some novel challenges, primarily because there is no parallel in other jurisdictions. Again, the value of the monopoly position is the reduction in Postal Service profits resulting from its elimination. One would expect Postal Service profits to decline for three main reasons. First, existing competitors (e.g., FedEx and UPS) will be able to deliver to the mailbox. This would improve the quality of their offerings and decrease the Postal Service's market share for parcels and priority mail. Second, the products of carriers providing delivery using unaddressed mail and newspaper inserts will become more attractive once those can be placed in the mailbox. This may erode Postal Service Standard mail volumes that compete with such alternatives. Third, it has been argued that the presence of non Postal Service pieces in the mailbox may tend to increase the delivery cost of the Postal Service due to Mailbox congestion.

The primary methodological approach for modeling these effects remains the Entry Pricing model. However, in this case the most useful decomposition analysis will focus on quantity and cost rather than quantity and price. We will again focus on the contribution impact resulting from changes involving a single product. Then the comparison of interest for valuing the mailbox monopoly is

$$\text{PROFIT}(L_U) - \text{PROFIT}(D_U) = \{[P - c(L_U)]V(L_U) - F\} - \{[P - c(D_U)]V(D_U) - F\}.$$

The above expression reflects our assumptions that the entry resulting from elimination will not have a significant impact on prices and that congestion cost impacts will affect

volume variable costs rather than fixed costs: i.e., $P(D_U) = P(L_U) = P$ and $F(D_U) = F(L_U) = F$. This equation can be rewritten as:

$$PROFIT(L_U) - PROFIT(D_U) = [P - c(D_U)][V(L_U) - V(D_U)] + V(L_U)[c(D_U) - c(L_U)].$$

The above decomposition is readily interpreted and serves to highlight the assumptions that play an important role in valuing the mailbox monopoly. The first product on the right hand side of the above equation is the amount of contribution that would be lost if variable costs remained at their status quo level: i.e., in the absence of significant costs due to mailbox congestion. The second product on the right hand side measures the cost increases suffered by the Postal Service as a direct result of mailbox congestion. The two effects must be combined if one anticipates that elimination of the mailbox monopoly will have a significant cost impact.

5.5 *Illustrative example: valuing monopoly using an Entry Pricing model.*

The example presented in Table 1 can also be used to illustrate the use of an Entry Pricing model to value a postal monopoly. Columns RevN6 and CostN6 list the revenues the incumbent would receive and the costs it would incur if its monopoly were removed. The revenue value results from the assumption that entrants are able to obtain 40% of the incumbent's volume at given prices in Segment B. The cost figure reflects the assumption that costs decline less than proportionately with volume due to economies of scale.

The value of the monopoly is readily calculated from the profit differences. The ability of entrants to attract 40% of the revenues of the profitable segment results in a loss of 12 for the incumbent. Comparing this outcome to the zero profits earned in the status quo situation establishes that the value of the monopoly was 12. The example also reveals the important role played by assumptions made by the analyst regarding the market share obtained by the entrant. The value of the monopoly is obviously larger the larger the market share is assumed to be that the entrant would capture.

6   Summary and Conclusions

This section presents an explanation of the methodology we use to obtain estimates of the cost of the USO requirements imposed on the Postal Service and the value of the Letter and Mailbox monopolies that it enjoys. Our analysis is based upon the impact of these policies on the profitability of the Postal Service. This focus on Postal Service profits allows us to directly measure the *burden* of the USO and the *market value* of a monopoly position. That is, our approach is designed to calculate the amount of profit that the Postal Service would *gain* if it were relieved of its USO or the amount that it would *lose* if one or both of its monopoly privileges were removed. In each case, this exercise directly measures the dollar *opportunity cost* of the policy at issue.

Because our methodology is based on calculating *changes* in Postal Service profits, it will typically require estimates of those profits in two distinct operating environments: i.e., with and without the policy provision in question. These comparisons will usually involve the current operations of the Postal Service. That is, we evaluate the policy changes at issue relative to the status quo. Since it is pivotal to our approach, we take great care in characterizing the status quo situation of the Postal Service. A major focus of our historical and legal analysis is devoted to carefully understanding exactly what are, and are not, included in the current USO requirements and monopoly positions of the Postal Service. Without a thorough understanding of what is included in these provisions, it is impossible to even speculate about the implications of their removal.

Our focus on the status quo extends also to the current regulatory environment. This includes the system of Price Cap regulation mandated by PAEA and implemented by the PRC. We assume that Price Cap regulation will remain an integral part of all the counterfactual situations that we analyze. This is because we do not consider the elimination of Price Cap regulation to be a policy relevant possibility to consider. Therefore, Price Cap regulation, per se, is not considered part of the USO of the Postal Service.

Much of the analysis of this section utilizes a diagrammatic framework as a heuristic device to illustrate the principles involved. That is, we proceed by "locating" various operating environments of the Postal Service as points on a Cartesian (XY) plane. The

two dimensions considered are the "extent of monopoly protections" and the "severity of the USO." Associated with any combination of values for these two variables is a level of Postal Service profits that would be earned in the designated environment: e.g., {status quo USO, mailbox monopoly only}. This construction makes it possible to precisely envision the appropriate thought experiment required to evaluate the policy change at issue. Thus, the valuation of a monopoly position begins with a (downward) vertical movement that holds constant USO requirements while relaxing monopoly restriction. The value of the monopoly given up is the difference in Postal Service profits between the (status quo) starting position and the (counterfactual) ending position. Similarly, the cost of providing the status quo level of USO service quality is measured by the change in Postal Service profits that would result from a (leftward) horizontal movement reflecting an elimination of USO constraints while retaining existing monopoly protections. The advantage of this approach is that it makes precise the assumptions underlying the analysis. Also, it makes it clear whether the analyst has succeeded in his mandate to "change one policy at a time," so as not to confound multiple effects.

Even when care is taking to precisely identify the hypothetical profit comparison being calculated, it remains the case that there are often many operational differences between the "before" and "after" scenarios. In this case, it is sometimes useful to *decompose* the change in Postal Service profits into two or more effects. For example, by definition, the USO cost of reducing delivery frequency from six to three days per week can be divided into two effects: cost savings and foregone revenues. These, in turn, can be further divided into price, volume, and quantity effects. Approaching the exercise in this manner makes explicit the assumptions used in calculating the counterfactual results: e.g., the elasticity of volume with respect to frequency of delivery; the price elasticity of demand; the market share lost to entrants; etc.

7   Bibliography

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