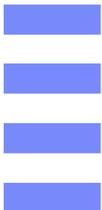


October 8, 2008



# Quantitative Analysis of the Universal Service Obligation

Final Report



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# Executive Summary

## Introduction

This is a report on the *costs* of the universal service obligation (USO) conducted on behalf of the United States Postal Service. The Postal Service engaged a study team led by Dr. Michael Bradley (Professor of Economics at George Washington University) and IBM Global Business Services. The purposes of this study are two-fold:

- Provide quantitative insights into key aspects of the USO to assist in decision making
- Provide a credible and effective tool to help the Postal Service and policy makers contribute to the ongoing debate over the USO.

USO costs were estimated with a detailed financial model that accounts for the volume, revenue, and cost effects of the USO and the postal monopoly. The model constructed for this study is a “bottom-up” model in the sense that it captures the effects of the USO at a 3-digit ZIP Code level and then aggregates the local results.

The financial tools constructed in this project are grounded in state-of-the-art methodologies, Postal Regulatory Commission approved costing methods, and official Postal Service data sets.

Calculating the costs of the USO and changes to the monopoly is a complex problem. First, there are a variety of aspects of the USO to consider. There is also a spectrum of possible liberalization scenarios under which the costs of the USO will vary. The costs of the USO depend not only upon its own definition but also upon the scope of the monopoly.

The costs of the USO are calculated as the net impact on the Postal Service’s financial position from following the universal service obligation. This approach to measuring the costs of universal service can be used in both regulated and liberalized environments and is often referred to as the profitability approach.<sup>1</sup> Note that all analyses in this report assume that the Postal Service continues to provide universal service in the sense of providing mail delivery to all addresses in the nation.

Postal operators and policy makers should be wary of too much focus on analyses that claim to measure “THE” cost of the USO. The costs of the USO depend upon both how the USO is structured and the postal and regulatory environment in which it is imposed.

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<sup>1</sup> The profitability approach is presented 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.

## ***Implementation of Approach***

Implementation of the profitability approach requires taking a holistic approach to measuring the costs of the USO. In practical terms, this means considering both the demand response (reactions of consumers and competitors) as well as the operational response (reaction by the Postal Service).

Because of the complexities and uncertainty in measuring the costs of the USO, the characteristics of any useful quantitative tool should be flexibility to analyze alternative scenarios, a bottom-up approach to investigate local responses to changes in the USO, and the ability to capture the quantitative relationship between the monopoly and the USO.

The USO quantitative model is a sophisticated financial model of the Postal Service that is sufficiently flexible and detailed to support investigation of a variety of USO questions. Issues such as estimating the net impact of reducing the number of delivery days or the impact on revenue of allowing competition in the delivery of Standard Mail can be assessed quantitatively with this tool.

### ***Application 1: Costs of the Delivery Day USO***

As part of its USO, the Postal Service is required to deliver mail virtually everywhere in the country six days a week. Without the USO, the Postal Service would be free to choose its delivery frequency solely on the basis of business considerations. This could lead to substantial cost savings.

#### **Areas of Cost Savings**

Cost savings were included for the following three areas.

- **Network Costs** - Network costs arise from the need for the carrier to traverse his or her route and are not related to volume. A reduction in the number of delivery days reduces the number of times that carriers must traverse their routes. As the number of trips around the network is reduced, network delivery costs are saved.
- **Attributable Delivery Costs** - Delivery cost per piece falls as the number of pieces per delivery point rises. This leads to a reduction in the attributable costs of delivery.
- **Indirect Costs** - These include costs for supervisors, vehicle maintenance, building maintenance and service-wide benefits that rise and fall as the number of direct hours change.

#### **Potential Offsets and Additions**

Changing delivery days can have implications for mail processing and transportation costs, but these are not included in the results presented below. If delivery days are reduced, some mailers may consider alternatives and Postal Service revenue and volume may decline. This potential impact is also not included in the following results.

## **Scenario 1: Eliminate Saturday Delivery**

The first scenario is a simple elimination of Saturday delivery across all delivery points nationwide. **Analysis of this scenario leads to an estimated cost savings of \$3.5 billion per year.**

## **Scenario 2: Differential Days of Delivery**

In the second scenario, the number of delivery days in a 3-digit ZIP Code is dependent upon the amount of volume delivered. To compare the results to elimination of Saturday delivery, the delivery standard is set so that the Postal Service averages five delivery days per week across 3-digit ZIP Codes. **The results of the analysis yield very similar results to Scenario 1, with total delivery cost savings of \$3.7 billion.** It is informative to examine the pattern of delivery and where delivery days are high and low across the country.

## ***Application 2: Analysis of Removing the Mailbox Monopoly***

This analysis examines the impact on the Postal Service of removing the mailbox monopoly without a change in the Private Express Statutes (PES). There are two impacts of removing the mailbox monopoly. First, the Postal Service may lose revenue and volume to competitors. Second, due to extra items in the mailbox, the carrier may not be able to deliver mail and will have to reattempt delivery the next day, and/or may have to take extra time to sort through mailbox items to determine what pieces are for collection. This congestion in the mailbox may cause the Postal Service to face higher delivery and collection costs. The analysis accounts for both impacts. The key inputs, assumptions, and results are below:

- Competitors are free to deliver items not restricted by the PES into the mailbox. Thus, Standard Enhanced Carrier-Route (ECR), Standard Regular Flats and Parcels, and Periodicals are subject to competition.
- A small amount of Priority Mail and non-Parcel Select small parcels is diverted to existing competitors.
- To account for the increase in mailbox congestion delivery productivity is reduced.

**The cost of losing the mailbox monopoly while keeping the PES was estimated to be between \$1.5 and \$2.6 billion a year.** Further sensitivity analysis demonstrated that the entrant network cost is the key variable, since entrants have limited volume with which to cover the costs.

## ***Application 3: Costs of the Uniform Pricing USO under Standard Mail Liberalization***

The uniform pricing aspect of the USO requires the Postal Service to charge the same rates across the country for certain products. In a liberalized environment, uniform pricing can also lead to “cream skimming” by new entrants, which occurs when entrants

gain volume by lowering price in certain areas, causing an erosion of revenue and contribution for the Postal Service.

### **Scenario Definition**

Under this scenario, the mailbox monopoly has been lifted and the PES has been removed for Standard Mail. In addition, the Postal Service still can only price within the price cap and the USO restrictions are in place.

### **Calculating the Uniform Pricing USO Costs**

Without a uniform price USO, the Postal Service could respond to the entrant by matching price and winning back the volume, or better yet, preventing any volume from leaving initially. The Postal Service will match the entrant's price only if it improves its financial position by gaining back the lost volume.

The uniform price USO costs are the additional profits lost because of an inability to meet competition. **Under liberalization of just Standard Mail, these USO costs are estimated to be between \$1.4 billion and \$3.3 billion in profit per year.**

### ***Additional Analysis: Costs of the Retail Network USO***

Without public policy restrictions on the closure of Post Offices, the Postal Service would be able to freely choose the number of retail outlets it operates, as do private sector firms. This analysis presents the estimated cost savings from closing retail operations at over 18,000 of the Postal Service's smallest Post Offices. These retail costs savings are part of the costs of the retail network USO.

Note that the estimated cost savings include only the salaries and indirect costs for postmasters in these small offices. The other costs generated by these offices are assumed to be transferred to the remaining offices in the retail network. In addition, these remaining costs are assumed to be consolidated into other offices without incurring additional costs. Finally, the estimate does *not* include savings or offsets from potential changes in mail processing, transportation, or customer demand.

**If the 18,574 smallest Post Offices were closed, the cost savings are estimated to be \$1.4 billion per year.** Alternatively, if just the Post Offices with no delivery functions were closed, the cost savings are estimated to be \$590 million per year.

# 1. Introduction

## 1.1 Project Objectives

Postal administrations across the world have been addressing the critical issues associated with universal service obligations (USOs) over the past decade. Postal administrations, their regulators, and their customers have examined a broad range of questions surrounding their USOs, including their definitions, ways to fund the USOs, the relationship between their USOs and monopoly provisions, and very importantly, USO costs in different countries.

With the passing of the Postal Accountability and Enhancement Act of 2006 (PAEA), the focus on all aspects of the USO for the United States Postal Service has sharpened considerably. Stakeholders ranging from Congress, mailers, the Postal Regulatory Commission, and the Postal Service itself are currently examining issues related to the USO through a series of studies and public discussions.<sup>2</sup> Much of this focus has been placed on analyzing the *costs* of the USO for the Postal Service because, given the organization's vast size and scope, the financial impact of the USO could be significant.

To fully analyze the costs of the USO, the Postal Service engaged a study team led by Dr. Michael Bradley (Professor of Economics at George Washington University) and IBM Global Business Services. The purposes of this study are two-fold:

- Provide quantitative insights into key aspects of the USO to assist in decision making
- Provide a credible and effective tool to help the Postal Service contribute to the ongoing debate over the USO.

As noted above, this project (and report) focuses on the *costs* of the USO for the Postal Service. Other separate studies are being prepared by the Postal Service that focus on related topics such as the applicability of other countries' experiences with their USOs to the United States' situation and the social costs and benefits of the USO.

## 1.2 Principles and Issues in Calculating Costs of the USO

Calculating the costs of the USO and the financial effects of changes to the monopoly is a complex problem. First, there are a variety of aspects of the USO to consider. Commonly considered aspects include ubiquity, frequency of delivery, and uniform pricing, but there are a variety of others that may be considered, such as retail access. There is also a spectrum of possible liberalization scenarios under which the costs of the USO will vary. This adds complexity because the USO and the monopoly are intricately linked. The costs of the USO depend not only upon its definition but also upon

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<sup>2</sup> For example, the Postal Service recently held a series of discussions at the National Postal Forum in Anaheim, CA with mailers and other industry participants addressing various aspects of the USO. Similarly, the Postal Regulatory Commission has sponsored a series of hearings at various locations throughout the country to elicit public feedback regarding the USO.

the scope of the monopoly. Thus, they will change with liberalization. For example, if only a small portion of the overall mail volume is opened to competition, the financial impact to the postal operator, and thus the USO costs, would be significantly different from a scenario in which the monopoly is completely removed. The chosen approach to handling this complexity and some caveats in interpreting the results are presented below.

### **Approach to Defining the USO Costs**

The USO is a set of public policy restrictions on the actions of a post that keep it from making its decisions on purely a business-like basis. For example, a post may be required to provide delivery service to a high-cost area at the same price as delivery to a low-cost area, even though the costs of that delivery exceed its revenue. A profit seeking business would not provide that service on an ongoing basis at a uniform price. This makes clear the fact that the costs caused by the USO are measured by the degradation in the post's financial position which results from the imposition of the USO restrictions. This approach to measuring the costs of universal service, which can be used in both a regulated environment and in a liberalized environment, is often referred to as the profitability approach.<sup>3</sup> Thus, in the analysis presented in this report, the costs of the USO are calculated as the net impact on the Postal Service's financial position from following the universal service obligation.

### **Caution in Attempting to Measure “the” USO Cost**

Postal operators and policy makers should be wary of too much focus on analyses that claim to measure “THE” cost of the USO. As discussed above, the costs of the USO depend upon both how the USO is structured and the postal and regulatory environment in which it is imposed. Rather than providing just one answer, a more robust approach considers the costs of the USO for a variety of aspects of the USO and regulatory environments in order to draw useful insights about why the costs arise and how to potentially modify the USO.

### **Measurement of USO Costs Should Be “Forward-Looking”**

Because the costs of the USO depend upon the environment in which those costs arise, measurements of the costs of the USO are most useful when they are forward-looking, rather than historical. This requires constructing scenarios that predict how complex interactions between the postal operator, competitors, and their customers will likely occur. For these reasons, precise measurements of the costs of the USO are difficult but reliable approximations are useful.

### **Conclusion**

In order to meet the challenges of measuring the costs of the USO, the best approach is to build a flexible, robust tool that can quantify critical aspects of the monopoly and the USO as well as account for the interaction between the two. This report discusses the

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<sup>3</sup> The profitability approach is presented in Cremer, H., Grimaud, A., and Laffont, J.J., “The Cost of Universal Service in the Postal Sector,” in Current Directions In Postal Reform, Crew, M., and Kleindorfer, P., (eds.), Kluwer, 2000.

methodologies and inputs used in developing this quantitative tool as well as the costs of the USO under scenarios under various regulatory and USO conditions.

## 2. Methodology

### 2.1 *Choosing the Approach to Measuring the Costs of a Universal Service Obligation*

A consensus has recently emerged on the appropriate measure of universal service obligation (USO) costs. Academic researchers and practitioners have come to agree that the appropriate measure of the costs of the universal service obligation is the net impact on a postal service's financial position caused by the imposition of a universal service obligation. Note that this approach differentiates between universal service and the universal service obligation. Universal service activities that a postal operator provides voluntarily (because the benefits exceed the costs) are not typically included in the USO. A postal service may be willing to provide service to every address in a country (universal service) but would not wish to do so at a uniform frequency or price. These latter two constraints are examples of universal service obligations.

There have been a number of methods proposed for measuring the costs of universal service for postal services. To understand why a consensus has emerged, it is helpful to review these alternatives. While the different methods have different computational algorithms, they share a common foundation: all are attempting to measure the costs associated with the provision of a service to a group of customers for which the received revenues are insufficient to cover the incremental costs. This implies that the measured costs of universal service are typically less than the total resource costs of providing the covered services. In other words, computing the costs of universal service requires taking both incurred costs and revenues into account.

The first method proposed for measuring the costs of universal service in the postal sector is the net avoided cost (NAC) method.<sup>4</sup> This method had been used in telecommunications, so it is natural that it was borrowed to measure the costs of USO for postal operators. The NAC approach is straightforward and is just a mathematical expression of the idea that the costs of universal service are the deficiency in revenue for a set of services provided by the post. Were it not for the universal service regulation, presumably the post would cease providing these services.<sup>5</sup> The NAC approach to measuring the costs of the USO has been limited to calculating the difference between the revenues earned on high-cost routes and the cost of providing that service.

The NAC approach has been harshly criticized on a number of grounds. First, it has been described as "the answer to the wrong question." Measuring the costs of universal service is relevant for evaluating the value of its existence and determining how it should be funded. In the postal sector, it has been funded through the provision of a

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<sup>4</sup> For a more complete discussion and application of the NAC approach, see Bradley, Michael and Colvin, Jeff, "Measuring the Cost of Universal Service for Posts," in Current Directions In Postal Reform, Crew, M., and Kleindorfer, P., (eds.), Kluwer, 2000.

<sup>5</sup> Critics of the NAC approach argue that it ignores the potential benefits from providing ubiquitous services. In order to preserve ubiquity, a post might find it beneficial to serve an area even though the revenue earned does not cover the cost of such service. On the other hand, the post may wish to include a surcharge for said service, which is precluded by the universal service requirement.

“reserved area” or monopoly product. This market restriction prevents “cream skimming,” which occurs when competitors enter and can pick and choose the most profitable customers/regions to serve, leaving the post with the unprofitable ones. The restriction also allows the post to subsidize the high-cost area with “profits” made on the service in the low-cost area. The right question, then, is whether the monopoly is the right size to pay for the universal service costs and thus how large the universal service costs would be with a reduced or eliminated monopoly. The NAC approach does not provide an answer to this question, as it assumes no change in the monopoly. Thus, it provides little, if any, information about the costs of universal service in a liberalized environment. In addition, the NAC approach focuses on the cost effects of universal service but does not necessarily capture the revenue effects. That is, it does not account for the fact that the uniform price could cause revenue effects in the demand for products and the overall level of revenue received by the post.

In an effort to address some of the deficiencies of the NAC approach, a second approach was developed, the entry pricing cost (EPC) approach.<sup>6</sup> The EPC approach attempts to investigate the costs of universal service in a liberalized environment. The EPC approach thus presupposes a liberalized environment in which cream skimming takes place. Because of the relatively high uniform price, competitors can take away service to the low-cost area and still make a profit. The result is that the post is left solely with service to the high-cost area. In addition, the post also has the fixed cost of sustaining the network. According to the EPC approach, under liberalization and a universal service requirement, the post’s financial position is unsustainable without a subsidy. Therefore, under the entry pricing approach, the subsidy needed to return the post to its pre-liberalization financial health is a measurement of the costs of universal service.

While it may be considered an advance over the NAC approach, the EPC approach also has its drawbacks. First, it assumes that the demand for postal products is the same before and after liberalization. Second, it assumes that there is no reaction on the part of the post to the cream skimming behavior on the part of competitors. For example, would the post attempt to raise the uniform price as it loses volume in low-cost areas? After all, its average marginal cost per piece is rising due to volume leakage. Finally, the EPC approach assumes that all losses occurring in the liberalized environment are due to the universal service requirement. This may not be true, as the post could lose some volume and revenue in a liberalized environment even without a universal service requirement.

In essence, both the NAC approach and the EPC approach attempt to take the financial results from a pre-liberalized environment and extrapolate them to understand universal service in the liberalized environment. While this is computationally convenient, it is not methodologically correct.<sup>7</sup> To calculate universal service costs in a liberalized

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<sup>6</sup> For a discussion of the Entry Pricing approach, see, Rodriguez, F, Smith, S. and Storer, D., “Estimating the Cost of the Universal Service Obligation in Postal Service,” *Emerging Competition in Postal and Delivery Services*, Crew, M., and Kleindorfer, P., (eds.), Kluwer, 1999.

<sup>7</sup> This is not to say that the NAC and EPC measures are valueless, but rather they should be viewed and interpreted with extreme caution.

environment, it is important to embed that cost calculation in the economic environment of the liberalized environment. Because this is not done, both the NAC approach and the EPC approach are potentially misleading and could either overstate or understate the true cost of universal service in the liberalized environment.

A final approach to measuring the costs of universal service which can be used to measure the USO in a regulated environment and in a liberalized environment is the profitability approach.<sup>8</sup> The USO is a set of public policy restrictions on the actions of a post that keep it from making its best business decisions. A post may be required to provide delivery service to a high-cost area at the same price as delivery to a low-cost area, even though the costs of that delivery exceed its revenue. A profit seeking business would not provide that service on an ongoing basis at a uniform price. This makes clear the fact that the cost of the USO is the degradation in the post's financial position that results from following the USO restriction rather than being able to make the optimal business decision.

The profitability approach has the distinct advantage of attempting to directly measure the correct conceptual measure of the costs of the USO. Theoretically, the profitability approach takes as its starting point the financial position of the post in either a regulated or a liberalized environment without a USO. Once this benchmark financial position is derived, the costs of universal service measurement require computation of the financial position of the post with the universal service requirements in place.<sup>9</sup> The difference in the two financial positions is the costs of the USO.

A material advantage of the profitability approach is its ability to calculate the costs of the USO in a liberalized environment. Unlike the EPC approach, the profitability approach has the ability to separate the financial effects of the imposition of a liberalized environment from the effects of the USO. This avoids the problem of contaminating the true USO costs with the costs of liberalization.

Although this approach is computationally difficult (because it requires estimating what would occur in a liberalized environment), it is methodologically preferred because it produces the number required for calculating the costs of universal service in a liberalized environment. It also has the advantage of being flexible. The parameters of both the liberalized environment and the USO can be varied and the impact on the costs of universal service can be assessed.

The following section describes how the profitability approach to measuring the costs of the USO was applied to the Postal Service.

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<sup>8</sup> The profitability approach is presented 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.

<sup>9</sup> Because the USPS has always operated with a USO, actual computations using the profitability approach reverse the order of these operations. The benchmark is the current financial position of the USPS and that benchmark is compared with what the USPS's financial position would be if some or all of the USO restrictions are relaxed.

## **2.2 Implementation of the Profitability Approach to the Postal Service**

Application of the profitability approach to the United States Postal Service has two important preliminary steps, the development of a general computational algorithm and the identification of the essential characteristics of the quantitative tool. Both of these preliminary steps are discussed in this section.

### **2.2.1 Specifying the General Computational Algorithm**

As discussed above, a USO cost arises from the placement of a legal or policy constraint on the Postal Service. This means that, in the ideal, the net cost of the constraint could be calculated by observing the Postal Service both before and after the constraint was put into place and comparing its net financial situation in the two states. The degradation in the Postal Service's financial position is the cost of that USO.

Obviously, this ideal is unattainable because the USO restrictions are already in place. The estimation of the costs of a USO restriction thus requires estimation of the net financial position of the Postal Service with the restriction removed. The difference between the two net financial positions, the current actual financial position and the estimated financial position absent the constraint, is the estimate of the costs of the USO being examined. In summary, the costs of a universal service obligation can be estimated as the net improvement in the Postal Service's financial position arising from the removal of that obligation.

This means that implementation of the profitability approach requires taking a holistic approach to measuring the costs of a particular USO. In practical terms, this means considering both the demand response (reactions of consumers and competitors) as well as the operational response (reaction by the Postal Service). As the following figure illustrates, the computational methodology starts with identification of the USO restriction that is removed. It then pursues two tracks, one focusing on the Postal Service response and one focusing on the demand-side response.

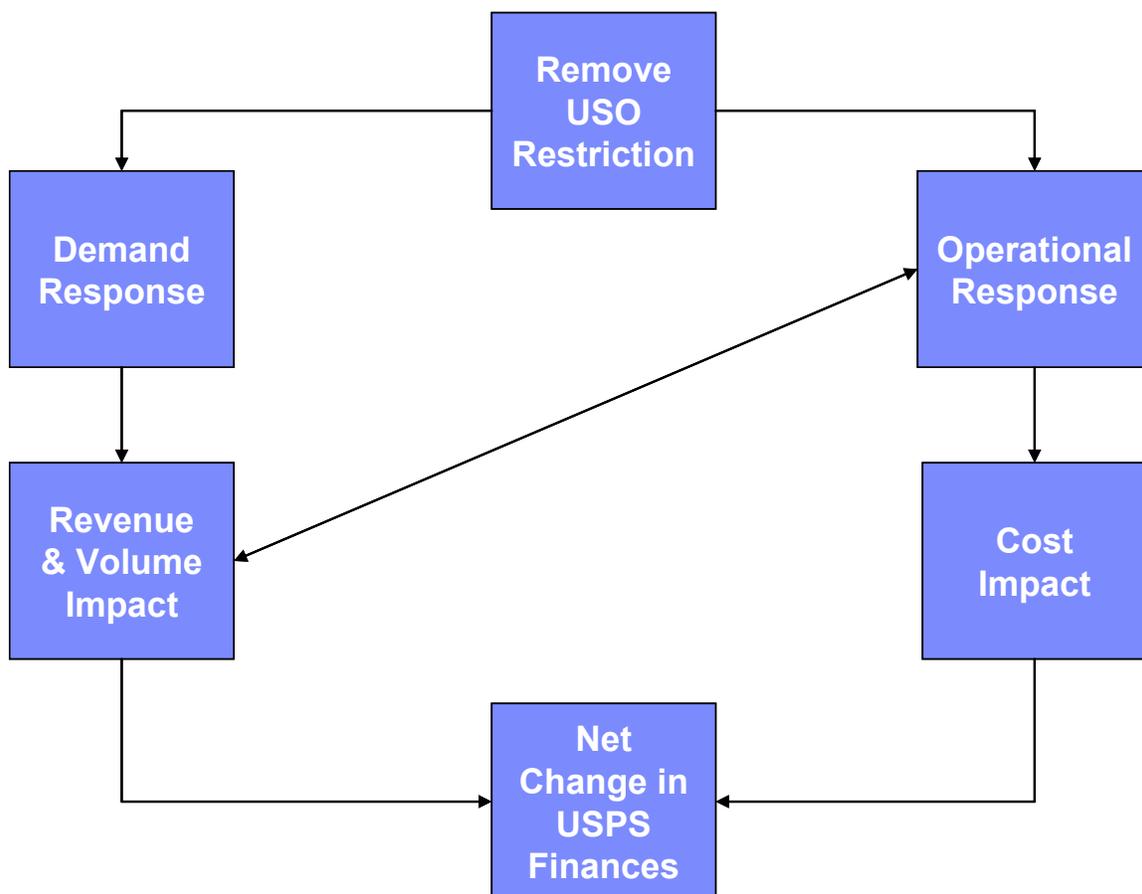
On the cost side, the process stops with identification of the Postal Service's operational response to removal of the restriction. This response will depend upon the restriction that is removed and may include changes in operations, changes in product offerings, or changes in the structure of prices. Once the operational changes are identified, then they must be translated into cost responses. This requires highlighting where the operational changes impact the Postal Service's product costs and where they occur geographically. The cost side of the model can then be used to calculate the resulting change in Postal Service costs.

At the same time, changes in a USO restriction may result in a reaction by the Postal Service's customers and/or competitors. These responses would occur on the demand side and would affect the Postal Service's volumes and revenue. Demand changes can arise from both market liberalization and from removing USO restrictions. For example,

under liberalization, new competitors can enter the market and divert existing Postal Service volume and revenue.

Finally, the computational algorithm should allow for interaction between these two channels of response. It is quite likely that in some scenarios changes in postal operations could have an impact on consumer demand and competitive offerings. If delivery USO restrictions are lifted, the Postal Service could change aspects of delivery such as frequency or ubiquity, causing customers to change mailing behaviors. In addition, changes in volume and revenue may have a subsequent impact on operations and cost. The computational algorithm thus allows for interaction between the two channels.

To complete the calculation, the two tracks are brought together. The final calculation combines any changes in revenue with any changes in costs to calculate the net change in the Postal Service's financial position. This net change is the profitability measure of the costs of the USO.



## 2.2.2 Characteristics of a Useful Quantitative Tool

Implementation of the computational algorithm requires building a quantitative tool that calculates the impact on volumes, revenues and costs of changes in the monopoly and the universal service obligation. The construction of that tool is the embodiment of the computational algorithm in exact mathematical structures and appropriate construction is critical to producing useful results. It is useful, therefore, to start by identifying the key characteristics of a quantitative tool that should be embodied in its structure. For the USO tool, there are three key characteristics.

### Flexibility

The first characteristic of a useful quantitative tool is that it is flexible. Flexibility is important for two reasons. First, flexibility is required because the USO is a complex, multi-faceted set of restrictions on Postal Service operations and offerings and because its costs depend on the economic and regulatory environment in which the Postal Service operates. This means that there is not a single cost to the USO and a tool that purports to calculate “the” cost is overly simple and potentially misleading. Flexibility allows investigation and quantification of these different aspects of the USO and the monopoly.

Second, the analysis of USO costs is “forward-looking.” In other words, calculating the costs of the USO requires estimating how the Postal Service, its customers and its competitors would react in a different economic environment than exists today. Calculation of USO costs thus includes an element of prediction or forecast. Because there is uncertainty about the future environment and responses of entrants, customers and the Postal Service, there can be range of outcomes. It is important that a quantitative tool be sufficiently flexible to accommodate that range. In addition, policymakers and interested parties have varying opinions about the likelihood of various liberalization scenarios or which aspects of the USO should be lifted. A flexible approach assists policymakers by providing the ability to quantify various aspects of the USO. Most discussions of the USO focus not on the simple question of whether it should exist, but rather on how it should be formulated. Quantification of the various aspects of the USO helps in the investigation of that formulation.

### Disaggregation

The second characteristic of a useful quantitative tool is that it is disaggregated. Specifically, the tool should take a detailed “bottom-up” approach to calculating the costs of the USO. While national estimates are important, it is very useful to have a deeper level understanding of the issues. This deeper understanding can be provided, in part, by a disaggregated analysis. Analysis at a more micro level can help explain how, where, and why USO costs arise as well as quantifying their overall amount. Rather than taking a broad national approach, a disaggregated methodology focuses on the impact of the USO at a local level. This permits the calculation to take into account the diverse landscape over which the Postal Service operates and accounts for the fact that the consequences of a national USO restriction occur at the local level. For example, in a liberalized environment, the bottom-up methodology explicitly models entry at a 3-digit ZIP Code level and thus provides an understanding of not only total

entry but also where and how entry occurs. It also permits a detailed calculation of the USO to ensure that the costs are computed only for those local areas in which a USO cost actually arises.

## **Capturing the Relationship between Monopoly and USO**

The monopoly and the universal service obligation are intricately linked. It is not by chance that the PAEA specifies simultaneous study of the two. The USO is one of the main justifications for the monopoly and costs of the USO depend upon the structure of the monopoly. As a result, a quantitative tool should have the ability to capture the relationship between the monopoly and the USO. For example, it should be capable of calculating costs of the USO in both the current environment and in a liberalized environment. This is critical because it is a fundamental mistake to calculate the costs of the USO only under the current regulated environment. There are material USO costs which arise only in a liberalized environment. In other words, the costs of a USO without a monopoly may be substantially above the costs of a USO with a monopoly. This important fact should be considered by policymakers. It is a mistake to consider just the costs of the USO in a regulated environment when contemplating how it should be funded in a liberalized environment.

The following section describes the methodology and inputs used to define various liberalized environments for the purposes of estimating the costs of the USO.

### **2.3 Defining a Liberalized Environment**

As previously discussed, the costs of the USO will depend upon the regulatory environment in which the Postal Service is operating. For example, in a regulatory environment in which the market has been fully liberalized and there is no longer a postal monopoly of any sort, entrants would be free to cream skim and capture the profitable volumes, leaving the Postal Service primarily with the unprofitable ones. If so, earned revenue will fall on many carrier routes (as volume goes to competitors) despite the requirement that the carrier regularly visit each stop. This could cause USO costs to rise. Thus, the extent, nature, and degree of liberalization must be considered and defined in the model. This section describes the aspects of liberalization considered and the liberalization inputs and parameters developed for use in quantifying the USO under various liberalization scenarios.

The monopoly has two parts: the Private Express Statutes (PES) and what is known as the mailbox monopoly. The PES covers the definition of the types of mail that are covered by the monopoly and the restrictions on competition, and the mailbox monopoly means that only items bearing postage may be placed in a mailbox. Both are important because they each impact how entrants would behave and what the level of volume diversion would be. The table below summarizes each of these parts along with the various aspects of each which could change in a future liberalized environment.

### Potential Aspects of the Monopoly for Relaxation

Monopoly	Aspect	Potential Types of Relaxation
PES	Mail Characteristics Protected	<ul style="list-style-type: none"> <li>• Reduction in mailpiece weight protected by PES</li> <li>• Exclusion of all advertising content from protection</li> <li>• Lowering the price competitors must charge relative to FCM</li> <li>• Removing monopoly protection from certain shapes (i.e., flats)</li> <li>• Removing monopoly protection from presorted mail</li> </ul>
Mailbox	Mailbox Monopoly	<ul style="list-style-type: none"> <li>• Licensing access to selected operators</li> <li>• Licensing to all entrants</li> </ul>

Although it is not possible to predict exactly how liberalization will occur, the modeling exercise requires some assumptions about the nature of liberalization in order to define the types and degree of entry. The following sections describe two inputs used to define various liberalization environments under which costs of the USO would be calculated.

#### 2.3.1 Summary of European Liberalization Path

In order to develop a realistic set of scenarios, the example of liberalization in Europe was reviewed. Understanding the nature of liberalization in Europe is helpful since many of the policy makers and regulators in the United States may be influenced by how the market was liberalized there. The table below summarizes the stages of liberalization across Europe. While individual countries have varying degrees of liberalization, with countries such as Sweden having removed all monopoly protection, the table below summarizes the official EU requirements:

#### Summary of EU Liberalization Requirements

Monopoly Areas	2003	2006	2011 (Planned)
Weight Limit	Mail under 100g (3.5 ozs) remains protected	Mail under 50g (1.8 ozs) remains protected	No protection
Price Limit	Competitive product must be priced at 3 times the equivalent of the FCM rate	Competitive product must be priced at 2.5 times the equivalent of the FCM rate	No protection

However, there are many competitive and geographic factors characteristic to the United States that may require a different liberalization path. Therefore, a Delphi survey of experts with in-depth knowledge of the United States postal market was conducted to provide additional inputs into potential paths of liberalization in the United States. This Delphi survey and methodology is described below.

### **2.3.2 Overview of the Delphi Method**

The Delphi method has been used for many studies focused on developing forecasts or future predictions for complex problems, including technology forecasting, assessing policy impacts, and developing economic models. The Delphi method is particularly useful when the contemplated future is complex and potentially different from the present and thus little or no empirical data exist to inform the analysis. A study of the accuracy of Delphi showed that in at least one application the Delphi forecasts were more accurate than subjective forecasts or quantitative forecasts.<sup>10</sup>

The Delphi method has also been used as part of a number of studies in the postal economics field, including several recent market entry and competition studies of the European postal market such as the 2005 ECorys study “Development of Competition in the European Postal Sector.” The 2006 PricewaterhouseCoopers study “The Impact on Universal Service of the Full Market Accomplishment of the Postal Internal Market in 2009” also used a stakeholder questionnaire as part of the overall approach.

The Delphi Method is characterized as a method for structuring a group communication process so that the process is effective in allowing a group of individuals, as a whole, to deal with a complex problem. The process is straightforward: a questionnaire is sent to the desired respondent group. After the questionnaire is returned, the analysis team summarizes the results and sends a revised questionnaire with the group response to the respondent group. The respondent group is usually given at least one opportunity to reevaluate its original answers based upon examination of the group response.

### **2.3.3 Delphi Methodology Used in This Study**

#### **Objective**

The key objectives were to narrow the broad set of potential monopoly changes into a finite set of liberalization scenarios by identifying the degree to which there is consensus around the types of liberalization likely to occur in the United States. In addition, the Delphi Survey was used to assess the degree of consensus around the impacts of potential liberalization in order to provide some boundaries and starting ranges for volume diversion for the quantitative model.

#### **Survey Overview**

The survey used a combination of quantitative and qualitative questions around the following topics:

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<sup>10</sup> “Incorporating Judgments in Sales Forecasts: Application of the Delphi Method at American Hoist and Derrick.” S. Basu and R.G. Schroeder. *Interfaces*. Vol. 7. No. 3. 1977.

- How liberalization might occur in the United States
- Who are the likely entrants and how they would most likely enter the market
- From what segments (customer/product) and to what degree volume diversion would occur
- How the market and the Postal Service would respond to entry (price, products, service)

In order to solicit input on several topics related to different liberalization conditions, two scenarios similar to the European liberalization of phased in reductions to the monopoly at various weight breaks and to planned full liberalization of the market were included in the survey:

- Delphi Liberalization Scenario 1: Elimination of the PES on all Standard Mail and on First-Class Mail weighing 2 ounces or more
- Delphi Liberalization Scenario 2: Elimination of the PES on all Standard and First-Class Mail

Each of the above scenarios also included a variation on whether the mailbox monopoly was also relaxed.

### ***Respondents***

The original survey was sent to over forty experts across the postal industry, and twenty responses were received. The final participants were representative of various segments, including current and former USPS executives, Wall Street industry analysts, industry consultants, large mailers, and regulatory experts, with approximately equal representation from both non-USPS and USPS participants.

## **2.3.4 Key Findings**

### ***Nature of Liberalization***

Participants in the Delphi survey were asked to envision how they thought liberalization might occur. Most participants believed that liberalization would occur in a similar manner as European liberalization, with classes such as Standard Mail being liberalized first, accompanied or followed by heavier First-Class Mail being liberalized in incremental stages.

Additional liberalization scenarios mentioned by participants included:

- Liberalization of presorted mail before single-piece mail
- Downstream access such as drop-shipping for other mail classes
- Removal of the mailbox monopoly only

### Potential Entrants and Likelihood of Entry

With a very well-developed and large mailing industry providing services in almost every aspect of mailing except last-mile delivery, it is not surprising that almost every type of potential entrant was thought to be at least somewhat likely to enter the market. The most likely to enter were viewed as those who had a strong local delivery presence, whether that was local delivery companies (new or existing) or combinations of companies with upstream assets and those with delivery assets such as 1) presort bureaus/printers with local delivery companies and 2) presort bureaus/printers with integrators such as FedEx, UPS, etc. Respondents also thought consortia of mailers with local delivery companies were likely to enter. Others included newspaper companies. Least likely were printers and direct marketing companies who have limited involvement in actual mail preparation such as presorting. The table below summarizes the average of the ratings assigned to the potential entrants.<sup>11</sup>

Type of Entrants	Likelihood of Entry Rating	Probability of Entry
Combinations/ consortiums:	1.4	72%
Local Delivery Companies	1.6	69%
Integrators (UPS, FedEx, DHL)	1.8	64%
Consolidators	2.0	59%
Presort Bureaus	2.1	58%
Other National Postal Operators (i.e., Canada Post, Deutsche Post)	2.4	54%
Printers	2.9	43%
Direct Marketing Companies	2.9	42%
Others:	1.2	76%
Local Newspaper Companies		

### Nature of Entry

Participants also provided significant input into the types of business models that these entrants might pursue, either product-specific and/or geographic. Participants also mentioned particular segments of senders and recipients that might be targeted, such as Business-to-Business (B-to-B) or Business-to-Consumer (B-to-C). While participants described various entry scenarios, the overwhelming consensus was that entry would occur locally, regardless of whether entrants were national or local. The following table presents the most commonly suggested potential entry scenarios for the entrants considered most likely to enter.

<sup>11</sup> The responses were assigned numerical values and percentages with 1 = Very Likely to Enter and 80% Likelihood of Entry; 2 = Somewhat Likely to Enter and 60% Likelihood of Entry; 3 = Somewhat Unlikely to Enter and 40% Likelihood of Entry; and 4 = Very Unlikely to Enter and 20% Likelihood of Entry.

Entrant	Entry Scenario	Type of Mail Impacted
Integrator	Urban and suburban high density areas. Many thought integrators would start local and expand nationally as time progressed, though some thought national right away.	Most anticipated to be impacted would be all B-to-B mail and heavyweight B-to-C FCM.
Combination 1: Presort Bureau/Printer with Integrators	In this scenario, presort bureaus and printers essentially contract with integrators like FedEx and UPS for delivery. This would likely also impact urban and suburban high density areas first.	Likely to include all mail that is presorted and/or outsourced for printing which would include all First-Class Presort and possibly Standard Presort subclasses depending on the economies of density available.
Combination 2: Presort Bureau/Printer with Local Delivery Company	Similar to previous scenario, but these providers contract with local (lower-cost) delivery companies for non-time sensitive bulk mail delivery, which could be only a few days a week.	Standard Presort, mainly Standard that was saturation and/or drop-ship.
Local Delivery Company	Focused mostly on unaddressed mail and advertisements to local and high density urban areas.	Standard Presort, mainly saturation and drop-ship today; a few believe local FCM could also be at risk

### **Level of Volume Diversion under Partial Liberalization**

The averages of the respondents' estimates of diversion of volume for the scenario under which the United States market is partially liberalized, with Standard Mail fully liberalized and First-Class Mail over 2 ounces open to competition, are presented below.

#### *Results with Full Relaxation of Mailbox Monopoly*

Mail/Segment	B-to-B	B-to-C	C-to-B	C-to-C
FCM Letters	6%	6%	4%	2%
FCM Flats	7%	5%	3%	2%
Standard Letters	11%	13%		
Standard Flats	16%	19%		

#### *Results with No Change in Mailbox Monopoly*

Mail/Segment	B-to-B	B-to-C	C-to-B	C-to-C
FCM Letters	5%	4%	4%	3%
FCM Flats	5%	4%	2%	2%
Standard Letters	4%	4%		
Standard Flats	7%	8%		

Although the majority of responses were for less than 10 percent diversion, there were several respondents in the 20-50 percent range for Standard Mail in this scenario.

### **Level of Volume Diversion under Full Liberalization**

The averages of the respondents' estimates of diversion of volume for the scenario under which the United States market is fully liberalized and all mail, including First-Class Mail, is open to competition, are presented below.

*Results with Full Relaxation of Mailbox Monopoly*

Mail/Segment	B-to-B	B-to-C	C-to-B	C-to-C
FCM Letters	19%	15%	8%	3%
FCM Flats	18%	12%	4%	3%
Standard Letters	12%	15%		
Standard Flats	14%	17%		

*Results with No Change in Mailbox Monopoly*

Mail/Segment	B-to-B	B-to-C	C-to-B	C-to-C
FCM Letters	12%	6%	6%	2%
FCM Flats	12%	6%	3%	2%
Standard Letters	7%	6%		
Standard Flats	8%	7%		

Although the majority of responses were for less than 20 percent, there were several respondents in the 20-40 percent range for the B-to-B and B-to-C categories, and a few in the 50-75 percent range for B-to-B mail.

**Additional Findings of Interest**

- *USPS vs Non-USPS Respondent Differences:* USPS respondents rated the likelihood of entry for all types of potential entrants higher than non-USPS respondents did. However, non-USPS respondents predicted higher levels of volume diversion once entry occurred.
- *Price Impacts:* Respondents felt that price impacts would diverge, with the price of mail in high-density areas dropping on average 10 percent and the price of mail in low-density areas increasing from between 5-20 percent.
- *Other Impacts of Liberalization:* In addition to pricing changes, several respondents believed that liberalization would create product innovation at USPS. Others believed that service might deteriorate if USPS was forced to compete on cost.
- *Important Attributes to Maintain under Liberalization:* Respondents were asked to rank the attributes of mail that were the most important to preserve under liberalization. Service quality and affordable pricing for businesses ranked as most important. Uniform pricing ranked as the least important.

**2.3.5 How the Results Are Used**

The results of the Delphi survey provided valuable insights to allow the model to be constructed in a sufficiently flexible manner to accommodate and prioritize a variety of liberalization and entry scenarios. The survey also provided starting ranges for volume diversion in scenarios in which the costs of the USO are calculated in a liberalized environment. For example, the consensus was that Standard Mail would be the first area that would be liberalized. Thus, one of the key scenarios in which the costs of the USO are calculated is one in which Standard Mail is liberalized. The results of the analysis of this scenario are presented in Section 6.

## 3. The Quantitative Tool

### 3.1 General Approach to Model Construction

The construction of the quantitative model is central to the effort of measuring the costs of the universal service obligation. The actual model is a mathematical structure, but an understanding of its workings can be gained from examining its structure and components.

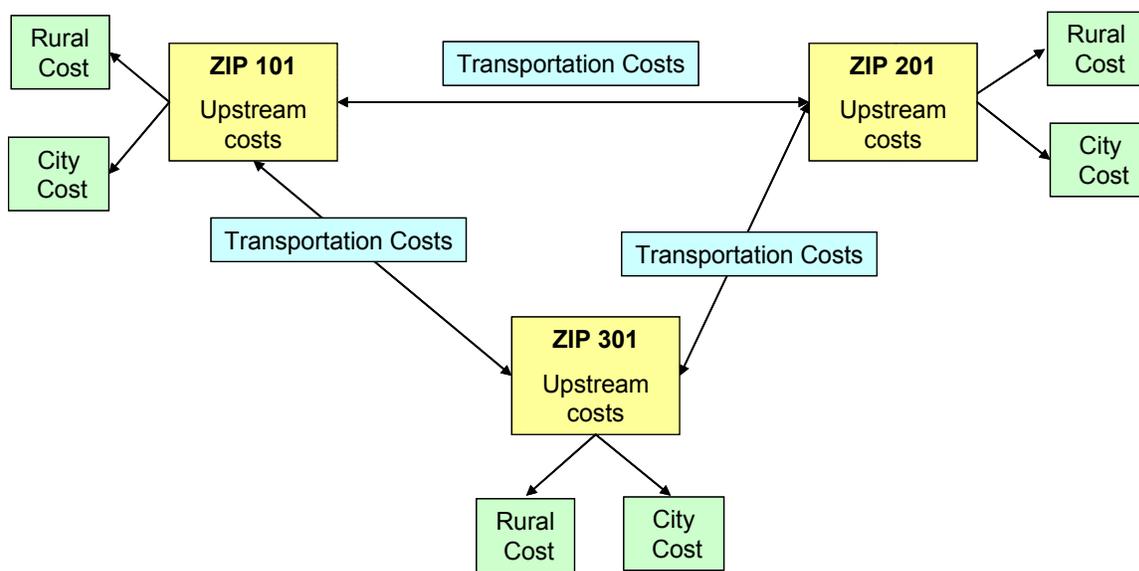
The quantitative tool is a set of financial models for the Postal Service and entrants that focus on measuring the costs of the USO and the monopoly while taking into account customer reactions to changes in product offerings. It is constructed to calculate the costs of the USO using the profitability approach and it employs Postal Regulatory Commission costing methods and parameters. All costs for the Postal Service are modeled but the focus of the model is on delivery costs because that is the primary area of interest for both the monopoly and the USO. Costs are broken into three main areas, delivery costs, transportation costs and “upstream” costs.

The financial models for the Postal Service and the entrant include both the revenues and costs and attempt to capture the interactions among these two sets of providers and their customers. Those interactions are governed, in part, by the regulatory structure and the modeled interactions thus change and the regulatory structure is revised. For example, changes in the regulations governing access to the mailbox will stimulate reactions among both customers and competitors that will affect both the Postal Service’s operations and its financial position.

#### 3.1.1 The Bottom-Up 3-Digit ZIP Code Approach

The model has been structured at a sufficiently detailed level to assist the user in understanding “why” and “where” the USO costs arise as well as “how much.” This was achieved by modeling costs, revenues, and economic interactions at the 3-digit ZIP Code level. In essence, there are 910 simultaneous cost, revenue, and volume calculations, one for each of the 910 3-digit ZIP Codes in the country.

To gain a sense of the model, suppose there were only three 3-digit ZIP Codes in the country. If so, the cost structure of model structure would be given by the following figure:



In this figure, the black arrows represent the flow of volume and revenue among the 3-digit ZIP Codes. The model thus accounts for where the mail originates (e.g., 3-digit ZIP Code 101) as well as where it is destined (e.g., 3-digit ZIP Code 301). While it is not shown in the figure, the model does allow for mail which has its origin and destination in the same 3-digit ZIP Code. As shown in the figure, the model relies upon PRC-approved costing models for measuring the upstream (mail processing, retail and administrative costs) costs as well as the transportation and delivery costs. Also, the model explicitly allows for both city carrier and rural carrier delivery within the same 3-digit ZIP Code.

Although constructing a disaggregated model is an ambitious task, it provides several advantages. First, it permits calculation of not only national USO costs but identification of where those costs arise. This further permits identification of the groups of consumers who are currently benefiting from the USO and those who would be made worse off from its elimination. Another advantage of a disaggregated model is that it permits a detailed analysis of the entry that would occur under relaxation of the private express statutes and the mailbox monopoly. Because the model allows entry to occur on a 3-digit ZIP Code by 3-digit ZIP Code basis, it mirrors the likely reality that entry will occur in some 3-digit ZIP Codes across the country but not others. A disaggregated model also permits investigation of important economic issues like cream-skimming of low-cost regions.

### 3.1.2 Model Flexibility

As discussed above, the calculation of the costs of the USO are difficult and depend upon the chosen definition of the USO and the regulatory and economic environment in which the USO is imposed. A tool that attempts to quantify these costs should be sufficiently flexible to allow for a range of alternative analysis. Thus, the quantitative tool allows the user to adjust multiple parameters at once so as to create a tailored scenario.

In addition, multiple tailored scenarios can be created by the user to also determine USO cost sensitivities around different parameters such as the level of volume diversion or the number of delivery days.

To get a sense of the role of model flexibility, consider one of the critical conditions in the model, the determination of entry by new competitors. Both valuations of the postal monopoly and estimation of the costs of USO depend upon the amount of competitive pressure faced by the Postal Service under liberalization. This pressure is measured by the ability of competitors to enter the Postal Services market and capture volume currently handled by the Postal Service. Because of the bottom-up structure of the model, the determination of entry can be done in a detailed manner. Rather than simply specifying a national entry percentage, the model determines that national percentage by evaluating the cost and revenues for each 3-digit ZIP Code and then determining where successful entry could take place. Part of this determination depends upon the expected costs incurred and revenues earned by entrants. Because such competition does not currently exist, these costs and revenues must be estimated. (This is a good example of the “forward looking” nature of monopoly valuation and USO cost estimation.) But such estimation is difficult as little is currently known about future entrants. This, then, is a place where model flexibility is valuable as it allows evaluation of the costs of the USO under a range of estimates for entrant costs and revenues.

Model flexibility is provided by allowing the user to determine the values for a key set of parameters, which are termed “levers.” These levers describe the characteristics of consumers and entrants and embody the nature of the economic and regulatory environment in which the Postal Service will operate. An excellent example of the use of the levers is provided by the entry condition. In the quantitative tool, entry is required to be fair and sustainable. This means that in any 3-digit ZIP Code, the entrant’s revenues must be at least sufficient to cover its costs. Entry is not sustainable if the entrant earns insufficient revenue to cover its costs. Mathematically, this condition is given by:

$$\text{Entrant Revenue} \geq \text{Entrant Attributable Cost} + \text{Entrant Network Cost}$$

Because none of these magnitudes are known, they must be estimated and the models levers allow flexibility in this estimation. Entrant revenue has two parts, the prices the entrant receives and the volume it diverts from the Postal Service. Both of these parts can be specified by the user. The price the entrant receives for a product can be determined as a percentage of the Postal Service price for the comparable product. For example, many analysts believe an entrant will have to provide a discount to attract customers away from the Postal Service. The quantitative tool allows the user to specify the size of this discount. Alternatively, if the entrant is providing a premium service, the quantitative tool allows the user to specify the size of the premium. In addition, the

quantitative tool allows the user to specify the amount of volume that the entrant will receive at the specified discount or premium. With the determination of these parameters, the model calculates the amount of revenue the entrant will earn.

Similar flexibility exists on the cost side of the equation. For example, an entrant's attributable cost has two components, the physical productivity of delivery (in time) and the wages paid to entrant workers. Both of these parameters can be set by the user. The entrant's physical productivity can be set to be greater than, less than, or equal to the Postal Service's physical productivity, depending upon the belief of the user. In addition, it is generally accepted that the Postal Service pays a wage premium to its workers. The quantitative tool allows the user to specify the degree to which, on average, entrant wages would be below Postal Service wages. However, wages vary by cost of living across the country, so the entrant's average wage discount is adjusted by local cost of living indexes to account for difference in wages in high and low-cost areas.

The following subsections provide further detail on each of the calculation modules of the quantitative tool.

## **3.2 Model Structure**

The model discussed below exists within the MS Excel application and comprises several modules. These modules are combined in order to calculate the USPS financial position for a range of relevant scenarios. The modules also project regions where a competitor could enter the postal market and compete successfully against the Postal Service. This is done on a 3-digit ZIP Code basis. Each of the individual modules is described below.

### **3.2.1 Volume Module**

The primary module is the volume module. This module contains the 3-digit ZIP Code specific values for national destinating volumes by product and shape. The volume database excludes Express Mail, international mail and special services.

To prepare the volumes for analysis, a number of subdivisions are made. First, for the relevant products, each 3-digit ZIP Code's volume is split into its drop-shipped and non drop-shipped components. Then, total destinating volume for each product and shape is split into one of three subdivisions: city carrier delivery, rural carrier delivery and no delivery. This latter category includes mail picked up by the customer such as in Post Office boxes or firm holdouts. This division is based upon 3-digit ZIP Code specific proportions drawn from separate city carrier, rural carrier and Post Office box data sets.

### **3.2.2 Delivery Cost Module**

The delivery costs for city carrier and rural carrier areas are incurred by the Postal Service in different ways. The delivery cost module thus includes two different sets of cost calculations, one for city carrier delivery and one for rural carrier delivery. These calculations are described below. However, before calculating delivery costs, upstream costs are applied to the volumes. This is done by product and shape and includes all

cost segments in the Postal Service's product cost model that are involved in delivery or transportation.

### ***City Delivery Costs***

City delivery costs are made up of both in-office and street costs. Both in-office and street costs have an attributable cost portion and a network (institutional) cost portion. The delivery cost module calculates the attributable and network costs for city carrier delivery in each 3-digit ZIP Code. These calculations are based upon the Postal Regulatory Commission-approved methodology for calculating attributable delivery costs. Within each 3-digit ZIP Code, network costs are the difference between recorded total delivery costs and attributable delivery costs.

### ***Rural Delivery Costs***

Total rural delivery costs are also made up of attributable and network cost proportions. The attributable cost portion is based upon the certain "evaluation factors," which determine the rates at which rural carriers get paid for handling mail volume. The calculation of attributable rural delivery costs in each 3-digit ZIP Code follows approved Postal Regulatory Commission methodology.

## **3.2.3 Entrant Module**

The entrant module calculates potential revenue and potential costs for each entrant in a 3-digit ZIP Code, and as described in Section 3.1.2 above, compares them in the entry condition to determine if the entrant can successfully enter a given 3-digit ZIP Code.

### ***Entrant Revenue***

Entrant revenue is calculated at a 3-digit ZIP Code level as the product of entrant price and potential entrant volume. The entrant's price is defined by the user as a percentage of the Postal Service price. Potential entrant volume is the estimated amount of volume that would be diverted from the Postal Service to the entrant at the entrant's price.

### ***Entrant Costs***

The entrant has two types of costs, attributable costs and network costs, both of which are expressed relative to the Postal Service's costs. The entrant's attributable costs are defined as the product of the entrant's cost per piece and its potential volume. The costs per piece are calculated based upon estimates of the entrant's physical productivity and its wages paid. Entrant network costs are calculated, on a 3-digit ZIP Code basis, as a percentage of the Postal Service's network cost.

## **3.2.4 USPS Financial Module**

The last module combines the calculated costs with the relevant revenues to calculate the Postal Service financial position. For each scenario, this calculation is done both for the baseline, before a change in the monopoly or USO occurs, and for a counterfactual in which the change does take place. For example, if entry occurs in the scenario, the post-entry revenues, volumes and costs are calculated for the Postal Service. These are used to then calculate the post-entry financial position for the Postal Service.

In addition, if the scenario specifies a competitive reaction by the Postal Service to the entry, then another subsequent set of calculations is performed.

### **3.3 Calibration and Data Sources**

#### **3.3.1 Analysis of 3-Digit ZIP Codes**

The quantitative model uses official USPS data from the city and rural carrier cost systems, the transportation system, the volume measurement system, and the product cost system applied to the 3-digit ZIP Code level. Additional data for each 3-digit ZIP Code was incorporated that includes geographic and delivery characteristics such as population, land square miles, residential and business delivery points.

The data for each of the 910 3-digit ZIP Codes were individually reviewed for reasonableness and consistency. This investigation revealed that a small subset of the 3-digit ZIP Codes contains what are known as “unique” 3-digit ZIP Codes. This means that there is only one delivery point for the entire 3-digit ZIP Code. Because of their unusual nature, these 3-digit ZIP Codes were not included in the analysis of the costs of the USO.

In addition, the analysis revealed another small subset of 3-digit ZIP Codes for which there appeared to be an inconsistency among the delivery cost data, the delivered volume and the national destinating volume. Pending further analysis, this subset of 3-digit ZIP Codes was also held out of the USO cost calculations. The USO cost calculations in this report thus include 772 of the 910 3-digit ZIP Codes. The included 3-digit ZIP Codes cover more than 90 percent of the national volumes for the products included in the analysis.

#### **3.3.2 Calibration of the Model**

The model has been calibrated such that the financial baseline data it calculates reflect the conditions in the relevant published financial reports of the Postal Service.

- Total delivered volumes are compared and calibrated to match the FY2007 Revenue, Pieces and Weight report.
- Marginal city delivery times have been adjusted so that total delivery cost for city carriers matches the cost reported in Cost Segments 6 and 7 of the FY2007 Cost and Revenue Analysis report.
- Marginal rural delivery times have been adjusted so that total delivery costs for rural carriers matches the cost reported in Cost Segment 10 of the FY2007 Cost and Revenue Analysis report.
- Upstream costs are calibrated against total non-delivery costs in the FY2007 Cost and Revenue Analysis report.

#### **3.3.3 Description of Data Elements and their Sources**

The following is a list of the key data elements and their sources.

## **Volume Sources**

**National Originating and Destinating Volume By 3-Digit ZIP Code** – This data set was developed by the Postal Service for its network analysis efforts. It includes estimated volume flows among the 910 3-digit ZIP Codes. The data includes volumes by shape for First-Class Mail, Standard Regular, Standard Enhanced Carrier-Route (ECR), Periodicals, Priority Mail and Package Services. It excludes Express Mail and international mail. The individual 3-digit flows are based upon 3-year averages of recorded volume flows from the Origin-Destination Information System (ODIS). These flows are augmented with information from other sources for those products not included in ODIS, and also include drop-shipped volumes. The individual flows are reconciled to the RPW totals for FY2007.

**National Rural Mail Count** – This data set is the FY2006 Rural Mail Count (RMC) and is used to measure workload and pay for rural carriers. It includes data on the delivered volumes by rural category and the hours paid to all rural carriers across the country. It is used to calculate rural carrier volumes delivered and rural delivery cost by 3-digit ZIP Code.

**Delivery Operations Information System (DOIS)** – This data set is an extract from the Postal Service's Delivery Operations Information System which tracks volumes delivered by shape and hours for city carriers across the country. It is used to calculate city carrier volumes delivered and city delivery cost by 3-digit ZIP Code.

**PO Box Volumes** – This data set contains PO Box volume data by shape. These volumes serve as the basis for staffing and workhour credits for box section mail processing clerks. For FY2007, letters and flats volume were included but data on parcels was not yet collected. Parcels were added to the data set in FY2008. Thus, for parcels, Jan-June FY2008 volumes were used and adjusted for full year volumes. PO Box volume by 3-digit ZIP Code is derived from this data set.

**Carrier Cost System** – This data set contains volume data by product and shape for both rural and city carriers for FY2007. The data were used to evaluate the other delivered volume data sources and to provide a mapping between the rural mail count categories and national destinating products.

**Standard Mail Billing Determinants** – This data set contains the billing determinants for Standard Mail for FY2007. It is used to develop a break-out for Standard Mail by degree of destination entry.

## **Cost Sources**

**CRA Cost Segments and Components** – This data set is the set of parameters from the FY2007 Segment and Components report which supports the official Cost and Revenue Analysis (CRA) report. It contains attributable costs by product for 20 different Cost Segments and embodies the costing methodology approved by the PRC. It provides the inputs used to calculate the upstream costs and provides a basis for calibrating the model.

**Cost Segments 6 and 7 Workpapers** – This data set is the set of parameters from the FY2007 CRA Cost Segments 6 and 7 electronic workpapers. These workpapers contain detailed cost information relating to city carrier operations and the parameters used in calibrating the city carrier cost model.

**Cost Segment 10 Workpapers** – This data set is the set of parameters from the FY2007 CRA Cost Segment 10 electronic workpapers. These workpapers contain detailed cost information relating to rural carrier operations and the parameters used in calibrating the rural carrier cost model.

### **Delivery Point Data**

**National Delivery Points** – This data set is an extract from the Postal Service’s Address Management System. It includes the number of delivery points (addresses) by type for both city and rural delivery. It includes both residential and business delivery points and is used to calculate total delivery points by 3-digit ZIP Code.

### **Other Data Sources**

**Entrant Wage Rate Factors** – Entrant wage rate factors are created using the Bureau of Labor Statistics, 2007 Annual Consumer Price Index - Urban Wage Earners and Clerical Workers (CPI-W). Twenty-seven individual city and metro areas are mapped to the 3-digit ZIP Codes. At each 3-digit ZIP Code, entrant wages scenarios are adjusted using the USPS national wage premium and the relative wages from the CPI-W.

## **3.4 Computational Methods**

### **3.4.1 Analytical Structure**

The costs of the USO are calculated through a series of computations making use of the modules described above, as necessary. These computations are governed by a series of equations. For example, the determination of delivery costs is done separately for rural and city carrier delivery, each with its own equation. The equation for city carrier delivery costs in the “*ith*” 3-digit ZIP Code is given by:

$$DC_i = ADC_i + NDC_i,$$

where ADC is attributable delivery cost and NDC is network delivery cost. Attributable delivery cost is calculated as the sum of the products of delivered volume, by shape, and their associated marginal costs. The attributable delivery cost for *ith* 3-digit ZIP Code is thus given by:

$$ADC_i = \omega a_1 V_{Li} + \omega a_2 V_{Fi} + \omega a_3 V_{Si} + \omega a_4 V_{Pi}.$$

Where  $V_L$  is the volume of letters delivered,  $V_F$  is the volume of flats delivered,  $V_S$  is the volume of sequenced mail delivered,  $V_P$  is the volume of parcels delivered. The “*a*” coefficients are the associated marginal times and  $\omega$  is the average city carrier wage. The time coefficients are currently embedded in the CRA delivery cost model.

Network delivery cost is caused by non-volume characteristics of delivery such as the number of delivery points, the square miles of the delivery area, or the types of delivery receptacles (box, NDCBU, park and loop):

$$NDC_i = b_1 DP_i + b_2 M_i^2 + b_3 \theta_i.$$

Fortunately, one does not have to estimate the “b” coefficients as one can directly calculate the network delivery costs. In other words, for each 3-digit ZIP Code, one first observes the total delivery costs  $DC_i$ . Then, using the above equation, one calculates  $ADC_i$ . The difference between these two measures is  $NDC_i$  which captures the 3-digit ZIP Code specific characteristics of delivery.

The final piece of the calculation is the mapping between national destinating volumes and city carrier delivered volumes by shape. Not all national destinating volumes are delivered by city carriers, so only that portion so delivered enters the city carrier delivery cost example. Separate datasets for city carrier delivered mail, rural carrier delivered mail and non-delivered (e.g. PO Box, firm holdout) mail, by 3-digit ZIP Code are used to determine the relevant proportions. With these proportions (the  $\delta$  coefficient in the following equation), city carrier delivery cost in a given 3-digit ZIP Code can be calculated as a function of national destinating volumes.

$$DC_i = \omega a_1 \sum_{j=1}^n \delta_{Lij} V_{Lji} + \omega a_2 \sum_{j=1}^n \delta_{Fij} V_{Fji} + \omega a_3 \sum_{j=1}^n \delta_{Sij} V_{Sji} + \omega a_4 \sum_{j=1}^n \delta_{Pij} V_{Pji} + NDC_i$$

Similar equations exist for the computation of transportation and upstream costs.

### 3.4.2. The Computational Algorithm

The quantitative tool is coded into a series of linked Excel workbooks with each workbook corresponding to a separate computational module. In all instances, the computations start with the national destinating volumes by 3-digit ZIP Code which are then decomposed into their city carrier delivered, rural carrier delivered and non-delivered volumes. The volumes are then combined with the equations for delivery, transportation and upstream costs to calculate the resulting Postal Service costs.

At this point the model is ready for scenario analysis. The next step is the specification of characteristics for the entrant. “Levers” such as entry relative productivity, wage, price discount and volume diversions are specified by the user. Also, the scenario to be analyzed is selected: relaxation of the mailbox monopoly, removal of Standard Mail from the Private Express Statutes and so forth.

Once the scenario is selected the quantitative tool then calculates the entrant’s costs and revenue by 3-digit ZIP Code. These are used to see if entry is sustainable. For each 3-digit ZIP Code in which entry is sustainable, the tool calculates the amount of volume diverted, by product, and the resulting financial impact on the Postal Service

and the entrant. Note the Postal Service revenues, costs and volumes are recalculated to take into account the post-entry conditions.

Finally, in the case of uniform-price USO scenarios, the quantitative tool identifies where it would be advantageous for the Postal Service to cut price to match the entrant's lower price and win back volume. (This could also be a preemptive strike if the Postal Service could predict where entry would occur.) This identification requires review of the profit made in each 3-digit ZIP Code with and without price matching. In those 3-digit ZIP Codes in which price matching increases profit relative to non-matching, the tool recalculates Postal Service volume, revenue and cost under the conditions of price matching.

### **3.5 Conclusions**

The USO quantitative model is a sophisticated financial model of the Postal Service that is sufficiently flexible and detailed to support investigation of a variety of USO questions. Issues such as estimating the net impact of reducing the number of delivery days or the impact on revenue of allowing competition in the delivery of Standard Mail and/or First-Class Mail can be assessed quantitatively with this tool. Examples of the use of the model to calculate the costs of the USO under various USO changes and regulatory environment conditions are presented in the next several sections of the report.

## 4. Quantifying the Mailbox Monopoly

### 4.1 Introduction

This analysis examines the impact on the Postal Service of removing the mailbox monopoly without a change in the Private Express Statutes (PES). The determination of what mail items continue to be restricted by the PES is ultimately a legal question, but a working definition of what is allowed to be delivered is required for this analysis. We thus assume that under a relaxation of the mailbox monopoly competitors are free to deliver items not restricted by the PES into the mailbox, including certain advertising matter, expedited letters and flats, publications, and parcels.

There are two impacts of removing the mailbox monopoly. First, the Postal Service may lose revenue and volume to competitors. Second, because of congestion in the mailbox caused by the inclusion of non-mail items, the Postal Service may face higher delivery and collection costs. The following analysis accounts for both impacts.

### 4.2 Analysis of Response to Relaxation of the Mailbox Monopoly

This section presents the responses to the relaxation of the mailbox monopoly by existing competitors, new entrants, and the Postal Service which were considered and analyzed in order to quantify the impacts of an elimination of the mailbox monopoly. Those key responses included are:

- Existing expeditors will be able to deliver to the mailbox.
- In some 3-digit ZIP Codes, entrants will choose to provide alternative products that will substitute for mail.
- Presence of non-mail items will reduce delivery and collection productivity and increase its cost.

#### 4.2.1 Existing Expeditors Will Deliver to the Mailbox

Opening the mailbox will enhance the ability of existing delivery companies to compete with the Postal Service. Because existing competitors (e.g., UPS or FedEx) will gain the ability to deliver to the mailbox, they may be able to offer a more competitive price on certain items for which they previously had to dismount from their vehicles. In addition, access to the mailbox may mean that some items that previously required a signature could now be left in the mailbox. These changes would primarily impact Priority Mail and/or Express Mail.

Other parcel products, including First-Class Mail, Parcel Post, and Media Mail, could also be impacted. Competitors might also offer a somewhat more attractive product due to the lower price and/or increased security associated with being able to put small parcels into the mailbox.

## **4.2.2 Entrants Will Offer Alternative Products in Some 3-Digit ZIP Codes**

Opening the mailbox provides an opportunity for new competition. The first type of competition to consider is the introduction of unaddressed advertising mail that would compete with the Postal Service's saturation Standard Mail. Another source of direct competition is that of delivery of advertising materials that are not currently protected by the PES, which include advertising materials over 24 pages and Periodicals such as newspapers and magazines. Additional potential competition could occur in the local delivery of correspondence and utility bills, although the scale required for addressing might be too high to overcome.

## **4.2.3 Presence of Non-Mail Items in Mailbox**

Additional costs will be incurred by the Postal Service due to the volume of non-mail items placed in mailboxes by new entrants and existing competitors. The degree of this effect depends upon the amount and nature of the non-mail material put into the box.

### ***4.2.3.1 Competitor Package and Flat Volumes***

Opening the mailbox means that some of the competitors' volume will now be deposited in the mailbox and there will be competitor package and flat volumes in mailboxes that carriers will have to contend with. This additional volume could cause congestion in the mailbox and could thus cause an increase in the amount of time the Postal Service carrier spends collecting and delivering mail.

This effect will occur even for mail products like First-Class Mail that do not directly face competition under relaxation of the mailbox monopoly. Examples of situations that may cause an increase in delivery cost are (1) if the carrier has to rearrange the competitors' volume in the mailbox to fit the Postal Service's volume alongside or (2) if the carrier has to make a trip to a front door to deliver the mail because the curbside mailbox is full. However, given the relatively low density of delivery for expedited and package items, without new entrants, this congestion effect is likely to be small.

### ***4.2.3.1 Entrant Volumes in New Entry 3-Digit ZIP Codes***

Relaxation of the mailbox monopoly will allow delivery of unaddressed advertising mail and Periodicals in all 3-digit ZIP Codes across the country. New entry in these products will be economical in only a subset of all 3-digit ZIP Codes. In those 3-digit ZIP Codes in which new entry takes place, entrants are delivering unaddressed advertising mail and Periodicals. This additional volume exacerbates the congestion cost problem and given the relatively high density of these products, the productivity reduction will be greater for those 3-digit ZIP Codes in which new entrants are successful.

For example, with unaddressed advertising mail in the box, it will be less evident whether the Postal Service's mail has been delivered - customers will see that there are items in their mailbox but won't be able to know if the mail has been delivered until they retrieve the items from the mailbox. This raises an important question: will customers make repeated trips to their mailbox to empty it after every delivery? If not, it will be less likely that any delivery will go into an empty mailbox. In addition, the existence of a

single newspaper in mailbox can significantly increase the time it takes to deliver mail as compared with delivery to an empty mailbox.

Finally, the collection of mail from customers' boxes may become very expensive as the carrier must retrieve items from within a mailbox, finger through those items, make a decision about whether each item was left for the Postal Service, and replace the items that were not left for the Postal Service.

### **4.3 Modeling the Relaxation of the Mailbox Monopoly**

The following sections provide details on how the effects of relaxing the mailbox monopoly were modeled.

#### **4.3.1 Quantifying the Effects of New Entrants**

The financial impact of relaxing the mailbox monopoly is estimated in the national 3-digit ZIP Code model that determines whether entry will occur on a 3-digit ZIP Code by 3-digit ZIP Code basis. This disaggregated approach is appropriate because entry will occur only where it can be profitable -- in the high-volume, low-cost areas.

##### ***Step 1: Estimate the entrant's cost structure***

The initial assumption in the model is that without congestion, new entrants' volume variable productivity matches that of the Postal Service. However, entrants will face potential congestion costs, just like the Postal Service. It is likely to be a smaller burden for entrants, however, because they are delivering smaller volumes.<sup>12</sup> To account for this congestion impact, a baseline reduction in the productivity of new entrants delivering unaddressed advertising mail and Periodicals of 5 percent is assumed.

##### ***Step 2: Set entrant's prices***

The entrant's price is set at 10 percent below USPS price.

##### ***Step 3: Calculate the diversion of eligible products at those prices***

The classes of mail and assumptions are presented below.

- **Diversion of Standard ECR:** Diversion of Standard ECR occurs due to the introduction of unaddressed advertising mail by entrants. *The benchmark level of diversion within an individual 3-digit ZIP Code is based upon the results of the Delphi survey. Baseline national diversion of Standard ECR is 4 percent.*
- **Diversion of Standard Regular Flats and Parcels:** Given the PES restriction on delivering advertising materials under 24 pages, we will assume that only flats and parcels in the Standard Regular category are eligible for diversion. *Baseline national diversion of Standard Regular flats and parcels is 4 percent.*

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<sup>12</sup> Our analysis of existing competitors delivering expedited flats and all parcels already accounts for any congestion costs existing competitors face in choosing to use the mailbox rather than delivery to the driveway or door.

- **Diversion of Periodicals:** Because Periodicals are not covered by the PES, diversion could occur as Periodical mailers form consortia or outsource delivery to low-cost local providers. *The baseline national diversion of Periodicals is 4 percent.*

The following potential impacts will not be included in the baseline analysis, although they could be added to the model in the future:

- **Diversion of Standard Mail to Other Media:** Due to the increase in unaddressed advertising mail, the overall value of Standard Mail as an advertising medium could decrease. If this occurs, it would cause a shift of advertising dollars to other media and a reduction in Standard Mail volumes. *Because of uncertainty about how large this impact will be, this diversion is not included in the baseline.*
- **Diversion of FCM to Other Options.** Opening the mailbox is likely to reduce the security of the mailbox. Once anyone can open and place things in a mailbox, anyone can take things out of the mailbox. Customers may lose their sense that the mail is secure. This reduces the perceived value of FCM, leading to a reduction in its use. *Because of uncertainty about how large this impact will be, this diversion is not included in the baseline.*
- **Diversion of Local FCM Utility Bills:** Regardless of whether or not the PES apply, the likelihood of a utility company overcoming the barriers to entry of delivering one piece to each household once a month is very small. Few utilities use traditional meter readers and the addressing requirements are significant.
- **Diversion of Local FCM Correspondence/Invitations:** The small amount of this mail is believed to be insufficient to materially impact the analysis.

**Step 4: Determine if entry will occur**

Entry will occur when the entrant can earn enough revenue from the diverted volumes to cover both its volume variable costs and network costs of delivery. This calculation is done for each 3-digit ZIP Code and the volumes used to determine whether entry occurs are the sum of the diverted Standard ECR, Standard Regular Flats, and Periodicals. The volumes associated with diverted Priority Mail and small parcels are not included in the new entrant's revenue base because this volume goes to existing competitors who will leverage their existing networks.

**Step 5: Calculate resulting USPS loss in volume, revenue, and attributable cost**

Once entry and diversion is determined, the diverted volume is removed from the Postal Service's model, and the resulting loss in revenue and change in attributable costs is calculated.

### 4.3.2 Quantifying the Effects of Mailbox Congestion

#### **Step 1: Identify it as either a “new entry” 3-digit ZIP Code or “non-entry” 3-digit ZIP Code**

Once it has been determined whether entry will occur, those 3-digit ZIP Codes with new entrants are designated as “new entry” 3-digit ZIP Codes, while those that do not have new entry are “non-entry” 3-digit ZIP Codes.

#### **Step 2: Adjust productivities for 3-digit ZIP Codes without new entrants**

The Postal Service already faces competition for expedited and parcel products, but opening the mailbox means that some of the competitors’ volume will now be deposited in the mailbox and there will be competitor package and flat volumes in mailboxes that carriers will have to contend with. However, given the relatively low density of delivery for expedited and package items, without new entrants, this congestion effect is likely to be small. To account for the impact of these congestion effects, the baseline reduction in delivery productivity in 3-digit ZIP Codes without new entry was set at 5 percent.

#### **Step 3: Adjust productivities for 3-digit ZIP Codes with new entrants**

In those 3-digit ZIP Codes in which new entry takes place, entrants are delivering unaddressed advertising mail and Periodicals. This additional volume exacerbates the congestion cost problem and given the relatively high density of these products, the productivity reduction will be greater for those 3-digit ZIP Codes in which new entrants are successful. To account for the impact of these congestion effects, delivery productivity in 3-digit ZIP Codes with new entry have a baseline reduction of 15 percent.

### 4.3.3 Quantifying the Effects of Diversion to Existing Expeditors

Opening the mailbox will enhance the ability of existing delivery companies to compete with the Postal Service. The type of existing mail that is potentially diverted is discussed below.

- **Diversion of Existing Priority Mail:** Because existing competitors (e.g., UPS or FedEx) will gain the ability to deliver to the mailbox, they may be able to offer a more competitive price on certain items for which they previously had to dismount from their vehicles. In addition, access to the mailbox may mean that some items that previously required a signature could now be left in the mailbox. These changes suggest a possible diversion of Express Mail and/or Priority Mail. Because of its relatively small volume, Express Mail is not explicitly included in the analysis and this effect is captured by a diversion of Priority Mail volume. *(Baseline diversion for Priority Mail is 5 percent.)*
- **Diversion of Non Parcel Select Small Parcels:** In other parcel products, including First-Class Mail, Parcel Post, and Media Mail, competitors might also offer a somewhat more attractive product due to the lower price and/or increased security associated with being able to put small parcels into the mailbox. To the extent this occurs, it will divert some of this volume from the Postal Service. *Baseline starting diversion will be 5 percent for the relevant USPS small parcel volume.*

#### 4.3.4 Example of Lever Settings

The model provides the user a great deal of flexibility in setting the initial parameters. Below are the baseline settings used in estimating the low-entry scenario results presented in section 4.4:

- Entrant delivery network costs are **25 percent** of USPS delivery network cost by 3-digit ZIP Code.
- Entrant wages are **21 percent** below USPS wages on average but vary by metropolitan area with cost of living.
- To attract volume, entrant price must be **10 percent** below USPS price.
- New entrant diversion in any given 3-digit ZIP Code is **35 percent** of baseline volume.
- Congestion effects are **5 percent** in non-entry 3-digit ZIP Codes and **15 percent** in new entry 3-digit ZIP Codes.

### 4.4 Results

The national 3-digit ZIP Code financial model is used to estimate the potential impact on USPS cost and revenue from the mailbox monopoly being lifted. After specification of the key parameters that characterize the reaction to relaxation of the mailbox monopoly, the model determines, on a 3-digit ZIP Code basis, where entry and cost changes will occur. The model then totals the changes in volume, revenue, volume variable cost, and profit.

#### 4.4.1 Overall Results

Initially, the results for the baseline scenario for the values presented above were computed. However, this baseline includes very conservative responses to relaxation of the mailbox rule and predicts only minimal entry by competitors. It is also important to get a sense of what happens when entry is more successful. Thus, an additional scenario was analyzed in which parameter values were changed to reflect a more successful reaction by entrants. In Scenario 2, the parameter specifying entrant's network cost is reduced. This reflects the view that local entrants will have great flexibility in delivering unaddressed products and will not have to incur the fixed network costs associated with delivering addressed products and collecting mail. In addition, the productivity effect on the Postal Service from mailbox congestion is modestly increased. Finally, the ability of entrants to attract volume from the Postal Service is increased.

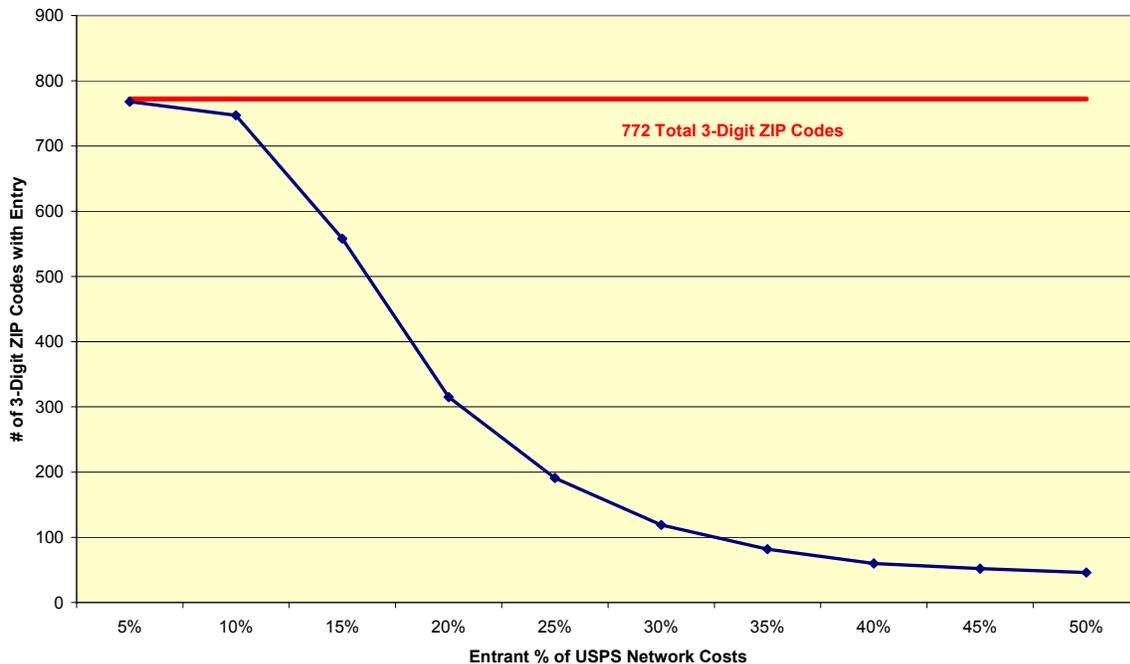
### Estimated Impact of Relaxing the Mailbox Monopoly

	3-digit ZIP CODES With Entry	Eligible Volume Diverted	Resulting Lost Contribution
<b>Low Entry Scenario</b>	<b>191</b> (25% of 3-digit ZIPs)	<b>6.8B pieces</b> (12% of volume)	<b>\$1.5B</b>
<b>High Entry Scenario</b>	<b>315</b> (41% of 3-digit ZIPs)	<b>11.2B pieces</b> (20% of volume)	<b>\$2.6B</b>

#### 4.4.2 Impact of Entrant Network Costs

It is useful to understand the factors which are important in determining the amount of contribution the Postal Service loses when the mailbox monopoly is relaxed. For example, the graph below illustrates how variations in entrant network cost affect the amount of entry that will take place without a mailbox monopoly.

#### Impact of Entrant Network Costs on Entry



The straight line at the top represents the total number of 3-digit ZIP Codes (772) included in the analysis. The declining line shows the number of 3-digit ZIP Codes in which competitive entry would be successful for different levels of entrant network costs. When the two lines are close together, nearly all 3-digit ZIP Codes are experiencing entry.

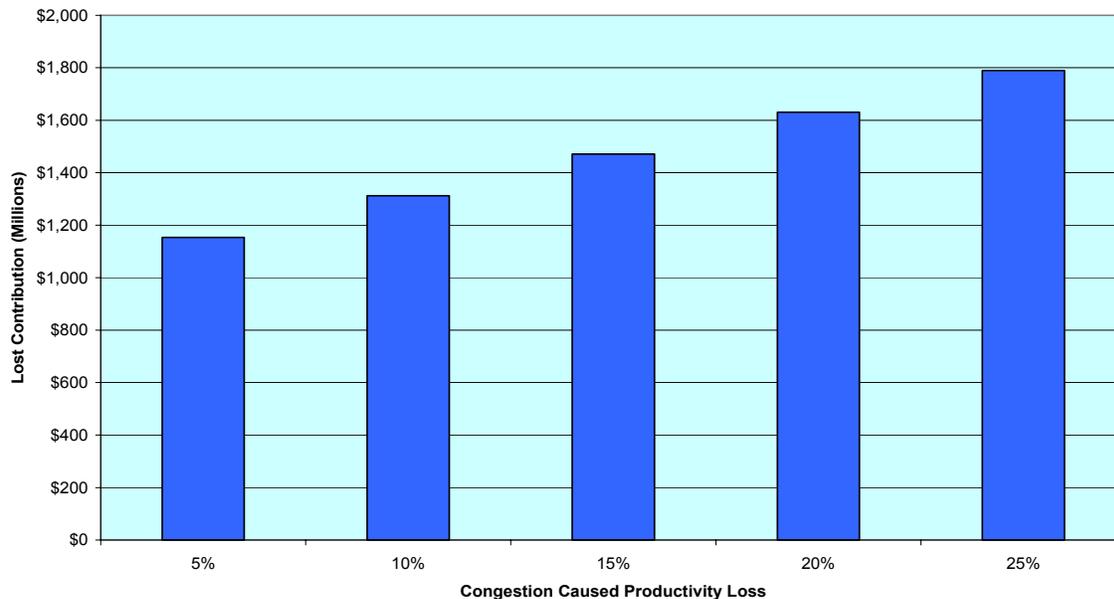
Note that the declining line drops sharply from the left side of the graph to the right side. This is a picture of the fact that as entrants' network costs rise, their ability to enter successfully declines. This effect becomes particularly large as entrants' network costs rise above one-third of Postal Service network costs.

In sum, the degree of entry, and thus the degree of Postal Service losses, depends upon how effective entrants will be in controlling their network costs. Because relaxing the mailbox monopoly, and not the PES, provides only a limited amount of potential volume and revenue to competitors, it is essential that they control costs if they are going to be profitable.

### 4.4.3 Effects of Mailbox Congestion Costs

As described previously, the impact of congestion costs associated with allowing new entrants and competitors to place items into the mailbox must be considered. Even an additional few seconds each day could be substantial given the Postal Service's large delivery workforce. The graph below shows the impact of congestion on the Postal Service's total lost contribution due to the opening of the mailbox.

**Impact of Congestion On Total Lost Contribution**  
*Low Entry Scenario*



The loss of Postal Service productivity due to mailbox congestion, while not immaterial, has moderate impact on the Postal Service's financials. Increasing the productivity loss from a very low 5 percent to a fairly substantial 25 percent loss in carrier productivity results in approximately \$600 million in additional lost contribution.

## **5. Estimating the Costs of the Delivery-Day Universal Service Obligation**

### **5.1 Introduction**

As part of its USO, the Postal Service is required to deliver mail virtually everywhere in the country six days a week. While there may be some benefits from “ubiquity” (going everywhere) as a general matter, observation of delivery frequency by private sector firms reveals that delivery frequency is a choice for those firms. For example, they do not deliver six days a week. This is not true for the Postal Service, as its delivery frequency is set by public policy, not business rules.

An alternative to six-day delivery is five-day delivery. Estimating the cost savings of moving to five-day delivery requires calculation of delivery costs in a hypothetical five-day delivery environment and comparing those calculated costs with the current costs under six-day delivery. However, since a five-day delivery environment has never existed, an estimation of the delivery costs of the Postal Service in that situation must be made. The following sections detail the methodology and results for calculating the costs of the USO when the number of delivery days is changed.

### **5.2 Areas of Cost Savings**

The reduction of costs from reducing delivery frequency impacts four areas. These are described below.

#### **5.2.1 Network Costs**

There are two types of delivery costs, network costs and attributable costs. Network costs arise from the need for the carrier to traverse his or her route and are not related to volume. For example, delivery network costs are the same on heavy volume days and on light volume days. The other type of delivery costs, attributable costs, is volume related. These include the time required for the carrier to deviate from his or her route to deliver mail to an address and the time spent placing the mail into the mail receptacle. Both of these activities -- accessing delivery points and loading mail into receptacles -- are classified as attributable. A reduction in the number of delivery days reduces the number of times that carriers must traverse their routes. As the number of trips around the network is reduced, network delivery costs are saved.

#### **5.2.2 Attributable Delivery Costs**

At first blush, it may seem like a reduction in the number of delivery days would have no impact on attributable (volume related) costs of delivery. However, this ignores the fact the Postal Service’s delivery network is characterized by “returns to density.” It is well known that the delivery cost per piece falls as the number of pieces per delivery point rises. Consider the time required for a carrier to deviate from his or her route and access a delivery point. This time is the same whether the carrier has two pieces or six pieces to deliver to the address. Reducing the number of delivery days increases the

average pieces per delivery point and reduces the delivery cost per piece. This leads to a reduction in the attributable costs of delivery.

### **5.2.3 Indirect Costs**

The delivery network and attributable cost savings cover only the direct labor costs of delivery. Yet, there are substantial indirect costs of delivery, including costs for supervisors, vehicle maintenance, building maintenance and service-wide benefits. These costs are substantial; for city carriers, they amount to nearly 40 percent of direct labor cost and they rise and fall as the number of direct hours change. They are included in the cost savings calculation.

### **5.2.4 Potential Offsets and Additions**

#### ***Mail Processing and/or Transportation Cost Changes***

Changing delivery days can have implications for mail processing and transportation costs. For example, if reducing the number of delivery days increases the efficiency of mail processing operations by allowing longer run times, these cost savings should be included in the calculation. It is also possible that additional costs would be incurred if equipment or transportation capacities are exceeded in locations due to increased volumes on the remaining days. To the extent they occur, these should also be considered in the estimates.

#### ***Revenue Offsets***

A reduction in the number of delivery days could be viewed as a reduction in service by some postal customers and this could have an impact on the volume of mail tendered. While some mailers will be unaffected and would be willing to work with the Postal Service in adjusting the timing of entering mail into the system, others may find reduced delivery frequency less palatable. These mailers may consider alternatives and Postal Service revenue and volume may decline as a result. While this does not directly affect the cost savings from moving to five-day delivery it is an important issue that should be considered.

## **5.3 Scenarios**

Two scenarios were considered in the estimation of the costs of the delivery-day USO.

### **5.3.1 Eliminating Saturday Delivery**

First, the elimination of one delivery day nationwide was considered. The first step was to determine which delivery day should be eliminated, and the lowest delivery volume day was considered first. The following table presents the delivered volumes by day of week for city and rural carriers.

Delivered Volumes By Day of Week FY2007						
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Rural	11,323,517	10,454,356	9,187,284	9,196,173	9,472,974	8,965,999
City	22,627,714	21,426,156	20,440,204	20,358,796	19,907,490	18,780,649
Total	33,951,231	31,880,512	29,627,488	29,554,969	29,380,464	27,746,649

Source: FY2007 Carrier Cost System. All figures in thousands of pieces.

The day with the least volume is Saturday on which 15.2 percent of the volume is delivered. Accordingly, this analysis assumes delivery will be made Monday through Friday.

The second operational decision is the number of network trips that will be eliminated as a result of dropping Saturday delivery. Because the full network must be traversed everyday, we will assume that 1/6 of the network trips can be eliminated.<sup>13</sup> Next a decision must be made about how much of Saturday's volume can be absorbed on the other days. For city carrier delivery, the current analysis assumes that 50 percent of the additional volume can be absorbed with no additional attributable cost. This approximates the current state of affairs in which about 52 percent of city carrier costs are attributable costs and 48 percent are network costs. A 50 percent absorption rate means that eliminating Saturday delivery saves 7.7 percent of attributable city carrier costs.

Rural carriers are paid on a per piece basis, so it may be harder to save attributable costs in the rural carrier network. To reflect this possibility the scenario assumes that only 15 percent of rural volumes are absorbed, leading to a 2.3 percent savings in rural attributable cost. Finally, for simplicity, this scenario excludes analysis of mail processing and transportation cost effects and focuses just on delivery costs. Analysis of these additional operations could lead to changes in the calculated cost savings from eliminating Saturday delivery. This analysis also assumes there are no offsets. The following table presents the results of applying the assumptions of a five-day delivery week where there is no Saturday delivery.

<sup>13</sup> This is a minor overstatement as there are a few places in which Saturday delivery is not currently provided. The costs associated with these stops are *de minimis* when compared to the national delivery costs.

**Results of Eliminating Saturday Delivery**  
(Figures in millions)

Carrier Activity	Type of Cost	Actual Costs FY2007	Costs Under 5- Day Delivery	Cost Savings
City Carrier Office	Network	\$865.6	\$721.4	\$144.3
City Carrier Office	Attributable	\$4,311.8	\$3,981.9	\$329.8
City Carrier Street	Network	\$6,904.8	\$5,754.0	\$1,150.8
City Carrier Street	Attributable	\$4,183.9	\$3,863.8	\$320.1
City Carrier Street & Office	Indirect	\$5,671.4	\$4,971.3	\$700.1
Rural Carrier	Network	\$3,777.3	\$3,147.8	\$629.6
Rural Carrier	Attributable	\$2,584.4	\$2,525.5	\$58.9
Rural Carrier	Indirect	\$1,733.6	\$1,563.6	\$169.9
<b>Total Cost Savings</b>				<b>\$3,503.5</b>

*Totals may not add due to rounding*

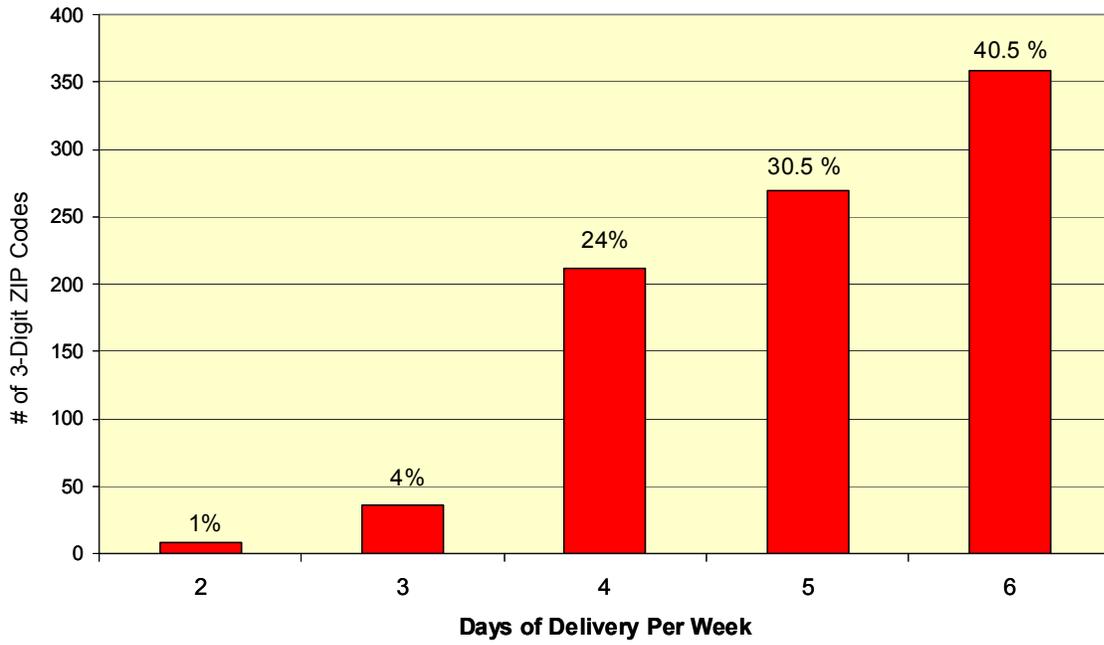
### 5.3.2 Differential Delivery Days Across 3-Digit ZIP Codes

Since it is not clear the Postal Service would simply suspend Saturday delivery everywhere, a more sophisticated scenario would allow for differential delivery days across 3-digit ZIP Codes. For example, one could imagine that the Postal Service would examine the delivery volume on specific days of the week at a 3-digit ZIP Code level and optimize the days of delivery for each. Thus, in this scenario, each 3-digit ZIP Code's delivery day is calculated as follows:

- Calculate average pieces per delivery point across all 3-digit ZIP Codes
- Set delivery days for each 3-digit ZIP Code to make their daily delivery volume per delivery points equal the nationwide average
- Re-calibrate the desired average pieces per delivery point so that the Postal Service averages 5 delivery days per week across 3-digit ZIP Codes.
- Recalculate the cost analysis allowing for differential delivery as calculated above

In this scenario, high-volume 3-digit ZIP Codes would continue to receive deliveries six days a week whereas low-volume 3-digit ZIP Codes may receive delivery as few as two days a week. **The total cost savings of \$3.7 billion is comparable to the results in the elimination of Saturday scenario**, but results in a very different pattern of delivery across the country as illustrated by the graph below.

## Predicted Distribution of Delivery Days



## 6. Costs of a Uniform Pricing USO

### 6.1 Introduction

The uniform pricing aspect of the USO requires the Postal Service to charge the same prices across the country for certain products. This requirement creates USO costs because the Postal Service is charging “too much” for delivery in low-cost areas and “too little” for delivery in high-cost areas. Relaxing the uniform pricing requirement of the USO would enable the Postal Service to have differential pricing that would more closely align its prices with its costs, potentially improving its financial position through increased revenue and/or reduced costs due to volume declining in high-cost areas and increasing in low-cost areas. One example of how competitive firms such as FedEx and UPS use differential pricing is their use of a residential delivery surcharge to recover the increased costs associated with high-cost residential deliveries.

The costs of a uniform pricing requirement are much larger in a liberalized environment than in a monopoly environment. Under a liberalized environment, new entrants to the market can gain volume by charging lower prices in low-cost areas thereby causing an erosion of revenue and contribution for the Postal Service. This practice is called “cream skimming.” However, if the Postal Service did not have a uniform pricing requirement, it could choose to match the lower prices of its competitors. This would reduce the losses incurred by the Postal Service from cream skimming by new entrants. The costs of the uniform pricing requirement arise from not being able to match the prices of entrants on a local market level. Therefore, the estimated costs of the uniform pricing aspect of the USO are the difference between revenue minus delivery costs under uniform pricing and revenue minus delivery costs in an environment in which the Postal Service can use differential pricing.

Calculating the costs of the uniform pricing USO is a two-step process:

- Construct the liberalized environment with entry (using a methodology similar to that for the mailbox monopoly removal scenario)
- Calculate these USO costs as lost profit from entry without price match (this is the value of this aspect of the PES) minus the lost profit from entry with the price match.

These costs can be material and are in addition to other USO costs. The sections that follow present the detailed calculations and results for various scenarios of estimating the uniform pricing USO costs.

### 6.2 Methodology for Calculating the Uniform Pricing USO Costs

#### 6.2.1 Constructing the Liberalized Environment

A liberalization scenario in which Standard Mail is open to competition, was chosen based on the consensus determined from results of the Delphi survey, as discussed in section 2.3. The first step in estimating the costs of this USO under this scenario is to model where and how much entry will occur when the market is opened to competition.

The Delphi results predicted that entry would occur at a local level, but could be from a local or national competitor. Thus, entry is modeled at a local level in this scenario, with the assumption that there is no additional upstream competition. The combination of Standard Mail liberalization with local delivery competition means that the volume at risk is Standard Mail Enhanced Carrier-Route (ECR), which is virtually all drop-shipped, as well as the drop-shipped portion of Standard Mail Regular.

Under this scenario, the mailbox monopoly has been lifted for the impacted products. In addition, the Postal Service still can only price within the price cap and the USO restrictions are still in place.

Finally, potential entrants must price below Postal Service prices in order to induce customers to switch suppliers. A lower price is required to overcome Postal Service brand loyalty. In addition, only fair entry is considered. That is, the entrant must at least cover its costs in any 3-digit ZIP Code for entry to take place. This means that there must be favorable delivery conditions, most likely implying relatively high volumes and relatively low delivery network costs.

For this first liberalization scenario, the following parameters were chosen based on the Delphi survey data as well as Postal Service assumptions:

- **Entrant delivery network costs in relation to USPS network costs:** Entrant delivery network costs are 33 percent of USPS delivery network costs by 3-digit ZIP Code, meaning that entrants incur only 33 percent of USPS fixed delivery costs. One example would be an entrant that delivers only 2 days a week.
- **Entrant wage rates in relation to USPS wage rates:** Entrant wage rates are 21 percent below USPS wages on average but vary by metropolitan area with cost of living. The 21 percent was derived from the Postal Service's response to a Federal Trade Commission study.
- **Entrant productivity in relation to USPS productivity:** Entry productivity in delivery matches USPS productivity, for example, an entrant can deliver as many pieces per hour as USPS can.
- **Entrant prices in relation to USPS prices:** To attract customers, entrant prices must be 10 percent below USPS prices.
- **Entrant diversion sensitivity:** Diversion to an entrant in any given 3-digit ZIP Code is 35 percent of the Postal Service's baseline volume.

### 6.2.2 Calculating the USO Costs

The costs of the uniform pricing USO arise because the Postal Service cannot respond to price competition by the entrant, due to the USO restrictions currently in place. In order to calculate the costs of this aspect of the USO, the model needs to assume the Postal Service could respond to the entrant by matching price and winning back the volume, or better yet, preventing any volume from leaving initially. The Postal Service will match the entrant's price, in this case, a 10 percent reduction in original price, only if it improves its financial position by gaining back the lost volume. Overall though, the

Postal Service financials are still worse because it is charging a lower price for this recaptured volume. Thus, the model first calculates the lost profit from entry without allowing price matching by the Postal Service. Then the model calculates the lost profit from entry when price matching by the Postal Service is permitted. The difference between the two is the uniform price USO cost.

### 6.3 Results for Standard Mail Liberalization Scenario

Initially, the results for the baseline scenario for the values presented above were computed. However, this baseline includes very conservative responses to relaxation of the mailbox rule and predicts only minimal entry by competitors. It is also important to get a sense of what happens when entry is more successful. Thus, an additional scenario was analyzed in which parameter values were changed to reflect a more successful reaction by entrants. In this high-entry scenario, the parameter specifying entrant’s network cost is reduced. This reflects the view that local entrants will have great flexibility in delivering advertising mail and will not have to incur the fixed network costs associated with delivering FCM and collecting mail. Finally, the ability of entrants to attract volume from the Postal Service is increased.

**Results of Uniform Pricing Costs of the USO**

	<b>3-digit ZIP CODES With Entry</b>	<b>Eligible Volume Diverted</b>	<b>Uniform Price USO Costs</b>
<b>Low-Entry Scenario</b>	<b>252 (33% of 3-digit ZIP Codes)</b>	<b>13.2B pieces (13.5% of eligible volume)</b>	<b>\$1.4B</b>
<b>High-Entry Scenario</b>	<b>586 (76% of 3-digit ZIP Codes)</b>	<b>24.2B pieces (25% of eligible volume)</b>	<b>\$3.3B</b>

## 7. Other USO Costs

### 7.1 Retail

As part of its USO, the Postal Service is required to provide retail services and access throughout the nation. While the USO does not explicitly specify the nature of retail access, the closure of existing Post Offices is governed by public policy, not business rules. For example, the Postal Service, faced with shifting demographic trends and new options in providing retail services such as internet and kiosk technologies, might prefer to be able to close Post Offices in certain locations and offer a more efficient way to provide retail access to those customers. Thus, without that ability, the provision of retail access may not be optimal.

#### 7.1.1 Theoretical Issues

Identifying the optimal retail network is a complex and data-intensive problem that must at a minimum take into account customer demand, revenues, labor costs, facility costs, geographic location, population density factors, and delivery requirements.

#### 7.1.2 Scope of Analysis

This analysis focuses only on the potential cost savings associated with closing retail operations in the approximately 18,000 Post Offices with the lowest annual revenue, regardless of individual profitability or proximity to other retail outlets. This analysis uses a “cost calculator” which is a financial model that permits the calculation of the cost savings of closing retail operations in any or all of the 18,000 Post Offices.

#### *Characteristics of Included Offices*

The Post Offices included in this analysis are in the Postal Service’s revenue groupings of Post Offices with the lowest annual revenue. These revenue groups range from A-L, with the lowest revenue offices in groups H-L. The number of Post Offices and the average annual revenue associated with each of the Post Offices in each of the included groups are shown in the table below:

Revenue Group	Number of Post Offices	Total Retail Revenue for Group	Avg. Annual Revenue per PO
H	4,061	\$701.5m	\$172,751
J	5,051	\$432.7m	\$85,664
K	8,282	\$278.4m	\$33,616
L	1,180	\$9.0m	\$7,605

Source: USPS Analysis

#### 7.1.3 Sources of Cost Savings

There are four main sources of cost savings that can result from closing Post Offices, as well as two potential sources of offsets:

### **1. *Postmaster Direct Labor Costs***

In many of these offices, the postmaster conducts all retail functions that, in larger offices, would be performed by retail window clerks. Similarly, the postmaster also does all the sorting necessary to boxes and carrier routes. Thus, should the retail functions be eliminated, the postmaster annual salary would no longer be incurred, though sorting work done by postmasters would need to be done by clerks at other offices.

### **2. *Window Clerk Labor Costs***

Any hours associated with window service clerks would also be eliminated if the retail functions are eliminated. The majority of these offices do not have labor hours associated with additional window clerks. However, since these hours cannot be isolated from the other clerk hours in this analysis, they are not included here. This is a conservative approach that reflects that any mail processing operations would likely be moved to another office, rather than eliminated, and is primarily an issue that impacts Scenario 3 presented in the results section.

### **3. *Facility Costs***

If the office can indeed be closed completely, the rental or depreciation costs on the building would be saved, provided that additional space is not required to accommodate the delivery functions that would be moved to another location. These cost savings should be considered in the estimate.

### **4. *Other Indirect Cost Savings***

In addition to the savings from the direct labor costs of postmasters, there are indirect costs associated with their activities, including costs for building maintenance and service-wide benefits. These costs are not insubstantial, as they amount to slightly over 20 percent of the direct labor costs and they rise and fall as the number of direct hours change. They are included in the cost savings calculation, consistent with the share of postmaster savings.

### **5. *Delivery Operations Consolidation Offsets***

If Post Offices with delivery operations are closed, these activities will have to be consolidated into other offices, or other alternative arrangements will have to be made. Increasing the supervisory duties in other offices could create an offset in the savings from closing the offices. While not included in this analysis, both the operational impact and the potential cost offset should be considered.

### **6. *Revenue Offsets***

A reduction in the number of Post Offices may impact revenue if customers do not have access to retail services. These customers may consider alternatives, and Postal Service revenue and volume may decline as a result. While this does not directly affect the cost savings of closing Post Offices, it is an important issue that should be considered.

### 7.1.4 Scenarios and Results

In order to determine the cost savings associated with closing retail operations in these Post Offices, decisions must be made about which offices are included. The results for three scenarios that vary in the number of offices impacted are presented below.

#### *Scenario 1: Only Offices with No Delivery Operations*

Most Post Offices have both retail and delivery operations. However, many of the smallest offices have only one postmaster who is responsible for the retail functions, and delivery in the area is performed by a larger office nearby or by highway box contract routes. In this scenario, only offices that have a very limited number of other window clerk and mailhandler hours and no delivery personnel hours are included<sup>14</sup>. The savings presented below include only the postmaster direct labor hours and indirect costs such as building maintenance costs and benefits associated with the postmaster.

Revenue Group	Total Offices in Group	Number of Offices Included	Direct Labor Cost Savings	Indirect Cost Savings	Total Cost Savings
H	4,061	340	\$24,353,994	\$5,284,817	\$29,638,810
J	5,051	1,412	\$104,336,080	\$22,640,929	\$126,977,010
K	8,282	5,458	\$321,339,081	\$69,730,581	\$391,069,661
L	1,180	1,030	\$32,922,235	\$7,144,125	\$40,066,360
<b>Total</b>	<b>18,574</b>	<b>8,240</b>	<b>\$ 482,951,389</b>	<b>\$ 104,800,451</b>	<b>\$587,751,841</b>

#### *Scenario 2: Only Offices with No Additional Window Clerks or Mail Handlers*

In this scenario, only offices that have a limited number of other window clerk or mailhandler hours are included<sup>15</sup>. It is assumed that any delivery operations which are conducted at the Post Office are moved or consolidated without additional costs or savings occurring. The savings presented in the following table include only the postmaster direct labor hours and indirect costs such as building maintenance costs and benefits associated with the postmaster.

<sup>14</sup> The threshold for inclusion was a total of 200 hours to allow for the occasions when non-postmaster personnel substitute in for a postmaster on annual leave or out due to illness, but without including those offices with part-time or full-time non-postmaster personnel.

<sup>15</sup> *Ibid.*

Revenue Group	Total Offices Within Group	Number of Offices Included	Direct Labor Cost Savings	Indirect Cost Savings	Total Cost Savings
H	4,061	561	\$37,067,355	\$8,043,616	\$45,110,971
J	5,051	3,067	\$225,808,127	\$49,000,363	\$274,808,490
K	8,282	8,049	\$477,919,091	\$103,708,443	\$581,627,534
L	1,180	1,060	\$34,190,027	\$7,419,236	\$41,609,263
<b>Total</b>	<b>18,574</b>	<b>12,737</b>	<b>\$774,984,599</b>	<b>\$168,171,658</b>	<b>\$943,156,257</b>

**Scenario 3: All Offices in Included Revenue Groups**

In this scenario, all offices in these revenue groups are closed or consolidated into other offices. It is assumed that any delivery operations which are conducted at the Post Office are moved or consolidated without additional costs or savings occurring. The savings presented below include only the postmaster direct labor hours and indirect costs such as building maintenance costs and benefits associated with the postmaster.

Revenue Group	Total Offices Within Group	Number of Offices Included	Direct Labor Cost Savings	Indirect Cost Savings	Total Cost Savings
H	4,061	4,061	\$285,604,688	\$61,976,217	\$347,580,905
J	5,051	5,051	\$367,483,221	\$79,743,859	\$447,227,080
K	8,282	8,282	\$489,670,464	\$106,258,491	\$595,928,954
L	1,180	1,180	\$34,334,090	\$7,450,497	\$41,784,587
<b>Total</b>	<b>18,574</b>	<b>18,574</b>	<b>\$1,177,092,461</b>	<b>\$255,429,064</b>	<b>\$1,432,521,526</b>

**7.2 Other USO Costs**

A number of other potential sources of USO costs exist that are not part of this quantitative analysis. For example, a December 2007 Federal Trade Commission Report entitled “Accounting for Laws that Apply Different to the United States Postal Service and Its Private Competitors,” lists several activities that are potentially part of the Postal Service’s universal service obligation. These activities are not analyzed in

this report, but the arguments provided in the FTC report are repeated here because examination of the overall costs of the USO should consider these additional activities.

### 7.2.1 Periodicals and Non-Profit Pricing

In pricing certain products, the Postal Service and the PRC are required to take into account the “educational, cultural, scientific, and informational value to the recipient of mail matter.”<sup>16</sup> This results in pricing for Periodicals and Non-Profit Standard Mail to be less than it would be if the restriction was lifted. For example, the price of Periodicals generally results in cost coverage of approximately 100 percent, resulting in little to no contribution toward the Postal Service’s fixed network costs. If the Postal Service were allowed to raise prices so that the cost coverage for Periodicals was 120 percent, it estimates that it could increase its annual revenues by **\$500 million**.<sup>17</sup>

A similar restriction applies to pricing of Non-Profit Standard Mail. The Postal Service estimates that removing this restriction and allowing it to price this mail so that its cost coverage is at similar levels as its commercial Standard Mail would result in an increase in annual revenue of **\$1.1 billion**.<sup>18</sup>

### 7.2.2 Alaska and Hawaii Special Transportation

As part of the universal service obligation, the Postal Service is required to provide transportation and delivery to all parts of the country, and Section 5402 of Title 39 prescribes “extensive and explicit regulations governing the transportation of mail by air to bush points within the State of Alaska”.<sup>19</sup> Without this restriction, the Postal Service might choose to still provide service to these places, but possibly at reduced frequency or increased prices. The Postal Service estimates that this obligation resulted in a cost of approximately **\$100 million** in FY2006.<sup>20</sup> Similar burdens exist for the provision of service to Hawaii.

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<sup>16</sup> December 2007 Federal Trade Commission Report “Accounting for Laws that Apply Different to the United States Postal Service and Its Private Competitors” at 44.

<sup>17</sup> *Ibid.*

<sup>18</sup> *Ibid.*

<sup>19</sup> *Ibid.*

<sup>20</sup> *Ibid.*