

**Quantitative Methods for Testing Pricing Strategies at the United States
Postal Service**

By

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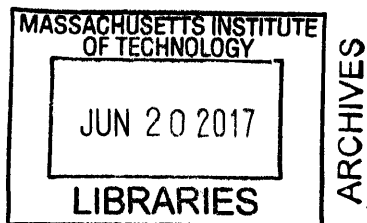
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ABSTRACT

The United States Postal Service (USPS) faces intense competitive pressure in the shipping business. At the same time, shipping is becoming an increasingly critical segment of revenue and profitability for USPS. USPS' existing retail sales data can be analyzed for opportunities to improve profitability and the consumer experience. This paper introduces assortment optimization techniques USPS can use to identify improvements to their current retail pricing approach.

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Disclaimer

The views expressed in this thesis are those of the author and do not reflect the official views, policies or positions of the United States Postal Service.

No official United States Postal Service approval is expressed or implied.

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Chapter 1: Problem Statement and Opportunity

Introduction to USPS

The United States Postal Service's (USPS) mission is to provide a reliable, efficient, trusted and affordable universal delivery service that connects people and helps businesses grow [1]. As evidence of this mission, USPS delivers more mail to more addresses in a larger geographical area than any other postal service in the world [2].

On December 20, 2006, the Postal Accountability and Enhancement Act (PAEA) was signed into law by Congress and created a new system of regulating rates and classes. The impact of this law has been problematic for USPS. USPS faces many roadblocks in trying to improve their profitability and deliver a sustainable business model. The challenge is best described by Megan Brennan, the Postmaster General, in her 2016 testimony to Congress:

We are now entering the 10th year since the enactment of the Postal Accountability and Enhancement Act of 2006 (PAEA). At the time the PAEA was enacted, we had just finished fiscal year 2006, in which we delivered 213 billion pieces of mail; last year, we delivered 154 billion pieces, a 28 percent decline. Unfortunately, the PAEA did not establish a business model with sufficient flexibility to enable us to effectively respond to this unanticipated precipitous volume decline. The PAEA imposed an inflexible price cap that has proven to be completely unsuitable in an environment characterized by declining mail volumes — particularly in First-Class Mail, which provides the greatest contribution to covering our institutional costs, including the costs associated with the ever-expanding number of U.S. delivery addresses [3].

With First-Class Mail in decline, USPS needs to look to other product categories to grow. The Shipping category, for packages, has strong growth but is highly competitive. To make matters more complicated, due to the USPS regulatory environment, products are categorized as either market dominant or competitive. "Market Dominant Products" are traditional letters, flats, and some package shipping services. USPS enjoys a monopoly for some of these services, and competitive alternatives are limited. Their price increases are regulated and must stay within a

price cap. The largest product, First-Class Mail, generated 37% of revenue and 40% of volume in 2016. The next largest product, Standard Mail, generated 23% of revenue and 52% of volume.

“Competitive Products” are services that USPS competitors, like FedEx or UPS, also provide in the market and are commonly referred to as “Shipping and Packages.” Our regulator reviews USPS’s pricing proposals to ensure that USPS costs are covered and that we do not violate any of the PAEA statutes regarding “Competitive Products”. USPS has more freedom regarding products in this category. This category represents 24% of our revenues and 3% of USPS volume.

Limitations of Market Setting

Vestiges of Historical Regulated Status

By focusing on Competitive Products, USPS has the opportunity to explore how to effectively experiment with defining products and setting prices in the market. Today our Competitive Products and their prices are restricted. These limitations are either partially vestiges of our historical regulated status, or have not been considered worth changing, or both.

In order to compete more profitably in the shipping category, USPS needs to reconsider the following limitations:

- *Prices are set uniformly across the country.* While they consider the distance that an item travels by assigning zones, the rates are always the same. So even if the origin city is in New York City or rural Arkansas, a customer will always pay the same rate for a Zone 3 shipment. Furthermore, prices do not reflect the local competition. For instance, the proximity of USPS retail location to a competitor (e.g., FedEx Kinkos or UPS Store) would influence consumer choice.
- *Prices are structured by weight-based increments.* We introduced the “flat-rate box” product, which is priced uniformly around the country regardless of weight: “If it Fits, it Ships.” For the Priority Mail (PM) customers who are not using the flat rate boxes, the

price they pay is based on weight increments. These increments are identical nationwide, regardless of where they purchase the service.

- *Prices vary slightly by channel.* A few years ago when we launched our online shipping platform, we introduced online discounts to encourage customers to pay for their shipping and prepare their labels online. This convenience reduces the cost and errors associated with hand written labels and retail transactions. However, we recently eliminated this discounting structure nationally due to the use of this technology becoming a standard practice.
- *Products and price point offerings are increasingly complex.* Products are rarely deleted or eliminated. The costs and time required to make price changes, for us and our business customers, has gotten increasingly expensive and burdensome over time.

Why not just experiment?

Given our current regulatory “pre-approval” process, experimentation is difficult if not impossible to do. All price changes require approval by the regulator, the Postal Regulation Commission (PRC). The process is relatively open to the public and time-consuming. Stakeholders have significant influence on price changes that USPS wants to make, even if the changes are considered *market tests*¹.

As an enterprise that is fully owned by the U.S. Government, USPS is in the awkward position of competing with commercial entities for shipping services. The aforementioned stakeholders primarily include competitors, industry associations that represent shipping companies or other customers, and politicians. When changes appear to disadvantage competitors or treat consumers very differently, stakeholders will often intervene or protest the regulatory proceedings. For example, if USPS were to charge a surcharge for delivering to rural and more

¹ “Market tests” are regulated activities that must be approved by the Postal Regulatory Commission (PRC). On August 28th 2014, the PRC established new procedures concerning such requests. The PRC has oversight over market tests but also seeks to balance the Postal Service's need for flexibility to test new product ideas. The PRC included safeguards to “avoid disruptions to the commercial marketplace.” The rules require USPS to include in proposals, for the PRC's review, revenue and time limitations, data to be collected from a market test, and the mechanisms by which USPS can seek to change a market test or transition experimental products to permanent products [24].

expensive destinations, USPS would most likely experience significant resistance from the politicians and stakeholders living in those locations.

These interventions come with their own risks for USPS. The PRC could make the details of USPS' filings available for review by stakeholders or the public. These exposures could make USPS competitive data, like our costs, available to our customers and competitors.

Stakeholders may enlist politicians friendly to their industry or interests to pressure either USPS or the PRC to change course. Interventions will often delay implementations, thus impacting the speed at which USPS can move in the market.

Historical pricing decisions have been made with little experimentation and instead primarily relied on expert opinion. USPS has also relied on sources of consumer and market insights such as market research, customer focus groups, and competitor positioning.

Experimentation and Analytics

Ideally USPS would run many experiments to test customers' reactions to changes. Professors Anderson and Simester make a strong case for how powerful experiments are:

Managers need to become adept at using basic research techniques. Specifically, they need to embrace the "test and learn" approach: Take one action with a group of customers, take a different action (or often no action at all) with a control group, and then compare the results. The outcomes are simple to analyze, the data are easily interpreted, and causality is usually clear. The test-and-learn approach is also remarkably powerful [4].

Given the aforementioned challenges, USPS needs to be very judicious and strategic in determining which experiments to run. How can USPS evaluate innovative product and pricing models with minimal disruption to the consumer and interference from stakeholders?

Given that there is a practical limit on the number of experiments that managers can run, analytics helps define and prioritize which experiments should be conducted [4]. Furthermore, analytics may expose when natural experiments have occurred. Natural experiments are

defined as instances when a business can “find treatment and control groups that were created by some outside factor, not specifically gathered for an experiment” [4]. Professors Anderson and Simester share an example of how an apparel retailer recognized a natural experiment when they opened their first store in a state. After this opening, the state required the retailer to charge sales tax on online or catalog orders shipped to the state. This allowed the retailer to understand how sales tax impacted demand from the catalog and online channel [4].

Objective of Thesis

USPS’ existing retail transaction data can be analyzed for opportunities to improve profitability [4]. In particular, this thesis evaluates whether assortment optimization techniques can help USPS explore alternatives to their product assortment for shipping services at retail and predict how customers will react to potential changes.

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Chapter 2: How Do Retail Businesses Identify Product Assortment?

Category Management

Retail businesses typically manage their products through a practice called Category Management. They group products into discrete groups of similarly situated items and these categories are the basis for managing the performance of their products. “Traditionally, the key metric has been space for dollars, with category managers answering the question: How productive is this amount of shelf space?” [5].

More brands and products compete for shelf space now than ever before. Increased assortment, or Stock Keeping Units (SKUs), can be problematic for the following reasons [6]:

- For retail operations, too many SKUs can increase complexity and thus increase costs associated with sales, shelf space, planning, advertising, inventory, and logistics.
- For consumers, too many SKUs can lead to confusion and increased shopping time.

Category Management helps retailers understand how products perform and how they interact with each other. For example, a Publix supermarket had a bottle of wine for \$264, which is a lofty price for a grocery store. The wine manager defended this choice by acknowledging that while they never sold any bottles of this wine, they did sell a lot of the \$67 bottle which sat right next to it on the shelf. Fisher and Raman suggest that “a broad array in a category, including high-end aspirational goods, can signal that your store is the best place to buy all of the products in that category” [7].

The aforementioned example demonstrates why assortment decisions are not just about maximizing the profit on every single SKU. Reasons for carrying SKUs that don’t sell frequently include the following [7].

- Carrying a premium-priced offering will increase sales of other pricey products by making them look like bargains,

- Pleasing the best customers who often spend a disproportionate amount on other products, and
- Carrying a loss leader that attracts shoppers to the store.

With Category Management retailers will see increased profitability within a category and probably increase their available shelf space [6]. Yet, this approach has limitations and challenges. Foremost, Category Management can often lead to myopic decisions.

Fisher and Raman observe that Category Managers typically evaluate the performance of their products and determine which SKUs they should discard [7]. Retailers generally do a good job at identifying poor performing SKUs and replacing them from a “deck of potential new offerings” [7]. This practice is based on the aspiration that eventually a more productive assortment will be landed on. They suggest that instead categories should be evaluated based on their “marginal productivity” which is evaluated at the storewide level as opposed to just the category. [7]

Assortment Planning

Successful retailers seek to both maximize profit and reduce the number of SKUs across multiple categories for the entire store [6]. Therefore, retail businesses need to start planning at an “assortment” level. The following explanation of assortment planning exemplifies a more effective strategy for retailers to consider:

Given fixed store space and financial resources, assortment planning requires a tradeoff between three elements: how many different categories does the retailer carry (called a retailer’s breadth), how many SKUs do they carry in each category (called depth), and how much inventory do they stock of each SKU, which obviously affects their in-stock rate. The breadth vs depth tradeoff is a fundamental strategic choice faced by all retailers [8].

Most retailers need to change their assortment for many reasons, like seasonality, new product introductions, or changes in consumer preferences [8].

Fortunately, when a business reduces their assortment it does not always lower sales or revenue [6]. Customers will potentially substitute among products, so retailers can maximize profit with a smaller assortment. Businesses that want to maximize profit do not need to offer a full range of assortments to capture all demand [9]. Many retailers mistakenly try to broaden their product lines and assortment to increase market share. However, because their pricing is ineffective, they instead cause cannibalization among categories and within the product categories. As a result the increase in revenue, or lack of, is disappointing. [9]

Trader Joe's is best known for its Global, trailblazing epicurean approach to food [10]. However, their secret to success is both due to their use of private labels but also their "limited-selection, high-turnover model" [10]. Kowitt best explains this strategy for Fortune magazine:

*Take peanut butter. Trader Joe's sells 10 varieties. That might sound like a lot, but most supermarkets sell about 40 SKUs. For simplicity's sake, say both a typical supermarket and a Trader Joe's sell 40 jars a week. Trader Joe's would sell an average of four of each type, while the supermarket might sell only one. With the greater turnover on a smaller number of items, Trader Joe's can buy large quantities and secure deep discounts. And it makes the whole business—from stocking shelves to checking out customers—much simpler. Swapping selection for value turns out not to be much of a tradeoff. Customers may think they want variety, but in reality too many options can lead to shopping paralysis. "People are worried they'll regret the choice they made," says Barry Schwartz, a Swarthmore professor and author of *The Paradox of Choice*. "People don't want to feel they made a mistake." Studies have found that buyers enjoy purchases more if they know the pool of options isn't quite so large. [10].*

Substitution

To understand Assortment Planning effectively, it is important to introduce the concept of substitution.

Assortment planning (for retailers in particular) is to define a set of substitutable products to carry in the assortment which usually represents a homogeneous product category. In the simplest form of assortment planning, prices of products are fixed constants, and the primary decisions are binary – whether to include a certain product into the assortment or not [9]

For effective assortment planning, managers need to understand how willing a customer is to substitute a product within a particular category. If a customer has a “high propensity to substitute,” then the retailer does not need to maintain a high stock rate for each product within that category; the reverse also applies [8].

Customers choose products they do not prefer for one of the following three reasons [9]:

- *Assortment-based substitution.* The customer voluntarily chooses a substitute because a new item or service was added to the assortment;
- *Inventory-based substitution.* The customer’s first choice is not available due to a stock out, and therefore the customer is motivated to defer the purchase or choose an available substitute; and
- *Price of substitutable product.* The customer’s substitution behavior is driven by a price change of either the preferred choice or substitutable product.

Assortment options are not always the same. Dilip Soman and John T. Gourville introduce the concept of “alignable assortments” and “non-alignable assortments” [11]. An alignable assortment is defined as a set of products of a similar category or type that differ along a single dimension, such as quantity. Consumer’s need to make tradeoff on a single attribute and thus can clearly understand the difference. Therefore choice is easier for them [11]. A non-alignable assortment is a set of products where the variants between them are along multiple non-

compensatory dimensions, furthermore the variants have many desirable features. For non-alignable assortments consumers experience conflict “that makes choice aversive and compels them to delay their decision and seek additional information or options.” [11]

If retailers want to provide consumers choices, they can minimize the risk of conflict by ensuring the alternatives they offer vary along a single dimension and are incremental in nature. [11]

How to forecast consumer choice for new products?

When planning assortments, management needs a better way to understand the demand for new products. With a lack of sales history, management has little data to use in making these decisions [7]. Fisher and Raman suggest that the key to estimating future sales is to define each SKU as a collection of attributes; by understanding the attributes associated with the new product, management can find an existing product that closely resembles the future product [7]. Management then assumes that the sales of the new product will resemble the sales of the old one.

This approach makes the following simplifying assumptions that are worth noting [7]:

- Attribute demand patterns are independent of each other;
- Consumer preferences for attributes are stable over time or, at least trend predictably;
- Customers will substitute for a different product when their first choice is unavailable;
- Customers are perfectly knowledgeable about their preferences and the offerings available to them; and
- Customers are better off when choosing from a broader set of products.

Unfortunately, empirical studies show us that consumer choice is affected by a consumer’s perception of variety rather than the actual variety that exists [8]. Conversely, variety can negatively affect consumers’ experience, leading to dissatisfaction and decreased sales [8].

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Chapter 3: Applicability of Assortment Planning for USPS

USPS Inventory Management Challenges

USPS is in the unique position of potentially being able to offer a complete selection of services with unlimited inventory levels. This is rare for most retailers struggling with assortment planning activities. First, USPS primarily provides shipping services to their customers at retail locations. For these categories (i.e., Priority Mail), USPS does not incur any costs for holding inventory². Therefore, USPS does not need to decide how many of each item to stock and will never experience a stock out. Furthermore, USPS does not worry about maximizing the revenue potential of their shelf space or minimizing the associated costs. Finally, USPS is not likely to change their assortment as frequently as a typical retailer would. These traditional motivations to minimize the carrying costs associated with poor performing SKUs does not exist.³

Given these differences between USPS and a traditional retailer, why would USPS not offer a very robust range of shipping services to meet every consumer's precise needs? The three following categories represent the costs that USPS does experience with having a very large assortment of shipping options:

- As product complexity increases (because of too many price cells and variations), customers are more likely to be less satisfied with their retail experience. It will take them longer to select a service, possibly increasing the wait time in line for customers during busy periods. Increased complexity also requires USPS retail clerks to consistently and clearly communicate the benefits of the product and services.

² USPS carries some inventory of physical products including: stamps, greeting cards, packages for flat rate shipments, shipping supplies, etc. Stamps are the most complex to manage and plan for given their inherent value and variability in design. These items (with the exception of flat rate shipments) are outside the scope of this analysis.

³ The potential does exist for USPS, at certain times (i.e., peak holiday periods), to have insufficient capacity. If this situation were to occur, USPS could not deliver on their transit time commitment to that customer and, thus, should not allow the sale to occur. However, this is not likely an issue our retail consumers will ever be concerned with.

- USPS incurs administrative costs for each product and price permutation it sells. The costs also include the management time and resources dedicated to ensuring the prices are set appropriately, are profitable, can be presented to the regulator, and are implemented effectively. Therefore, assortment complexity increases costs related to sales, planning, and advertising.
- USPS commercial customers and shipping partners maintain technical systems and applications that allow partners to interface seamlessly with USPS. Therefore, any time USPS changes a product and price category, but our partners and USPS are required to implement costly changes in their technologies.

As product complexity increases, the USPS brand may suffer. USPS could be perceived as a government bureaucracy instead of a competitive modern shipping provider.

Attributes of the USPS Shipping Category

To evaluate the product assortment at USPS, we begin by understanding *product attributes*.

USPS regularly evaluates consumer perceptions and the attributes that drive consumer satisfaction. Figure 1 summarizes the factors that influence customer satisfaction based on USPS research [12].

Table 12 in the Appendix, details the attributes that USPS consumers consider when selecting a shipping service. These attributes help differentiate Priority Mail from other potential USPS substitutes, like PM Express and USPS Retail Ground. The following is a summary of the key differences:

Figure 1 - Attributes that Matter to Shipping Consumers

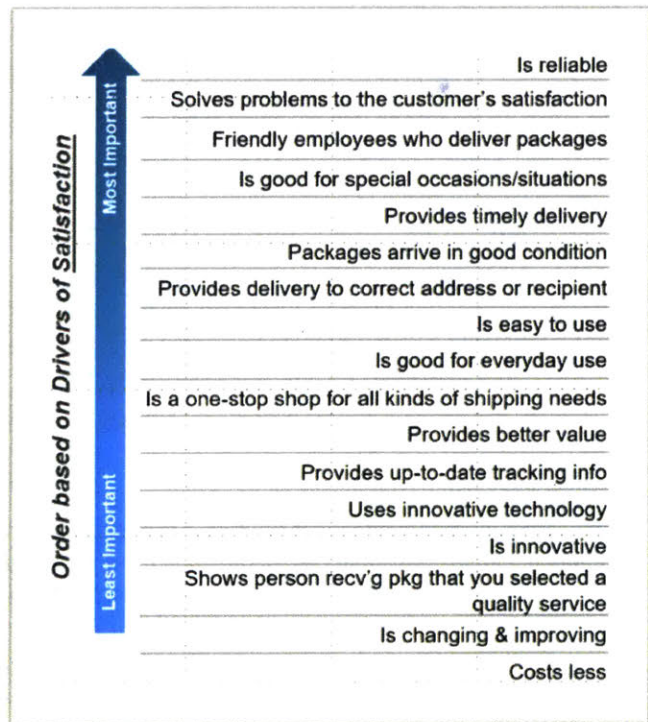


Table 1 – Summary of USPS Product’s Attributes

Attribute	Priority Mail (PM)	PM Express	USPS Retail Ground
Reliability	No Guarantee; average days to delivery: 2 [13, p. 4]	On-time Guarantee	No Guarantee
Timely Delivery	Shipping in 1 to 3 days	1 and 2 day delivery.	2 to 8 business dates
Good Value	Affordable and low cost compared to UPS and FedEx	Premium USPS service	Most affordable service
Insurance	Items are insured against loss or damage up to \$50	Items are insured against loss or damage up to \$100	Not included
Up-to-date tracking info.	Door to door tracking with up to 11 scans, electronic notification.	Same as Priority Mail	Same as Priority Mail

When a USPS retail customer selects a shipping service, three factors narrow the selection available to them: 1) the weight of the item being shipped, 2) the distance it is going to travel, and 3) whether their item fits in a flat rate envelope or box. These limitations result in the following pricing and product structure:

- *Flat Rate Products:* Flat rate products offer one rate to any state. Zones do not apply. Customers should ensure the items they are shipping fit adequately in the preprinted boxes or envelopes;
- *Variable Weight Price Structure:* For any shipping service that is not a flat rate, the shipment is weighed. PM pricing starts at 1 pound. The 1 pound weight is charged for items up to 1 pound and items over 1 pound are rounded up to the next whole pound.⁴ PM cannot weigh more than 70 pounds, thus there are 70 weight breaks.; and,
- *Zone Based Pricing:* Zones are classified as 1 through 9. However, Zone 1 and 2 are treated as one combined zone called “Local”; so, 8 zones are used for prices. Zones are radial, measuring distance from the 3-digit ZIP code origination point of the item, to the destination. For example, Zone 3 is defined as 151 miles to 300 miles. This framework

⁴ For example if a piece weighs 1.37 pounds, the weight (postage) increment is 2 pounds

begets a price matrix with 560 prices; 70 rows, one for each weight break, and 8 columns for the Zones.

For example a domestic shipment that weighs 1.37 pounds and travels 180 miles, thus assigned to Zone 3, requires the customer to select one service from 10 potential shipping options⁵, see Table 2 below. Furthermore, if the customer wants to use a flat rate option, they must check that their item fits in the preprinted packaging.

Table 2 - Options for a Zone 3 shipment that rounds up to the 2 lbs. rate (using January 17, 2016 prices).

<i>Shipping Services</i>	<i>Offering</i>
Priority Mail Express	Flat Rate Envelope (choice of 3): \$22.95
	Variable Weight Rate: \$25.55
Priority Mail	Flat Rate Box, Large: \$18.75
	Flat Rate Box, Medium: \$13.45
	Flat Rate Box, Small: \$6.80
	Flat Rate Envelope Padded: \$6.80
	Variable Weight Rate: \$7.15
	Flat Rate Envelopes (choice of 4): \$6.45
USPS Retail Ground	Variable Weight Rate: \$7.00

There are significant opportunities to explore USPS retail shipping products and their associated pricing structures.

⁵ This example excludes items traveling to military ZIP codes, also known as APO/FPO.

Chapter 4: Data Sources and Data Collection Approach

USPS Retail Transactions

The primary source of data used for this analysis are the transactions USPS's retail point of sale system recorded throughout 2016⁶. This study is limited to three key services for shipping packages domestically Priority Mail, Priority Mail Express, and USPS Retail Ground. Given their willingness to adjust their expectations for delivery speed and willingness to pay; consumers will consider these products as potential substitutes for each other.

In order to keep the data analysis manageable, the data was limited to New England region. Even with this restriction, USPS provided over 8.9 million transactions in the data set.⁷ From January to November, USPS average over 700,000 transactions, and, as expected, this activity jumps up to over 1.4 million transactions in December.

USPS' retail point of sale system uses different naming conventions for the services than the public is familiar with. Table 3 reflects the service name that the consumer sees in our retail locations, the system name, and the price for the flat rate services.

Table 3 - USPS Product Naming Conventions (*italics represents Retail System Technical Name*) and Prices

Variable Weight Products	Flat Rate Products and Price in 2016
Priority Mail Express® <i>(Express Mail Post Office to Addressee)</i>	Padded Flat Rate Envelope (<i>Express Mail Flat Rate Padded Envelope PO-ADD</i>): \$22.95 Flat Rate Envelope (<i>Express Mail Flat Rate Post Office to Addressee</i>): \$22.95 Legal Flat Rate Envelope (<i>Express Mail Legal Flat Rate Envelope</i>) \$22.95

⁶ Since USPS implemented new prices on January 17th, 2016, transactions that occurred before this price change from 2016 were excluded from the study.

⁷ The data needed to be correctly formatted to be evaluated effectively. Some errors were found and discarded to facilitate the analysis.

Variable Weight Products	Flat Rate Products and Price in 2016
Priority Mail® (Priority Mail)	Flat Rate Envelope (PM Flat Rate Envelope) \$6.45 Gift Card Flat Rate Envelope (Priority Mail Gift Card Flat Rate Envelope) \$6.45 Legal Flat Rate Envelope (Priority Mail Legal Flat Rate Envelope) \$6.45 Small Flat Rate Envelope (Priority Mail Small Flat Rate Envelope) \$6.45 Window Flat Rate Envelope (Priority Mail Window Flat Rate Envelope) \$6.45 Padded Flat Rate Envelope (Priority Mail Padded Flat Rate Envelope) \$6.80 Small Flat Rate Box (Priority Mail Small Flat Rate Box) \$6.80 Medium Flat Rate Box (Priority Mail Medium Flat Rate Box) \$13.45 Flat Rate Box (PM APO/FPO Flat Rate Box) \$16.75 Large Flat Rate Box (PM Large Flat Rate Box) \$18.75
Retail Ground® (Retail Ground)	None

Priority Mail, a variable weight service, represents over 47% of the transactions and 40% of the revenue from this subset (see Table 4). Priority Mail is clearly the most popular shipping service USPS offers. Consumers also frequently purchase the Priority Mail Flat Rate Envelope, with 12.34% of the transactions, and the Retail Ground service, with 10.84% of the transactions.

Table 4 - Summary of Transaction Counts; Based on New England 2016 Transactions Shipping Services Only

Shipping Product	2016 Transactions	% of Total Transactions	% of Revenue
Express Mail Post Office to Addressee	181,988	2.02%	5.20%
<i>Flat Rate Envelopes:</i>			
Express Mail Flat Rate Post Office to Addressee	524,605	5.84%	10.77%
Express Mail Legal Flat Rate Envelope	27,346	0.30%	0.56%
Express Mail Flat Rate Padded Envelope PO-ADD	9,691	0.11%	0.20%
Priority Mail	4,243,737	47.22%	40.16%
<i>Flat Rate Envelopes:</i>			
PM Flat Rate Envelope	1,109,329	12.34%	6.55%
Priority Mail Window Flat Rate Envelope	251,704	2.80%	1.47%
Priority Mail Padded Flat Rate Envelope	154,580	1.72%	0.95%
Priority Mail Small Flat Rate Envelope	108,857	1.21%	0.64%
Priority Mail Gift Card Flat Rate Envelope	44,331	0.49%	0.26%
Priority Mail Legal Flat Rate Envelope	32,099	0.36%	0.19%

Shipping Product	2016 Transactions	% of Total Transactions	% of Revenue
<i>Flat Rate Boxes:</i>			
Priority Mail Medium Flat Rate Box	643,436	7.16%	7.88%
Priority Mail Small Flat Rate Box	375,522	4.18%	2.40%
PM Large Flat Rate Box	284,052	3.16%	4.83%
PM APO/FPO Flat Rate Box	21,439	0.24%	0.32%
Retail Ground	974,495	10.84%	17.60%
Grand Total	8,987,211	100%	100%

Table 4 shows that Priority Mail is an important service category to USPS' shipping business. This is also evident when you examine nationwide data. USPS publishes limited information on their Competitive services and extensive detail on Market Dominant services. [14]. Table 5 summarizes USPS's financial results for the 2016 Fiscal Year for the entire nation⁸. The category "USPS Grand Total" includes the revenue USPS recognized for all Market Dominant services and products, worth \$53 Billion.

Table 5 - Summary of USPS FY 2016 Revenue, Pieces, and Weight (all data in Millions) [14]

Service Category	Revenue	Pieces	Weight (in lbs)
Priority Mail Express	\$ 809	33	35
Priority Mail	\$ 7,785	1,004	2,321
Retail Ground	\$ 2,076	776	300
Other Competitive Products and Services ⁹	\$ 7,937	2,686	5,599
Total Competitive Revenue	\$ 18,607	4,499	8,255
USPS Grand Total	\$ 71,530	not available	not available

⁸ The Fiscal Year for USPS runs from October 1st through September 30th.

⁹ This category is a subtotal for the following products and special services: Standard Post Mail, Parcel Select Mail, Parcel Return Service Mail, Special Services, and International Mail. With the exception of International Mail and Special Services, most of these services are not available to Retail customers.

To effectively evaluate the transactions USPS provided for the Northeast, it was necessary to have a reference table for USPS authorized prices. This table, see the Appendix for Tables 18 and 19, includes the zone designation, weight steps, and the relevant prices.¹⁰ These tables reflect the prices that were in effect from January 17th 2016 through January 22, 2017. Prices were most recently changed on January 22nd of 2017.

Demographic Data

Not all consumers behave the same way. To better understand U.S. consumers, USPS uses Tapestry, a commercial market segmentation system. Esri, a.k.a. Environmental Systems Research Institute, is the creator of Tapestry. Esri is an international supplier of geographic information system software and geodatabase management applications.

Tapestry integrates consumer traits with residential characteristics to identify markets and classify US neighborhoods by ZIP code. These segments are based on a location's socioeconomic and demographic composition. Neighborhoods with the most similar characteristics are grouped together, while neighborhoods with divergent characteristics are separated. The result is a combination of the "who" of lifestyle demography with the "where" of local geography [15]

Esri's approach to classifying U.S. neighborhoods is based on cluster analysis. To capture the subtlety and diversity of the US marketplace, Esri used the following data sources [15]:

- Census 2010;
- The American Community Survey;
- Esri's demographic updates;
- Experian's ConsumerView database; and
- Consumer Surveys (such as the Survey of the American Consumer from GfK MRI).

¹⁰ USPS publishes a notification whenever they have a price change known as "Notice 123". The Price Reference Table reflects the information that was in the Notice 123 of that year. It has been formatted in a tabular format that allows the analytics to be completed.

The key to developing successful segmentation is the careful selection of variables used to classify consumers. Esri believes that the following variables are most likely to differentiate consumer spending and preferences [15]:

- Household characteristics such as single person or family, income, relationships (married or multigenerational), and tenure;
- Personal traits such as age, sex, education, employment, and marital status; and
- Housing characteristics like home value or rent, type of housing (single family, apartment, town house, or mobile home), seasonal status, and owner costs relative to income.

ESRI's Tapestry segmentation provides a detailed description of America's neighborhoods and divides them into 67 distinctive segments¹¹. Each ZIP code is then classified as having a dominant LifeMode and a dominant Urbanization Group [16]. Table 13 and Table 14 in the Appendix provides a more detailed description of the two groups and links the segments to each group [16].

- LifeMode groups represent markets that share a common experience—born in the same generation or immigration from another country—or a significant demographic trait, like affluence. There are 14 LifeMode groups.
- Tapestry groups are also available as Urbanization summary groups, in which markets share similar locales, from the urban canyons of the largest cities to the rural lanes of villages or farms. There are 6 Urbanization groups.

To help articulate how this works, we explore The Great Outdoors segment further. This segment is either associated with the Cozy Country or Family Landscapes LifeGroups. According to Esri, the populations in The Great Outdoors have a median age of 46.3 , median household

¹¹ The 67 segments are based on the 2016 version of Tapestry. USPS provided the data for 2015 and just for the New England region. This results in just 49 segments being relevant. The following link to Esri's website provides a detailed flier for each of the 67 segments:
http://downloads.esri.com/ESRI_CONTENT_DOC/DBL/US/TAPESTRY/TAPESTRY_FLIERS_ALL_0914.PDF

income of \$53,000, and median household size of 2.43. The Great Outdoors are described by Esri as follows:

These neighborhoods are found in pastoral settings throughout the United States. Consumers are educated empty nesters living an active but modest lifestyle. Nearly 60% have attended college or hold a degree. Their focus is land. They are more likely to invest in real estate or a vacation home than stocks. They are active gardeners and partial to homegrown and home-cooked meals. Although retirement beckons, most of these residents still work, with incomes slightly above the US level. Typical of neighborhoods with older residents, income from retirement and Social Security is common, but residents also derive income from self-employment and investments. [16]

USPS provided the 2015 version of Tapestry for this analysis. The data set was limited to the New England region. (e.g., Maine, Massachusetts, New Hampshire, and Vermont).¹² Using this data set, Table 6 lists the population size and number of ZIP codes for the 14 LifeMode groups. Table 7 lists the statistics for the top 25 segments in New England. The first 25 segments represent over 90% of the population considered.

Table 6 - Summary Statistics for New England by LifeMode Group (2015) [16]

LifeMode Group	Population	Population %	# of ZIPs	ZIP Code %
Affluent Estates	1,871,013	17.08%	215	15.49%
Cozy Country Living	1,305,254	11.92%	514	37.03%
Ethnic Enclaves	3,468	0.03%	1	0.07%
Family Landscapes	418,125	3.82%	52	3.75%
GenXurban	2,008,118	18.34%	190	13.69%
Hometown	64,345	0.59%	20	1.44%
Middle Ground	1,642,169	14.99%	82	5.91%
Midtown Singles	350,117	3.20%	17	1.22%
Next Wave	767,918	7.01%	27	1.95%
Rustic Outposts	150,271	1.37%	86	6.20%
Scholars and Patriots	128,709	1.18%	14	1.01%

¹² The 3 Digit ZIPs associated with these four states are: 010 to 035, 038 to 049, 054, 055, and 056.

LifeMode Group	Population	Population %	# of ZIPs	ZIP Code %
Senior Styles	325,774	2.97%	60	4.32%
Upscale Avenues	1,201,502	10.97%	75	5.40%
Uptown Individuals	714,908	6.53%	35	2.52%
Grand Total	10,951,691	100.00%	1388	100.00%

Table 7 - Summary Statistics for New England by Segment, Top 25 (2015) [16]

Segment Name	Population	Population %	# of ZIPs	ZIP Code %
Parks and Rec	1,324,549	12.09%	101	7.28%
Pleasantville	942,484	8.61%	51	3.67%
Savvy Suburbanites	888,459	8.11%	78	5.62%
Front Porches	750,274	6.85%	36	2.59%
City Lights	620,670	5.67%	22	1.59%
The Great Outdoors	565,729	5.17%	216	15.56%
Green Acres	514,590	4.70%	122	8.79%
Fresh Ambitions	434,948	3.97%	17	1.22%
In Style	405,559	3.70%	46	3.31%
Top Tier	400,667	3.66%	72	5.19%
Exurbanites	337,330	3.08%	44	3.17%
International Marketplace	293,580	2.68%	8	0.58%
Set to Impress	292,890	2.67%	17	1.22%
Professional Pride	280,165	2.56%	20	1.44%
Soccer Moms	277,209	2.53%	30	2.16%
Metro Renters	257,608	2.35%	13	0.94%
Urban Chic	250,960	2.29%	23	1.66%
Laptops and Lattes	235,806	2.15%	14	1.01%
Emerald City	182,031	1.66%	10	0.72%
Trendsetters	167,457	1.53%	6	0.43%
City Strivers	164,740	1.50%	5	0.36%
Comfortable Empty Nesters	141,747	1.29%	22	1.59%
Rural Resort Dwellers	139,029	1.27%	126	9.08%
Golden Years	110,776	1.01%	13	0.94%
College Towns	103,470	0.94%	7	0.50%
Segments 26 to 49	868,961	7.93%	268	19.31%
Grand Total	10,951,691	100.00%	1,388	100.00%

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Chapter 5: Findings

Description of the Approach

The remainder of this paper starts to answer the following question: is the price structure of the Priority Mail variable weight service optimal? As introduced in Chapter 3, the Priority Mail variable weight price structure is based on 8 zones and 70 weight increments and thus results in a matrix with 560 price points. Could USPS benefit from a price matrix that had fewer weight steps, fewer zones, or both? This is an initial exploration into how USPS can adjust their service offering without compromising the consumer's experience or reducing USPS' revenue.

To answer the aforementioned question, a Discrete Optimization model was used. The purpose of an optimization model is to find the best value (optimal solution or feasible solution) of a particular output measure and the choices it produces. [17] Model elements likely include a set of decisions, criterion used to measure success, and the required conditions (or constraints) the decision must satisfy. [17] A Discrete Optimization model is one where the decision variables are required to be whole numbers (nonnegative) and all of the constraints and the objective function are linear functions. [18]

The goal, also commonly referred to as the optimization function, of our model is to maximize revenue. Revenue was calculated by multiplying demand, represented by the average weekly sales transactions from 2016, times the published prices. The decision variable for the model was to determine whether or not to keep each of the 560 price cells (or the intersection of 70 weight steps and 8 zones). The model's ability to find an optimal solution was limited by a series of rules, or constraints:

- Elimination of any weight step must occur in all zones;
- Elimination of any zone must occur in all weight steps;
- When a weight step is eliminated, consumers who purchased transactions in that weight step will pay the same or more to move to a heavier weight step;
- When a zone is eliminated, consumers who purchased transactions in the obsolete zone will pay the same or more when they use the new zone (one that is farther out);

- Consumers will pay only 5% more as a result of changes (i.e., elimination of either a zone or a weight step); and
- An integer is required for the decision variables.

To see if the model would yield very different results, the aforementioned constraint of 5%, or willingness to pay more, was changed to 10% and then 15%. Figure 2, in the Appendix, provides the detailed mathematical formulation of the discrete optimization model.

The primary inputs of this model are 1) demand for Priority Mail or transaction counts, and 2) price. Prices remain constant throughout the modeling experiment.

We considered three groupings of demand. The first was for all of the ZIP codes in the New England area. The second was ZIP codes where the dominant Tapestry segment was City Lights and the LifeMode group was Upscale Avenues. The last grouping was ZIP codes with the dominant Tapestry segment The Great Outdoors and the LifeMode group Cozy Country Living.

These two segments, Great Outdoors and City Lights, were selected because they represent very different types of neighborhoods and thus consumers.

- The Great Outdoors segment is significantly larger. In 2015, it represents 209 ZIP codes, covers all 5 states, and has a population of 495,310. Residents live in small towns and rural communities with an average of 107 individuals per every square mile. The consumers in these ZIP codes have an average income of \$52,758, and over 44% have attended college or hold a degree. These residents spend very little on Priority Mail, with the 209 ZIP codes averaging less than \$1,000 a week in revenue for USPS [16].
- The City Lights segment, in 2015, is associated with only 2 ZIP codes in Massachusetts: Woburn and Melrose. Residents live in more densely populated areas, with 4,430 individuals per every square mile, on the suburban periphery of metropolitan Boston. The consumer in these ZIP codes has an average income of \$80,166 and almost 49% have attend college or hold a degree. These residents use quite a bit of Priority Mail services; the 2 ZIP codes average \$6,766 a week in revenue for USPS [16].

Findings

The optimization model seeks to deliver a solution that is better than the status quo. Table 8 summarizes the status quo and the results of the model runs for the three sets of demand data that were modeled. After the optimization model was run, some opportunities to refine Priority Mail prices emerge. These recommended changes improve revenue for USPS, but only minimally. Average weekly revenue is improved by .03% in the first scenario, where the Willingness to Pay was 5%. For all ZIP Codes, the average weekly revenue increase would only be \$ 247. The 10% scenario has better results, 0.43% or \$3,565. The best results appear in the 15% scenario, with an improvement of average weekly revenue of 1.18% or \$9,812.

Table 8 – Summary of Findings for 3 sets of demand and 3 scenarios

<i>Categories Evaluated by Scenario</i>	<i>Demand (ZIP Code Groupings)</i>		
	<i>New England Region All ZIP Codes</i>	<i>The Great Outdoors; Cozy Country Living</i>	<i>City Lights; Upscale Avenues</i>
Status Quo (before Optimization)			
<i>Average Weekly Transactions</i>	80,388	94	658
<i>Average Weekly Revenue</i>	\$ 829,401.41	\$ 985.06	\$ 6,765.91
1. Willingness to Pay: 5% more			
<i>Average Weekly Revenue</i>	\$ 829,648.80	\$ 985.39	\$ 6,768.99
<i>Increase in Revenue (%)</i>	\$247.93, 0.03%	\$0.32, 0.03%	\$3.08, 0.05%
<i>Number of Weight Steps</i>	44	43	42
<i>Number of Zones</i>	8	8	8
2. Willingness to Pay: 10% more			
<i>Average Weekly Revenue</i>	\$ 832,966.57	\$ 989.50	\$ 6,795.12
<i>Increase in Revenue (%)</i>	\$3,565.16, 0.43%	\$4.43, 0.45%	\$29.21, 0.43%
<i>Number of Weight Steps</i>	28	27	32
<i>Number of Zones</i>	8	8	8
3. Willingness to Pay: 15% more			
<i>Average Weekly Revenue</i>	\$ 839,213.68	\$ 997.76	\$ 6,851.21
<i>Increase in Revenue (%)</i>	\$9,812.27, 1.18%	\$12.69, 1.29%	\$85.30, 1.26%

<i>Categories Evaluated by Scenario</i>	<i>Demand (ZIP Code Groupings)</i>		
	<i>New England Region All ZIP Codes</i>	<i>The Great Outdoors; Cozy Country Living</i>	<i>City Lights; Upscale Avenues</i>
<i>Number of Weight Steps</i>	37	31	30
<i>Number of Zones</i>	7	7	7

Revenue improvement was modest, and it is linked to the number of weight steps or zones that the model suggested eliminating. In all cases, the higher the weight step, the more likely the model finds an opportunity to eliminate it. Given USPS' existing published prices, these results are expected. Priority Mail prices increase an average of 3% to 5% from one weight step to another, especially in the higher weight steps; see Table 9. USPS price increases are often greater than 5% in the weight steps under 9 pounds; thus the optimization model does not eliminate any of those weight steps.

Table 9 - Price increase (in %) from one weight step to the next highest weight step

<i>Weight Step (lbs):</i>	<i>Zone 1,2</i>	<i>Zone 3</i>	<i>Zone 4</i>	<i>Zone 5</i>	<i>Zone 6</i>	<i>Zone 7</i>	<i>Zone 8</i>	<i>Zone 9</i>
1								
2	5%	7%	13%	36%	45%	55%	58%	62%
3	8%	18%	26%	20%	25%	24%	34%	34%
4	13%	17%	14%	32%	29%	28%	20%	21%
5	19%	11%	12%	14%	14%	15%	15%	16%
6	2%	3%	2%	10%	11%	8%	9%	13%
7	6%	8%	6%	11%	11%	12%	13%	12%
8	8%	6%	4%	9%	10%	11%	12%	12%
9	4%	3%	4%	6%	9%	8%	11%	11%
10	6%	0%	2%	9%	8%	10%	9%	9%
Average: Steps 1 to 10	8%	8%	9%	16%	18%	19%	20%	21%
Average: All Weight Steps	3%	3%	3%	4%	4%	4%	5%	5%

Table 10 shows the price increase from one zone to the next highest zone. These increases are significantly higher, and thus the optimization model only found one opportunity to eliminate a zone. Zone 6 was eliminated by the model in the 3rd scenario, where the customer's willingness

to pay more was 15%. The average price increase from Zone 6 to Zone 7 was 11%; since this is lower than 15%, the model found an opportunity to eliminate Zone 6.

Table 10 - Price increase (in %) from one zone to the next highest zone

Weight Step (lbs):	Z1,2 to Z3	Z3 to Z4	Z4 to Z5	Z5 to Z6	Z6 to Z7	Z7 to Z8	Z8 to Z9
1	4%	2%	1%	1%	4%	8%	27%
2	5%	8%	22%	8%	11%	9%	31%
3	15%	15%	16%	13%	10%	18%	30%
4	19%	13%	34%	10%	9%	11%	30%
5	11%	14%	37%	10%	10%	12%	31%
6	13%	13%	47%	11%	8%	13%	35%
7	15%	12%	54%	11%	9%	13%	35%
8	13%	10%	60%	11%	10%	14%	35%
9	11%	11%	63%	15%	9%	18%	35%
10	5%	12%	74%	14%	11%	17%	35%
Average: Steps 1 to 10	11%	11%	41%	11%	9%	13%	32%
Average: All Weight Steps	17%	23%	49%	15%	11%	17%	41%

The model picks weight steps to eliminate. Table 11 identifies these with a '0'. In the first scenario, where the customers are willing to pay only 5% more, the model reduces the number of weight steps down to 44 for all of New England, and as low as 42 for City Lights. In the second scenario, customers are willing to pay 10% more, the model recommends as few as 28 weight steps when using the data for all of New England, as few as 27 weight steps for The Great Outdoors ZIP Codes, and 32 weight steps for the City Lights ZIP codes.

Table 11 – Model recommendations of which weight steps to eliminate (equals 0)

	Demand Set: All of New England			Great Outdoors			City Lights				Demand Set: All of New England			Great Outdoors			City Lights		
	Scenario: 5% 10% 15%			5% 10% 15%			5% 10% 15%				Scenario: 5% 10% 15%			5% 10% 15%			5% 10% 15%		
# of Weight Steps:	44	28	37	43	27	31	42	32	30	# of Weight Steps:	44	28	37	43	27	31	42	32	30
1 (lb)	1	1	1	1	1	1	1	1	1	36 (lb)	1	0	0	1	0	0	0	0	1
2 (lb)	1	1	1	1	1	1	1	1	1	37 (lb)	0	0	1	1	0	1	1	1	0
3 (lb)	1	1	1	1	1	1	1	1	1	38 (lb)	1	1	1	0	0	1	0	0	1
4 (lb)	1	1	1	1	1	1	1	1	1	39 (lb)	1	0	0	0	0	0	0	1	0
5 (lb)	1	1	1	1	1	1	1	1	1	40 (lb)	1	0	0	1	1	0	0	0	0
6 (lb)	1	1	1	1	1	1	1	1	1	41 (lb)	1	0	1	0	0	0	1	0	1
7 (lb)	1	1	1	1	1	1	1	1	1	42 (lb)	1	0	0	0	0	1	1	0	0
8 (lb)	1	1	1	1	1	1	1	1	1	43 (lb)	1	0	1	1	0	0	1	0	0
9 (lb)	1	0	1	1	0	1	1	0	1	44 (lb)	0	1	0	0	0	0	0	0	0
10 (lb)	1	1	1	1	1	1	1	1	1	45 (lb)	0	1	0	0	1	0	0	0	0
11 (lb)	1	0	1	1	0	1	1	0	1	46 (lb)	1	1	0	0	0	0	0	1	0
12 (lb)	1	1	1	1	1	1	1	1	1	47 (lb)	0	0	0	0	1	0	0	1	0
13 (lb)	1	0	1	1	0	1	1	0	1	48 (lb)	0	0	0	1	0	0	1	1	1
14 (lb)	1	1	1	1	1	1	1	1	1	49 (lb)	1	0	1	0	0	1	0	1	0
15 (lb)	1	0	0	1	0	0	1	0	0	50 (lb)	0	0	0	0	0	0	0	1	0
16 (lb)	1	1	1	1	1	1	1	1	1	51 (lb)	0	0	0	0	0	0	0	1	0
17 (lb)	1	0	0	1	0	0	1	0	0	52 (lb)	0	1	0	0	0	0	0	1	1
18 (lb)	1	1	1	1	1	1	1	1	1	53 (lb)	1	0	0	1	0	0	1	1	0
19 (lb)	1	0	0	1	0	0	1	0	0	54 (lb)	0	0	1	1	1	0	0	0	0
20 (lb)	1	1	0	1	1	0	1	1	0	55 (lb)	0	0	0	0	1	1	0	0	0
21 (lb)	1	0	1	1	0	1	1	0	1	56 (lb)	0	0	0	1	0	0	0	0	0
22 (lb)	1	1	0	1	1	0	1	1	0	57 (lb)	1	0	1	1	0	0	1	0	0
23 (lb)	1	0	1	1	0	1	1	0	1	58 (lb)	0	0	0	0	0	0	0	0	0
24 (lb)	1	1	0	1	1	0	1	1	0	59 (lb)	0	1	1	0	0	0	0	0	0
25 (lb)	1	0	1	1	0	1	1	0	1	60 (lb)	0	1	0	0	0	0	0	1	0
26 (lb)	0	1	0	0	1	0	0	1	1	61 (lb)	1	0	1	1	0	0	1	0	0
27 (lb)	1	0	1	1	0	1	1	0	0	62 (lb)	0	1	0	1	1	0	1	0	0
28 (lb)	0	0	1	0	0	1	0	0	1	63 (lb)	0	0	1	1	0	0	1	1	1
29 (lb)	1	1	1	1	1	1	1	1	1	64 (lb)	1	0	0	0	0	0	1	1	0
30 (lb)	0	0	1	0	0	1	0	0	0	65 (lb)	0	0	1	0	0	0	1	0	1
31 (lb)	0	0	1	0	0	1	0	0	0	66 (lb)	1	0	0	0	0	1	0	0	0
32 (lb)	1	0	0	1	0	0	1	0	0	67 (lb)	0	0	0	0	0	0	0	0	0
33 (lb)	0	0	0	0	0	0	0	0	0	68 (lb)	0	0	1	0	0	0	0	0	0
34 (lb)	1	1	1	1	1	1	1	1	0	69 (lb)	0	0	0	1	0	0	0	0	0
35 (lb)	0	0	0	0	1	0	0	0	0	70 (lb)	1	1	1	1	1	1	1	1	1

Three demand sets were provided by USPS and optimized by the model. In all scenarios tested, the optimization model elects to eliminate more weight steps in The Great Outdoors and City Lights segments than in the broader New England demand set. These results were also expected; if no transactions existed in a price cell, the model has fewer constraints when seeking to remove either a weight step or a zone. The demand sets varied significantly in how many of the price cells actually had demand associated with them:

- New England: 6% of the price cells, or 35, were missing transactions,
- The Great Outdoors: 31% or 174 price cells were missing transactions, and
- City Lights: 53% or 294 price cells were missing transactions.

Given the inputs used, the model behaved in an expected fashion. The model also found optimal solutions in all scenarios evaluated. Additional sensitivities can be run to not only explore how USPS could make changes to their pricing structure, but also better understand how the model works. The following are some suggestions:

- Test additional scenarios regarding the willingness to pay (such as 3%, 8%, or 20%);
- Evaluate a scenario where the willingness to pay was constrained by a set dollar amount the consumer will pay for moving to a new price cell (for instance \$0.30 more);
- Include Priority Mail flat rate options in the demand set since USPS consumers consider these substitutes for the variable weight services (especially for items under 20 pounds);
- Include Priority Mail Express variable weight packages in the demand set since USPS consumers may “buy up” for a better service if it falls within their willingness to pay; and
- Include Retail Ground in the demand set considering the possibility a USPS consumer may “buy down” to a slower and less expensive option.

Given the aforementioned findings, the USPS can likely conclude that our current pricing structure has too many weight steps. One option for changing the pricing structure is to use one and half pound increments for those weight step greater than 10 pounds. This strategy would eliminate 20 weight steps from the price matrix and reduce the number of price cells to 400 from 560. This proposed price structure requires further evaluation to see if it is profitable and whether it impacts consumer’s decisions to use the flat rate options or substitute Priority Mail Express or Retail Ground.

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Chapter 6: Conclusions

Identifying an optimal assortment is not easy or done quickly. It will likely take many data experiments and iterations to arrive at a solution that warrants serious consideration. While the model run for this paper had minimally improved revenue, this does not preclude USPS from making changes. Having more price cells than necessary increases management and administrative costs and can degrade the consumer experience. As the optimization model suggests, USPS can reduce their assortment at retail with minimal impact to the customer. However, additional exploration is necessary. To identify the optimal assortment, USPS needs to decide if they want to maximize revenues or profits, how to price existing and future services, and whether the final assortment should vary by location [19].

To address the complexities of the market, the competition, the consumers' varied needs, and the regulatory status, USPS should use data analytics to help inform and design experiments before they make broad changes. The use of data analytics will help define and refine a hypothesis about the optimal assortment in retail. USPS can then file a request with their regulator to test this proposed assortment in a limited market and thus confirm whether or not consumers behave as expected. The results of the market test would then inform USPS if the market test should be expanded or if new insights could be used to help improve the analytic method used. This process should be iterative, to not only improve the effectiveness of the optimization method but also to ensure that consumer disruption is minimized. To be successful in the environment in which the USPS operates, both analytics and experimentation are necessary.

USPS faces intense competitive pressure in the shipping business. Shipping is becoming an increasingly critical segment of revenue and profitability for USPS. USPS competitors operate under different regulatory frameworks and have more flexibility to experiment. Since USPS is hamstrung in their ability to run experiments, management science tools like the optimization model run for this thesis should become routine.

Appendices

Table 12 USPS Retail Product Attributes [20] [21]

Attributes <i>(In Alphabetical Order)</i>	Priority Mail (PM) USPS Retail Products		PM Express	USPS Retail Ground
	Flat Rate Envelope & Boxes	Variable Weight Envelope & Boxes		
Accessibility – How easy is it for a consumer to access a retail location and purchase the service?	Sold at all 17,892 Retail locations. Hours of operation are 8:00 am to 5:00 pm Mon. to Fri. Some locations are open on Saturdays. Many locations have Self-Service Kiosks 24/7 where accessible.		Sold at all locations.	Sold at all locations.
Content Restrictions – Is there a limitation to what can be shipped?	Regulations and standards exist for restricted, prohibited, and hazardous materials, including cigarettes and smokeless tobacco. Live animals are not eligible for flat rate shipping.		Same as PM	Same as PM; available for <u>mailable</u> hazardous materials or live animals.
Ease of Use – How easy is it for a consumer to access this service?	Customers purchase services at the counter or self-service kiosk. They can also pay online with a credit card and print a label remotely. The package can be dropped off at a USPS mailbox or location or given to a carrier.		Same as PM	Same as Priority Mail.
Free Supplies – Does the consumer benefit from free boxes or envelopes?	<i>Flat Rate:</i> 3 types of envelopes, 4 types of boxes	<i>Variable Weight:</i> None	Envelopes only, with Flat Rate service	None
Insurance Available – Is the item insured against damage or loss? Can the customer purchase additional insurance?	Includes \$50 insurance for most items. Can be purchased for up to \$5,000 in indemnity against loss or damage.		Includes \$100 insurance for most items. Insurance available for purchase (same as PM).	Insurance available for purchase (same as PM).
Notifications via Email/Text – Ways tracking is shared with consumers.	Consumer provides delivery instructions when not home, so carrier knows where to leave packages. Receive text alerts on phone or text a tracking number to USPS to check a package's status.		Same as PM.	Same as PM.

Attributes <i>(In Alphabetical Order)</i>	Priority Mail (PM) USPS Retail Products		PM Express	USPS Retail Ground
	Flat Rate Envelope & Boxes	Variable Weight Envelope & Boxes		
Number of zones - Shipping is priced based on distance, denoted by zones.	Flat rates offer one rate to any state, zones do not apply.	<i>Variable weight service</i> : 8 zones measures distance from the origination point to the destination. ¹³	Same as PM for variable weight items. Zones do not apply for flat rates envelopes.	Same as PM.
Package Pickup – USPS picks up the package.	Free if package is picked up during regular delivery. For \$20.00 customers can specify a time for the pickup service.		Same as PM	Not Free.
Price – Amount paid by the customer. ¹⁴	Ranges from small flat rate boxes and envelopes from \$6.45 and rises up to \$18.75 for the large flat rate box.	Matrix has 560 price points; 70 rows (for each weight break) and 8 columns for the zones. Starts at \$6.45 for local 1lb and rises up to \$200.10 for 70lb item to Zone 9.	Flat Rate starts at \$23.75. Variable weight price matrix with 569 prices. Starts at \$23.75 and rises up to \$469.45 (70lb item for Zone 9).	Variable weight price matrix with 639 prices, rises up to 70lb with 9 zones. Also includes prices for Balloon and Oversized items.
Proof of Delivery – Includes proof of delivery with a signature record.	Not available.		Included in price.	Not available.
Real Time Tracking Events – How frequently are tracking events shared?	USPS Tracking (electronic option) is included at no additional cost. Door-to-door tracking with up to 11 scans.		Same as PM.	Same as PM.
Reliability – Will the package be delivered by the expected date? Does an on-time guarantee exist?	Service objectives for delivery are 1 to 3 days; however, the USPS does not guarantee the delivery time.		Includes on-time guarantee.	No guarantee. Delivery dates are “estimated”.

¹³ Zone charts can be found at USPS.COM® at <https://postcalc.usps.com/ZoneCharts/Default.aspx> . [22, p. 3] Local zone applies to mail deposited at any post office for delivery to any address within the delivery area of that post office. Non-local zones are defined numerically by radial distance. For instance, Zone 2 refers to an item that travels between 51 and 150 mile radius from origin to destination.

¹⁴ Note: USPS does not have additional surcharges like UPS or FedEx. Stamps.com study estimates that surcharges can add up to 32% of additional fees to costs. **Invalid source specified.**

Attributes <i>(In Alphabetical Order)</i>	Priority Mail (PM) USPS Retail Products		PM Express	USPS Retail Ground
	Flat Rate Envelope & Boxes	Variable Weight Envelope & Boxes		
Retail Payment Options – What forms of payment does USPS accept?	Postage may be paid with stamps, with meter stamps affixed to each piece, or online using USPS Click-N-Ship. Customers can purchase this postage using cash, check, credit card, or debit card. Priority Mail Forever Prepaid Flat Rate packaging must be purchased by credit card online.		Same as PM.	Same as PM, except customers cannot pay for postage online and no pre-paid options.
Speed – Number of business days it takes from when the customer tenders the item to USPS until it is delivered to the recipient.	Shipping in 1 to 3 days. Depends on the distance the item travels. Most shipments that stay within the local zone are delivered in 1 day. Items traveling across the US will take 3 days. The expected delivery date is printed on the receipt.		1-Day delivery is available at designated USPS facilities for overnight service. All other destinations are delivered in 2 days.	Estimated 2 to 8 business days for USPS Retail Ground.
Sunday/Holiday Delivery – Will USPS delivery on Sundays or a Holiday? If so, is there a fee?	Available to commercial customers only who have a contract with USPS, not a service the general public can request.		Available 365 days a year; for Sunday or Holiday delivery add \$12.50	Not available.
Volumetric Pricing – Does the price include additional charges for items that are low weight but large dimensions?	Does not apply to flat rate services. The pre-printed boxes should close normally.	Packages under 20lbs, more than 84 inches (in combined length and girth), and for Zones 1 to 4 are charged as a 20lb parcel (or balloon price) based on the applicable zone. Packages exceeding one cubic foot for Zones 5 to 9 are charged based on the actual weight or dimensional weight ¹⁵ , whichever is greater.	Not applicable.	For Retail Ground: Balloon prices apply (similar to Priority Mail). Oversized prices apply to parcels exceeding (combined length and girth) 108 inches, based on the applicable zone.
Weight/Size Restrictions – are packages restricted by weight or size?	None. Requires the use of USPS provided packaging.	Available for shipments up to 70 lb. Maximum combined length and girth is 108 inches.	Same as PM.	Available for shipments up to 70 lbs and up to 130 inches in combined length and girth

¹⁵ Dimensional Weight is calculated based on the instructions in the Domestic Mail Manual Section 123.1.4; <http://pe.usps.com/text/dmm300/123.htm#ep1219955>

Attributes <i>(In Alphabetical Order)</i>	Priority Mail (PM) USPS Retail Products		PM Express	USPS Retail Ground
	Flat Rate Envelope & Boxes	Variable Weight Envelope & Boxes		
<p>Table excludes:</p> <ul style="list-style-type: none"> • Priority Mail Regional Rate, it is available only for commercial customers and online customers. • Priority Mail Open and Distribute, it is available for commercial customers for bulk mailings. • Forever Prepaid Flat Rate packaging is equivalent in price to the retail price for Priority Mail Flat Rate packaging. Each Forever Prepaid Flat Rate Envelope or Flat Rate Box bears a shipping label with affixed Forever Prepaid postage and may not be removed from the existing packaging and placed on any other packaging. The Forever Prepaid label bears the USPS watermark, which validates the postage. 				

Table 13 – ESRI LifeMode Summaries and Associated Segment IDs; Nationwide and for 2016 version of Tapestry

LifeMode	Segment ID and Name
<p>LifeMode 1 Affluent Estates</p> <ul style="list-style-type: none"> • Established wealth—educated, well-traveled married couples • Accustomed to "more": less than 10% of all households, with 20% of household income • Homeowners (almost 90%), with mortgages (70%) • Married couple families with children ranging from grade school to college • Expect quality; invest in time-saving services • Participate actively in their communities • Active in sports and enthusiastic travelers 	<p>1A Top Tier 1B Professional Pride 1C Boomburbs 1D Savvy Suburbanites 1E Exurbanites</p>
<p>LifeMode 2 Upscale Avenues</p> <ul style="list-style-type: none"> • Prosperous married couples living in older suburban enclaves • Ambitious and hard-working • Homeowners (70%) prefer denser, more urban settings with older homes and a large share of townhomes • A more diverse population, primarily married couples, many with older children • Financially responsible, but still indulge in casino gambling and lotto tickets • Serious shoppers, from Nordstrom's to Marshalls or DSW, that appreciate quality, and bargains • Active in fitness pursuits like bicycling, jogging and aerobics • Also the top market for premium movie channels like HBO and Starz 	<p>2A Urban Chic 2B Pleasantville 2C Pacific Heights 2D Enterprising Professionals</p>
<p>LifeMode 3 Uptown Individuals</p> <ul style="list-style-type: none"> • Young, successful singles in the city • Intelligent (best educated market), hard-working (highest rate of labor force participation) and averse to traditional commitments of marriage and home ownership • Urban denizens, partial to city life, high-rise apartments and uptown neighborhoods • Prefer debit cards to credit cards, while paying down student loans • Green and generous to environmental, cultural and political organizations • Internet dependent, from social connections to shopping for groceries (although partial to showrooming) • Adventurous and open to new experiences and places 	<p>3A Laptops and Lattes 3B Metro Renters 3C Trendsetters</p>

LifeMode	Segment ID and Name
<p>LifeMode 4 Family Landscapes</p> <ul style="list-style-type: none"> • Successful young families in their first homes • Non-diverse, prosperous married-couple families, residing in suburban or semirural areas with a low vacancy rate (second lowest) • Homeowners (80%) with mortgages (second highest %), living in newer single-family homes, with median home value slightly higher than the U.S. • Two workers in the family, contributing to the second highest labor force participation rate, as well as low unemployment • Do-it-yourselfers, who work on home improvement projects, as well as their lawns and gardens • Sports enthusiasts, typically owning newer sedans or SUVs, dogs, and savings accounts/plans, comfortable with the latest technology • Eat out frequently at fast food or family restaurants to accommodate their busy lifestyle • Especially enjoy bowling, swimming, playing golf, playing video games, watching movies rented via Redbox, and taking trips to a zoo or theme park 	<p>4A Soccer Moms 4B Home Improvement 4C Middleburg</p>
<p>LifeMode 5 GenXurban</p> <ul style="list-style-type: none"> • Gen X in middle age; families with fewer kids and a mortgage • Second largest Tapestry group, comprised of Gen X married couples, and a growing population of retirees • About a fifth of residents are 65 or older; about a fourth of households have retirement income • Own older single-family homes in urban areas, with 1 or 2 vehicles • Live and work in the same county, creating shorter commute times • Invest wisely, well-insured, comfortable banking online or in person • News junkies (read a daily newspaper, watch news on TV, and go online for news) • Enjoy reading, photo album/scrapbooking, playing board games and cards, doing crossword puzzles, going to museums and rock concerts, dining out, and walking for exercise 	<p>5A Comfortable Empty Nesters 5B In Style 5C Parks and Rec 5D Rustbelt Traditions 5E Midlife Constants</p>

LifeMode	Segment ID and Name
<p>LifeMode 6 Cozy Country Living</p> <ul style="list-style-type: none"> • Empty nesters in bucolic settings • Largest Tapestry group, almost half of households located in the Midwest • Homeowners with pets, residing in single-family dwellings in rural areas; almost 30% have 3 or more vehicles and, therefore, auto loans • Politically conservative and believe in the importance of buying American • Own domestic trucks, motorcycles, and ATVs/UTVs • Prefer to eat at home, shop at discount retail stores (especially Walmart), bank in person, and spend little time online • Own every tool and piece of equipment imaginable to maintain their homes, vehicles, vegetable gardens, and lawns • Listen to country music, watch auto racing on TV, and play the lottery; enjoy outdoor activities, such as fishing, hunting, camping, boating, and even bird watching 	<p>6A Green Acres 6B Salt of the Earth 6C The Great Outdoors 6D Prairie Living 6E Rural Resort Dwellers 6F Heartland Communities</p>
<p>LifeMode 7 Ethnic Enclaves</p> <ul style="list-style-type: none"> • Established diversity—young, Hispanic homeowners with families • Multilingual and multigenerational households feature children that represent second-, third- or fourth-generation Hispanic families • Neighborhoods feature single-family, owner-occupied homes built at city's edge, primarily built after 1980 • Hard-working and optimistic, most residents aged 25 years or older have a high school diploma or some college education • Shopping and leisure also focus on their children—baby and children's products from shoes to toys and games and trips to theme parks, water parks or the zoo • Residents favor Hispanic programs on radio or television; children enjoy playing video games on personal computers, handheld or console devices • Many households have dogs for domestic pets 	<p>7A Up and Coming Families 7B Urban Villages 7C American Dreamers 7D Barrios Urbanos 7E Valley Growers 7F Southwestern Families</p>
<p>LifeMode 8 Middle Ground</p> <ul style="list-style-type: none"> • Lifestyles of thirtysomethings • Millennials in the middle: single/married, renters/homeowners, middle class/working class • Urban market mix of single-family, townhome, and multi-unit dwellings • Majority of residents attended college or attained a college degree • Householders have ditched their landlines for cell phones, which they use to listen to music (generally contemporary hits), read the news, and get the latest sports updates of their favorite teams • Online all the time: use the Internet for entertainment (downloading music, watching YouTube, finding dates), social media (Facebook, Twitter, LinkedIn), shopping and news • Leisure includes night life (clubbing, movies), going to the beach, some travel and hiking 	<p>8A City Lights 8B Emerald City 8C Bright Young Professionals 8D Downtown Melting Pot 8E Front Porches 8F Old and Newcomers 8G Hardscrabble Road</p>

LifeMode	Segment ID and Name
<p>LifeMode 9 Senior Styles</p> <ul style="list-style-type: none"> • Senior lifestyles reveal the effects of saving for retirement • Households are commonly married empty nesters or singles living alone; homes are single-family (including seasonal getaways), retirement communities, or high-rise apartments • More affluent seniors travel and relocate to warmer climates; less affluent, settled seniors are still working toward retirement • Cell phones are popular, but so are landlines • Many still prefer print to digital media: Avid readers of newspapers, to stay current • Subscribe to cable television to watch channels like Fox News, CNN, and The Weather Channel • Residents prefer vitamins to increase their mileage and a regular exercise regimen 	<p>9A Silver & Gold 9B Golden Years 9C The Elders 9D Senior Escapes 9E Retirement Communities 9F Social Security Set</p>
<p>LifeMode 10 Rustic Outposts</p> <ul style="list-style-type: none"> • Country life with older families in older homes • Rustic Outposts depend on manufacturing, retail and healthcare, with pockets of mining and agricultural jobs • Low labor force participation in skilled and service occupations • Own affordable, older single-family or mobile homes; vehicle ownership, a must • Residents live within their means, shop at discount stores and maintain their own vehicles (purchased used) and homes • Outdoor enthusiasts, who grow their own vegetables, love their pets and enjoy hunting and fishing • Technology is cost prohibitive and complicated. Pay bills in person, use the yellow pages, read the newspaper and mail-order books 	<p>10A Southern Satellites 10B Rooted Rural 10C Diners & Miners 10D Down the Road 10E Rural Bypasses</p>
<p>LifeMode 11 Midtown Singles</p> <ul style="list-style-type: none"> • Millennials on the move—single, diverse, urban • Millennials seeking affordable rents in apartment buildings • Work in service and unskilled positions, usually close to home or public transportation • Single parents depend on their paycheck to buy supplies for their very young children • Midtown Singles embrace the Internet, for social networking and downloading content • From music and movies to soaps and sports, radio and television fill their lives • Brand savvy shoppers select budget friendly stores 	<p>11A City Strivers 11B Young and Restless 11C Metro Fusion 11D Set to Impress 11E City Commons</p>

LifeMode	Segment ID and Name
<p>LifeMode 12 Hometown</p> <ul style="list-style-type: none"> • Growing up and staying close to home; single householders • Close knit urban communities of young singles (many with children) • Owners of old, single-family houses, or renters in small multi-unit buildings • Religion is the cornerstone of many of these communities • Visit discount stores and clip coupons, frequently play the lottery at convenience stores • Canned, packaged and frozen foods help to make ends meet • Purchase used vehicles to get them to and from nearby jobs 	<p>12A Family Foundations 12B Traditional Living 12C Small Town Simplicity 12D Modest Income Homes</p>
<p>LifeMode 13 Next Wave</p> <ul style="list-style-type: none"> • Urban denizens, young, diverse, hard-working families • Extremely diverse with a Hispanic majority, the highest among LifeMode groups • A large share are foreign born and speak only their native language • Young, or multigenerational, families with children are typical • Most are renters in older multi-unit structures, built in the 1960s or earlier • Hard-working with long commutes to jobs, often utilizing public transit to commute to work • Spending reflects the youth of these consumers, focus on children (top market for children's apparel) and personal appearance • Also a top market for movie goers (second only to college students) and fast food • Partial to soccer and basketball 	<p>13A International Marketplace 13B Las Casas 13C NeWest Residents 13D Fresh Ambitions 13E High Rise Renters</p>
<p>LifeMode 14 Scholars and Patriots</p> <ul style="list-style-type: none"> • College and military populations that share many traits due to the transitional nature of this LifeMode Group • Highly mobile, recently moved to attend school or serve in military • The youngest market group, with a majority in the 15 to 24 year old range • Renters with roommates in nonfamily households • For many, no vehicle is necessary as they live close to campus, military base or jobs • Fast-growing group with most living in apartments built after 2000 • Part-time jobs help to supplement active lifestyles • Millennials are tethered to their phones and electronic devices, typically spending over 5 hours online every day tweeting, blogging, and consuming media • Purchases aimed at fitness, fashion, technology and the necessities of moving • Highly social, free time is spent enjoying music and drinks with friends • Try to eat healthy, but often succumb to fast food 	<p>14A Military Proximity 14B College Towns 14C Dorms to Diplomas</p>

Table 14 · ESRI Urbanization Summaries and Associated Segments

Urbanization	Segment ID and Name
<p>Principal Urban Centers</p> <ul style="list-style-type: none"> • Young, mobile, diverse populations living in the most densely populated neighborhoods of the largest cities (populations of 2.5 million or more) • Traits shared by more than 2.5 million people: crowding, high cost of living, and full access to urban amenities, including jobs • Youngest, most diverse populations among the Urbanization groups • Households are renter occupied by singles or roommates • The most challenging market for auto sales: half the commuters use public transportation, bicycles or walk to work • Focus on style and image with liberal spending on apparel • Constantly connected, using the Internet for everything from finding jobs to finding dates 	<p>3A Laptops and Lattes 3B Metro Renters 3C Trendsetters 8D Downtown Melting Pot 11A City Strivers 13C NeWest Residents 13D Fresh Ambitions 13E High Rise Renters</p>
<p>Urban Periphery</p> <ul style="list-style-type: none"> • City life for starting families in neighborhoods that fringe major cities • The earliest suburbs, built before 1970, primarily single-family housing with some apartments • Young families with children, diverse population • Homeowners living closer to the city, with below average vacancy rates • Leisure focuses on the children (visits to theme parks or water parks), sports (soccer, basketball, baseball) and movies • Spending also emphasizes the children—clothing, toys and baby products • Parents of small children favor family restaurants and fast food • Smartphones are popular, for social contacts, shopping and music 	<p>2C Pacific Heights 5D Rustbelt Traditions 7B Urban Villages 7C American Dreamers 7D Barrios Urbanos 7F Southwestern Families 8A City Lights 8C Bright Young Professionals 11C Metro Fusion 12A Family Foundations 12D Modest Income Homes 13A International Marketplace 13B Las Casas</p>
<p>Metro Cities</p> <ul style="list-style-type: none"> • Affordable city life including smaller metropolitan cities or satellite cities that feature a mix of single-family and multiunit housing • Single householders seeking affordable living in the city: usually multi-unit buildings that range from mid- to high-rise apartments; average monthly rents and home value below the U.S. average • Consumers include college students, affluent Gen X couples, and retirement communities • Student loans more common than mortgages; debit cards more popular than credit cards • Residents share an interest in city life and its amenities, from dancing and clubbing to museums and concerts • Convenience and mobility favor cell phones over landlines 	<p>5B In Style 8B Emerald City 8E Front Porches 8F Old and Newcomers 8G Hardscrabble Road 9E Retirement Communities 9F Social Security Set 11B Young and Restless 11D Set to Impress 11E City Commons 12B Traditional Living</p>

Urbanization	Segment ID and Name
<ul style="list-style-type: none"> Many residents rely upon the Internet for entertainment (download music, play online games) and as a useful resource (job searches) 	14B College Towns 14C Dorms to Diplomas
<p>Suburban Periphery</p> <ul style="list-style-type: none"> Urban expansion: affluence in the suburbs or city-by-commute The most populous and fast-growing among Urbanization groups, Suburban Periphery includes one-third of the nation's population Commuters value low density living, but demand proximity to jobs, entertainment and the amenities of an urban center Well-educated, two-income households, accept long commute times to raise their children in these family-friendly neighborhoods. Many are heavily mortgaged in newly built, single-family homes Older householders have either retired in place, downsized or purchased a seasonal home Suburbanites are the most affluent group, working hard to lead bright, fulfilled lives Residents invest for their future, insure themselves against unforeseen circumstances, but also enjoy the fruits of their labor 	1A Top Tier 1B Professional Pride 1C Boomburbs 1D Savvy Suburbanites 1E Exurbanites 2A Urban Chic 2B Pleasantville 2D Enterprising Professionals 4A Soccer Moms 4B Home Improvement 5A Comfortable Empty Nesters 5C Parks and Rec 5E Midlife Constants 7A Up and Coming Families 9A Silver & Gold 9B Golden Years 9C The Elders 14A Military Proximity
<p>Semirural</p> <ul style="list-style-type: none"> The most affordable housing—in smaller towns and communities located throughout the country Single-family and mobile homes in the country, but still within reach of some amenities Embrace a quiet, country lifestyle including country music and hunting Prefer domestic products and vehicles, especially trucks Shop at large department and discount stores like Walmart Fast food and dinner mixes/kits are much more common than fine dining Many make a living off the land through agriculture, fishing and forestry Time off is spent visiting nearby family rather than flying to vacation destinations When services are needed, the yellow pages are within reach 	4C Middleburg 6F Heartland Communities 7E Valley Growers 9D Senior Escapes 10D Down the Road 12C Small Town Simplicity

Urbanization	Segment ID and Name
<p>Rural</p> <ul style="list-style-type: none"> • Country living featuring single-family homes with acreage, farms and rural resort areas • Very low population density distinguishes this group—typically less than 50 people per square mile • Over half of all households are occupied by persons 55 years and older; many are married couples without children at home • The least diverse group, with over 80% non-Hispanic White • Mostly home owners (> 80%) , but rentals are affordable in single-family or mobile homes • Long trips to the store and to work—often driven alone in a truck or SUV, listening to country radio • Blue collar jobs dominate the landscape including manufacturing, agriculture, mining and construction • Many are self-employed, retired, or receive income from Social Security • Satellite TV and landline phones are necessary means to connect • More conservative in their spending practices and beliefs • Comfortable, established and not likely to move 	<p>6A Green Acres</p> <p>6B Salt of the Earth</p> <p>6C The Great Outdoors</p> <p>6D Prairie Living</p> <p>6E Rural Resort Dwellers</p> <p>10A Southern Satellites</p> <p>10B Rooted Rural</p> <p>10C Diners & Miners</p> <p>10E Rural Bypasses</p>

Table 15 - Priority Express Mail Price Reference Table; Up to 30lbs

Priority Mail Express - Retail

Flat Rate Envelope	\$ 22.95
Legal Flat Rate Envelope	\$ 22.95
Padded Flat Rate Envelope	\$ 22.95
Flat Rate Boxes Eliminated	-

Weight Not Over (Lbs)	Zones								
	L, 1 & 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8	Zone 9	
0.5	\$ 22.95	\$ 22.95	\$ 23.70	\$ 25.75	\$ 27.55	\$ 29.25	\$ 31.20	\$ 38.05	
1	\$ 22.95	\$ 23.95	\$ 28.85	\$ 32.30	\$ 33.45	\$ 35.50	\$ 36.60	\$ 44.65	
2	\$ 22.95	\$ 25.55	\$ 31.45	\$ 35.20	\$ 36.65	\$ 38.80	\$ 40.15	\$ 49.00	
3	\$ 22.95	\$ 26.75	\$ 35.35	\$ 40.50	\$ 42.25	\$ 44.75	\$ 46.00	\$ 56.10	
4	\$ 22.95	\$ 28.50	\$ 37.70	\$ 45.80	\$ 47.60	\$ 50.40	\$ 51.75	\$ 63.15	
5	\$ 24.00	\$ 32.00	\$ 40.20	\$ 49.00	\$ 53.50	\$ 56.05	\$ 57.55	\$ 70.20	
6	\$ 27.45	\$ 36.65	\$ 46.60	\$ 55.70	\$ 58.60	\$ 61.60	\$ 63.50	\$ 77.45	
7	\$ 30.10	\$ 40.15	\$ 53.40	\$ 60.90	\$ 63.65	\$ 67.30	\$ 69.70	\$ 85.05	
8	\$ 33.05	\$ 44.05	\$ 57.85	\$ 65.50	\$ 69.10	\$ 73.05	\$ 75.05	\$ 91.55	
9	\$ 34.35	\$ 45.80	\$ 60.00	\$ 70.05	\$ 74.45	\$ 78.70	\$ 80.80	\$ 98.60	
10	\$ 36.15	\$ 47.75	\$ 62.30	\$ 73.20	\$ 78.30	\$ 82.75	\$ 84.85	\$ 103.50	
11	\$ 38.20	\$ 53.40	\$ 69.60	\$ 78.25	\$ 82.10	\$ 86.70	\$ 88.90	\$ 108.45	
12	\$ 40.25	\$ 57.15	\$ 73.95	\$ 82.40	\$ 85.80	\$ 90.65	\$ 92.85	\$ 113.30	
13	\$ 42.60	\$ 60.85	\$ 77.35	\$ 86.15	\$ 89.40	\$ 94.40	\$ 98.25	\$ 119.85	
14	\$ 44.55	\$ 64.60	\$ 80.40	\$ 89.50	\$ 93.15	\$ 98.35	\$ 102.30	\$ 124.80	
15	\$ 46.00	\$ 68.20	\$ 83.80	\$ 93.30	\$ 96.95	\$ 102.30	\$ 106.40	\$ 129.80	
16	\$ 48.00	\$ 72.10	\$ 87.10	\$ 96.90	\$ 101.15	\$ 106.70	\$ 109.95	\$ 134.15	
17	\$ 49.85	\$ 75.85	\$ 90.40	\$ 100.45	\$ 104.55	\$ 110.20	\$ 113.05	\$ 137.90	
18	\$ 51.85	\$ 79.45	\$ 93.60	\$ 104.00	\$ 108.20	\$ 114.10	\$ 117.10	\$ 142.85	
19	\$ 53.70	\$ 83.20	\$ 96.80	\$ 107.50	\$ 111.95	\$ 117.95	\$ 121.00	\$ 147.60	
20	\$ 56.00	\$ 86.95	\$ 101.60	\$ 112.75	\$ 116.30	\$ 122.55	\$ 126.40	\$ 154.20	
21	\$ 57.25	\$ 92.40	\$ 104.80	\$ 116.30	\$ 121.45	\$ 127.90	\$ 131.15	\$ 160.00	
22	\$ 59.40	\$ 96.25	\$ 109.40	\$ 121.35	\$ 125.30	\$ 131.85	\$ 136.20	\$ 166.15	
23	\$ 61.15	\$ 99.95	\$ 112.60	\$ 124.90	\$ 129.15	\$ 135.90	\$ 140.15	\$ 171.00	
24	\$ 63.40	\$ 103.80	\$ 116.25	\$ 128.85	\$ 133.05	\$ 139.95	\$ 143.25	\$ 174.75	
25	\$ 65.95	\$ 107.65	\$ 119.05	\$ 131.85	\$ 136.65	\$ 143.70	\$ 147.75	\$ 180.25	
26	\$ 67.40	\$ 111.50	\$ 122.50	\$ 135.65	\$ 140.50	\$ 147.70	\$ 151.95	\$ 185.40	
27	\$ 69.35	\$ 115.15	\$ 125.70	\$ 139.10	\$ 144.20	\$ 151.55	\$ 155.95	\$ 190.25	
28	\$ 70.75	\$ 119.00	\$ 129.70	\$ 143.50	\$ 147.95	\$ 155.45	\$ 160.05	\$ 195.25	
29	\$ 72.95	\$ 122.75	\$ 133.95	\$ 148.10	\$ 151.80	\$ 159.35	\$ 163.95	\$ 200.00	
30	\$ 75.00	\$ 126.55	\$ 138.20	\$ 152.70	\$ 156.15	\$ 163.95	\$ 169.15	\$ 206.35	

Table 16 – Priority Express Mail Price Reference Table; 31 to 70lbs

Weight Not Over (Lbs)	Zones								
	L, 1 & 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8	Zone 9	
31	\$ 76.85	\$ 130.35	\$ 142.35	\$ 157.30	\$ 161.10	\$ 169.05	\$ 174.50	\$ 212.90	
32	\$ 78.90	\$ 134.30	\$ 146.65	\$ 161.85	\$ 165.80	\$ 173.95	\$ 179.70	\$ 219.25	
33	\$ 81.35	\$ 138.00	\$ 150.85	\$ 166.45	\$ 170.65	\$ 178.95	\$ 184.85	\$ 225.50	
34	\$ 83.70	\$ 141.70	\$ 155.20	\$ 171.20	\$ 175.35	\$ 183.85	\$ 190.00	\$ 231.80	
35	\$ 85.85	\$ 145.55	\$ 159.25	\$ 175.55	\$ 180.05	\$ 188.70	\$ 195.20	\$ 238.15	
36	\$ 88.05	\$ 149.40	\$ 163.60	\$ 180.25	\$ 185.00	\$ 193.80	\$ 200.45	\$ 244.55	
37	\$ 89.95	\$ 153.10	\$ 167.80	\$ 184.80	\$ 189.90	\$ 198.85	\$ 205.70	\$ 250.95	
38	\$ 92.05	\$ 157.00	\$ 172.05	\$ 189.45	\$ 194.60	\$ 203.75	\$ 210.80	\$ 257.20	
39	\$ 94.35	\$ 160.80	\$ 176.35	\$ 194.00	\$ 199.15	\$ 208.45	\$ 216.05	\$ 263.60	
40	\$ 96.35	\$ 164.45	\$ 180.65	\$ 198.70	\$ 204.00	\$ 213.45	\$ 221.30	\$ 270.00	
41	\$ 98.25	\$ 168.35	\$ 184.85	\$ 203.20	\$ 208.95	\$ 218.60	\$ 226.45	\$ 276.25	
42	\$ 100.00	\$ 172.20	\$ 189.10	\$ 207.75	\$ 213.85	\$ 223.60	\$ 231.60	\$ 282.55	
43	\$ 102.30	\$ 175.90	\$ 193.25	\$ 212.25	\$ 218.60	\$ 228.45	\$ 236.85	\$ 288.95	
44	\$ 104.15	\$ 179.75	\$ 197.55	\$ 216.85	\$ 223.30	\$ 233.35	\$ 242.00	\$ 295.25	
45	\$ 106.15	\$ 183.60	\$ 201.65	\$ 221.30	\$ 228.10	\$ 238.30	\$ 247.30	\$ 301.70	
46	\$ 108.25	\$ 187.25	\$ 206.15	\$ 226.05	\$ 232.85	\$ 243.15	\$ 252.45	\$ 308.00	
47	\$ 110.50	\$ 191.10	\$ 210.30	\$ 230.55	\$ 237.65	\$ 248.10	\$ 257.65	\$ 314.35	
48	\$ 112.40	\$ 195.00	\$ 214.45	\$ 234.95	\$ 242.45	\$ 253.00	\$ 262.85	\$ 320.70	
49	\$ 114.40	\$ 198.65	\$ 218.75	\$ 239.50	\$ 247.40	\$ 258.10	\$ 268.10	\$ 327.10	
50	\$ 116.85	\$ 202.55	\$ 223.05	\$ 244.20	\$ 252.00	\$ 262.80	\$ 273.25	\$ 333.35	
51	\$ 118.90	\$ 206.40	\$ 227.25	\$ 248.65	\$ 256.75	\$ 267.65	\$ 277.75	\$ 338.85	
52	\$ 120.95	\$ 210.00	\$ 231.40	\$ 253.10	\$ 261.70	\$ 272.70	\$ 283.75	\$ 346.20	
53	\$ 122.90	\$ 213.90	\$ 235.75	\$ 257.65	\$ 266.50	\$ 277.65	\$ 288.95	\$ 352.50	
54	\$ 125.10	\$ 217.75	\$ 239.90	\$ 262.10	\$ 271.30	\$ 282.55	\$ 294.10	\$ 358.80	
55	\$ 127.60	\$ 222.75	\$ 244.30	\$ 266.75	\$ 276.05	\$ 287.35	\$ 299.25	\$ 365.10	
56	\$ 130.25	\$ 226.65	\$ 248.45	\$ 271.15	\$ 280.80	\$ 292.25	\$ 304.50	\$ 371.50	
57	\$ 132.50	\$ 230.45	\$ 252.70	\$ 275.70	\$ 285.55	\$ 297.15	\$ 309.65	\$ 377.75	
58	\$ 134.75	\$ 234.10	\$ 256.90	\$ 280.10	\$ 290.40	\$ 302.05	\$ 314.85	\$ 384.10	
59	\$ 136.60	\$ 237.90	\$ 261.10	\$ 284.60	\$ 295.30	\$ 307.00	\$ 320.05	\$ 390.45	
60	\$ 138.45	\$ 241.70	\$ 265.35	\$ 289.10	\$ 300.05	\$ 311.85	\$ 325.25	\$ 396.80	
61	\$ 140.40	\$ 245.60	\$ 269.80	\$ 293.80	\$ 304.85	\$ 316.70	\$ 330.45	\$ 403.15	
62	\$ 142.60	\$ 249.30	\$ 273.90	\$ 298.10	\$ 309.55	\$ 321.50	\$ 335.75	\$ 409.60	
63	\$ 144.95	\$ 253.05	\$ 278.15	\$ 302.60	\$ 314.40	\$ 326.50	\$ 341.00	\$ 416.00	
64	\$ 146.90	\$ 256.85	\$ 282.35	\$ 307.00	\$ 319.25	\$ 331.40	\$ 346.20	\$ 422.35	
65	\$ 149.40	\$ 260.65	\$ 286.55	\$ 311.45	\$ 324.00	\$ 336.15	\$ 351.30	\$ 428.60	
66	\$ 152.20	\$ 264.55	\$ 290.90	\$ 316.05	\$ 328.80	\$ 341.05	\$ 356.45	\$ 434.85	
67	\$ 153.95	\$ 268.25	\$ 295.20	\$ 320.55	\$ 333.45	\$ 345.75	\$ 361.70	\$ 441.25	
68	\$ 156.00	\$ 272.05	\$ 299.40	\$ 324.90	\$ 338.45	\$ 350.85	\$ 367.05	\$ 447.80	
69	\$ 158.45	\$ 275.90	\$ 303.60	\$ 329.35	\$ 343.10	\$ 355.55	\$ 372.00	\$ 453.85	
70	\$ 161.35	\$ 279.70	\$ 307.90	\$ 333.80	\$ 347.95	\$ 360.40	\$ 377.25	\$ 460.25	

Table 17 - Priority Mail Price Reference Table; Up to 30lbs

Priority Mail - Retail

Flat Rate Envelopes	\$	6.45
Legal Flat Rate Envelope	\$	6.45
Padded Flat Rate Envelope	\$	6.80
Small Flat Rate Box	\$	6.80
Medium Flat Rate Boxes	\$	13.45
Large Flat Rate Boxes	\$	18.75
APO/FPO/DPO Large Flat Rate Box	\$	16.75

Weight Not Over (Lbs)	Zones								
	L, 1 & 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8	Zone 9	
1	\$ 6.45	\$ 6.70	\$ 6.85	\$ 6.95	\$ 7.05	\$ 7.30	\$ 7.85	\$ 10.00	
2	\$ 6.80	\$ 7.15	\$ 7.75	\$ 9.45	\$ 10.25	\$ 11.35	\$ 12.40	\$ 16.20	
3	\$ 7.35	\$ 8.45	\$ 9.75	\$ 11.35	\$ 12.80	\$ 14.10	\$ 16.65	\$ 21.70	
4	\$ 8.30	\$ 9.90	\$ 11.15	\$ 14.95	\$ 16.45	\$ 18.00	\$ 20.05	\$ 26.15	
5	\$ 9.85	\$ 10.95	\$ 12.45	\$ 17.00	\$ 18.70	\$ 20.65	\$ 23.15	\$ 30.25	
6	\$ 10.00	\$ 11.30	\$ 12.75	\$ 18.70	\$ 20.80	\$ 22.40	\$ 25.25	\$ 34.15	
7	\$ 10.60	\$ 12.15	\$ 13.55	\$ 20.85	\$ 23.05	\$ 25.15	\$ 28.45	\$ 38.40	
8	\$ 11.40	\$ 12.85	\$ 14.15	\$ 22.65	\$ 25.25	\$ 27.80	\$ 31.80	\$ 42.95	
9	\$ 11.90	\$ 13.20	\$ 14.65	\$ 23.90	\$ 27.50	\$ 30.05	\$ 35.40	\$ 47.80	
10	\$ 12.65	\$ 13.25	\$ 14.90	\$ 25.95	\$ 29.70	\$ 33.05	\$ 38.60	\$ 52.10	
11	\$ 13.50	\$ 13.80	\$ 15.10	\$ 28.00	\$ 31.90	\$ 36.50	\$ 42.35	\$ 57.65	
12	\$ 13.95	\$ 14.20	\$ 15.30	\$ 30.00	\$ 34.70	\$ 39.45	\$ 45.45	\$ 61.85	
13	\$ 14.10	\$ 14.55	\$ 15.50	\$ 31.70	\$ 37.25	\$ 41.05	\$ 47.10	\$ 64.10	
14	\$ 14.30	\$ 15.00	\$ 15.70	\$ 33.70	\$ 39.30	\$ 43.35	\$ 49.45	\$ 67.30	
15	\$ 14.55	\$ 15.45	\$ 15.90	\$ 35.65	\$ 41.00	\$ 44.30	\$ 50.80	\$ 69.20	
16	\$ 15.40	\$ 16.55	\$ 17.45	\$ 37.65	\$ 43.30	\$ 46.75	\$ 53.65	\$ 73.00	
17	\$ 16.15	\$ 17.60	\$ 19.05	\$ 39.60	\$ 45.50	\$ 49.25	\$ 56.45	\$ 76.85	
18	\$ 16.95	\$ 18.60	\$ 20.60	\$ 41.55	\$ 47.90	\$ 51.65	\$ 59.35	\$ 80.80	
19	\$ 17.75	\$ 19.65	\$ 22.15	\$ 42.70	\$ 48.85	\$ 52.75	\$ 60.60	\$ 84.60	
20	\$ 18.50	\$ 20.70	\$ 23.70	\$ 43.40	\$ 50.00	\$ 54.65	\$ 63.40	\$ 88.50	
21	\$ 19.30	\$ 21.75	\$ 25.25	\$ 44.05	\$ 50.85	\$ 55.55	\$ 64.85	\$ 91.25	
22	\$ 20.05	\$ 22.80	\$ 27.35	\$ 45.10	\$ 52.00	\$ 56.90	\$ 66.40	\$ 93.50	
23	\$ 20.85	\$ 23.80	\$ 29.45	\$ 45.85	\$ 52.95	\$ 58.00	\$ 67.60	\$ 95.15	
24	\$ 21.65	\$ 25.10	\$ 31.50	\$ 46.85	\$ 54.05	\$ 59.45	\$ 69.25	\$ 97.50	
25	\$ 22.55	\$ 27.10	\$ 33.95	\$ 47.65	\$ 54.75	\$ 60.95	\$ 70.40	\$ 99.10	
26	\$ 23.50	\$ 28.35	\$ 36.35	\$ 48.60	\$ 56.10	\$ 62.45	\$ 72.65	\$ 102.25	
27	\$ 24.20	\$ 28.75	\$ 37.45	\$ 49.55	\$ 56.90	\$ 63.90	\$ 75.35	\$ 106.10	
28	\$ 24.95	\$ 29.15	\$ 38.55	\$ 50.80	\$ 57.65	\$ 65.35	\$ 78.20	\$ 110.10	
29	\$ 25.70	\$ 29.45	\$ 39.50	\$ 51.55	\$ 58.65	\$ 66.85	\$ 80.30	\$ 113.05	
30	\$ 26.45	\$ 29.85	\$ 40.45	\$ 52.25	\$ 60.25	\$ 68.40	\$ 82.05	\$ 115.50	

Table 18 - Priority Mail Price Reference Table; 31 to 70lbs

Weight Not Over (Lbs)	Zones								
	L, 1 & 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8	Zone 9	
31	\$ 27.25	\$ 30.15	\$ 41.10	\$ 52.95	\$ 61.15	\$ 69.85	\$ 83.70	\$ 118.80	
32	\$ 27.55	\$ 30.80	\$ 41.80	\$ 53.55	\$ 61.95	\$ 71.35	\$ 85.40	\$ 121.20	
33	\$ 28.00	\$ 31.65	\$ 42.85	\$ 54.25	\$ 63.15	\$ 72.85	\$ 87.00	\$ 123.50	
34	\$ 28.25	\$ 32.50	\$ 43.90	\$ 55.40	\$ 64.60	\$ 74.35	\$ 88.65	\$ 125.80	
35	\$ 28.55	\$ 33.30	\$ 44.50	\$ 56.60	\$ 66.35	\$ 75.80	\$ 90.10	\$ 127.90	
36	\$ 28.85	\$ 34.20	\$ 45.10	\$ 57.80	\$ 68.05	\$ 76.85	\$ 91.70	\$ 130.10	
37	\$ 29.15	\$ 34.85	\$ 45.75	\$ 58.85	\$ 69.80	\$ 77.85	\$ 93.20	\$ 132.25	
38	\$ 29.45	\$ 35.70	\$ 46.35	\$ 60.00	\$ 71.75	\$ 78.80	\$ 94.70	\$ 134.40	
39	\$ 29.75	\$ 36.50	\$ 46.90	\$ 61.25	\$ 73.50	\$ 80.80	\$ 96.10	\$ 136.40	
40	\$ 30.10	\$ 37.30	\$ 47.55	\$ 62.55	\$ 74.65	\$ 82.65	\$ 97.45	\$ 138.30	
41	\$ 30.40	\$ 38.00	\$ 48.05	\$ 63.15	\$ 75.85	\$ 84.40	\$ 98.85	\$ 141.40	
42	\$ 30.65	\$ 38.70	\$ 48.60	\$ 64.50	\$ 77.20	\$ 85.50	\$ 100.20	\$ 143.35	
43	\$ 31.00	\$ 39.30	\$ 49.05	\$ 65.95	\$ 79.10	\$ 86.60	\$ 101.45	\$ 145.15	
44	\$ 31.20	\$ 39.95	\$ 49.65	\$ 67.30	\$ 80.35	\$ 87.60	\$ 102.65	\$ 146.90	
45	\$ 31.40	\$ 40.40	\$ 50.00	\$ 68.85	\$ 81.20	\$ 88.60	\$ 103.95	\$ 148.75	
46	\$ 31.65	\$ 40.70	\$ 50.55	\$ 70.10	\$ 82.10	\$ 89.55	\$ 105.20	\$ 150.55	
47	\$ 31.95	\$ 41.05	\$ 51.00	\$ 71.70	\$ 83.00	\$ 90.55	\$ 106.35	\$ 152.15	
48	\$ 32.20	\$ 41.40	\$ 51.50	\$ 73.10	\$ 84.10	\$ 91.40	\$ 107.50	\$ 153.80	
49	\$ 32.40	\$ 41.70	\$ 51.90	\$ 74.45	\$ 85.20	\$ 92.35	\$ 108.60	\$ 155.35	
50	\$ 32.55	\$ 41.95	\$ 52.25	\$ 75.90	\$ 86.35	\$ 93.55	\$ 109.70	\$ 156.95	
51	\$ 32.70	\$ 42.35	\$ 52.75	\$ 77.15	\$ 87.55	\$ 94.90	\$ 110.70	\$ 159.65	
52	\$ 33.10	\$ 42.60	\$ 53.10	\$ 77.80	\$ 88.45	\$ 96.30	\$ 112.00	\$ 161.60	
53	\$ 33.65	\$ 42.90	\$ 53.45	\$ 78.40	\$ 89.20	\$ 97.85	\$ 113.45	\$ 163.70	
54	\$ 34.10	\$ 43.10	\$ 53.80	\$ 79.05	\$ 89.85	\$ 99.30	\$ 115.10	\$ 165.95	
55	\$ 34.70	\$ 43.40	\$ 54.10	\$ 79.60	\$ 90.55	\$ 100.85	\$ 116.60	\$ 168.20	
56	\$ 35.15	\$ 43.65	\$ 54.40	\$ 80.15	\$ 91.15	\$ 102.30	\$ 117.70	\$ 169.75	
57	\$ 35.65	\$ 43.80	\$ 54.75	\$ 80.60	\$ 91.85	\$ 103.85	\$ 118.55	\$ 171.00	
58	\$ 36.25	\$ 44.00	\$ 55.05	\$ 81.15	\$ 92.35	\$ 105.25	\$ 119.45	\$ 172.25	
59	\$ 36.80	\$ 44.20	\$ 55.35	\$ 81.65	\$ 92.90	\$ 105.90	\$ 120.40	\$ 173.65	
60	\$ 37.30	\$ 44.40	\$ 55.90	\$ 82.05	\$ 93.40	\$ 106.55	\$ 121.15	\$ 174.80	
61	\$ 37.85	\$ 44.60	\$ 56.90	\$ 82.45	\$ 93.90	\$ 107.15	\$ 122.80	\$ 177.20	
62	\$ 38.25	\$ 44.70	\$ 57.60	\$ 82.90	\$ 94.40	\$ 107.65	\$ 124.80	\$ 180.00	
63	\$ 39.00	\$ 44.95	\$ 58.55	\$ 83.30	\$ 94.90	\$ 108.15	\$ 126.80	\$ 182.90	
64	\$ 39.35	\$ 45.05	\$ 59.40	\$ 83.65	\$ 95.25	\$ 108.70	\$ 128.70	\$ 185.65	
65	\$ 39.90	\$ 45.15	\$ 60.20	\$ 83.95	\$ 95.60	\$ 109.20	\$ 130.75	\$ 188.60	
66	\$ 40.40	\$ 45.35	\$ 61.15	\$ 84.35	\$ 96.05	\$ 109.55	\$ 132.60	\$ 191.30	
67	\$ 41.05	\$ 45.45	\$ 62.20	\$ 84.65	\$ 96.35	\$ 110.00	\$ 134.35	\$ 193.80	
68	\$ 41.55	\$ 45.55	\$ 63.00	\$ 84.85	\$ 97.55	\$ 110.40	\$ 135.80	\$ 195.90	
69	\$ 42.10	\$ 45.60	\$ 63.75	\$ 85.05	\$ 98.75	\$ 110.70	\$ 137.25	\$ 197.95	
70	\$ 42.55	\$ 45.70	\$ 64.80	\$ 85.35	\$ 99.95	\$ 111.10	\$ 138.75	\$ 200.10	
Balloon	\$ 18.50	\$ 20.70	\$ 23.70	-	-	-	-	-	-

Table 19 - USPS Retail Ground Mail Price Reference Table; Up to 30lbs

USPS Retail Ground - Retail (formerly Standard Post)

Weight Not Over (Lbs)	Zones								
	1 & 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8	Zone 9	
1	\$ 6.75	\$ 6.80	\$ 6.85	\$ 6.89	\$ 7.04	\$ 7.29	\$ 7.84	\$ 7.84	
2	\$ 6.85	\$ 7.00	\$ 7.75	\$ 7.97	\$ 9.02	\$ 10.09	\$ 11.51	\$ 11.51	
3	\$ 7.35	\$ 8.45	\$ 9.75	\$ 10.38	\$ 11.14	\$ 12.91	\$ 15.00	\$ 15.00	
4	\$ 8.30	\$ 9.90	\$ 11.15	\$ 12.71	\$ 13.55	\$ 15.85	\$ 18.05	\$ 18.05	
5	\$ 9.85	\$ 10.95	\$ 12.45	\$ 14.45	\$ 15.33	\$ 18.16	\$ 20.86	\$ 20.86	
6	\$ 10.00	\$ 11.30	\$ 12.75	\$ 15.91	\$ 17.06	\$ 19.90	\$ 22.98	\$ 22.98	
7	\$ 10.60	\$ 12.15	\$ 13.55	\$ 17.72	\$ 18.89	\$ 21.91	\$ 25.03	\$ 25.03	
8	\$ 11.40	\$ 12.85	\$ 14.15	\$ 19.27	\$ 20.72	\$ 23.93	\$ 28.01	\$ 28.01	
9	\$ 11.90	\$ 13.20	\$ 14.65	\$ 20.33	\$ 22.56	\$ 25.85	\$ 31.16	\$ 31.16	
10	\$ 12.65	\$ 13.25	\$ 14.90	\$ 22.06	\$ 24.35	\$ 28.44	\$ 33.95	\$ 33.95	
11	\$ 13.50	\$ 13.80	\$ 15.10	\$ 23.78	\$ 26.14	\$ 31.39	\$ 37.25	\$ 37.25	
12	\$ 13.95	\$ 14.20	\$ 15.30	\$ 25.50	\$ 28.44	\$ 33.94	\$ 39.99	\$ 39.99	
13	\$ 14.10	\$ 14.55	\$ 15.50	\$ 26.96	\$ 30.53	\$ 35.28	\$ 41.46	\$ 41.46	
14	\$ 14.30	\$ 15.00	\$ 15.70	\$ 28.64	\$ 32.24	\$ 37.30	\$ 43.52	\$ 43.52	
15	\$ 14.55	\$ 15.45	\$ 15.90	\$ 30.32	\$ 33.60	\$ 38.10	\$ 44.71	\$ 44.71	
16	\$ 15.40	\$ 16.55	\$ 17.45	\$ 32.00	\$ 35.52	\$ 40.20	\$ 47.22	\$ 47.22	
17	\$ 16.15	\$ 17.60	\$ 19.05	\$ 33.68	\$ 37.31	\$ 42.35	\$ 49.70	\$ 49.70	
18	\$ 16.95	\$ 18.60	\$ 20.60	\$ 35.32	\$ 39.27	\$ 44.41	\$ 52.21	\$ 52.21	
19	\$ 17.75	\$ 19.65	\$ 22.15	\$ 36.29	\$ 40.04	\$ 45.35	\$ 53.31	\$ 53.31	
20	\$ 18.50	\$ 20.70	\$ 23.70	\$ 36.91	\$ 41.02	\$ 47.00	\$ 55.78	\$ 55.78	
21	\$ 19.30	\$ 21.75	\$ 25.25	\$ 37.44	\$ 41.70	\$ 47.76	\$ 57.06	\$ 57.06	
22	\$ 20.05	\$ 22.80	\$ 27.35	\$ 38.32	\$ 42.64	\$ 48.92	\$ 58.44	\$ 58.44	
23	\$ 20.85	\$ 23.80	\$ 29.45	\$ 38.98	\$ 43.41	\$ 49.86	\$ 59.49	\$ 59.49	
24	\$ 21.65	\$ 25.10	\$ 31.50	\$ 39.82	\$ 44.30	\$ 51.11	\$ 60.95	\$ 60.95	
25	\$ 22.55	\$ 27.10	\$ 33.95	\$ 40.49	\$ 44.90	\$ 52.41	\$ 61.96	\$ 61.96	
26	\$ 23.50	\$ 28.35	\$ 36.35	\$ 41.33	\$ 46.01	\$ 53.71	\$ 63.93	\$ 63.93	
27	\$ 24.20	\$ 28.75	\$ 37.45	\$ 43.11	\$ 46.65	\$ 54.96	\$ 66.31	\$ 66.31	
28	\$ 24.95	\$ 29.15	\$ 38.55	\$ 44.20	\$ 47.29	\$ 56.21	\$ 68.82	\$ 68.82	
29	\$ 25.70	\$ 29.45	\$ 39.50	\$ 44.83	\$ 48.10	\$ 57.51	\$ 70.65	\$ 70.65	
30	\$ 26.45	\$ 29.85	\$ 40.45	\$ 45.47	\$ 49.42	\$ 58.81	\$ 72.21	\$ 72.21	

Table 20 - USPS Retail Ground Price Reference Table; 31 to 70lbs

Weight Not Over (Lbs)	Zones								
	1 & 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8	Zone 9	
31	\$ 27.25	\$ 30.15	\$ 41.10	\$ 46.05	\$ 50.14	\$ 60.06	\$ 73.67	\$ 73.67	
32	\$ 27.55	\$ 30.80	\$ 41.80	\$ 46.60	\$ 50.78	\$ 61.36	\$ 75.14	\$ 75.14	
33	\$ 28.00	\$ 31.65	\$ 42.85	\$ 47.19	\$ 52.04	\$ 62.65	\$ 76.56	\$ 76.56	
34	\$ 28.25	\$ 32.50	\$ 43.90	\$ 48.18	\$ 53.30	\$ 63.95	\$ 78.02	\$ 78.02	
35	\$ 28.55	\$ 33.30	\$ 44.50	\$ 49.22	\$ 54.56	\$ 65.20	\$ 79.30	\$ 79.30	
36	\$ 28.85	\$ 34.20	\$ 45.10	\$ 50.31	\$ 55.82	\$ 66.10	\$ 80.67	\$ 80.67	
37	\$ 29.15	\$ 34.85	\$ 45.75	\$ 51.21	\$ 57.22	\$ 66.95	\$ 82.00	\$ 82.00	
38	\$ 29.45	\$ 35.70	\$ 46.35	\$ 52.21	\$ 58.84	\$ 67.75	\$ 83.33	\$ 83.33	
39	\$ 29.75	\$ 36.50	\$ 46.90	\$ 53.29	\$ 60.25	\$ 69.49	\$ 84.56	\$ 84.56	
40	\$ 30.10	\$ 37.30	\$ 47.55	\$ 54.42	\$ 61.23	\$ 71.06	\$ 85.75	\$ 85.75	
41	\$ 30.40	\$ 38.00	\$ 48.05	\$ 54.92	\$ 62.21	\$ 72.58	\$ 86.99	\$ 86.99	
42	\$ 30.65	\$ 38.70	\$ 48.60	\$ 56.10	\$ 63.32	\$ 73.52	\$ 88.18	\$ 88.18	
43	\$ 31.00	\$ 39.30	\$ 49.05	\$ 57.36	\$ 64.86	\$ 74.46	\$ 89.28	\$ 89.28	
44	\$ 31.20	\$ 39.95	\$ 49.65	\$ 58.54	\$ 65.88	\$ 75.35	\$ 90.33	\$ 90.33	
45	\$ 31.40	\$ 40.40	\$ 50.00	\$ 59.90	\$ 67.30	\$ 76.20	\$ 91.47	\$ 91.47	
46	\$ 31.65	\$ 40.70	\$ 50.55	\$ 60.98	\$ 68.03	\$ 77.01	\$ 92.57	\$ 92.57	
47	\$ 31.95	\$ 41.05	\$ 51.00	\$ 62.39	\$ 68.75	\$ 77.86	\$ 93.58	\$ 93.58	
48	\$ 32.20	\$ 41.40	\$ 51.50	\$ 63.61	\$ 69.65	\$ 78.62	\$ 94.59	\$ 94.59	
49	\$ 32.40	\$ 41.70	\$ 51.90	\$ 64.78	\$ 70.54	\$ 79.42	\$ 95.55	\$ 95.55	
50	\$ 32.55	\$ 41.95	\$ 52.25	\$ 66.05	\$ 71.53	\$ 80.45	\$ 96.55	\$ 96.55	
51	\$ 32.70	\$ 42.35	\$ 52.75	\$ 67.14	\$ 72.51	\$ 81.61	\$ 97.42	\$ 97.42	
52	\$ 33.10	\$ 42.60	\$ 53.10	\$ 67.68	\$ 73.23	\$ 82.82	\$ 98.57	\$ 98.57	
53	\$ 33.65	\$ 42.90	\$ 53.45	\$ 68.22	\$ 73.83	\$ 84.16	\$ 99.85	\$ 99.85	
54	\$ 34.10	\$ 43.10	\$ 53.80	\$ 68.76	\$ 74.38	\$ 85.42	\$ 101.27	\$ 101.27	
55	\$ 34.70	\$ 43.40	\$ 54.10	\$ 69.26	\$ 74.94	\$ 86.71	\$ 102.59	\$ 102.59	
56	\$ 35.15	\$ 43.65	\$ 54.40	\$ 69.71	\$ 75.45	\$ 87.96	\$ 103.55	\$ 103.55	
57	\$ 35.65	\$ 43.80	\$ 54.75	\$ 70.12	\$ 76.00	\$ 89.31	\$ 104.33	\$ 104.33	
58	\$ 36.25	\$ 44.00	\$ 55.05	\$ 70.62	\$ 76.43	\$ 90.51	\$ 105.11	\$ 105.11	
59	\$ 36.80	\$ 44.20	\$ 55.35	\$ 71.03	\$ 76.90	\$ 91.09	\$ 105.93	\$ 105.93	
60	\$ 37.30	\$ 44.40	\$ 55.90	\$ 71.39	\$ 77.28	\$ 91.63	\$ 106.62	\$ 106.62	
61	\$ 37.85	\$ 44.60	\$ 56.90	\$ 71.75	\$ 77.71	\$ 92.17	\$ 108.09	\$ 108.09	
62	\$ 38.25	\$ 44.70	\$ 57.60	\$ 72.11	\$ 78.09	\$ 92.57	\$ 109.82	\$ 109.82	
63	\$ 39.00	\$ 44.95	\$ 58.55	\$ 72.47	\$ 78.52	\$ 93.02	\$ 111.56	\$ 111.56	
64	\$ 39.35	\$ 45.05	\$ 59.40	\$ 72.79	\$ 78.82	\$ 93.46	\$ 113.26	\$ 113.26	
65	\$ 39.90	\$ 45.15	\$ 60.20	\$ 73.02	\$ 79.07	\$ 93.91	\$ 115.04	\$ 115.04	
66	\$ 40.40	\$ 45.35	\$ 61.15	\$ 73.38	\$ 79.46	\$ 94.23	\$ 116.69	\$ 116.69	
67	\$ 41.05	\$ 45.45	\$ 62.20	\$ 73.65	\$ 79.71	\$ 94.58	\$ 118.24	\$ 118.24	
68	\$ 41.55	\$ 45.55	\$ 63.00	\$ 73.83	\$ 80.69	\$ 94.94	\$ 119.53	\$ 119.53	
69	\$ 42.10	\$ 45.60	\$ 63.75	\$ 74.01	\$ 81.67	\$ 95.21	\$ 120.76	\$ 120.76	
70	\$ 42.55	\$ 45.70	\$ 64.80	\$ 74.24	\$ 82.65	\$ 95.57	\$ 122.09	\$ 122.09	
Balloon	\$ 18.50	\$ 20.70	\$ 23.70	\$ 36.91	\$ 41.02	\$ 47.00	\$ 55.78	\$ 55.78	
Oversized	\$ 63.04	\$ 67.99	\$ 86.94	\$ 105.16	\$ 123.42	\$ 141.67	\$ 169.92	\$ 169.92	

Prices in Zones 1 - 4, up to 70 lbs, are only for the mailing of hazardous materials, live animals, or other items required to be shipped by ground/surface transportation.

Objective Function:

The objective function is to maximize revenue where:

- d represents demand or number of transactions,
- z represents the new price the consumer pays or zero, if the budget (\tilde{P}) was exceeded; note any budget limit can be used in this formulation,
- q represents the new price in the optimal solution,
- t represents the weight steps in the optimal solution, and
- s represents the zone in the optimal solution.

$$\text{Max} \sum_{\substack{m=1,\dots,M \\ n=1,\dots,N}} d_{mn} z_{mn}$$

Subject to:

$$q_{mn} \leq w_{ij} \quad \forall i \geq m, j \geq n \quad \forall m, n$$

$$w_{mn} = C(1 - x_{mn}) + p_{mn}x_{mn} \quad \forall m, n$$

$$MY_{mn} \geq \tilde{P}_{mn} - q_{mn} \quad \forall m, n$$

$$M(Y_{mn} - 1) \leq \tilde{P}_{mn} - q_{mn} \quad \forall m, n$$

$$z_{mn} \leq Cy_{mn} \quad \forall m, n$$

$$z_{mn} \leq q_{m,n} \quad \forall m, n$$

$$z_{mn} \geq q_{mn} - (1 - Y_{mn})C \quad \forall m, n$$

$$q_{mn} = \sum_{i \geq m, j \geq n} p_{ij} v_{mnij} \quad \forall m, n$$

$$\sum_{i,j} v_{mnij} = 1 \quad \forall m, n$$

$$i \geq m, j \geq n$$

$$v_{mnij} = 0 \quad \forall i < m, j < n \quad \forall m, n$$

$$v_{mnij} \leq x_{mn} \quad \forall m, n, i \geq m, j \geq n$$

$$x_{mn} \leq t_m \quad \forall m, n$$

$$x_{mn} \leq s_n \quad \forall m, n$$

$$x_{mn} \leq t_m + s_n - 1 \quad \forall m, n$$

$$x_{mn}, y_{mn}, t_m, s_n, v_{mnij} \in \{0,1\} \quad \forall m, n, i, j$$

$$w_{mn}, q_{mn}, z_{mn} \geq 0 \quad \forall m, n$$

$$C, M \text{ are constants such that } C > \max_{i,j} P_{ij}, \quad M \geq \max_{i,j} P_{ij}$$

Figure 2 - Discrete Optimization Model

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