swiss economics

Impact of Discontinuance of Saturday Delivery for Letters and Flats

Final Report

Dr. Urs Trinkner
Andreas Haller

Prepared for the U.S. Postal Regulatory Commission

February 2014

ISSN 2235-1868

Acknowledgments

Swiss Economics has been commissioned by the U.S. Postal Regulatory Commission to conduct this research on the plan of the United States Postal Service to discontinue the delivery of letters and flats on Saturdays while maintaining parcels delivery. Swiss Economics is an independent economic think tank.

Swiss Economics would like to acknowledge the valuable input and feedback from the Postal Regulatory Commission staff. We also thank the United States Postal Service for providing the Postal Regulatory Commission the data necessary to perform this research.

This report has been authored by the project team at Swiss Economics. Any errors or omissions herein remain the responsibility of the project team.

Contents

List of Figures

List of Tables

1. Executive Summary

Overview

Delivery costs are the largest segment of total costs incurred by the United States Postal Service (USPS). These costs comprise 38 percent of total operating costs. Accurately assessing how unit delivery costs behave is crucial to properly attribute costs to products. This report presents the application of a model for estimating the relationship between the cost of city carrier delivery and the number of delivery points receiving mail, as well as the volume of mail to be delivered. This model uses data from the Postal Service that allow the identification of the geographic location of all delivery points served by each delivery route, the volume delivered on the route each day, and the time spent on the route by the carrier. The model simulates each route, determining the shortest linear distance to serve all delivery points receiving mail.

The simulation can be modified to estimate the cost impact of a variety of possible scenarios that would alter the number and location of addresses served by a route on a given day including shifts in weekly or seasonal mail volumes, redesign of routes to shift addresses from one route to another, or switching to centralized mailbox delivery from delivery to each address. Additional research could also lead to refinements in measuring the relationship between delivery mode (e.g., foot or motorized) and delivery costs.

The discontinuance of Saturday delivery—a plan announced by USPS in 2013[1]—is likely to have the greatest impact on city carrier delivery costs. Therefore, an analysis of the estimated impact of discontinuing Saturday delivery of letters and flats is provided in this report as an illustration of how the model can be applied.

After running a baseline simulation to calibrate the model, the routes are re-simulated under the assumption that only addresses receiving parcels are served on Saturdays. Using the results of the re-simulation, the lengths and times are recalculated for each route, and compared to the status quo to measure the effects of the change on delivery costs.

This report adopts and modifies, as appropriate, previous Postal Service and U.S. Postal Regulatory Commission (PRC) analysis of the impact on other operations (collection, sorting, transportation) of discontinuing Saturday delivery. The results of these analyses are combined with the results of the delivery analysis to develop an overall estimate of the net impact. The results are presented as a range, with the low estimate of net savings reflecting more conservative assumptions and the high estimate reflecting the greatest likely potential savings.

Discontinuance of Saturday delivery: Plan 5, Plan 5+ and methodology

A first plan of USPS to discontinue Saturday delivery and deliver letters, flats and parcels five times a week was filed in 2010 (“plan 5”). The main difference in the adapted plan of 2013 is that Saturday delivery for parcels would be maintained. It is therefore referred to as “plan 5+.” In contrast to plan 5, plan 5+ was never officially filed by USPS. This study focuses on assessing the impact of plan 5+ and applies information from plan 5 as far as considered appropriate.

---

1 On February 6, 2013, the Postal Service announced plans to discontinue the street delivery of letter and flat mail on Saturdays, while continuing parcels delivery on Saturdays, and the delivery of mail addressed to PO Boxes. Post Offices would remain open on Saturdays. Once fully implemented, the USPS expects cost savings of approximately USD 2 billion. The implementation of the new delivery schedule was prohibited by congress. As a consequence, the Postal Service decided to delay the implementation and it did not file the plan for regulatory review by PRC.

Two possible scenarios of plan 5+ are analyzed. "Plan 5+ high" is designed to represent the upper bound of the savings estimates, whereas "plan 5+ low" indicates the lower bound. Plan 5+ high is based on adapted sorting and transport processes that were projected for plan 5. In contrast, "plan 5+ low" is much closer to the status quo, implying lower savings.

In both scenarios, letters and flats are not delivered on Saturdays. With only parcels remaining, this leads to significant changes in Saturday street times. It also affects Mondays, when the workload is significantly increased by the need to deliver letter and flat volumes no longer delivered on Saturdays. Based on earlier USPS assumptions, mail volume for delivery on Mondays would be about twice the volume of Wednesdays or Thursdays under plan 5+. On Saturdays, the parcels delivered are less than 1% of the daily average of mail pieces. The differences in delivery patterns between the status quo and plan 5+ are shown in Table 1. A value of 126.6% indicates that on that day, volumes are 26.6% higher than on an average weekday.

Table 1: Daily delivery patterns for status quo and plan 5+ and impact of plan 5+ in delivery

	Status quo	Plan 5+	Impact in delivery
Monday	126.6%	**195.7%**	Major impact on load times likely to increase existing overtime hours
Tuesday	100.6%	109.6%	
Wednesday	92.7%	92.7%	
Thursday	94.0%	94.8%	
Friday	93.6%	116.2%	Impact on load times may increase existing overtime hours
Saturday	92.5%	**0.7%**	Major impact on route, access and load times; reduction of existing overtime

The last column of Table 1 indicates the major financial impact of plan 5+ in delivery: Sharply reduced street times on Saturdays and an increase in workload on Mondays and Fridays, which is likely to increase existing carrier overtime hours, especially on Mondays. To estimate these effects, the adapted street times and increases of overtime hours are calculated in a model of street delivery activity. For all other direct effects, the information on plan 5 is analyzed and where necessary corrected. To compute the overall effect on USPS profits, the direct effects are then complemented with an illustrative assessment of potential indirect effects arising from consumers responding to the service changes by sending less mail.

Bottom-up delivery model

To compute the effects of plan 5+ on delivery, Swiss Economics used a bottom-up delivery model. For each carrier route and delivery day, the model computes a proxy of the time necessary to access all recipient mailboxes that require delivery. First, the model was applied for a random subsample of over 16,000 routes. Next, the model was calibrated and validated with actual USPS street times and base mileages. The model was then run for all FY 2012 Saturdays using actual parcels volumes. While the model can also be used to estimate the effect of increased coverage of addresses on weekdays, but based on experience with the model it would likely have a very small impact and would require a very substantial increase in the time required to run the model. Using the results of the model, savings on Saturdays and increases in overtime on Mondays and Fridays can be calculated. The savings on Saturdays can be computed both as avoided costs from plan 5+ relative to the status quo and incremental costs of plan 5+ relative to plan 5.

Direct effects of plan 5+ high and low

Based on the model, the following estimates on direct effects on USPS' operational delivery cost emerge.

For city carriers, the direct savings are USD 634 million before overtime effects, assuming that the cost for load times for letters and flats are shifted from Saturdays to other weekdays with no change in productivity. If however the plan 5 assumption of higher productivity on Mondays is applied, then the savings are USD 892 million. The more conservative estimate of USD 634 million is taken for plan 5+ low, and the higher value of USD 892 million for plan 5+ high.

In terms of overtime, the street time calculations for Friday, Saturday and Monday for FY 2012 translate into an upper bound of incremental overtime costs of USD 378 million. The recent American Postal Workers Union contract allows greater use of workers with more flexible work schedules. This may allow USPS to handle peak loads with fewer overtime hours. If all overtime hours were managed this way, zero additional paid overtime hours could occur. The assumptions for plan 5+ high and low are therefore zero and USD 378 million incremental costs, respectively.

For rural carriers, no such savings or incremental costs relative to plan 5 are assumed, as rural carriers are paid by the number of various workload elements (e.g., pieces, miles, and delivery points) each route requires. Similarly, plan 5 estimates for incremental express delivery costs are adopted.

For administrative "indirect" carrier costs, the approach used by USPS for plan 5 is applied, leading to an estimated additional savings of USD 265 million (plan 5+ high) and USD 238 million (plan 5+ low).

In total, the estimated direct savings of plan 5+ in delivery range between USD 0.9 and 1.7 billion. Table 2 provides an overview and compares with plan 5. The elements that differ from plan 5 are highlighted in red.

Table 2: Estimated direct cost savings in delivery

M USD	Plan 5	Plan 5+ high	Difference	Plan 5+ low	Difference
City carrier direct street time	1'162	892	(270)	634	(528)
City carrier direct in-office costs	102	102	-	-	(102)
City carrier adjustment for Saturday Express Mail	(7)	(7)	-	(7)	-
City carrier adjustment for cost of overtime hours	-	-	-	(378)	(378)
Rural carrier direct costs	341	341	-	341	-
Rural carrier EMA savings	85	85	-	85	-
Rural carrier adjustment for Saturday express mail	(1)	(1)	-	(1)	-
Indirect cost for city and rural carriers	305	265	(40)	238	(67)
Total delivery savings	**1'987**	**1'677**	**(310)**	**912**	**(1'075)**

For the processes other than delivery (collection, sorting and transport), the plan 5+ high scenario assumes the same adaptations are made as in plan 5. This is possible because the plan 5 operational changes are compatible with plan 5+. Under plan 5, sorting of mail items including parcels is continued on Friday night; therefore, parcels would arrive in delivery offices in time to be delivered on Saturday mornings. As a consequence, savings arise mainly from the discontinuation of Saturday dispatch from Post Offices, inducing fewer mail items requiring sorting and transport during the weekends. Based on earlier analysis of plan 5, the corresponding savings are estimated at about USD 290 million. In the plan 5+ low scenario it is assumed that Saturday dispatch continues as in the status quo, and consequently there are no savings. However, this would result in faster end-to-end delivery times, which should mitigate the reduction in volumes sent by mailers in response to the service changes.

In total, the estimated direct effects of plan 5+ range from USD 0.9 billion for plan 5+ low to 2 billion for plan 5+ high, as shown in Table 4.

Overall financial impact

The yearly impact on USPS' profits is computed as the combination of the direct effects of cost reductions, and indirect effects of volume changes as customers respond to the changed level of service.

If consumers respond to plan 5+ by sending fewer mail items, the resulting loss of revenue will partially offset savings. The quantification of demand effects is not part of this project. Instead, profitability boundaries are calculated and illustrative demand scenarios are evaluated.

For the computation of profitability boundaries, the magnitude of reduced mail demand that would equally offset savings (i.e., the break-even point) from plan 5+ is calculated. Table 23 presents the results of the calculation for FY 2012. The implementation of plan 5+ high with estimated direct savings of about USD 2 billion is therefore profitable as long as volume losses do not exceed 7.5% on average. With estimated direct savings of about USD 900 million for plan 5+ low, an average volume loss of 3.5% would offset savings.

Table 3: Break-even volume response

	Plan 5+ high	Plan 5+ low
Break-even average volume response	-7.5%	-3.5%

In addition, the net effect of plan 5+ high and low on the USPS' yearly profits is evaluated for illustrative demand assumptions. The demand responses are assumed to be smaller in plan 5+ low compared to plan 5+ high because the effects on quality are less severe in the low scenario compared to the high scenario. The results are shown in Table 4. In plan 5+ high, indirect effects caused by the assumed volume loss of 2.20% on average would reduce profits by about USD 570 million. In plan 5+ low, consumers respond less sharply, leading to a decrease of USD 287 million. For plan 5 with illustrative volume losses of 2.22% on average, the indirect effects are slightly smaller than in plan 5+ high. This somewhat counterintuitive result is caused by a negative contribution of market dominant parcels in FY 2012.

Table 4: Financial effects of plan 5+ compared to plan 5

M USD	Plan 5	Plan 5+ high	Plan 5+ low
Direct effects (direct avoided cost)	**2'276**	**1'966**	**912**
Savings Collection/Sorting	120	120	-
Savings Transport	170	170	-
Savings Delivery	1'987	1'677	912
Indirect effects for FY2012 (lost contribution)	**(571)**	**(573)**	**(287)**
Average volume response	-2.22%	-2.20%	-1.10%
Foregone revenue*	(1'234)	(1'169)	(585)
Avoided cost*	663	596	298
Total Savings	**1'705**	**1'393**	**625**

*For Plan 5, adapted to FY2012 figures

The illustrative demand scenarios indicate plan 5+ net savings ranging between USD 0.6 and 1.4 billion. This compares to the expected savings of USD 1.7 billion for plan 5. A final assessment would require additional details of the plan and its calculations, and market research on consumers' response to the plan. The estimated impact on USPS finances, which measures the impact on producers' surplus, may be complemented with an assessment of the impact on consumers' surplus to estimate the overall economic effects.

Additional applications

The model can be modified to evaluate a variety of possible scenarios that would alter the number and location of addresses served by a route on a given day, as well as a more general examination of the behavior of street delivery costs. The study currently used by the USPS and PRC to estimate the volume variability of city carrier street time costs predates many recent operational changes. It is currently being reviewed, and the USPS is collecting data on parcel delivery costs to be used in combination with data on regular delivery and mail collection to develop an updated analysis of total street time costs. The model presented in this report may prove useful in validating the results of that analysis and providing additional insight.

To respond to recent volume declines and financial difficulties, the USPS may also consider potential changes in delivery operations other than (or in addition to) reduced delivery frequency. Possible changes could include converting routes where deliveries are made to the door into curbline routes, or delivering to centralized neighborhood locations instead of delivering to each address. The model used in this report could be modified to evaluate the likely impacts of these types of operational changes.

2. Introduction

2.1 Overview

Delivery costs are the largest segment of total costs incurred by the Postal Service. These costs comprise 38 percent of total operating costs. Accurately assessing how unit delivery costs behave is crucial to properly attribute costs to products. This report presents the application of a model for estimating the relationship between the cost of city carrier delivery and the number of delivery points receiving mail, as well as the volume of mail to be delivered. This model uses data from the Postal Service that allow the identification of the geographic location of all delivery points served by each delivery route, the volume delivered on the route each day, and the time spent on the route by the carrier. The model simulates each route, determining the shortest linear distance to serve all delivery points receiving mail.

The discontinuance of Saturday delivery —a plan recently announced by USPS and further explained below—is likely to have a substantial impact on city carrier delivery costs. Therefore, an analysis of the estimated impact of discontinuing Saturday delivery of letters and flats is provided in this report as an illustration of how the model can be applied.

To provide a more complete analysis of the effects of discontinuing Saturday delivery of letters and flats, the report adopts and modifies, as appropriate, previous Postal Service and PRC analysis of the impact on other operations (collection, sorting, transportation) of discontinuing Saturday delivery. The results of these analyses are combined with the results of the delivery analysis to develop an overall estimate of the net impact. The results are presented as a range, with the low estimate of net savings reflecting more conservative assumptions and the high estimate reflecting the greatest likely potential savings.

2.2 Discontinuance of Saturday Delivery

On February 6, 2013, the Postal Service announced plans to discontinue the street delivery of letter and flat mail on Saturdays, while continuing parcels delivery on Saturdays, and the delivery of mail addressed to PO Boxes. Post Offices currently open on Saturdays will remain open on Saturdays. The USPS expects to achieve cost savings of approximately USD 2 billion annually when fully implemented. Congress responded in March 2013 by prohibiting the implementation of the new delivery schedule. Consequently, the Postal Service Board of Governors decided on April 9 to delay the implementation of its new delivery schedule until legislation is passed that provides the authority to implement a new schedule. Therefore, the USPS has not yet filed a plan for regulatory review by PRC. In anticipation of the USPS' postponed plan, the PRC commissioned Swiss Economics SE AG (Swiss Economics) to perform an analysis to better understand the background of how the USPS' plan 5+ would affect delivery, mail processing, and transportation costs. The main results of the analysis are summarized in this report.

2.3 Methodology

The analysis assesses the long-term impact of selected modified USPS delivery schedules on cost and quality, and calculates boundaries for induced demand effects under which the delivery schedules are still profitable for the USPS. In addition, bottom line effects on the USPS' profits are calculated for illustrative demand assumptions.

The analysis has been carried out in the following steps. Details are provided in Appendix A.

- **Step 1: Definition of modified delivery schedules**
  Based on the known details of plan 5+ and plan 5, definition of modified USPS delivery schedules that are to be analyzed (modified compared to the status quo).
- **Step 2: Impact on cost and quality**
  Quantification of impact on cost and quality of the selected modified delivery schedules. To this end, a business process analysis along the postal value chain is performed to identify the relevant cost and quality effects. Delivery is the largest cost of the USPS, and the most affected by plan 5+. Therefore, the analysis centers on the application of a new approach to estimating the effects on delivery costs. The effects of the new delivery schedules on delivery street time will be assessed by a bottom-up model, which is the core of this study. As no detailed USPS filing is available, many other effects are – as far as appropriate – based on the USPS' plan 5 filing. The analysis focuses on direct effects and results in estimates of avoided cost, incremental cost, as well as effects on delivery time. Indirect effects are accounted for in Step 3.
- **Step 3: Impact on USPS' profitability**
  Computation of the impact of the modified delivery schedules on the USPS' profitability. The difference in yearly profits $\Delta\pi$ (or net financial effect of modified delivery schedule) is computed as the net impact of direct effects and indirect effects. Direct effects relate to avoided or incremental costs due to changes of processes (e.g., savings from not delivering letters on Saturdays). Indirect effects result from mailers' responses to the adjusted services. If mailers respond to a five-day delivery schedule by sending less mail, then postage that is not sold anymore constitutes foregone revenue, and the reduction in variable costs resulting from the decrease in volume are the avoided volume costs. The following summarizes the computations, a technical derivation can be found in the appendix.

  $$\Delta\pi = \underbrace{\text{avoided process cost} - \text{incremental cost}}_{\text{direct effects on process costs}} - \underbrace{\text{foregone revenue} + \text{avoided volume costs}}_{\text{indirect effects from demand response}}$$

  The direct effects are calculated in Step 2. Indirect effects (difference of avoided volume costs and foregone revenue) must be considered whenever a modified delivery schedule has an effect on mail and/or parcels demand. The exact quantification of demand effects is beyond the scope of this project. We will therefore compute boundaries of maximum revenue losses such that the net effect is zero and compute the net effects for illustrative demand assumptions that are based on earlier USPS market research on plan 5.

2.4 Structure of the report

This report summarizes the results of the three steps above and is structured as follows.

Section 3 presents an overview of the postal value chain and current USPS process and product costs.

Section 4 defines the details of the modified delivery schedules that are analyzed. Two variants of plan 5+ are analyzed: A "high" scenario representing an upper bound of the savings estimates, and a "low" scenario that gives a lower bound representation. Plan 5+ high is based on processes that were foreseen for plan 5 by the USPS, whereas plan 5+ low is much closer to the status quo. For both scenarios however, a bottom-up delivery model is required to compute the effect of plan 5+ on the time USPS' carriers can save when delivering parcels only on Saturdays.

Section 5 presents the bottom-up delivery model. The model is run for a subsample of real USPS routes. It is then calibrated to actual USPS street time data for 2012, confirming that the model provides an accurate fit of actual street times.

Section 6 then presents the analysis of the financial effects of plan 5+ on the USPS. The delivery savings are based on the model from Section 5. The results show that the savings are likely to be lower than expected by the USPS. Whereas the USPS estimated savings of about USD 2 billion for plan 5+, the calculations indicate savings between USD 0.6 and 1.4 billion.

Section 1 summarizes the report.

Appendices A (methodology), B (cost allocation), C (model calibration) and D (business process analysis) can be found in Sections 8 to 11.

3. Status quo: USPS processes and costs

3.1 Overview of the postal value chain

The postal value chain can be segmented into the four main processes

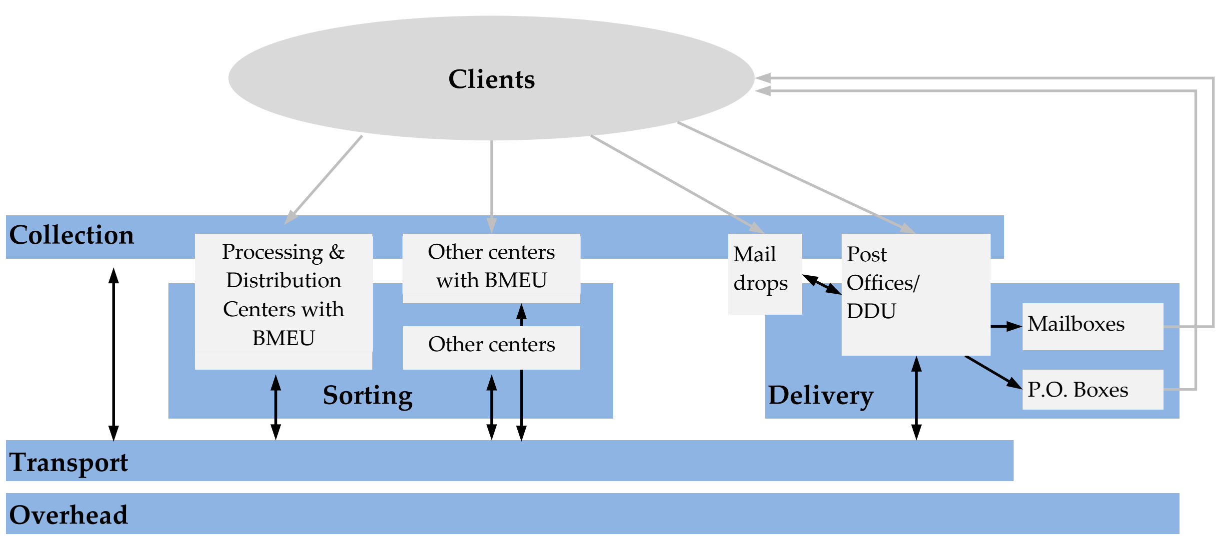
- collection,
- processing (also referred to as sorting),
- transportation,
- delivery, and
- overhead.

Collection takes many forms. The traditional retail channels are post offices and mail drop boxes. Larger customers also use customized acceptance units, e.g., bulk mail entry units at processing facilities, detached entry units at the mailer's location, direct collection by delivery carriers or electronic acceptance (click and ship). Processing is done in several main steps. Outgoing primary mail involves a first run where the mail is sorted to the first three to five digits of the postal ZIP Code, and incoming primary mail involves sorting to the five-digit ZIP Code. Incoming secondary mail consists of delivery point sequencing (DPS) where mail is sorted to the walk sequence per route. Delivery is done by mail carriers who first complete the sorting of the residual mail that is not yet in walk sequence before physically delivering the mail to mailboxes on their routes. Transport involves dispatch at collection facilities to sorting infrastructures, transport in between sorting facilities, and the distribution to delivery units. In this typology, overhead includes all other costs that cannot be attributed to one of these four processes, e.g., marketing.

USPS mail operations are highly integrated. For example, a postmaster will lead a post office that is involved in mail collection and delivery. In addition to window services, the postmaster will organize local delivery, and the post office is used for both operations. Similarly, there are bulk mail entry units (BMEU) in most processing and distribution centers, with joint organization and overhead.

The main processes and the attribution of USPS facilities is stylized in Figure 1.

Figure 1: USPS' value chain



Source: Swiss Economics

3.2 Actual costs of USPS

In this chapter, USPS' total operating costs are distributed to processes and product groups and differentiated between variable and fixed components. As a direct consequence of the USPS' integration, various cost components are shared among processes, which will lead to a larger share of overhead costs as compared to other postal operators.

Table 5 shows fiscal year 2012 USPS operating costs of USD 67.7 B, which is about USD 2.5 B higher than operating revenue. For purposes of this analysis, this represents all costs except the statutorily mandated Retiree Health Benefits Fund payment and an adjustment to workers' compensation liabilities. Including these non-operating expenses, the net loss was considerably higher. For the remaining part of the analysis, it is assumed that these other expenses are non-variable costs. Therefore, the analysis focuses on operating expenses.

Table 5: Overall USPS figures for FY 2012

M USD	Expenses	Revenue	Difference	
Operating	67'697	65'248	(2'449)	**Net Operating Loss**
Other	13'456	-		
Total	**81'153**	**65'248**	**(15'905)**	**Net Loss**

Source: PRC Annual compliance report, fiscal year 2012[2]

USPS organizes its accounts among the cost segments C/S 1 to C/S 20. These are further divided into sub-segments. For example, segment 3.3.1 reflects the cost for administrative clerks of segment three (C/S 3). Table 26 of Appendix B shows how the cost segments have been allocated to the four processes described above and to overhead. Because of the high integration of the USPS, portions of some cost segments reflect costs related to more than one process. Therefore the allocation performed here is indicative only.

The USPS further subdivides the costs of every segment into "attributable" (to products) and "other," which is also called "institutional." Based on information from the PRC and the USPS' computations for plan 5, attributable costs can be roughly considered as variable and the other costs as fixed. The USPS then allocates the attributable costs of every segment to its products identified by a product number. The products have been grouped by Swiss Economics to largely shape-based product groups according to Table 27 from Appendix B. Although most of these product groupings are intuitive, it should be noted that Packages consists of only those parcel-shaped pieces that remain classified as market dominant products. The competitive product group includes all products classified as competitive, such as Express Mail and bulk Parcel Post. The assignment of products to product groups is presented in the Appendix.

The distribution of cost segments to processes and products to groups leads to the allocation of total operating costs shown in Table 6. Delivery is by far the most costly process—more than collection, sorting and transportation together. The corresponding shares are provided in Table 28 from Appendix B. In terms of cost variability a much smaller share of delivery costs are attributable compared to the other processes. This can be seen in the last row of Table 6.

2 http://www.prc.gov/Docs/86/86931/2012_ACD_Web-REVISED-5-7-13.pdf

Table 6: Attribution of the USPS' operating expenses to processes and products

M USD FY2012	Collection	Sorting	Transport	Delivery	Overhead	Sum
Letters	1'007	5'640	1'070	6'128	3'887	**17'733**
Flats	345	2'416	599	2'759	1'536	**7'655**
Packages	138	699	528	389	365	**2'119**
Periodicals	91	867	238	746	460	**2'402**
Competitive	363	1'990	2'133	1'010	1'236	**6'732**
Others	731	613	1'197	784	976	**4'300**
Attributable Costs	**2'675**	**12'224**	**5'767**	**11'816**	**8'459**	**40'941**
Institutional Costs	1'772	1'198	863	13'842	9'081	**26'756**
Total Operating	**4'448**	**13'422**	**6'630**	**25'658**	**17'540**	**67'697**
Cost Variability	**60.2%**	**91.1%**	**87.0%**	**46.1%**	**48.2%**	**60.5%**

Source: Swiss Economics

In the PRC's Annual Compliance Determination (ACD) report for fiscal year 2012 and the corresponding background information from Docket No. ACR2012, volume and revenue data have been reported for USPS products, leading to the volumes and revenues per product group as shown in Table 7. Column five computes the share of attributable cost distributed to each product group. Applying the same shares to allocate fixed costs on product groups results in the values in column 6. These are taken as the basis to compute fully distributed costs (FDC) as shown in Table 8.

Table 7: Volume, revenue and allocated fixed costs per product group

K USD	Volume	Revenue [USD]	Attributed Costs [USD]	Share Attributed	Allocated Fixed Costs [USD]
Letters	119'810'779	36'000'932	17'733'009	43%	11'589'150
Flats	29'209'976	9'599'102	7'655'348	19%	5'003'042
Packages	911'250	2'013'129	2'118'511	5%	1'384'522
Periodicals	6'741'351	1'723'228	2'401'602	6%	1'569'532
Competitive	2'259'651	9'607'416	6'732'259	16%	4'399'770
Others	3'087'361	6'304'192	4'300'222	11%	2'810'348
Sum	**162'020'368**	**65'248'000**	**40'940'952**	**100%**	**26'756'364**

Source: Swiss Economics

Based on this information, it is straightforward to compute variable and fixed costs per piece (Table 29 of Appendix B), as well as contribution, fully distributed costs and profits per piece (Table 8). The contribution can be seen as economic profit per piece, whereas the profits per piece are arbitrary accounting profits. Overall however, the USPS lost an average of about 2 cents per piece delivered in FY 2012 (based on operating costs only).

Table 8: Profitability per product group

USD	Avg. Price	Marginal Costs	Contribution	Fully Distrib. Costs (FDC)	Calc. Profit
Letters	0.30	0.15	0.15	0.24	0.06
Flats	0.33	0.26	0.07	0.43	(0.10)
Packages	2.21	2.32	(0.12)	3.84	(1.64)
Periodicals	0.26	0.36	(0.10)	0.59	(0.33)
Competitive	4.25	2.98	1.27	4.93	(0.67)
Others	2.04	1.39	0.65	2.30	(0.26)
All	0.40	0.25	0.15	0.42	(0.02)

Source: Swiss Economics

The results show that packages and periodicals have a negative contribution, i.e., the average price per piece is lower than marginal costs. Therefore, the USPS loses money with every additional piece sent and may need to increase prices. In contrast, the other products have a positive contribution. In terms of accounting profits, all products except letters are unprofitable. However, the figures are based on a very simplified allocation of fixed costs to product categories (according to the respective share of attributable costs) and therefore may be distorted.

Later in the analysis, contribution per piece (per product) will be mirrored in the computation of indirect effects caused by changed consumer demand. The positive contribution of letters and flats means that if consumers respond to the service changes of plan 5 or plan 5+ by sending fewer of these items, then the contribution is lost for every lost item, reducing the positive impact of direct cost savings. However, for parcels, fewer items translate to an increase of profits, ceteris paribus, as long as the USPS does not increase its prices above marginal costs.

4. Plan 5+ scenarios

As noted in Section 2, detailed information is available for plan 5 only. Very limited information has been published for plan 5+. Nevertheless, to facilitate analysis, the specific changes that would likely occur if plan 5+ were implemented are identified. These assumptions are compared to the status quo and plan 5.[3] Plan 5 is similar to plan 5+ except that the delivery of parcels would have been discontinued as well. The information on plan 5 is taken from Docket No. N2010-1 with emphasis on the advisory opinion as well as witnesses Neri and Bradley. Table 9 illustrates the proposed operational changes of plan 5.

Table 9: Discontinued processes in plan 5

	Mon	Tue	Wed	Thurs	Fri	Sat	Sun
Collection in Post Offices	X	X	X	X	X	X	-
Dispatch in Post Offices	X	X	X	X	X	**Discontinued**	-
Sorting (Processing)	X	X	X	X	X	(X)	X
Delivery	X	X	X	X	X	**Discontinued**	-

Source: Swiss Economics based on N2010-1, advisory opinion and Neri

The USPS would have discontinued two major processes on Saturdays: Saturday delivery of letters, flats and parcels, and the dispatch of mail from Post Offices on Saturdays (that is, no transport of mail items collected on Saturdays to sorting centers). It is important to note that the USPS planned—despite discontinuing letters and parcels delivery on Saturday—to continue sorting on Friday night and dispatching the mail to the delivery units Saturday morning:

> "Periodicals, First-Class flat mail, standard flat mail, Priority Mail, other flat mail and parcels will be worked Friday night and dispatched early Saturday morning to the delivery units. This will include all P.O. box mail and may include any available street-addressed mail. Processing and dispatching of some street addressed mail to delivery units on Saturday will allow us to more fully utilize existing transportation capacities and advance available work to the carriers for the following Monday."[4]

Therefore, under plan 5, mail and parcels would have arrived in the delivery units early Saturday morning, but would not have been delivered until Monday. In other words, plan 5+ with its parcel delivery on Saturdays appears essentially compatible with the sorting and transport architecture of plan 5.

Based on this understanding of plan 5 there are two viable scenarios to calculate possible cost savings in plan 5+:

– **Scenario 1 "plan 5+ low"**: All processes except for delivery remain the same in plan 5+ as they are today. The discontinuation of delivery of letters and flats on Saturdays will lead to longer average end-to-end delivery times for all items previously delivered on Saturdays.

– **Scenario 2 "plan 5+ high"**: All processes from collection to transport except delivery are adjusted in the identical way as in plan 5. The restructuring of mail processing induces higher average end-to-end delivery times as compared to plan 5+ low. Mail items collected on Saturdays would not arrive before Tuesday.

---

3 In the original scope of work, the re-engineered processes according to the USPS' filing would have been analyzed on cost and quality differentials. As no filing took place, the necessary details are not known. Business process re-engineering is outside the scope of the project. Therefore, any deviation from the status quo or plan 5, where extensive information is available, is critical.

4 Docket No. N2010-1, USPS-T-4, DIRECT TESTIMONY OF FRANK NERI ON BEHALF OF THE UNITED STATES POSTAL SERVICE, p. 9.

Compared to the status quo, Scenario 1 features cost differentials in the delivery process only. Scenario 2 features cost differentials in all other processes. Thereby, the cost differentials in the collection, sorting and transport processes between the scenarios largely correspond to the cost differentials calculated for plan 5.

Evaluation between scenario 1 and 2 would require a detailed analysis of the current business processes and their reorganization under the new scenario. As the detailed plans of USPS are not available, this is beyond the scope of this study. Cost savings for scenarios in between scenarios 1 and 2 in the collection process, sorting and transport can be expected to be lower than the savings in scenario 2. **Therefore, scenario 1 "plan 5+ low" can be viewed as a lower bound on cost savings and scenario 2 "plan 5+ high" as an upper bound on cost savings.**

Table 10 gives an overview of the adaptations of business processes under plan 5, plan 5+ high and plan 5+ low, and how they compare. A detailed discussion along the processes collection, sorting, transport, and delivery can be found in Appendix D.

Table 10: Assumed changes per modified delivery schedule[5]

	Status quo	Changes in plan 5	Assumed changes in plan 5+ high	Assumed changes in plan 5+ low
Collection	Post offices: Open 6 days Collection boxes: 6 days	Post offices: No change. Collection boxes: Elimination of retrieval on Saturday.	As plan 5	As status quo
Sorting	Sorting 7 days a week()	Elimination of all Saturday outgoing mail processes (excluding Express Mail).[6]	As plan 5	As status quo
Transport	Transport 7 days a week	Elimination of Saturday transport for mail collected in post offices/collection boxes to processing facilities. Less transport on Sundays due to elimination of all Saturday outgoing mail processes.	As plan 5	As status quo
Delivery	6 days home delivery of letters, flats, packages 6 days P.O. Box delivery of letters, flats, packages	No home delivery of letters or flats and packages on Saturdays [Continued delivery of Express Mail and Saturday P.O. Box delivery]	No home delivery of letters or flats on Saturdays [Continued delivery of Express Mail, Saturday P.O. box delivery and package delivery]	As plan 5+ high
Volume Scenario	FY2012	Volume response considered	As plan 5, but no response for parcels	As plan 5+ high, but reduced response for letters and flats

Source: Swiss Economics.

5 Based on USPS press releases, USPS filing of plan 5 (Docket No. N2010-1), and Swiss Economics analysis.

6 Sorting Friday night remains unchanged.

The remaining chapters estimate the impact of plan 5+ high and low on the USPS’ profits.

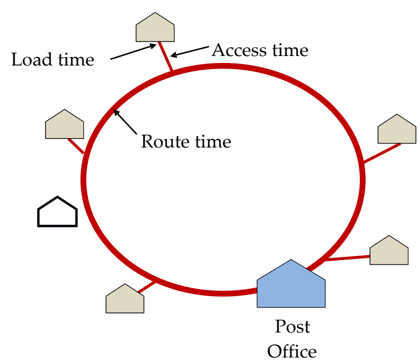
As Table 10 reveals, much of the analysis had already been done when plan 5 was filed. The major new element from plan 5+ that needs careful consideration is the standalone delivery of parcels on Saturdays. Delivery is the focus of this study. Chapter 5 presents the delivery model and describes how it can be used to compute street times under different delivery scenarios. The model is then applied to estimate the financial effects of plan 5+ low and plan 5+ high in Chapter 6.

5. A model to compute route and access times in delivery

As highlighted in Table 6, delivery is by far the process that accounts for the highest overall costs. As seen in Table 10, delivery is also the process likely to be the most affected by plan 5+.

Delivery carriers typically spend the first hours of the day in the office to prepare the mail for the route ("office time"). Once finished, the carrier leaves the office and delivers the mail along the route. The time spent leaving the route to access a recipient mailbox, is referred to as "access time." "Load time" is the time required to insert the mail into the mailbox. The time on the route itself is referred to as "route time" (Cohen and Chu, 1997). Route and access times constitute a significant cost driver for postal services. The distinction of route, access and load time is illustrated in Figure 2. The sum of the three components is referred to as "street time" by the USPS. For city carriers, street time accounts for more than 75 % of overall delivery time.[7]

Figure 2: Distinction of route time, access time and load time



Source: Swiss Economics based on Felisberto et al. (2006).

While load time is essentially variable with respect to the number of mail items delivered, access and route times are quasi-fixed costs. For a given delivery point, access time is variable with the first mail item, after which it is fixed. For a given (independent) route section, route time is variable with the first mail item for that section; thereafter, it is fixed up to the most remote delivery point receiving mail. In countries with high volumes per capita such as the U.S., route times can be considered as effectively constant, and access times as mostly constant (cf. Haller et al., 2014), which is also confirmed below in Section 5.1.3.

Discontinuing letter delivery on Saturdays while maintaining parcels delivery means that

- on Saturdays, route times are fundamentally different and much more variable, as the probability that a given household gets a (parcel) delivery is reduced sharply (leading to different routes every Saturday);
- from Monday to Friday, the probability that a household is served is increased slightly, leaving route times mainly constant and increasing access times to a small extent only. In the analysis, it is assumed that route and access remain constant from Monday to Friday.

In particular, the assessment of the first (Saturday) effect requires a model to predict the changes to route and access times. Such a prediction can be obtained from an application of the model presented by Trinkner et al. (2012) and Haller et al. (2014). The model computes bottom-up route and access times for different delivery schedules, and allows letter and parcel volumes to be taken explicitly into account. Route and access times can then be transformed into costs and normalized to

[7] Source: Swiss Economics based on DOIS data from Section 5.2.3.

fit the yearly delivery costs of the USPS. This allows for the estimation of the effects of the modified delivery schedules on delivery costs and unit cost. The time differentials can also be used to estimate the need for overtime hours on days with increased workload (in particular, Mondays).

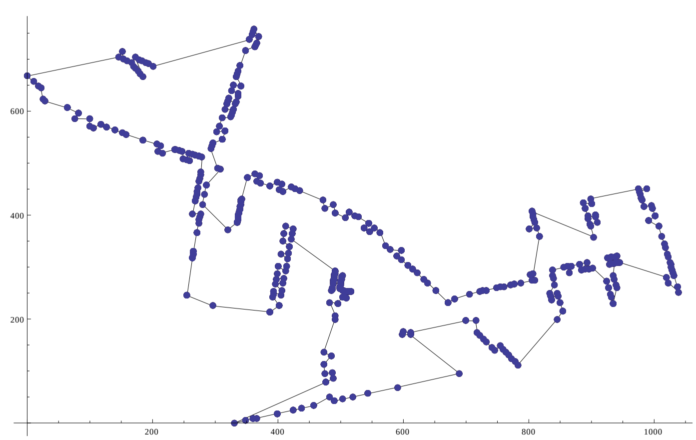
The application of the methodology is explained in more detail below. The methodology to assess the cost impact of modified delivery schedules is described for Saturday delivery and for the remaining delivery days.

5.1 Model

5.1.1 Bottom-up model to calculate route time differentials

In the model, the location of the delivery center is fixed, but the number of delivery days and/or the percentage and location of delivery points to be served can be varied. To determine the route costs as a function of the distribution of the households around the delivery center, the delivery process is treated as a routing problem (minimizing the total route time to deliver all the mail to the served delivery points) and solved by numerical methods (hereafter referred to as “shortest path”). To keep the model tractable, it is assumed that the mail deliverer can move freely in the area, i.e., we abstract spatial obstacles and roads. This approach does not deliver route costs directly. Instead, it computes linear distances which can serve as proxies for the real route costs. The model therefore requires calibration to determine effective route times and/or distances. Once calibrated, the model allows comparisons of delivery costs across various delivery plans or Universal Service Obligations (USO) definitions and letter volumes. Figure 3 illustrates the result of the applied shortest path simulation for route 7 (ZIP-Code 11793).

Figure 3: Illustration of shortest path simulation for an illustrative route



This simulation model has been applied successfully to Switzerland on behalf of Swiss Post. The model could on average explain 95.36 % of Swiss Post’s route times per delivery region, with high values independent of the specific delivery areas (cities, agglomerations, rural, mountain valleys). Calibration can take place either by actual (measured) route times or actual distances, or both.

5.1.2 Composition of delivery costs

As introduced and illustrated above, street time can be separated into route time, access time and load time. Route and access time are simulated in the model. The load time as well as work performed in the delivery office are estimated empirically based on DOIS data.

5.1.3 Calibration of the model

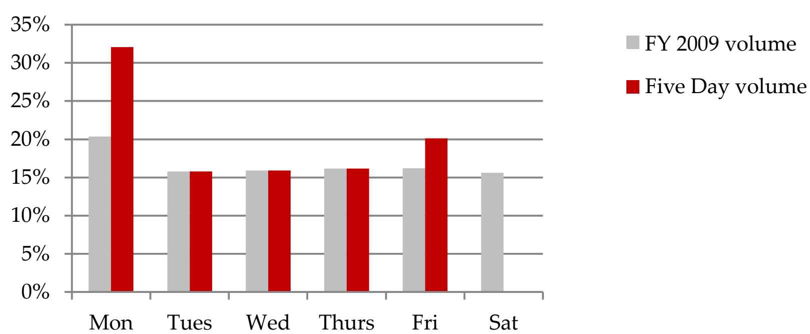
Before the new delivery costs can be calculated, the model needs to be adapted to the U.S. situation and calibrated accordingly, using USPS baseline delivery costs. To calibrate the model, it is run to simulate actual delivery routes. The resulting modeled distances are then regressed on the actual delivery times, while controlling for mail volumes. This calibration also allows an assessment of the integrity of the model.

The calibration exercise requires (1) defining the actual delivery routes, i.e., which points of delivery are served, (2) defining the measure of delivery time, and (3) defining the level of disaggregation in distinguishing the type of delivery, i.e., is there one type of delivery per route or should the types also be distinguished within a route.

For requirement (1), points of delivery served on a specific delivery day for each route are needed Figure 4 reveals significant changes in the pattern of mail volumes on Saturday and Monday expected for plan 5, and therefore plan 5+ as well. These patterns are confirmed for FY 2012 figures based on evaluations of DOIS data from Section 5.2.3. Table 15.

Figure 4: Shift of delivery volumes to primarily Monday

FY2009 percentages of total volume by day of the week



Source: Cigno (2011), Docket No. N2010-1 Advisory Opinion.

Accounting for daily variations in the specific delivery points served would require conducting iterated simulations for every route, consuming important computation time. Alternatively, the routes can be treated as fixed on regular delivery days, assuming that all points of delivery per route are served on every delivery day. This implies that the model needs to be simulated only once for each route.

Experience from previous model applications suggests that the marginal gains in the integrity of the calibration are small compared to the large additional computation requirements, which would mean—given the time constraints in the project—a much smaller sample of routes could be analyzed (c.f. 5.1.6). It is therefore assumed that the route calibrations are fixed on regular delivery days.

The assumption of fixed routes on regular delivery days was validated for 230 routes which were randomly chosen from DOIS data. For each route the simulation model was run with random assignment of actual mail volumes on households for two Mondays in FY 2012. In this setup, a household has to be served if it receives at least one mail item. The simulations confirmed that the assumption of fixed routes on non-Saturdays is reasonable. On average, the percentage deviations of the fixed route length compared to the stochastic route lengths amount to only 0.019% and from 460 observations only 25 showed deviations above 1 % of fixed route lengths.

5.1.4 Saturday delivery

Continuing Saturday parcel delivery will lead to different and more variable routes on Saturdays. The model is used to calculate these new routes. New routes are based on which delivery points are served on Saturdays. A delivery point is served if it receives at least one parcel. To determine the parcel distribution across delivery points, the actual parcel volumes on a given Saturday are randomly assigned to the addresses of a route.[8] That is, if there were n parcels on a given Saturday, then n addresses of a route are randomly drawn. The delivery points served are then the points which have at least one address receiving a parcel.[9] Delivery points are calculated for every Saturday in FY 2012. The new parcel-only Saturday routes are then simulated. Using this method, the parcel-only Saturday routes for FY 2012 are simulated under the new delivery regime.

5.1.5 Remaining delivery days (Monday to Friday)

Discontinuing Saturday letter delivery will affect volumes on the remaining delivery days. The model allows simulating the effects of increased letter volumes on the actual route times on Mondays, as well as any change that may occur from Tuesday to Friday. On Mondays, many letters will be delivered that were formerly delivered on Saturday (cf. Figure 4 based on USPS assumptions, "Double-Mondays"), making it more likely that a point of delivery has to be served on a given delivery day. This tends to lengthen the routes.

To do this within the model would require using a stochastic process of letter distribution as in the Saturday parcel delivery, and conducting a number of repeated simulations. This is time consuming and we expect the effects of increased volumes on route times to be small. Therefore, this aspect is ignored here.

The second, more important channel through which delivery times are affected is load time, which is mainly variable and independent of Saturday delivery (exception: possible overtime surcharges on "Double-Mondays").

5.1.6 Sample Selection

The model is computationally intensive and there are 224,000 routes in the U.S., which makes it extremely time-consuming to apply the model to all routes. To get an accurate estimate of the cost effects it is sufficient to consider a sample of all routes. The accuracy of the estimate of course increases in the size of the sample. For the calculation of delivery costs for parcel delivery on Saturdays, repeated simulations are needed. The number of simulations increases the accuracy of the cost estimate per route. However, running more simulations per route reduces the size of the sample that is feasible.

Based on predicted simulation times, a random sample of 20,000 city routes was chosen (for more information see below).

5.2 Data

The following data were provided by the PRC:

- Data from the USPS' Address Management System (AMS) for a random sample of 19'958 city carrier routes, containing delivery points, coordinates with additional information for each delivery point;

[8] This is as accurate as possible, as we do not have any information on address level.

[9] A delivery point can have several addresses.

– Data from the USPS' Delivery Operations Information System (DOIS), containing office and street times as well as volume data for city carrier routes for every delivery day of FY 2012. In addition, DOIS information for the type of delivery and base mileage for each route was available.

The data is described in more detail below.

5.2.1 Data per delivery point

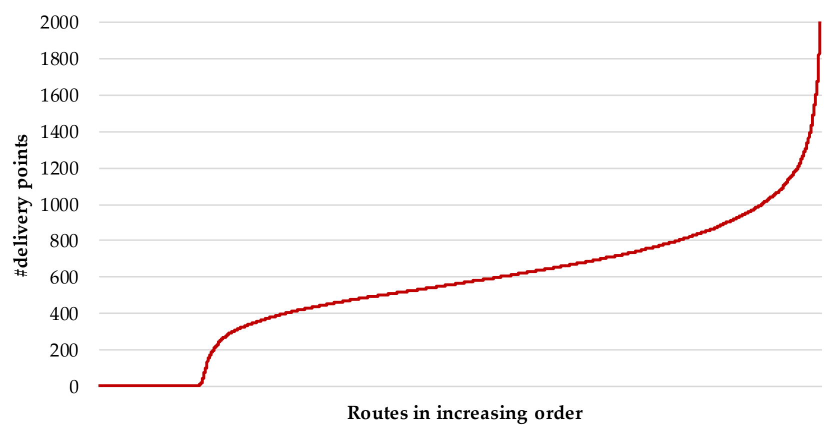
The analysis is based on data for 19,958 routes that were randomly drawn by the PRC from AMS data provided by the USPS. The PRC used ArcGIS software to identify the coordinates of each address. Per route, for every delivery point the following data was available: coordinates, USPS sequence number, vacancy, delivery type (e.g., curb line), and others.

Prior to the simulations, a series of steps were performed to validate and prepare the data:

– Validation of the structure of all files/routes, adaptations where necessary;
– Consistency check, e.g., number of delivery points, sequence numbers, check of random single coordinates in Google Maps, and others;
– Deletion of delivery points with or without invalid or incomplete coordinates;
– Transformation of longitude/latitude coordinates into metric coordinates; therefore, the origin for every route was set at the bottom left of the delivery points served by that route;
– Classification of routes into "ok", "validate", "and exclude." Exclusion means the number of routes with 100 or less delivery points and routes with a spanned area of zero. Similarly, routes with too large a spanned areas and/or suspect USPS sequence were marked as "validate." In total, 16,572 routes could be classified as "ok."

Figure 5 illustrates the distribution of the 19,958 sample routes. Routes are ordered with low number of delivery points first.

Figure 5: Number of valid x/y coordinates per route



Source: Swiss Economics based on PRC data of FY 2012.

5.2.2 Data per route

For FY2012, DOIS data for 141,436 routes were provided by the USPS. For each route and delivery day, the DOIS data provides information on office hours, out-of office hours, and the number of parcels, letters and flats. Details on the variables are in the next section. In FY 2012, there were 303 delivery days.

From the 16,572 routes in the AMS data classified as "ok," 16,274 could be identified in DOIS data. With 303 delivery days in FY2012, a sample with 4.9 million observations was used for our calibration exercise. Calibration per delivery type is only partially possible because from the 16,274 routes from AMS and DOIS data, there are 2,251 routes for which it was not possible to recover information on the delivery type.

The next section gives an overview of the DOIS data. Section 5.3 presents the results of the calibration.

5.2.3 Volume and street time data

The provided FY2012 DOIS data contains the variables as listed in Table 11 for 141,436 routes.

Table 11: Variables in DOIS

Variable	Example	Category
ServiceDate	1/18/2012	
RouteZIPCode	1108	
RouteNumber	001	
ActualOfficeHoursAmount	1.58	
ActualStreetHoursAmount	6.02	
TotalCasedLettersPiecesAmount	207	Letters
TotalCasedFlatsPiecesAmount	1041	Flats
TotDeliveryPtSequenceMailAmt	0	Letters
TotalFlatSeqMailPieceAmt	721	Flats
TotalSequencedMailPiecesAmt	0	Letters
TotalParcelsPiecesAmount	3	Parcels

With 303 delivery days in FY2012 and 141,436 routes in the dataset, this results in 42 million data points. From the 16,572 routes in the AMS data classified as "ok," 16,274 could be identified in DOIS data. For each of these 16,274 routes there are observations for 303 delivery days. The 77 observations with negative values in either hours or volume variables were excluded. In the following, all analysis is based on that sample. The sample size is 4.9 million.

The following variables were defined:

Flats = Totalflatseqmailpieceamount + Totalcasedflatspiecesamount

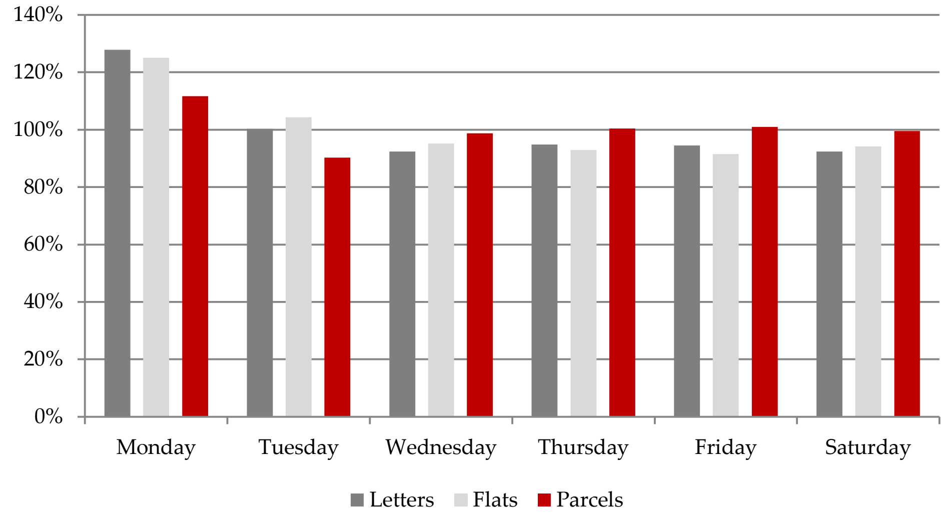
Letters = Totalcasedletterspiecesamount + Totdeliveryptsequencemailamt

+ Totalsequencedmailpiecesamount

Parcels = TotalParcelsPiecesAmount

Based on these definitions the volume patterns shown in Figure 6 and Figure 7 are observed in our sample.

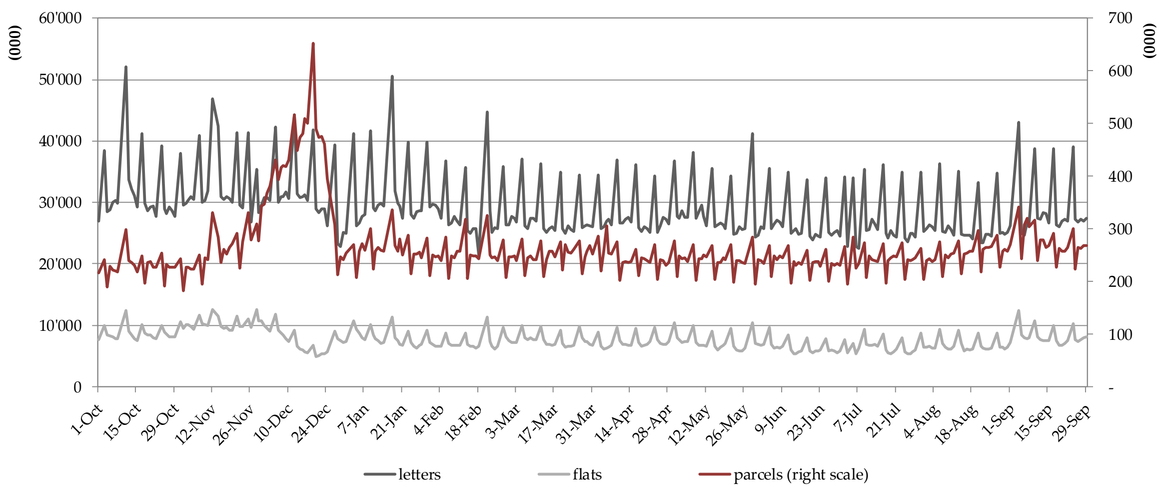
Figure 6: Mean volume per delivery day as percentage of yearly average daily volume



Source: Swiss Economics based on DOIS data of 2012

These patterns are consistent with information from PRC as shown in Figure 4.

Figure 7: Time Series Total Volume



Source: Swiss Economics based on DOIS data of 2012

From Figure 6 it can be observed that Mondays have the highest volumes in all product categories. On average, Monday's letter volumes are 128 % of the average volume of all days. The other days, Tuesday to Saturday, tend to have similar volumes. Figure 7 shows the volumes per product for FY 2012. The peak in Monday's volume is again well observable. Letters and flats do not exhibit strong seasonal patterns. Parcels have peak volumes in the weeks before Christmas.

All routes in the sample have letters throughout the year. From 16,274 routes, 546 routes do not have any parcels during FY 2012.

5.3 Simulation results and calibration to USPS data

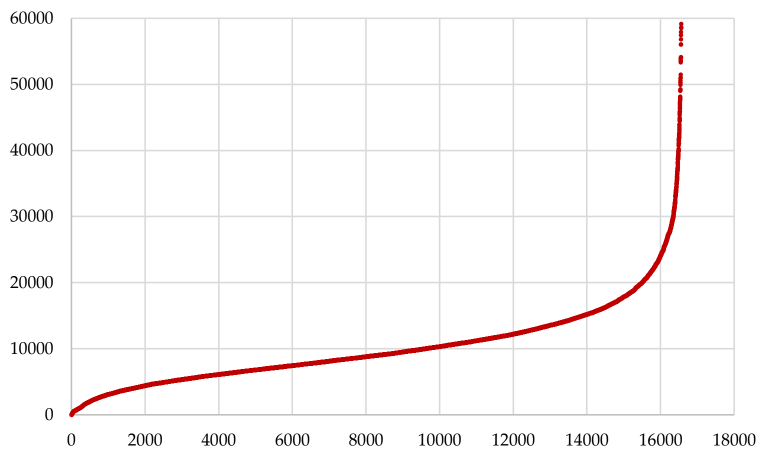
Based on the available data, route and access times are simulated and calibrated. In addition, office times are calibrated. These results are the basis of the financial effects as computed in Section 6.2.

5.3.1 Simulation

5.3.1.1 Linear distances with shortest path algorithm

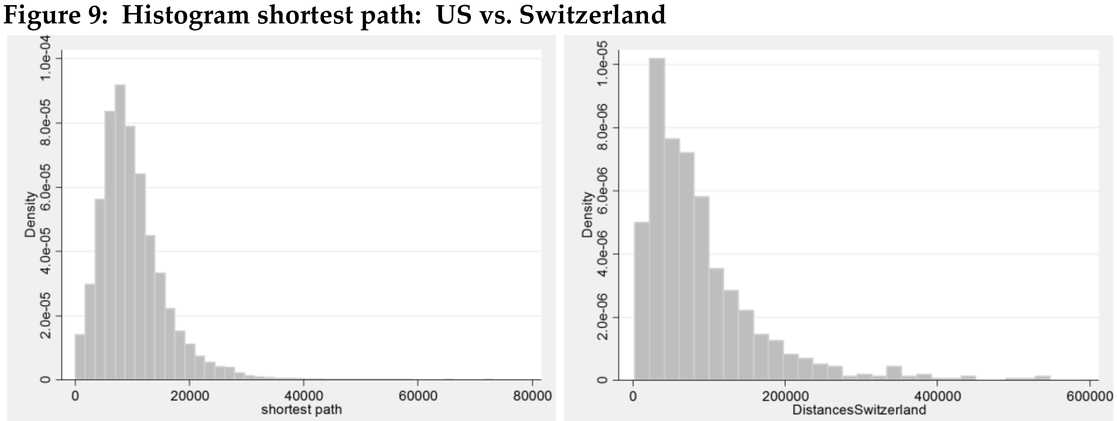
The model described in chapter 5.1 was applied to the data described in chapter 5.2. That is, the 16,274 routes in the dataset were simulated in the model. This results in proxies for route and access time in the status quo (2012). In 7 % of all routes, the standard algorithm failed to converge in a reasonable time horizon and a greedy algorithm[10] was used instead.

Figure 8: Shortest path results ordered by size



Source: Swiss Economics.

Figure 9: Histogram shortest path: US vs. Switzerland



Source: Swiss Economics.

---

[10] The "greedy" algorithm moves from one point to the nearest unvisited neighbor.

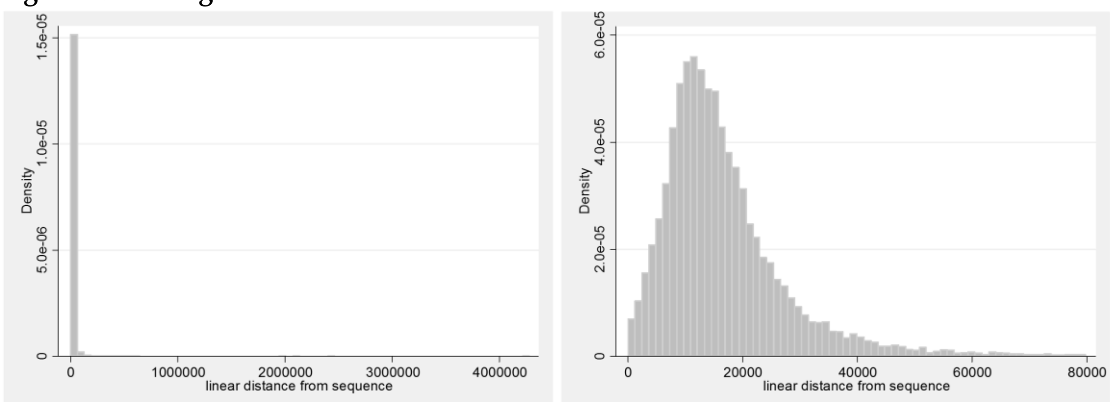
5.3.1.2 Linear distances with USPS sequence number

The AMS data contains information on the sequence of delivery points for each route applied by the USPS and walked by the carriers. In order to validate the shortest path results, a second proxy for the length of the routes was constructed by simply totaling the linear distances between the delivery points along the provided sequence. This proxy is referred to as "sequence path" in the following.

Figure 10 shows two histograms of the sequence paths. The histogram on the left is the histogram over all sequence paths. There are some implausibly large values, which indicate that there might be some errors in either the sequence in the AMS data or the coordinates assigned to the delivery points.

The histogram on the right is a clean version, excluding all distances above 80,000 for better comparability with the "shortest path" distribution above. The histogram reveals similar patterns.

Figure 10: Histogram linear distance



Source: Swiss Economics.

5.3.2 Calibration of route and access times

For each sample route, street hours, office hours, and volume data are available for all 303 FY 2012 delivery days. In addition, route information is available on type of delivery (e.g., curb) and base mileage. This forms an excellent base for calibrating the model.

Two calibration exercises are performed. First, calibration is done on a global level without reflecting different delivery types (e.g., curb or foot). All routes are treated the same, and actual street times on the simulated shortest paths and observed volumes are regressed. Second, the calibration is performed differentiating the delivery methods, i.e., running the regression of actual street times on simulated shortest paths, observed volumes, and the type of delivery.

In the global calibration, different proxies for route length are used and the model fits are compared. Results show the simulated shortest paths perform equally well as the reported base mileage in explaining actual street times. Based on these findings, it is concluded that the simulation model forms a valid base for calculating route times for alternative delivery scenarios, in particular, Saturday delivery of parcels only.

5.3.2.1 Global calibration street time

To validate and calibrate the model the following regression was run.[11]

$$actual\ street\ hours = \beta_0 shortest\ path + \beta_1 letters + \beta_2 flats + \beta_3 parcels.$$

As shown in the details of Table 30 of Appendix C, the model provides an accurate fit.. As expected, all coefficients are highly significant and the signs of the coefficients are all positive. Overall, the model is able to explain 87.24 % of all variation in actual street hours.

The same regression was run once with sequence path instead of the shortest path, once with a constant instead of the shortest path, and once with base mileage instead of the shortest path. The results show how well the simulated route length performs compared to other proxies of route distances. Table 31 to Table 33 from Appendix C present the results of these regressions. The variable Base Mileage is only available for a subset of the sample, so the sample for the Base Mileage regression is about 1.1 million data points ("delivery days") smaller than the standard sample (4.9 million).

Table 12 provides an overview of the results. In terms of quality of fit, the model with base mileage and shortest path perform equally well, and both do better than the other specifications. The variable Base Mileage measures the actual miles per route. This implies that the simulated distances perform equally well in explaining street hours as actually measuring the effective miles per route. The simulation model is therefore "as good as it can get." Moreover, the shortest path algorithm has two advantages: it is available for all routes (not the case for base mileage), and it is possible to simulate alternative volume and delivery point scenarios, which is of particular value for this study.

Table 12: Performance of proxies

Proxy β_0	Coefficient β_0	t-Value	Adj. R2
Linear distance shortest path	**0.00014**	**981.45**	**87%**
Linear distance sequence path USPS	0.00000592	265.84	85%
Base Mileage	0.1288	937.74	87%
Benchmark: Constant	5.567	3492.95	6%

5.3.2.2 Calibration by delivery type

The initial calibration did not differentiate between the USPS' methods of delivery. The USPS identifies five types of delivery:

- **Curb:** Carrier uses a vehicle and can deliver mail without leaving (dismounting) the car for more than 50 % of delivery points.
- **Dismount:** Carrier uses a vehicle and can deliver mail without leaving (dismounting) the car for less than 50 % of delivery points.
- **Park & Loop:** Carrier uses a vehicle, but parks it at a selected locations; then delivers by foot.
- **Foot:** Carrier delivers mail by foot.
- **Other:** No information available.

In our sample, delivery methods for around 14,000 routes could be identified. 2,251 routes could not be classified and are tagged as "Missing." Table 13 gives an overview of the number of routes per delivery type in the sample.

[11] Regressions were run with log(.) and quadratic specifications. These were not superior to this simple linear model.

Table 13: Frequency of route types

Delivery Method	Number of Routes	Share
Curb	3842	24%
Dismount	2200	14%
Park & Loop	7131	44%
Foot	771	5%
Other	80	0%
Missing	2251	14%
Total	16275	100%

To account for the delivery method in the calibration, there are generally two approaches: (a) include dummies for the delivery method and run a global regression, or (b) run the regressions separately for the delivery types.

a) Include delivery dummies in global regression

The results for the first approach, a global regression with delivery dummies, are reported in Table 34 of Appendix C. Compared to the regression without dummies, the model fit increases to 91.5 %. However, the approach with additive dummies is not intuitive. One cannot expect that the delivery method has a fixed effect on the delivery time. Rather, one would expect that speeds differ by deliver type, that is, the beta coefficients of "shortest path" should differ by delivery type. To reflect this reasoning, the regressions are run separately by delivery type below.

b) Separate regression per delivery type

As mentioned above, a total of 2,251 routes do not have a specified delivery type. For the remaining 14,000 routes, the regression is also run separately by delivery type. Table 35 to Table 39 of Appendix C show the results. Table 14 provides an overview.

The calibration at the delivery method level shows a better fit for dismount, park & loop, and curb and a poorer fit for foot and "other" compared to the global calibration over all delivery types. The coefficients for shortest path, i.e., the speeds, of the different delivery methods seem reasonable. The motorized delivery methods (curb, dismount, and park & loop) exhibit higher speeds than delivery by foot. However, the highest speed is found for the category "other." There is no further information on what type of delivery methods the category "other" contains.

The coefficients for flats, letters, and parcels show some variation between the different delivery types. Within each delivery method, the volume coefficients seem reasonable except for the delivery methods "other" and "foot." Specifically, the coefficients for letters and flats are of a similar order, and the coefficients for parcels are higher than the coefficients for letters and flats. In the model, this interprets flats and parcels featuring similar load times and parcels having significantly higher load times. For the delivery methods "other" and "foot," Flats are estimated to have much lower load times than letters. This seems inconsistent with reasonable expectations.

Comparing the load time coefficients between delivery methods, one would expect that load times are not delivery method specific, i.e., one would expect to observe similar coefficients in all regressions. For the methods curb, dismount, and park & loop, this is to some extent the case. "Foot" and "other" exhibit significantly different coefficients than the other delivery methods. However, "foot" and "other" account for only 6 % of all routes for which the delivery methods are known (see Table 13). The category "other" might consist of very heterogeneous delivery methods, which could explain the coefficients.

5.3.2.3 Discussion

Looking at the results of the regressions by delivery type in Table 14 (lower half), the delivery methods do not show stark inconsistencies except for the delivery methods “other” and “foot.” The coefficients differ by delivery method, which implies some error when calibrating on a global level ignoring the delivery methods.

However, the errors made with the global approach without dummies seem not to be excessively large. This is shown at the top of Table 14 by comparing the two global regressions with and without dummies. R^2 is reduced to a minor extent in the benchmark regression without dummies, but the “shortest path” coefficient is more consistent with the individual coefficients by delivery type. Moreover, the global approach without dummies implies a calibration of load times that is independent of the delivery method. Compared to the individual regressions by delivery type, the global approach allows using the entire sample.

For these reasons, the subsequent calculations are based on the global calibration without delivery dummies.

Table 14: Calibration by delivery type

Proxy β_0	N	Coefficient β_0 (shortest path)	t-Value	Adj. R2
Benchmark: Global without dummies	4.9 M	0.00014	981	87%
Global with dummies	4.9 M	0.00009	682	91.5%
Foot	0.2 M	0.00012	161	82%
Park and Loop	2.1 M	0.00019	806	89%
Dismount	0.7 M	0.00013	370	88%
Curb	1.1 M	0.00012	629	91%
Other	0.02 M	0.00028	81	79%

5.3.3 Calibration of office time

To estimate the effect of volumes on office time, it is assumed that only cased items cause office time and that all such costs are variable. Therefore, the following model is estimated:

$$office\ time = \beta_1 casedletters + \beta_2 casedflats + \beta_3 parcels.$$

The regression results are summarized in Table 40 of Appendix C. All coefficients are highly significant and seem consistent with expectations because cause more parcel office time than letters and flats.

6. Financial impact analysis

This chapter estimates the financial impact of plan 5+ high and low resulting from changes in costs and speed of delivery. In terms of direct effects, delivery costs are of primary concern. The impact analysis for home delivery is reported in Section 6.1. It is based on the calibrated bottom-up delivery model from Section 5. Results for processes other than delivery are summarized in Section 6.2 (details cf. Appendix D). Indirect effects from reduced mail demand that is caused by longer end-to-end delivery times (details also in Appendix D) are analyzed in Section 6.3 as part of the discussion of the overall impact of plan 5+ on USPS profits.

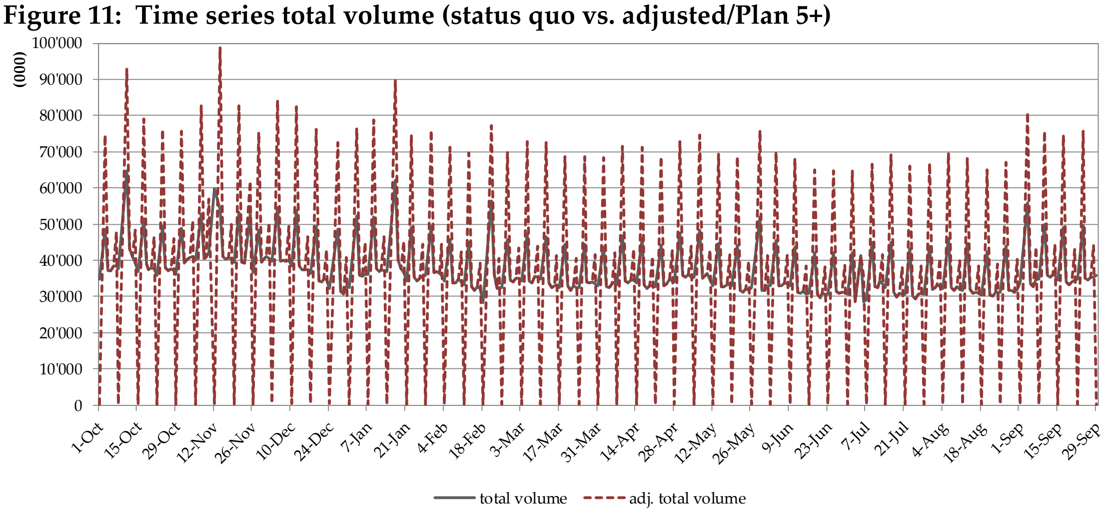
6.1 Impact of plan 5+ on delivery

Under plan 5+, parcels are still delivered on Saturdays, while letters and flats are not. Compared to plan 5, plan 5+ requires an approach to estimate delivery times for separate parcel delivery on Saturdays.

Plan 5+ shifts letter and flat volumes away from Saturday, causing new, reduced route and access times on Saturday (parcels only). The shift of letters and flats to other weekdays will impact route and access times to a limited extent only. Shifts of office time and load time, however, may cause overtime work that requires higher compensation per hour. For the shifts of letters and flats, the USPS' assumptions from plan 5 are applied; that is, 25% of mailpieces from Saturday are shifted to Fridays, and 75 % to Mondays (or the next delivery day when a Monday is a holiday).

This leads to the delivery patterns illustrated in Figure 11. The red dotted line shows the daily volumes that would have been delivered in plan 5+ assuming FY 2012 volumes. The figure reveals that the differences among delivery days are much larger than the status quo. Volumes are particularly high on Mondays.

Figure 11: Time series total volume (status quo vs. adjusted/Plan 5+)



These patterns can also be seen in Table 15. In FY 2012, average actual Monday volumes were 127 % of the average daily volume. The days with minimum volumes were Saturday and Wednesday, both around 93 % of average. The shift from Saturday letters and flats to Fridays and Mondays (or Tuesdays, if Monday is a holiday) increases the differences sharply, ranging from 196 % on Mondays to 1 % on Saturday (Parcels only). This means that on Mondays, delivery volumes would be about twice the size as compared to Wednesday or Thursday. Table 15 confirms the finding of the PRC as shown in Figure 6.

Table 15: Daily delivery patterns for status quo and plan 5+ and impact of plan 5+ in delivery

	Status quo	Plan 5+	Impact in delivery
Monday	126.6%	**195.7%**	Major impact on load times likely to increase existing overtime hours
Tuesday	100.6%	109.6%	
Wednesday	92.7%	92.7%	
Thursday	94.0%	94.8%	
Friday	93.6%	116.2%	Impact on load times may increase existing overtime hours
Saturday	92.5%	**0.7%**	Major impact on route, access and load times; reduction of existing overtime

Table 15 also indicates the major financial effects of plan 5+ on delivery. These are:

- Sharply reduced route and access times on Saturdays;
- A shift of load times from Saturdays to Mondays and Fridays, likely to increase existing overtime hours of carriers, in particular on Mondays (while decreasing on Saturdays);

The USPS' segments its plan 5 delivery cost calculations into city delivery savings (which is further segmented into street time and in-office time savings), rural carrier time savings, and indirect savings. The distinction between city carriers and rural carriers is meaningful as the two types of carriers face fundamentally different pay schedules: City carriers are essentially paid by the hour, while rural carriers are paid based on workload, e.g., pieces delivered. Therefore, USPS' savings would be—as in plan 5—mainly on the city carrier side. As a consequence, the analysis below distinguishes the same cost categories as those from plan 5 (details cf. Appendix D), and special emphasis is given to city carriers.

6.1.1 City carriers

6.1.1.1 Approach and assumptions

City carrier savings can be calculated relative to the status quo (avoided cost) or relative to the savings estimates of the USPS/PRC from plan 5 (incremental costs). Relevant details on the cost saving estimates of the USPS/PRC from plan 5 can be found in Section 11.3 in Appendix D. With the model presented in Section 5, both avoided and incremental route and access times can be calculated.

If current costs from the status quo are corrected based on avoided route and access times on Saturdays, the underlying assumption is that productivity for shifted load times is independent of the weekday. The load time costs for 1,000 mailpieces on Saturdays translates to the same load time costs for 1,000 additional mailpieces on Mondays. This differs from the assumption made by USPS for plan 5. The USPS argued that on Mondays, average productivity is already higher, and therefore the load costs of additional 1,000 mailpieces on Mondays would be lower than the original cost on Saturdays. Applying the second approach of computing and applying the incremental route and access time on Saturdays for plan 5+, as compared to plan 5, reflects the productivity assumptions from PRC's review of plan 5.

The first approach represents a cautious approach and ideally fits to the plan 5+ low scenario, which aims at finding the lower bound of the plan 5+ savings. The second approach is in line with the plan 5+ high scenario (upper bound).

In both approaches, however, additional overtime hours must also be considered. Based on new contracts with labor unions, the USPS may be able to apply flexible workforce models, reducing the need for overtime hours. Consistent with the idea of providing lower and upper bounds for plan 5+ savings, it is assumed in plan 5+ high, that USPS can effectively handle overtime, whereas in plan 5+ low it cannot (leading to incremental overtime costs).

Table 16 summarizes the delivery scenarios and the corresponding major assumptions.

Table 16: Delivery scenario

Scenario	Plan 5	Plan 5+ high	Plan 5+ low
	No home delivery of Letters/Flats and Packages on Saturdays, 75% shifted to Mondays, 25% to Fridays [Continuation of delivery of Express Mail and Saturday post office box delivery]	No home delivery of Letters/Flats on Saturdays. Volume shifts for Letters and Flats as plan 5. [Continuation of delivery of Express Mail, Saturday post office box delivery and package delivery]	As plan 5+ high
City carrier implementation	**Plan 5**	**Plan 5+ high**	**Plan 5+ low**
Street time			
Route and access time	None on Saturdays	Incremental delivery cost as compared to plan 5	Avoided delivery costs as compared to status quo
Load time/productivity	For shifted Saturday volumes, application of higher Monday productivity	As plan 5 (reflected in incremental approach)	Constant productivity for shifted Saturday load time (all other costs other than route and access costs are transferred 1:1 to Mondays/Fridays)
Office Time			
Fixed costs	Saturdays fixed costs can be saved	Saturdays fixed costs can be saved	Saturday Fixed costs remain
Variable costs	No costs avoided (shift)	No costs avoided (shift)	No cost avoided (shift)
Street + Office Time			
Overtime		Additional overtime hours can be managed with flexible workforce	Additional overtime hours cannot be managed with flexible workforce (surcharge of $20 per hour)

Street time as referred to by the USPS includes route, access, and load time (cf. Figure 2). Based on the bottom-up model from Section 5, route and access time can be calculated and distinguished from load time.

To calculate cost differentials of plan 5+ in delivery, the following simulations are performed:

– For Saturdays, the new routes for parcel delivery are simulated by applying the model shown in Section 5. This gives an estimate for the new Saturday delivery hours. The difference between the actual delivery hours and the simulated "new" delivery hours constitute USPS' time savings on Saturdays in the first approach (avoided costs relative to status quo). These can be broken down into route and access times on the one hand, and load time on the other. The load time for letters and flats is shifted to other days, showing the effect on route and access times is the primary concern. The new route and access times can also be used to compute incremental costs in the second approach (relative to plan 5). The sum of all three components can be used to assess the impact on overtime hours, which are more costly than regular hours.

- On Mondays and Fridays, additional time is needed to deliver the mail previously delivered on Saturdays. Additional time per route is computed based on the empirical results on variable time per mailpiece from above (beginning of Section 6.1). Once additional time is determined, the effects on overtime can be calculated.

In both simulations, the effects on overtime are accounted for. From DOIS, the actual working hours for every day and route are known. The new working hours on Fridays, Saturdays, and Mondays are calculated as the actual working hours in FY2012 plus/minus the additional/reduced working hours from the volume shifts as shown above. Overtime is then defined as total working hours minus 8 hours:

$$overtime_i = \max\{(hours_i + \Delta hours_i) - 8, 0\},$$

where $i \in \{Friday, Saturday, Monday\}$.

6.1.1.2 Street time: Cost differentials on Saturdays

Saturday parcel delivery routes are simulated in the bottom-up model for all of FY2012.[12] It is assumed that a delivery point is served on a Saturday if it receives at least one parcel. To determine the parcel distribution across delivery points, the actual parcel volumes on a given Saturday are randomly assigned to the addresses of a route.[13] That is, if there were n parcels on a given Saturday, then n addresses of a route are randomly drawn. The delivery points served are then the points which have at least one address receiving a parcel.[14] This is done for every Saturday in FY2012 and the new Saturday routes are then simulated.

It is assumed that the volume of parcels remains the same as in FY 2012 after the change in delivery regime because the level of service of parcel delivery remains unchanged. AMS data provide information on the number of addresses per deliver point. From DOIS data, the number of parcels per delivery day is known. The random assignment of parcels to addresses does not imply that all delivery points have the same probability of receiving at least one parcel because some delivery points have more than one address. Delivery points with more addresses are more likely to receive a parcel on a given Saturday.

The results from the model calibration in section 5.3.2 and 5.3.3 allows simulated Saturday route distances and volumes to be converted into working hours and then into financial costs. These are then compared to the actual FY 2012 Saturday delivery costs to quantify the costs savings.

The new street and office hours on Saturdays are computed as

$$street\ hours = \underbrace{0.0001402 * shortest\ path}_{\text{route and access time}} + \underbrace{0.014067 * parcels}_{\text{load time}}.$$

$$office\ hours = .0084455 * parcels.$$

As introduced above, we are primarily interested in changes on route and access times to estimate avoided fixed costs of plan 5+. The net savings are the difference in route and access times multiplied by the average piggy-backed hourly rate of USD 59.42, which corresponds to the hourly costs of city carriers including labor and vehicle use. The factor was provided by the PRC.

12 There are 53 Saturdays in FY 2012.

13 This is as accurate as possible as we do not have any information on address level.

14 A delivery point can have several addresses.

All other costs shift to other days. Assuming constant productivity along labor days, the shifts are relevant if these cause increased or decreased overtime work, the latter may be the case for Saturdays. Therefore, total street hours and office hours per route are calculated to estimate the effects on overtime costs. The calculations assume a work day of eight hours and an overtime compensation premium of an additional USD 13.92 per hour.

The resulting avoided cost (reduced route and access time, reduced overtime) from discontinued Saturday delivery of letters and flats is shown in Table 17. Avoided costs for all city carriers are obtained from scaling up the estimated avoided costs in our sample with a factor of 8.69. This factor inflates our sample of 16,274 routes to represent the 141,469 total city routes in the system.

Table 17: Avoided costs on Saturdays

	Route and access time	Load time	Office hours	Total hours	Overtime
Status quo hours	1'750'150	3'314'941[15]	1'477'631	6'542'722	229'319
Plan 5+ hours	521'837	194'885	117'004	833'725	1'195
Plan 5+ hours as % of Status quo	30%	6%	8%	13%	1%
Difference Status quo/plan 5+ (hours)	-1'228'313				-228'124
Avoided costs (sample, USD)	-72'986'382				-3'175'486
Avoided costs (all city carriers, USD)	**-634'466'665**				**-27'604'328**
Incremental costs compared to plan 5 (all city carriers, USD)	**269'546'784**				**144'602**

Therefore, compared to the status quo, route and access times are USD 634 million lower under plan 5+. Compared to plan 5, the corresponding incremental cost is USD 270 million.[16]

In terms of overtime, less overtime is needed and USD 28 million can potentially be saved on Saturdays if overtime was performed by the carrier (as assumed in plan 5+ low).

6.1.1.3 Street time: Incremental costs on Fridays and Mondays

In line with the USPS' assumption from plan 5, it is assumed that 25% of letter and flat volumes of Saturdays shift to Fridays and 75% shift to Monday. Assuming that the routes on Friday and Monday are not redesigned even with the additional volumes, the calibrated model in Section 5.3.2 can be used to calculate the new working hours on Fridays and Mondays. Specifically, the additional hours are calculated as

$$\Delta streethours_{Friday} = 0.0017725 * 0.25 * letters_{Saturday} + 0.0015453 * 0.25 * flats_{Saturday}$$

$$\Delta streethours_{Monday} = 0.0017725 * 0.75 * letters_{Saturday} + 0.0015453 * 0.75 * flats_{Saturday}$$

As DOIS provides data on every delivery day, the volume shifts are done for every Saturday in FY 2012 for each route. Thus, the entire FY 2012 volume shifts are simulated under the new delivery regime.

15 DOIS does not differentiate access and load times. The reported load time here is an estimate from the calibrated model.

16 521k additional hours for parcels delivery times 59.42 times 8.69.

The same is done for the office hours by using the coefficients of the office hours regression, i.e.,

$$\Delta officehours_{Fr} = 0.0034844 * 0.25 * casedletters_{Saturday} + 0.0025288 * 0.25 * casedflats_{Saturday}$$

$$\Delta officehours_{Mo} = 0.0034844 * 0.75 * casedletters_{Saturday} + 0.0025288 * 0.75 * casedflats_{Saturday}$$

The resulting incremental overtime costs on Mondays and Fridays from discontinued Saturday delivery of letters and flats are provided in Table 18 and Table 19. Incremental overtime costs for all city carriers are obtained from scaling up the estimated avoided costs in the sample with the same factor of 8.69 used to scale up avoided costs on Saturdays.

Table 18: Incremental costs on Mondays

	Street hours	Office hours	Total hours	Overtime
Status quo (hours)	4'671'268	1'416'890	6'088'158	485'701
Plan 5+ (hours)	6'665'237	2'145'018	8'810'255	3'049'811
Plan 5+ hours as % of Status quo	143%	151%	145%	628%
Difference Status quo/plan 5+ (hours)				2'564'110
Incremental costs overtime (sample, USD)				35'692'411
Incremental costs overtime (all city carriers, USD)				**310'272'196**

Table 19: Incremental cost on Fridays

	Street hours	Office hours	Total hours	Overtime
Status quo (hours)	5'054'918	1'405'321	6'460'239	268'865
Plan 5+ (hours)	5'794'411	1'676'716	7'471'127	1'059'192
Plan 5+ hours as % of Status quo	115%	119%	116%	394%
Difference Status quo/plan 5+ (hours)				790'327
Incremental costs overtime (sample, USD)				11'001'349
Incremental costs overtime (all city carriers, USD)				**95'634'131**

6.1.1.4 Overtime

A shift of 75% of Saturday's letter and flat volumes to Mondays leads to a considerable workload on Mondays. To a lesser extent, workloads on Fridays also increase. Based on the distinction of route and access times on the one hand and load time on the other, we are able to compute the effects on the daily workhours per route. If these exceed eight workhours, then overtime may be required.

Table 17 to Table 19 above show the calculated upper bounds of required overtime work in the status quo and in plan 5+. The upper bound in workhours is calculated assuming constant productivity per piece, independent of the weekday. The resulting increases in overtime can then be translated into increased overtime costs.

The recent APWU contract allows greater use of workers with more flexible work schedules. This may allow the USPS to handle peak loads with fewer overtime hours. If all overtime hours were managed this way, zero additional paid overtime hours would occur. As the scenario plan 5+ high aims at providing an upper bound in terms of saving, it is assumed that additional overtime hours can be fully managed with this flexible work force (resulting in zero additional costs). In contrast, in plan 5+ low, it is assumed that additional overtime hours are required of the carrier in place, i.e., a surcharge on the daily rate is incurred. Assuming an hourly surcharge of USD 13.92 results in incremental overtime costs of USD 378 million, as shown in Table 20.

Table 20: Financial effect of additional overtime hours

[USD]	Additional overtime hours	Cost effect in plan 5+ high [USD]	Cost effect in plan 5+ low [USD]
Friday (25% of letters and flats from Saturday)	6'870'268	0	95'634'131
Saturday (no letters and flats)	-1'983'070	0	-27'604'328
Monday (75% of letters and flats from Saturday)	22'289'669	0	310'272'196
Total	**27'176'868**	**0**	**378'301'999**

6.1.1.5 Direct in-office costs

In plan 5, the USPS/PRC assume that the fixed part of Saturday direct in-office costs can be saved and the variable part is transferred one-to-one to the rest of the week. Consequently, in plan 5+low with continued Saturday parcel delivery, it is assumed that the fixed part of in-office costs still accrue so there are no savings for in-office costs. For plan 5+ high, it is assumed that parcel delivery does not involve any fixed in-office time; therefore, the fixed part of Saturday in-office costs are saved even with parcel delivery taking place demonstrating in-office cost savings in plan 5+ high are the same as in plan 5.

6.1.1.6 Express items

For express items, the values from the USPS/PRC are taken (USD 7 million incremental costs), implying methodically a separate distribution channel for Express Mail.[17]

6.1.2 Rural carriers

As rural carriers are paid on the basis of workload elements such as the number of pieces delivered, route miles, and addresses, only Saturday hours associated with non-volume-related elements may be eliminated. It is therefore assumed that there is no distinction between plan 5 and 5+. Total savings are estimated to be about USD 450 million.

6.1.3 Other carrier costs

Carriers induce some administrative costs. These other or indirect carrier costs are calculated as in plan 5, using the method presented in Library Reference USPS-LR-N2010-6. The different carrier labor costs in plan 5+ high and low scenario lead to slightly reduced indirect carrier costs, totaling USD 265 million in plan 5+ high and USD 238 million in plan 5+ low.

6.1.4 Summary

Table 21 provides an overview of the calculated incremental effect of plan 5+ in delivery as compared to plan 5. The changes as compared to plan 5 are highlighted in red.

[17] An integrated computation would require daily express volumes per route that were not available.

Table 21: Estimated direct cost savings in delivery

M USD	Plan 5	Plan 5+ high	Difference	Plan 5+ low	Difference
City carrier direct street time	1'162	892	(270)	634	(528)
City carrier direct in-office costs	102	102	-	-	(102)
City carrier adjustment for Saturday Express Mail	(7)	(7)	-	(7)	-
City carrier adjustment for cost of overtime hours	-	-	-	(378)	(378)
Rural carrier direct costs	341	341	-	341	-
Rural carrier EMA savings	85	85	-	85	-
Rural carrier adjustment for Saturday express mail	(1)	(1)	-	(1)	-
Indirect cost for city and rural carriers	305	265	(40)	238	(67)
Total delivery savings	**1'987**	**1'677**	**(310)**	**912**	**(1'075)**

Source: Swiss Economics.

6.2 Impact of plan 5+ on other processes

For the processes other than delivery (collection, sorting, and transportation) it is assumed that in the plan 5+ high scenario, the same operational changes are made as in plan 5. This is possible because the plan 5 processing architecture is compatible with plan 5+, as sorting of mail items including parcels is continued Friday night. Therefore, parcels would arrive at delivery offices in time for delivery on Saturday mornings. As a consequence, savings arise mainly from the discontinuation of Saturday dispatch from post offices, leading to fewer mail items that require sorting and transport during the weekends. The corresponding savings of about USD 290 million that were estimated by the PRC are reported in Table 22. In Appendix D, the processes and the planned adaptations and assumptions are described in greater detail.

In the plan 5+ low scenario, it is assumed that Saturday dispatch continues as in the status quo; therefore, no adaptations take place in these processes compared to the status quo, and there are no savings. However, continuing the dispatch would lead to faster end-to-end delivery times, implying a somewhat reduced secondary effect of consumer response.

Based on the assumptions on the adaptations in the processes other than delivery, the cost savings displayed in Table 22 emerge.[18] Details can be found in Appendix D.

Table 22: Estimated direct cost savings in collection, sorting, and transport

M USD	Plan 5	Plan 5+ high	Plan 5+ low
Collection and Sorting/Processing	**120**	**120**	**-**
Clerks and Mailhandlers	34	34	-
Supervisor	20	20	-
Equipment Maintenance	13	13	-
Custodial	0	0	-
Post Office	53	53	-
Transport	**170**	**170**	**-**
Air	62	62	-
Highway	13	13	-
Box Routes	35	35	-
Vehicle Service Drivers	59	59	-
Total Other Processes	**289**	**289**	
Delivery (from Section 6.1)	**1'987**	**1'677**	**912**
Total Direct effects	**2'276**	**1'966**	**912**

18 Collection and sorting are not declared separately in plan 5; therefore, they are taken together here as well.

6.3 Overall impact on profits and unit costs

Based on the calculations above, it is now possible to assess the impact of plan 5+ high and 5+ low on USPS profitability. The difference in yearly profits $\Delta\pi$ is computed as the difference between the direct effects of savings and the indirect effects of mailers' demand response (details cf. Appendix A):

$$\Delta\pi = \underbrace{\text{avoided process cost} - \text{incremental cost}}_{\text{direct effects on process costs}} - \underbrace{\text{foregone revenue} + \text{avoided volume costs}}_{\text{indirect effects from demand response}}$$

Direct effects relate to avoided or incremental costs due to changes of processes (e.g., savings from not delivering letters on Saturdays) described above (Section 6.1 for delivery and 6.2 for other processes).

Indirect effects are induced by mailers' responses to the adjusted services; that is, if plan 5+ has an impact on demand for postal items sent. If mailers send less mail, variable costs can be saved, and revenue is lost. The exact quantification of demand effects is beyond the scope of this project. Nevertheless, to provide context and an indication of the sensitivity of profits to secondary effects, we compute boundaries of maximum revenue losses such that the net effect is zero, and compute the net effects for illustrative demand assumptions that are based on earlier USPS market research on plan 5 (details cf. Appendix A).

6.3.1 Profitability boundaries

When computing profitability boundaries, it is asked how much mail demand can decrease such that plan 5+ is just profitable (break-even). If this exercise results in unrealistically high volume losses that cannot be expected due to the effects on quality from plan 5+, then it is likely that plan 5+ increases the USPS profitability, ceteris paribus.

Table 23 presents the results of this break-even calculation for FY 2012. The calculation assumes that plan 5+ will not affect parcel demand (because parcels are still delivered on Saturdays) and that the relative size of the demand effects between First-Class Mail products and other products is as documented in Table 44. The calculation of the corresponding revenue forgone and attributable costs avoided is based on USPS figures from FY 2012. (See summary in Section 3.2.)

Table 23: Break-even volume response

	Plan 5+ high	Plan 5+ low
Break-even average volume response	-7.5%	-3.5%

The implementation of plan 5+ high with estimated direct savings of about USD 1.96 billion is profitable as long as volume losses do not exceed 7.5% on average. For plan 5 low with estimated direct savings of about USD 912 million, an average volume loss of more than 3.5% would offset these savings and result in a net loss (i.e., reduced overall USPS profitability).

6.3.2 Change in profitability differentials for selected demand scenarios

Finally, overall net effects of plan 5+ high and 5+ low on USPS' yearly profits are computed for an illustrative demand scenario.[19]

To estimate the indirect effects, illustrative demand scenarios of consumers are evaluated (i.e., scenarios of possible mailer responses to plan 5+). The demand scenarios are evaluated against the cost and volume structure of the USPS in FY 2012 (as summarized in Section 3.2), adjusted to include the direct effects of plan 5+. For plan 5+, no market research is available. For plan 5, however, some market research was commissioned by the USPS and prepared for filing in 2010 (details in Section 11.5 from Appendix B). The methodology of this research was subject to a technical discussion and resulted in some modifications by the PRC. The doubts about the accuracy of the resulting figures remain, however. The demand effects as shown in Table 44 should, therefore, be viewed only as an illustrative example of potential net effects of plan 5 on the USPS' yearly profits. As shown in Table 24 (details in Section 11.5.2), the demand responses are assumed to be reduced in plan 5+ low compared to plan 5+ high because the effects on quality are less severe in the 5+ low scenario compared to the 5+ high scenario. End-to-end delivery times for items collected on Saturdays are faster if this mail is processed right away and not after Monday (which would be the case in the high scenario). However, end-to-end delivery times for pieces originally delivered on Saturdays remain lower. For illustrative purposes, it is, therefore, assumed that volume responses are lowered by 50 % in plan 5+ high.

Table 24: Demand effects

	Status quo	Plan 5	Plan 5+ high	Plan 5+ low
Volume scenario	FY2012	Volume response considered	As plan 5, but no response for parcels	As plan 5+ high, but reduced response

This illustrative demand scenario leads to the results shown in the lower part of Table 25. In plan 5+ high, indirect effects caused by the assumed 2.2% volume loss in average would reduce USPS' profits by about USD 570 million. In plan 5+ low, mailers respond less sharply, leading to a decrease of USD 287 million. For plan 5 with illustrative volume losses of 2.22% in average, the indirect effects are slightly smaller than in plan 5+ high. This somewhat counterintuitive result is caused by a negative contribution of parcels in FY 2012 (cf. Table 8).

Table 25: Financial effects of plan 5+ as compared to plan 5

M USD	Plan 5	Plan 5+ high	Plan 5+ low
Direct effects (direct avoided cost)	**2'276**	**1'966**	**912**
Savings Collection/Sorting	120	120	-
Savings Transport	170	170	-
Savings Delivery	1'987	1'677	912
Indirect effects for FY2012 (lost contribution)	**(571)**	**(573)**	**(287)**
Average volume response	-2.22%	-2.20%	-1.10%
Foregone revenue*	(1'234)	(1'169)	(585)
Avoided cost*	663	596	298
Total Savings	**1'705**	**1'393**	**625**

*For Plan 5, adapted to FY2012 figures

19 Technically, equation (1) from Appendix A is evaluated for specific demand scenarios $x^{j,J,1}$.

If the illustrative volume losses of 2.2% and 1.1% respectively are realistic, then the total savings of plan 5+ ranges between USD 0.6 and 1.4 billion. The range is somewhat lower than USPS' expected savings of USD 2 billion. The underlying USPS calculations are not known, and it is, therefore, not possible to identify where the differences lie.

7. References

Cohen, R.; Chu, E.H. (1997). “A Measure of Scale Economies for Postal Systems.” In Managing Change in the Postal and Delivery Industries, edited by M. A. Crew and Paul R. Kleindorfer. Boston, MA: Kluwer Academic Publishers.

Cremer, H., Grimaud, A.; Laffont, J.-J. (2000). The Cost of Universal Service in the Postal Sector. In: Current Directions in Postal Reform, ed. by Michael A. Crew and Paul R. Kleindorfer, Kluwer.

Felisberto, C.; Finger, M.; Friedli, B.; Krähenbühl, D.; Trinkner, U. (2006). “Pricing the last mile in the postal sector.” In: Crew, M A; Kleindorfer, P R. Progress toward liberalization of the postal and delivery sector. New York, N.Y., US, 249-266. ISBN 978-0-387-29743-9.

Haller, Andreas; Jaag, Christian; Trinkner, Urs (forthcoming 2014). “Calculating the Net Cost of Home Delivery Obligations.” In: The Role of the Postal and Delivery Sector in a Digital Age, edited by M.A. Crew and T. Brennan. Cheltenham, Edward Elgar, pp. 227 – 239.

Jaag C. & U. Trinkner & J. Lisle & N. Waghe & E. Van Der Merwe, 2011. "Practical Approaches to USO Costing and Financing," Competition and Regulation in Network Industries, Intersentia, vol. 12(2), pages 108-108, June.

Kenny, Ch. (2005) Questioning the Monopoly-Supported Postal USO in Developing Countries in M. Crew and P. Kleindorfer Progress Toward Liberalization of the Postal and Delivery Sector New York: Springer NERA. 2004. Economics of Postal Services: Final Report, A report to the European Commission.

Panzar, J. (2000). A Methodology for Measuring the Costs of Universal Service Obligations. Information Economics and Policy 12(3), 211-220.

Postal Regulatory Commission (2011). Advisory Opinion on Elimination of Saturday Delivery

Trinkner, Urs, Bernd Holznagel, Christian Jaag, Helmut Dietl, Andreas Haller (2012). Möglichkeiten eines gemeinsam definierten Universaldienst Post und Telekommunikation aus ökonomischer und juristischer Sicht. Study on behalf of Deutscher Bundestag.

8. Appendix A: Methodological details

The steps performed in this study are summarized in Section 2.3. In the following, further details are provided.

8.1 Step 1: Modified delivery schedules

The modified delivery schedules that are to be analyzed in detail are defined and specified. Plan 5+ is specified in detail and assumptions are taken on how the rest of the value chain is organized compared to the status quo and the known plan 5.

8.2 Step 2: Impact on cost and days to delivery

Plan 5 and 5+ impact unit costs of mail and parcels; quality of service may also be affected. The impact may be different in each element of USPS' value chain. It is, therefore, foreseen to conduct—where necessary—a value chain analysis to understand how the relevant processes are affected by the modifications (thereafter referred to as business process analysis).

Collection, sorting, transport and delivery are the main processes of the postal value chain. In the first place, modifying a delivery schedule has an impact on delivery itself. Upstream processes may, however, be impacted as well.

The exercise has already been done for plan 5 after the USPS' 2010 filing. It is built as much as possible on these calculations and respective PRC findings. A new exercise is necessary where plan 5+ deviates from plan 5. The analysis focuses on direct effects and results in avoided cost, incremental cost, and effects on delivery time. Indirect effects are accounted for in Step 3, requiring knowledge on cost shares per process that are variable (with mail demand/the number of letters).

The most crucial process in terms of cost differentials will be home delivery. On the one hand, there are cost savings from plan 5+ of discontinuing Saturday delivery for letters and flats, and on the other, there are the costs of a stand-alone parcel delivery organization on Saturdays. The assessment of the net effects requires a model to predict the changes on route and access times (following the distinction established by Cohen and Chu, 1997, see Figure 1).

In this framework, discontinuing letter delivery on Saturdays means that:

- on Saturdays, route times are fundamentally different and much more variable, as the probability that a given household gets a delivery is reduced sharply (leading to different routes every Saturday);
- from Monday to Friday, the probability that a household is served is increased slightly, leaving route times mainly constant and increasing access times to a small extent. In the analysis, it is assumed that route and access remain constant from Monday to Friday.

To predict the effects of the USPS' plans on Saturday route and access times, the delivery model from Trinkner et al. (2012) and Haller et al. (2014) is applied. The model computes route and access times for different delivery schedules with a bottom-up approach. Route and access times can then be transformed into cost and normalized to fit the yearly delivery costs of the USPS, allowing the estimation of the effects of the modified delivery schedules on delivery and unit cost. The time differentials can also be used to either estimate the need for overtime hours on days with increased workload (in particular, Mondays).

Cost effects other than route and access times are based on the existing analysis and methodologies from the PRC and USPS respectively (2010 discussion).

8.3 Step 3: Impact on profitability

Step 3 extends the analysis to be able to assess the impact of the modified delivery schedules on the USPS' profitability. This would require thorough analysis of demand effects that come along with a reduction of Saturday delivery. As this is beyond the scope of this project, two alternative calculations are performed. In Step 3a, boundaries of demand effects are estimated such that the new delivery plans are still profitable. In Step 3b, the yearly profitability differentials per delivery schedule are estimated for illustrative demand scenarios, assuming that the new plans would be already fully operational. The net effects on yearly profits π compute as:

$$\Delta\pi = \underbrace{(R^1 - C^1)}_{\substack{\text{Profit before implementation} \\ \text{of modified delivery schedule}}} - \underbrace{(R^0 - C^0)}_{\substack{\text{Profit before in} \\ \text{status quo of USPS}}} .$$

Rearranging yields:

$$\Delta\pi = \underbrace{(C^0 - C^1)}_{\substack{\text{net effect} \\ \text{on cost}}} - \underbrace{(R^0 - R^1)}_{\substack{\text{net effect} \\ \text{on revenue}}}. \quad (1)$$

Extending for processes i and products j yields:

$$\Delta\pi = \underbrace{\textstyle\sum_{i=1}^{I} C^{i,0}(x^{j..J,0}) - C^{i,1}(x^{j..J,1})}_{\substack{\text{per process i,} \\ \text{avoided cost (C0>C1)} \\ \text{or incremental cost (C0<C1)}}} - \underbrace{\textstyle\sum_{j=1}^{J} R(x^{j,0}) - R(x^{j,1})}_{\substack{\text{per product j,} \\ \text{forgone revenue (R0>R1) or} \\ \text{additional revenue (R0<R1)}}}. \quad (2)$$

That is,

$$\Delta\pi = \text{avoided cost} - \text{incremental cost} - \text{foregone revenue} + \text{additional revenue}. \quad (3)$$

It is noted that effects on the cost side are computed per process; whereas, net revenue effects are calculated per product category. See Jaag et al. (2011) for a more detailed treatment.

The cost functions per process $C^{i...I,1}(x^{j..J})$ have been assessed in Step 2. An idea on the demand effects $x^{j..J,0}$-$x^{j..J,1}$ per product is needed to calculate the net profit effects. It is noted that these are not only relevant to compute the right-hand side (net effect on revenues), but also for assessing the net cost effects (left-hand side). The first effect is direct; the second indirect. To compute the indirect effect, cost elasticities or variable costs of all affected products need to be determined.

Assuming no additional revenue, equation (3) can be rearranged as follows to separate direct and indirect effects:

$$\Delta\pi = \underbrace{\text{avoided process cost} - \text{incremental cost}}_{\text{direct effects on process costs}} - \underbrace{\text{foregone revenue} + \text{avoided volume costs}}_{\text{indirect effects from demand response}}. \quad (4)$$

The USPS and PRC have distinguished these two effects in their analysis of plan 5. This analysis will make the same differentiation, allowing basing the calculations, as far as considered appropriate, on existing data. Therefore, the analysis below will differentiate according to direct effects on process costs and indirect effects induced by the demand response of consumers.

It is assumed that in plan 5+, only demand of letter and flat products are affected. In plan 5, demand for parcels is affected as well. The demand assumptions are based on an earlier analysis of plan 5.

Step 3a: Profitability boundaries

As the demand effects are not known in detail, boundaries for induced demand effects under which the delivery schedules are still profitable are calculated. Formally:

$$\min(x^{j..J,0}) \text{ s.t. } \Delta\pi = 0.$$

If these boundaries lead to induced volume losses that can be considered as unrealistically high, then it is very likely that the corresponding delivery schedules reduce the USPS' yearly profit.

Step 3b: Profit differentials for selected demand scenarios

In addition, equation (2) will be evaluated for selected demand scenarios $x^{j..J,1}$ that are based on quantitative analysis made publicly available by the USPS in its filing of plan 5. The results indicate per modified delivery schedule the yearly impact on USPS' profits.

8.4 Remark on net costs

According to the profitability cost approach pioneered by Panzar (2000) and Cremer et al. (2000), the "net cost of the USO" N is the difference in profits in a competitive environment without USO π^1 and with USO (status quo) π^0:

$$N^{Profitability\ Cost} \equiv \pi^1 - \pi^0.$$

The profit in both scenarios results from the difference in revenue R and cost C. Therefore,

$$N^{Profitability\ Cost} = \underbrace{(R^1 - C^1)}_{\text{Profit without USO}} - \underbrace{(R^0 - C^0)}_{\text{Profit with USO}}.$$

This can be rearranged in terms of avoided cost and foregone revenues:

$$N^{Profitability\ Cost} = \underbrace{(C^0 - C^1)}_{\substack{\text{Avoided}\\ \text{Cost}}} - \underbrace{(R^0 - R^1)}_{\substack{\text{Foregone}\\ \text{Revenue}}}. \tag{5}$$

If a modified delivery schedule is not feasible due to the US USO, then equations (1) and (5) are equal:[20]

$$\Delta\pi = N^{Profitability\ Cost}.$$

Therefore, if plan 5 or plan 5+ are not feasible because of USO constraints, then the results of Step 3b above may qualify as (a component of) net costs of the USO. For such a classification, a detailed analysis of the legal framework, other USO dimensions and potential benefits of the USO would be required.

8.5 Deviations from the original scope of the project

Compared to the original scope of the project, the steps above induce the following changes:

Reductions:

- A somewhat less detailed analysis of cost and quality effects in collection, sorting and transport;
- Focus on long-term effects (as if the delivery schedule would be operational already) and differences to status quo plan 5.

---

20 Technically, this is limited to the special case where no other plans exist where one or several universal service obligations are binding. If there are other service modifications that are profitable but not feasible because of the USO, then the net costs are higher and the net costs of plan 5+ are one element of the net costs.

Extensions:

- Comparative analysis to plan 5;
- Two plan 5+ scenarios to indicate upper and lower bound of savings;
- Analysis of profitability boundaries;
- Evaluation of selected demand scenarios.

The scope of the project is therefore broadened, while some of the calculations are of less detail. This is observed against the background that the USPS has not filed plan 5+, meaning that the relevant details of the plan are not known (in particular, re-engineered processes in sorting, transport and delivery). The core part of the work remains the same however; namely, the computation of Saturday route and access times under plan 5+.

8.6 Alternative methodologies

8.6.1 Assessment criteria

The methods and model should meet the following criteria:

1. Accurate prediction of empirical data;
2. Accurate predictions of future date;
3. Efficiency;
4. Refutability, enabling estimation of the degree of confidence in the model; and
5. Simplicity.

8.6.2 Profitability cost vs. NPV

The main alternative to the profitability cost approach undertaken would be the computation of the net present value (NPV) of the modified delivery schedules, implying discounted cash flow protections into the future.

Under certain conditions, the profitability cost and NPV approach converge. This is why the profitability cost approach has a solid background in economic theory. Profitability cost approach can be seen as a conversion of NPV to yearly economic profit differences. NPV, however, needs much more information, although less informative to the reader as compared to yearly profit differentials.

This may also be the reason why the profitability cost approach is preferred by regulators in the US, Europe and elsewhere.

8.6.3 Cost modeling: bottom-up modeling vs. econometric analysis

Econometric methods to predict future changes in cost are powerful if the empirical data contains the technologies applied. For example, if a data set includes different types of post offices, then econometric techniques such as frontier analysis can be used to identify the production function. If such data is not available, then other techniques such as bottom-up modeling must be applied.

For delivery plans 5+ and plan 5, no empirical data exists to analyze the impact on street delivery times when packages only are delivered on Saturdays. Here, empirical studies of cost elasticities are of little value. An application of the model from Trinkner et al. (2012), in particular, when considering its accurate predictions of Swiss route times, appears reasonable as accurate measures route changes and access times can be expected. For other cost components such as load or office time, however, econometric methods are well suited as long as the underlying technology/processes are not affected by plan 5 or plan 5+.

9. Appendix B: Cost allocation

Table 26: Attribution of USPS cost segments to processes

Process	Attributed USPS Cost Segments
Collection	2.2; 3.2; 3.3.1; 3.3.2; 4.1; 13.1; 16.1.1; 16.1.2; 16.1.3; 20.3
Sorting	2.1.1; 2.1.2; 2.5.3; 3.1; 3.3.3; 16.3.2; 20.1
Transport	14.1.1; 14.1.1; 14.1.2; 14.1.3; 14.1.4; 14.2
Delivery	2.4.1; 2.4.2; 2.4.3; 2.5.4; 2.5.7; 6.1; 6.2.2; 6.2.3; 7.1; 7.2; 7.3; 8.1; 10.1; 10.2; 10.3; 13.2.1; 13.2.2; 13.2.3; 13.6; 13.7; 15.2; 20.2
Overhead	1.1; 1.2; 2.3; 2.5.2; 2.5.5; 2.5.6; 2.5.8; 11.1.1; 11.1.2; 11.2; 11.3; 12.1; 12.2; 12.3; 13.3; 13.4; 13.5; 15.1; 15.3; 16.2; 16.3.1; 16.3.3; 16.3.4; 16.3.5; 16.3.6; 17.1; 18.1.1; 18.1.2; 18.1.3; 18.1.4; 18.2.1; 18.2.2; 18.2.3; 18.2.4; 18.2.5; 18.2.6; 18.2.7; 18.3; 19.1.1; 19.1.2; 20.4; 20.5; 20.6

Source: Swiss Economics.

Table 27: Attribution of USPS products to product groups

Product group	Attributed USPS product numbers
Letters	3; 4; 8; 9; 21; 25; 125; 130
Flats	14; 22; 23; 26; 42; 44
Packages	19; 27; 41; 43
Periodicals	31; 32
Competitive	175
Others	51; 52; 54; 55; 56; 57; 58; 61; 62; 73; 74; 76; 185;

Source: Swiss Economics.

Table 28: Share of USPS costs per product group and process

Share FY 2012	Collection	Sorting	Transport	Delivery	Overhead	Sum
Letters	1.5%	8.3%	1.6%	9.1%	5.7%	**26.2%**
Flats	0.5%	3.6%	0.9%	4.1%	2.3%	**11.3%**
Packages	0.2%	1.0%	0.8%	0.6%	0.5%	**3.1%**
Periodicals	0.1%	1.3%	0.4%	1.1%	0.7%	**3.5%**
Competitive	0.5%	2.9%	3.2%	1.5%	1.8%	**9.9%**
Others	1.1%	0.9%	1.8%	1.2%	1.4%	**6.4%**
Attributable Costs	**4.0%**	**18.1%**	**8.5%**	**17.5%**	**12.5%**	**60.5%**
Institutional Costs	2.6%	1.8%	1.3%	20.4%	13.4%	**39.5%**
Total Operating	**6.6%**	**19.8%**	**9.8%**	**37.9%**	**25.9%**	**100.0%**

Source: Swiss Economics.

Table 29: Variable and fixed costs per piece

USD	Variable costs per piece					Fixed costs per piece
	Collection	Sorting	Transport	Delivery	Overhead	
Letters	0.01	0.05	0.01	0.05	0.03	0.10
Flats	0.01	0.08	0.02	0.09	0.05	0.17
Packages	0.15	0.77	0.58	0.43	0.40	1.52
Periodicals	0.01	0.13	0.04	0.11	0.07	0.23
Competitive	0.16	0.88	0.94	0.45	0.55	1.95
Others	0.24	0.20	0.39	0.25	0.32	0.91
All	0.02	0.08	0.04	0.07	0.05	0.17

Source: Swiss Economics,

10. Appendix C: Model calibration—estimation output

Table 30: Regression output with shortest path as proxy

Source	SS	df	MS
Model	171608368	4	42902092
Residual	25095709.6	4905932	5.11538065
Total	196704078	4905936	40.0951169

Number of obs	= 4905936
F(4,4905932)	= .
Prob > F	= 0.0000
R-squared	= 0.8724
Adj R-squared	= 0.8724
Root MSE	= 2.2617

actualstre~t	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
shortestpath	.0001402	1.43e-07	981.45	0.000	.0001399	.0001405
letters	.0017725	1.20e-06	1475.09	0.000	.0017702	.0017749
flats	.0015453	3.58e-06	431.71	0.000	.0015383	.0015523
parcels	.014067	.0000509	276.60	0.000	.0139673	.0141666

Table 31: Regression output with USPS sequence path as proxy

Source	SS	df	MS
Model	167107367	4	41776841.6
Residual	29596711	4905932	6.03284167
Total	196704078	4905936	40.0951169

Number of obs	= 4905936
F(4,4905932)	= .
Prob > F	= 0.0000
R-squared	= 0.8495
Adj R-squared	= 0.8495
Root MSE	= 2.4562

actualstre~t	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
sequencepath	5.92e-06	2.23e-08	265.84	0.000	5.88e-06	5.97e-06
letters	.002302	1.15e-06	1997.83	0.000	.0022997	.0023042
flats	.0018329	3.87e-06	473.24	0.000	.0018253	.0018405
parcels	.0188513	.000055	343.05	0.000	.0187436	.018959

Table 32: Regression output with Base Mileage

Source	SS	df	MS
Model	136823215	4	34205803.9
Residual	19584410.2	3881918	5.0450345
Total	156407626	3881922	40.291285

Number of obs	= 3881922
F(4,3881918)	= .
Prob > F	= 0.0000
R-squared	= 0.8748
Adj R-squared	= 0.8748
Root MSE	= 2.2461

actualstre~t	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
BaseMileage	.1288333	.0001374	937.74	0.000	.128564	.1291026
letters	.0015731	1.46e-06	1074.63	0.000	.0015702	.001576
flats	.0016159	4.33e-06	372.77	0.000	.0016074	.0016244
parcels	.0122998	.0000578	212.67	0.000	.0121864	.0124132

Table 33: Regression output with no proxy (constant)

Source	SS	df	MS
Model	537530.194	3	179176.731
Residual	8610154.41	4905932	1.75504968
Total	9147684.6	4905935	1.86461594

Number of obs	= 4905936
F(3,4905932)	= .
Prob > F	= 0.0000
R-squared	= 0.0588
Adj R-squared	= 0.0588
Root MSE	= 1.3248

actualstre~t	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
letters	.0004372	8.23e-07	531.36	0.000	.0004356	.0004388
flats	-.0004545	2.19e-06	-207.48	0.000	-.0004588	-.0004502
parcels	.0028247	.00003	94.17	0.000	.0027659	.0028835
_cons	5.567108	.0015938	3492.95	0.000	5.563984	5.570231

Table 34: Regression output with dummies for delivery methods

Source	SS	df	MS
Model	180020280	9	20002253.3
Residual	16683797.8	4905927	3.40074319
Total	196704078	4905936	40.0951169

Number of obs	= 4905936
F(9,4905927)	= .
Prob > F	= 0.0000
R-squared	= 0.9152
Adj R-squared	= 0.9152
Root MSE	= 1.8441

actualstre~t	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
shortestpath	.0000903	1.32e-07	682.43	0.000	.0000901	.0000906
letters	.0014196	1.02e-06	1386.03	0.000	.0014176	.0014216
flats	.0006845	3.09e-06	221.64	0.000	.0006784	.0006905
parcels	.0090431	.000042	215.12	0.000	.0089607	.0091255
d_curb	1.325841	.0027092	489.39	0.000	1.320531	1.331151
d_dismount	2.019309	.0028564	706.95	0.000	2.013711	2.024907
d_foot	1.52995	.0042583	359.28	0.000	1.521603	1.538296
d_park	2.8745	.001924	1494.02	0.000	2.870729	2.878271
d_other	1.64266	.0134671	121.98	0.000	1.616265	1.669055

Table 35: Regression output for “foot” routes

Source	SS	df	MS
Model	5146217.48	4	1286554.37
Residual	1118733.45	233304	4.79517474
Total	6264950.93	233308	26.8527051

Number of obs	= 233308
F(4,233304)	= .
Prob > F	= 0.0000
R-squared	= 0.8214
Adj R-squared	= 0.8214
Root MSE	= 2.1898

actualstre~t	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
shortestpath	.000121	7.50e-07	161.25	0.000	.0001195	.0001225
flats	.0005996	9.33e-06	64.25	0.000	.0005813	.0006179
letters	.0019427	4.22e-06	460.27	0.000	.0019344	.001951
parcels	.0053295	.0002447	21.78	0.000	.00485	.005809

Table 36: Regression output for "Park & Loop" routes

Source	SS	df	MS
Model	79097613.8	4	19774403.5
Residual	9557305.32	2150762	4.44368337
Total	88654919.2	2150766	41.2201602

Number of obs	= 2150766
F(4,2150762)	= .
Prob > F	= 0.0000
R-squared	= 0.8922
Adj R-squared	= 0.8922
Root MSE	= 2.108

actualstre~t	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
shortestpath	.0001901	2.36e-07	806.68	0.000	.0001896	.0001905
flats	.00181	5.90e-06	306.57	0.000	.0017984	.0018216
letters	.0020529	2.03e-06	1010.45	0.000	.002049	.0020569
parcels	.0108376	.0000778	139.25	0.000	.0106851	.0109902

Table 37: Regression output for “dismount” routes

Source	SS	df	MS
Model	23475464	4	5868866
Residual	3241273.46	664918	4.87469652
Total	26716737.5	664922	40.1802579

Number of obs	= 664922
F(4,664918)	= .
Prob > F	= 0.0000
R-squared	= 0.8787
Adj R-squared	= 0.8787
Root MSE	= 2.2079

actualstre~t	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
shortestpath	.0001334	3.60e-07	370.75	0.000	.0001327	.0001341
flats	.001852	.0000101	182.78	0.000	.0018321	.0018718
letters	.0016146	2.91e-06	554.05	0.000	.0016089	.0016204
parcels	.0127172	.0001107	114.83	0.000	.0125001	.0129342

Table 38: Regression output for "curb" routes

Source	SS	df	MS		
				Number of obs	= 1161430
				F(4,1161426)	= .
Model	40951332.6	4	10237833.1	Prob > F	= 0.0000
Residual	4115371.19	1161426	3.54337787	R-squared	= 0.9087
				Adj R-squared	= 0.9087
Total	45066703.8	1161430	38.8027722	Root MSE	= 1.8824

actualstre~t	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
shortestpath	.0001281	2.03e-07	629.81	0.000	.0001277	.0001285
flats	.0013175	5.98e-06	220.38	0.000	.0013058	.0013292
letters	.0013999	1.92e-06	729.08	0.000	.0013961	.0014036
parcels	.0129971	.0000934	139.20	0.000	.0128141	.0131801

Table 39: Regression output for "other" routes

Source	SS	df	MS		
				Number of obs	= 18925
				F(4, 18921)	=18068.02
Model	430480.242	4	107620.06	Prob > F	= 0.0000
Residual	112700.731	18921	5.95638345	R-squared	= 0.7925
				Adj R-squared	= 0.7925
Total	543180.973	18925	28.7017687	Root MSE	= 2.4406

actualstre~t	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
shortestpath	.0002874	3.54e-06	81.09	0.000	.0002805	.0002944
flats	.0049844	.0000535	93.18	0.000	.0048795	.0050892
letters	.0003437	.0000146	23.52	0.000	.0003151	.0003723
parcels	.0119014	.0004275	27.84	0.000	.0110634	.0127393

Table 40: Regression output for office hours

Source	SS	df	MS		
				Number of obs	= 4905936
				F(3,4905933)	= .
Model	14967304.7	3	4989101.56	Prob > F	= 0.0000
Residual	3235051.34	4905933	.65941612	R-squared	= 0.8223
				Adj R-squared	= 0.8223
Total	18202356	4905936	3.7102718	Root MSE	= .81204

actualofficehoursamount	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
totalcasedletterspiecesamount	.0034844	3.37e-06	1034.18	0.000	.0034778	.003491
totalcasedflatspiecesamount	.0025288	1.08e-06	2350.96	0.000	.0025267	.0025309
totalparcelspiecesamount	.0084455	.0000172	491.62	0.000	.0084118	.0084792

11. Appendix D: Business process analysis, consumer response

All subchapters are structured equally. First, the plan 5 approach is summarized based on the publicly available information of Docket No. N2010-1; then the approach for plan 5+ for the high and low scenarios are described; finally, corresponding results are provided.

11.1 Collection

11.1.1 Scenario

	Status quo	Changes in plan 5 [based on USPS 2010 filing N2010-1]	Assumed changes in plan 5+ high	Assumed changes in plan 5+ low
Collection	Post offices: Open on 6 days Collection boxes: 6 days	Post offices: No change Collection boxes: Elimination of retrieval on Saturday	As plan 5	As status quo

11.1.2 Plan 5 approach

All mail is still accepted on Saturdays. With the exception of Express Mail, retail customers' mail accepted on Saturday will, however, not be processed until the following Monday: Outgoing mail from retail facilities, with the exception of Express Mail, will not be picked up and dispatched on Saturdays. (For respective savings see sorting and transport.) Letter drops (blue collection boxes) will not be emptied on Saturdays, except in instances where local managers determine the need for capacity reasons.

The USPS calculates savings for no longer emptying letters drops. The USPS, however, expects the workhour savings of eliminating Saturday letter drop collection to be less than its current full costs. This is due to capacity issues which might require extra collection during the weekend and heavier collection volumes on Mondays, which may require additional Monday collections. For these reasons, after eliminating the 4.832 M workhours[21] associated with Saturday collections, one-half of those hours, 2.416 M were added back to cover the time that may be necessary to perform limited collections during a weekend or early collections on Mondays, or Tuesday after a holiday.[22]

It is noted that in the filing, the USPS and PRC did not treat collection as a separate process. Post office operations were considered as part of mail delivery processing. The corresponding savings are, therefore, included in Table 41 from Section 11.2 (sorting).

11.1.3 Plan 5+ approach

High scenario: As of plan 5, included in section below (sorting).

Low scenario: As of today, no savings.

---

21 The workhours are taken from DOIS data for Saturday city delivery collections' operations during August and September 2009 and scaled up to yearly hours.

22 See Library Reference USPS-LR-N2010-1/3 p. 6.

11.2 Sorting (Processing)

11.2.1 Scenario

	Status quo	Changes in plan 5 [based on USPS 2010 filing N2010-1]	Assumed changes in plan 5+ high	Assumed changes in plan 5+ low
Sorting	Sorting every day (7 days)	Elimination of all Saturday outgoing mail processes (excl. Express).[23]	As plan 5	As status quo

11.2.2 Plan 5 approach

The USPS assumes no clearance would take place on Saturdays, shifting the sorting workload to Mondays. According to USPS official Neri[24], the most significant change to mail processing in the planned five-day delivery environment is the elimination of all Saturday outgoing mail processes except outgoing Express Mail operations. Incoming operations will generally continue on Saturdays. It is further assumed that the USPS would continue sorting Friday night even though no delivery takes place on Saturdays. Importantly in this context, witness Neri states that parcels will be worked Friday night and dispatched early Saturday morning to the delivery units.[25]

Based on these assumptions, USPS calculates the savings in mail processing labor costs that would result from eliminating the processing of outgoing mail on Saturday and shifting the sorting workload. It first estimates the costs that would be avoided if outgoing processing were eliminated on Saturdays, and then adds the costs that would be incurred by the need to isolate post office box addressed mail from other mail on Friday to support delivery of post office box addressed mail on Saturday.

To estimate mail processing savings the USPS distinguishes between direct distribution operations and “allied” operations. Direct distribution operations include manual and automated processing of letters, flats, and mixed mail sorting, as well as supervisor and indirect time. Operations that are not direct distribution operations are categorized as “allied operations” since they support more than one distribution operation. They consist of loading mail in bulk form, generally out of larger containers into other containers, or vice versa, and moving the mail from the dock to sorting operations, or from sorting operations to the dock. Allied operations also involve some prepping of mail for sorting or for dispatch.

For direct distribution operations, a productivity analysis approach is taken by the USPS. The productivities on Mondays compared to Saturdays are from 10 to 35% higher for automated operations, and from 25 to 35% higher for manual operations. The USPS argues that the percent of labor hours saved on Mondays in these operations will equal the difference in productivities between Saturdays and Mondays.

The USPS’ estimates of the percentage of variable costs in allied operations range from 10 to 100% for different operations. These estimates are based on operational experience. The estimates for each group, when added together, imply that 38% of outgoing processing labor hours is fixed on any

---

23 Sorting Friday night remains unchanged.

24 Docket No. N2010-1, USPS-T-4, DIRECT TESTIMONY OF FRANK NERI ON BEHALF OF THE UNITED STATES POSTAL SERVICE, p. 8.

25 Docket No. N2010-1, USPS-T-4, DIRECT TESTIMONY OF FRANK NERI ON BEHALF OF THE UNITED STATES POSTAL SERVICE, p. 9, lines 13-15.

given day of the week, including Mondays. As a consequence, 62 % of those operations feature volume variability.

Table 41 provides an overview of the USPS' savings estimates.

The PRC questions the estimated cost savings related to labor hours savings of clerks and mailhandlers as these are significantly higher than in previous studies.

To corroborate the estimates for the direct distribution operations, the PRC assumes that 25% of Saturday volumes falls on Fridays and 75% are shifted to Mondays. The saved hours are then calculated by dividing new volumes by either average weekly productivities or day-specific productivities. In the first case, the saving are 1% of workhours, in the latter 7% of workhours are saved. However, it remains an open question whether new Monday and new Friday volume levels would exhibit either of the historical productivities modeled above, or some other productivity. However, the PRC accepts, with caution, the USPS' analysis of direct distribution operations.

For the allied operations, the PRC takes a volume variability approach and finds volume variability for mail processing labor costs of about 94%. This implies that about 6% of these costs are fixed. As USPS' estimate of fixed costs is around 38%, the PRC questions the USPS calculated cost savings in allied operations. In total, the PRC estimates workhours savings of $1.5 million which is $1.2 million less than USPS' estimate resulting in a difference in costs savings of $56 million, cf. Table 41.

Table 41: Estimated cost savings in outgoing mail processing operations

M USD	USPS	PRC	Difference
Clerks and Mailhandlers	90.11	33.73	56.39
Supervisor	19.50	19.50	-
Equipment Maintenance	13.33	13.33	-
Custodial	0.13	0.13	-
Post Office	53.00	53.00	-
Total	**176.07**	**119.69**	**56.39**

11.2.3 Plan 5+ Approach

High scenario: The sorting processes are assumed to be adapted in the exact same way as in plan 5.

It could be argued that variable costs of sorting a mailpiece is independent of volumes per day. Both the USPS and PRC have followed a different approach and assume higher productivity for Mondays because of higher volumes. If productivity measures include fixed costs, then increased productivity is a natural effect, and would not necessarily lead to changes in variable costs per piece. It is not known how the USPS is measuring productivity. We are forced to follow the approach of the USPS or PRC, respectively. As the discussion above on their approaches reveals, it is key to determine how the shift in volumes affects the productivity of sorting on the remaining days and to distinguish variable and fix costs in the sorting process properly.

For estimating the costs savings of direct distribution operations and allied operations, we follow the more conservative approach of the PRC.

The assumed plan 5+ high savings are those approved by the PRC for plan 5, i.e., USD 120 million.

Low scenario: As the USPS would continue to sort on Saturdays, no savings from volume shifts occur.

11.3 Delivery

11.3.1 Scenario

	Status quo	Changes in plan 5 [based on USPS 2010 filing N2010-1]	Assumed changes in plan 5+ high	Assumed changes in plan 5+ low
Delivery	6 days home delivery of letters, flats, packages	No home delivery of letters/flats and packages on Saturdays	No home delivery of letters/flats on Saturdays	As plan 5+ high
	6 days P.O. box delivery of Letters, Flats, packages	[Continuation of delivery of Express Mail and Saturday post office box delivery]	[Continuation of delivery of Express Mail, Saturday post office box delivery and package delivery]	
			Assumption that additional overtime hours can be managed with flexible workforce	Assumption that additional overtime hours cannot be managed with flexible workforce

11.3.2 Plan 5 approach

In plan 5, on Saturdays only, Express Mail and P.O. boxes are delivered.

The USPS' segments its calculations into city delivery savings (which is further segmented into street time and in-office time savings), rural carrier time savings, and indirect savings. The USPS and the PRC disagree on the level of potential cost savings of the city delivery street time and of the indirect costs.

City Carrier Time Savings

The USPS' calculation of city carrier time savings starts with Delivery Operations Statistical Information System (DOIS) data on city delivery carrier hours and delivered volume. Hours and volumes are apportioned to delivery days and hours are broken down into in-office time and street time. Street time is further classified into network travel, delivery activities, and delivery support. Network travel is the amount of time it takes the carrier to travel between delivery segments on the route. Delivery activities include the time it takes to leave the route and reach the receptacle, fingering the mail, and loading the mail into the receptacle. Delivery activities support is time needed for returning to vehicles and refilling satchels. The USPS estimates the hours that would be saved in each component by eliminating Saturday delivery and then multiplies these savings with an adjusted average carrier wage rate.

For in-office time, the operational analysis of the USPS suggest that on Saturdays, 34% of office time is fixed per route and 66% can be considered variable.[26] Given these numbers, the calculation of office time savings is then straightforward. The fixed office time is saved and the variable office time is transferred to the rest of the week. Therefore, the USPS estimates that 34% of Saturday office hours are saved in the five-day delivery regime. This corresponds to costs savings of $261 million.

With respect to street time savings, USPS assumes that 100% of Saturday's network travel time and 90% of both Saturday's delivery activities and delivery support time are saved. The 90% estimate is

[26] See Library Reference USPS-LR-N2010-1/3 at 3, Table 1.

based on historical data of Tuesday delivery times after a Monday holiday. The USPS argues that Mondays in a five-day environment are similar to Tuesdays after Monday holidays. The USPS finds that all but 9.4% of incremental post-holiday volume is absorbed on post-holiday Tuesdays. It assumes then that Saturday volume would be absorbed at the same rate when delivered on Mondays in a five-day delivery environment. The calculation of cost savings is then again straightforward. In total USPS estimates costs savings of $1690 million based on 41,3 M hours saved, implying an adjusted hourly wage rate of about USD 40,8.

Next to these savings, the USPS estimates the extra costs incurred for continuation of Saturday Express Mail to be $7 million[27].

With respect to in office time, the PRC agrees on the classification of fixed and variable time carrier activities. However, it raises some doubts concerning capacity adjustments; amely, they criticize the USPS' assumption that routes will not be rebalanced in the face of large transfers of volume from Saturday to Monday as this would imply that there is a great deal of excess capacity in current routes. Rebalancing routes on Mondays would imply that some of the fixed costs are also transferred to Mondays. Adjusting for that, the PRC estimates cost savings of $102 million.

The PRC doubts the consistency of the estimated street time delivery savings. USPS' comparison of post-holiday Tuesdays productivities leads to an incremental productivity which is much larger than average productivity on Mondays, or average weekly productivity and even substantially larger than the incremental productivity estimate of the PRC comparing Mondays and Saturdays. Furthermore, the PRC points out that delivered volume during the remainder of the week after a Monday holiday shows productivity declines. That is, average weekly productivity of a Monday holiday week and regular weeks do not significantly differ. The PRC also doubts that the higher volumes on Mondays could be absorbed without capacity adjustments. The PRC comes to a much lower estimate of street time delivery savings. They estimate cost savings to be $1'162 million.

Rural Carrier Savings

As rural carriers are paid essentially by the piece count of mail that they deliver, the variable costs of Saturday delivery are transferred one-to-one to the rest of the week because the volume is assumed to remain constant. Only Saturday hours associated with non-volume-related workload and the associated evaluation factors would be saved by eliminating Saturday delivery. However, there would be a shift in the labor mix accompanying five-day delivery which affects costs because replacement carriers would be eliminated under five-day delivery, all weekday hours would be paid at the higher regular carrier wage rate. This is accounted for by using an adjustment factor.[28]

The PRC agrees on this approach to estimate rural carrier savings. The cost savings estimates are listed in Table 42.

Indirect Savings

The USPS estimates indirect cost savings by examining indirect costs, element-by-element, and then assessing how costs would be affected by eliminating Saturday delivery. Because volumes remain constant, the USPS estimates that only some indirect costs, such as supervision and vehicle maintenance, change. No changes to other indirect costs, such as building maintenance and depreciation, or vehicle depreciation, are expected.

---

27 See Library Reference USPS-LR-N2010-1/3.

28 For details on the calculation see Docket No. N2010-1, USPS-T-6, DIRECT TESTIMONY OF MICHAEL D. BRADLEY ON BEHALF OF THE UNITED STATES POSTAL SERVICE, p. 21ff.

The PRC widely agrees on that approach, but comes to different cost savings estimates in their analysis.

Table 42: Estimated cost savings in delivery

M USD	USPS	PRC	Difference
City carrier direct route and access time	1690	1162	528
City carrier direct in-office costs	261	102	159
City carrier adjustment for Saturday Express Mail	-7	-7	0
Rural carrier direct costs	341	341	0
Rural carrier EMA savings	85	85	0
Rural carrier Adjustment for Saturday Express Mail	-1	-1	0
Indirect carrier costs	378	305	73
Total	**2'747.00**	**1'987.00**	**760.00**

11.3.3 Plan 5+ Approach

Cf. Section 6.1.

11.4 Transport

11.4.1 Scenario

	Status quo	Changes in plan 5 [based on USPS 2010 filing N2010-1]	Assumed changes in plan 5+ high	Assumed changes in plan 5+ low
Transport	Transport every day	Elimination of Saturday transport for mail collected in post offices / collection boxes to processing facilities. Less transport on Sundays due to elimination of all Saturday outgoing mail processes.	As plan 5	As status quo

11.4.2 Plan 5 approach

In plan 5, no Saturday transport for mail is needed anymore. Further, the USPS assumes savings on Sundays because transportation volumes are lower.

The USPS calculates transportation savings separately for air and surface. Surface transportation is further broken down into purchased highway transportation, box route transportation, and vehicle service driver activities Vehicle Service Drivers (VSD). For highway transportation and VSD, the USPS claims that there is sufficient truck capacity to move the diverted weekend mail without inducing added trips. This implies that under the new regime, weekend savings do not shift to Monday. With air and box route transportation contracts, the USPS recognizes added costs during weekdays to move mail that would have otherwise been delivered or processed on the weekend.

For highway transportation, the baseline costs of Saturday and Sunday transportation are constructed using USPS Transportation Cost Surface System (TCSS) for each contract type.29 Then, based on an operational analysis, the USPS estimates the reduction in transport capacity measured in cubic foot miles (CFM) when discontinuing Saturday outgoing operations. These estimates range for Saturday from 20 to 60% and for Sunday from 50 to 80% depending on the contract type.[30] The USPS states that there is not a one-to-one relationship between CFM and transportation cost. Therefore, capacity variability estimates are used to estimate cost savings. The capacity variability estimates range from 70 to 91%.[31] The costs savings in highway box route transportation are then the product of the reductions in required CFM multiplied by capacity variability estimate times the baseline costs.

For box route transportation, operational analysis of the USPS experts suggests that 68.1% of box route costs are route related. USPS operation experts find that 100% of box route transportation on Saturdays can be saved in the 5-day delivery regime. This implies that under the new delivery regime, 68.1% of box route costs fall apart. On Sunday, there are no box route transports.

For VSD (transportation provided by USPS and not contracted) there are two types of direct costs savings: labor cost savings and fuel cost savings. The USPS first constructs total VSD driver hours of Saturday transportation by using TACS data base. Operational experts estimate that 42% can be saved on Saturdays. The costs savings estimate is then 42% of total Saturday VSD costs. For Mondays, it is assumed that no additional costs occur.

For air transportation, it is assumed that the volumes transported on the week in the current regime will be transported on Tuesdays. There arise costs savings as the rates on Tuesdays are lower than the weekend tariffs.

The PRC disagrees with the way surface transportation costs are estimated. Specifically, it questions the argument of sufficient capacity during the remainder of the week to absorb all additional volume without incurring additional costs. If this were the case, the PRC argues that this indicates excess capacity in the regime today, which could be reduced to save costs without adjusting Saturday delivery. The PRC instead suggests an approach which uses elasticities of the number of trips to cubic feet of volume to calculate the additional number of trips required during the remainder of the week to absorb the shifted volumes. These additional costs are then added to the savings calculated by the USPS, which lead to a $207 million lower estimate of cost savings in highway transportation.[32] Table 43 shows an overview of the costs savings estimates of the PRC and USPS.

Table 43: Estimated cost savings in transportation

M USD	USPS	PRC	Difference
Air	62.35	62.35	-
Highway	220.22	12.68	207.54
Box Routes	35.15	35.15	-
Vehicle Service Drivers	59.32	59.32	-
Total	**377.04**	**169.50**	**207.54**

29 For details see Docket No. N2010-1, USPS-T-6, DIRECT TESTIMONY OF MICHAEL D. BRADLEY ON BEHALF OF THE UNITED STATES POSTAL SERVICE, p. 35f.

30 For details see Docket No. N2010-1, USPS-T-6, DIRECT TESTIMONY OF MICHAEL D. BRADLEY ON BEHALF OF THE UNITED STATES POSTAL SERVICE, p. 42.

31 For details see Docket No. N2010-1, USPS-T-6, DIRECT TESTIMONY OF MICHAEL D. BRADLEY ON BEHALF OF THE UNITED STATES POSTAL SERVICE, p. 44.

32 For details, see Docket No. N2010-1 Advisory Opinion, p. 99.

11.4.3 Plan 5+ Approach

High Scenario: Based on the evidence in plan 5, it cannot be expected that all volume shifted from the weekend to the remainder of the week can be absorbed without any capacity adaptations unless there exists overcapacities in the current regime. However, if this were the case, savings arising from reducing these overcapacities should not be accrued to the change in the regime of Saturday delivery. In fact, there are two consistent scenarios: either the capacity is fixed, or capacity can be adapted. If capacity can be adapted, then there should be savings on Saturday and Sundays, but also additional costs on Mondays. We, therefore, follow the approach of the PRC in calculating the cost saving potentials in transport and assume savings equaling USD 169.5 M.

Low Scenario: No savings can be achieved as processing is still fully operational.

11.5 Demand effects: impact of quality and demand response

	Status quo	Changes in plan 5 [based on USPS 2010 filing N2010-1]	Assumed changes in plan 5+ high	Assumed changes in plan 5+ low
Volume scenario	FY2012	Volume response considered	As plan 5, but no response for parcels	As plan 5+ high, but reduced response

Reductions in services reduce demand certeris paribus. In plan 5, demand for letters and parcels are reduced, whereas in plan 5+ only demand for letters is affected.

11.5.1 Plan 5 Approach

The USPS estimated $201 million in forgone revenue (USPS-T-7 at 17-18) based on a prediction of mailers' volume response to the implementation of five-day delivery. The prediction is based on quantitative market research. Overall, the USPS estimates that the loss of volume would be 1.242 B pieces or 0.7%, leading to a revenue loss of USD 456 M and of avoided attributable costs of USD 255 M (USPS-T-9 at 2). USPS' estimates are shown in Table 44.

The USPS provided a confidence interval of between a net loss of USD 576 M and a net gain of USD 114 M, the latter being rather unrealistic. (Service decreases should not lead to an increase of volumes when prices remain constant.) In market research methodology,, consumer's best estimates of own volume responses were decreased (multiplied) by likelihoods provided by the same respondents. The PRC did not consider it appropriate to deflating best estimates by an expected value function. As a consequence, the likelihood correction was not accepted, leading to revenue foregone of USD 587 M. This translates to an average volume response of 2.3%.

The USPS aggregated flats and parcels. The individual effects were reviewed, as well as the details of the calculations from PRC-N2010-1-LR6. The analysis of the estimates made a correction necessary. According to the USPS' filing, the calculations assumed for consumer parcels that First-Class Mail parcels would behave the same way as Priority Mail. Thereby, Priority Mail is positively affected from plan 5 because it is still delivered on Saturdays; therefore, some letters sent by First-Class Mail is shifted towards Priority Mail. This will not be the case for first class parcels, as these are no longer delivered in plan 5. An analysis of the corresponding consumer segment analysis (also available in PRC-N2010-1-LR6) revealed a predicted decrease of First-Class Mail parcels sent by consumers by 14% with likelihood correction and 21% without correction. Taking the corresponding value for the aggregation with other customer segments (businesses etc.) leads to an estimated decrease of 6.5% of parcels. Flats are estimated to decrease by 4.2%. The corrections by Swiss Economics are highlighted in red.

Table 44: Estimated demand response and financial effects

Service	USPS estimates					PRC/SE correction	
	Volume change %	Volume change #	Revenue foregone	Cost avoidable	Net income change	Volume change %	Net income change
First-Class Mail:	**-1.2%**	-974.64	-407.87	-205.58	-202.29	**-3.4%**	-595.91
Single-Piece Letters & Cards	**-1.9%**	-593.9	-259.5	-156.6	-102.8	**-3.9%**	-213.1
Presort Letters & Cards	**-0.7%**	-350.1	-119.6	-41.0	-78.6	**-3.0%**	-324.9
Flats	**-0.9%**	-30.6	-28.8	-8.0	-20.9	**-4.2%**	-58.0
Parcels						**-6.5%**	-1.3
Standard mail	**-0.3%**	-267.3	-28.4	-41.4	13.0	**-1.7%**	-14.0
Regular	**0.1%**	93.0	20.9	13.6	7.3	**-0.6%**	-29.9
Nonprofit	**-2.7%**	-360.3	-49.3	-55.0	5.7	**-7.4%**	15.9
Periodicals	**0.0%**	-0.9	-1.8	0.1	-1.9	**0.7%**	-8.4
Regular	**-0.4%**	-24.5	-6.6	-8.2	1.6	**-0.1%**	0.3
Nonprofit	**1.4%**	23.6	4.8	8.2	-3.4	**3.7%**	-8.7
Express mail	**-4.5%**	-2.1	-39.4	-24.7	-14.8	**-2.9%**	-9.6
Priority mail	**0.4%**	3.2	22.0	16.9	5.1	**3.2%**	39.2
Total	**-0.70%**	-1'241.7	-455.6	-254.7	-200.9	**-2.32%**	-588.7

Source: PRC-N2010-1-LR6, extended by Swiss Economics

11.5.2 Plan 5+ Approach

High scenario: With the exception of parcels, it is assumed that the volume responses occur as indicated in the second to last column of Table 44. For parcels, it is assumed that these remain constant in a plan 5+ environment.

Low scenario: In the low scenario, the effects on quality are less severe as in the high scenario; end-to-end delivery times for items collected on Saturdays are faster if this mail is processed right away and not after Monday (which would be the case in the high scenario). However, end-to-end delivery times for pieces originally delivered on Saturdays remain lower. Therefore, it is assumed that the volume responses from Table 44 are lowered by 50%.

11.6 Further issues: Peak load and impact on service level

11.6.1 Peak load

Peak load issues can be expected to remain the same as for plan 5 (high scenario), or they may be reduced in case of the low scenario. In collection, no peak load issues must be expected as there are no changes. In sorting, there may be some minor issues on Mondays to process the dispatched mail from Saturday and Mondays. In transport, no peak load issues are expected because of rather low capacity utilization. In delivery, the workload on Mondays increases sharply (doubled as compared to Wednesday) (see Table 15), forcing either a reorganization of routes or the use of overtime. Based on USPS' information for plan 5, it expects no need for route reorganizations. Therefore, the effect of plan 5+ on overtime is assessed in detail in Section 5.

11.6.2 Service

The main effects of discontinuing Saturday delivery for letters and parcels are longer end-to-end delivery times (from the time of collection to the time of delivery). According to the advisory opinion, of Docket No. N2010-1, about 25% of all letters, flats and parcels will be delivered with a lag of at least one day (see Table 45).

The lags cause some decreases in mail demand which have been discussed in Section 11.5.

Table 45: Lags caused by plan 5

Product	% of pieces with lag of at least one day
First class mail	25.8%
Priority	25.4%
Package services	26.1%

Source: Swiss Economics based on N2010-1, Advisory Opinion

Swiss Economics SE AG
Stampfenbachstrasse 142
CH-8006 Zürich

T: +41 (0)44 500 56 20
F: +41 (0)44 500 56 21

office@swiss-economics.ch
www.swiss-economics.ch