Analysis of the Impact of Ceasing Sales of Tobacco Products at ABC Pharmacy

Compiled by Brian Cullinan
5/9/2021

Executive Summary

Overview

CVS Health's 2014 decision to stop selling cigarettes and tobacco products in their stores has put pressure on our industry to also cease selling tobacco. In their decision, CVS Health CEO Larry Merlo stated "Cigarettes and tobacco products have no place in a setting where healthcare is delivered. This is the right thing to do." (CVS Health, 2014). As ABC Pharmacy, we need to prepare for social or political pressure to follow the lead of CVS Health. We can prepare by assessing the possible financial impact of no longer selling tobacco, should we move ahead with that decision.

Business goals

Using six months of sales data, this analysis aims to find out the viability of ceasing sales of tobacco products, or the impact should ABC Pharmacy be forced to do so. To assess the viability of that decision, we need to answer the following questions:
- How will eliminating the sale of tobacco products impact our overall revenue and profitability?
- Which branches will be impacted the most by no longer selling tobacco products ("at-risk" branches)?
- What is the revenue associated with tobacco sales in the form of other items bought with tobacco (referred to as "associated items" in this report) (*e.g.*, a pack of gum and a soda purchased in the same transaction are considered "associated items.")?

Data Description

This analysis will utilize six months of ABC Pharmacy sales data, primarily using the "pos_trans" file. This file contains data on all products purchased, including the branch where the purchase was made, the product identifier, and the price and quantity. It can be used to calculate revenue at the franchise as well as individual branch level.

This and all other source files were loaded into a SQLite database. The "pos_trans" table was augmented with a boolean flag to signify what products are tobacco, which was pulled from an update query utilizing the multiple product category tables. A unique "sale_ID" was also added so that transactions could be grouped.

In addition, this analysis will categorize pharmacy branches by risk level and utilize the "phrmcy_master" table to provide pharmacy names.

Methodological Summary

This analysis will start at a high level to explore the impact to the franchise of no longer selling tobacco products, along with the lost sale of items purchased along with tobacco products.

Some assumptions were made about overall profit margins and product-level profit margins, which can be found in the "Facts/Figures/Assumptions Used" section.

This analysis takes a conservative approach for associated items and assumes that all associated product sales will be lost. However, the "Core Report" explores that assumption to better understand which of those sales may be preserved.

Next, this analysis will categorize branches by risk level based on what percentage of their revenue comes from tobacco plus associated items. This proceeds a deep dive into the highest risk branches, including the portion of the franchise revenue made up by those branches should they not be able to survive without tobacco sales.

Lastly, this analysis will do a deep dive into the sale of associated items to better understand the assumption that the sale of all of these associated items will be lost.

Results

The key conclusions are as follows:

1. Tobacco products comprise 4.4% of ABC Pharmacy revenue and approximately 3.4% of profits.
2. 79 of ABC Pharmacy's 106 branches do not sell tobacco (nearly 75%), while 27 sell them.
3. Within those 27 branches, tobacco and associated item sales comprise a minor portion of revenue at 14 branches (less than 5% of revenue), and a moderate portion of revenue at 4 branches (more than 5%, but less than the profit margin of 21.8% of revenue).
4. The remaining 9 branches are heavily reliant on tobacco and associated item sales (more than the profit margin of 21.8%), but all branches are likely to remain profitable without tobacco product sales.
5. While this franchise-level and branch-level analysis assumed 100% loss of associated product sales, there is reason to believe that a significant portion (above 50% of associated sales) may be retained.
6.

This leads to the conclusion that ABC Pharmacy can remain profitable without tobacco product sales. Detailed Results may be found in the Core Report - Results Section.

Recommendations

Our recommendation is to take a rolling phase-out approach to stop the sale of tobacco products. This would start with ceasing tobacco sales at the 14 branches categorized as "Low Risk", and next move to the 4 "Medium Risk" branches. Despite the small number of "Medium Risk" branches, this sample can provide valuable learning opportunities before moving to cease tobacco sales at the 9 "High Risk" branches, including, for example, the percentage of associated product sales that may be retained.

Core Report

Overview

This analysis aims to assess the financial impact of no longer selling tobacco products, should ABC Pharmacy move ahead with that decision. This analysis will determine the financial feasibility of ceasing the sale of tobacco products, including the impact to the overall franchise and individual branches. Additionally, it will include an analysis of what else customers are buying when they purchase tobacco products, and the impact of losing those sales as well.

Summary of business goals

The goal is to determine the financial feasibility of ceasing the sale of tobacco products at all of ABC Pharmacy's branches. This assessment should include the impact to the overall franchise and to individual branches, and include an analysis of what else customers are buying when they purchase tobacco products. The following business questions will be answered:
- How will eliminating the sale of tobacco products impact our overall revenue and profitability?
- Which branches will be impacted the most by no longer selling tobacco products ("at-risk" branches)?
- What is the revenue associated with tobacco sales in the form of other items bought with tobacco (referred to as "associated items" in this report) (*e.g.*, a pack of gum and a soda purchased in the same transaction are considered "associated items")?

Data description

The data strategy was to load all available data (provided in the form of source .csv files) into a relational SQLite database, with each source file representing a table.
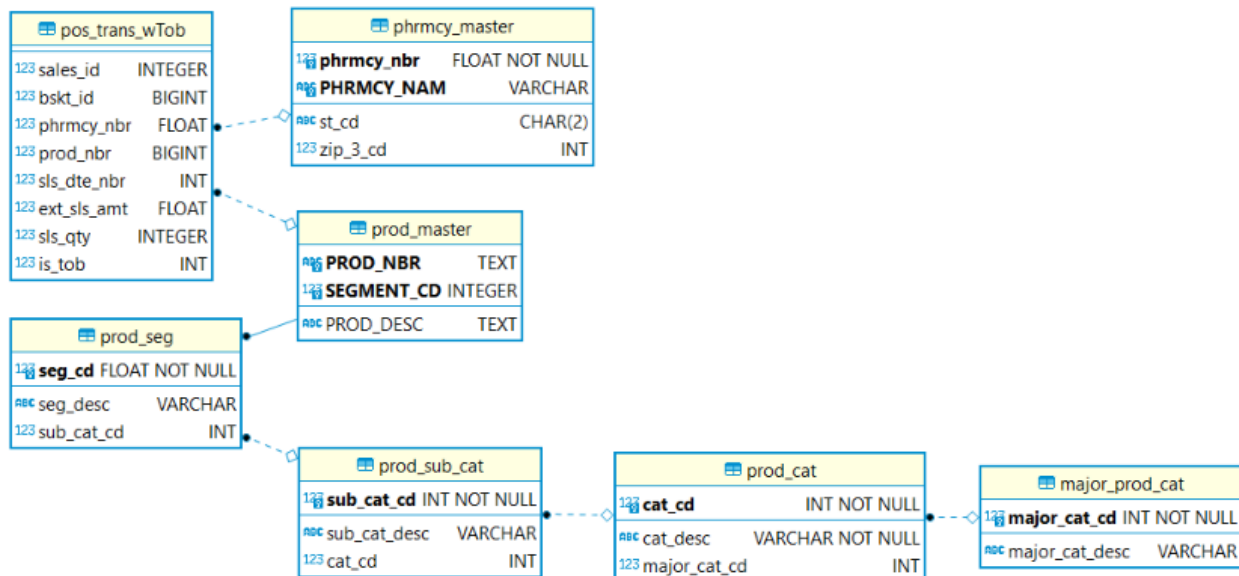
This analysis will primarily utilize six months of sales data from the "pos_trans" table. This table was augmented with a boolean flag to signify what products are tobacco products. While this data can be found elsewhere in the source data, in order to use it to identify groups of products at the individual sale level would require complex queries to join most tables. Instead, this complexity was addressed once by using the product categories in the "major_prod_cat", "prod_cat", "prod_sub_cat", "prod_seg", and "prod_master" tables to identify the products within all sales which were tobacco products and mark them using boolean flag "is_tob" which was added to the "pos_trans" table. This made all subsequent queries easier and replaced the need to join a large number of tables.

Additionally, there were several problems with the "bskt_id" field which was supposed to indicate a unique transaction, but did not. This field needed to be used in combination with "sls_dte_nbr", to uniquely identify an individual sale. Therefore a unique key ("sales_id") was constructed for each distinct combination of "bskt_id" and "sls_dte_nbr." This unique id could be

used to identify all individual transactions, and identify the associated items included in those transactions.

Finally, revenue was totaled by three groups ("not tobacco", "tobacco", and "associated item") at the branch level in order to categorize branches by risk level based on the percentage of revenue from tobacco and associated items. This portion of the analysis utilized the "phrmcy_master" table in order to identify the individual branches.

Data model

pos_trans_wTob
123 sales_id	INTEGER
123 bskt_id	BIGINT
123 phrmcy_nbr	FLOAT
123 prod_nbr	BIGINT
123 sls_dte_nbr	INT
123 ext_sls_amt	FLOAT
123 sls_qty	INTEGER
123 is_tob	INT

phrmcy_master
123 **phrmcy_nbr**	FLOAT NOT NULL
ᴬᴮᶜ **PHRMCY_NAM**	VARCHAR
ᴬᴮᶜ st_cd	CHAR(2)
123 zip_3_cd	INT

prod_master
ᴬᴮᶜ **PROD_NBR**	TEXT
123 **SEGMENT_CD**	INTEGER
ᴬᴮᶜ PROD_DESC	TEXT

prod_seg
123 **seg_cd**	FLOAT NOT NULL
ᴬᴮᶜ seg_desc	VARCHAR
123 sub_cat_cd	INT

prod_sub_cat
123 **sub_cat_cd**	INT NOT NULL
ᴬᴮᶜ sub_cat_desc	VARCHAR
123 cat_cd	INT

prod_cat
123 **cat_cd**	INT NOT NULL
ᴬᴮᶜ cat_desc	VARCHAR NOT NULL
123 major_cat_cd	INT

major_prod_cat
123 **major_cat_cd**	INT NOT NULL
ᴬᴮᶜ major_cat_desc	VARCHAR

Methodological summary

Once all data was added to the SQLite database, it was then primarily treated as a source repository with data pulled into Pandas dataframe using Python. This was done with a few base queries (such as the following example with others included in the attached .py code) to create dataframes in Python. The dataframes were transformed or merged as needed to answer the business questions summarized above.

```
SELECT pm.PHRMCY_NAM, ptwt.phrmcy_nbr, ptwt.prod_nbr,
(ptwt.ext_sls_amt * ptwt.sls_qty) as lineTotal
FROM pos_trans_wTob ptwt
JOIN phrmcy_master pm ON pm.phrmcy_nbr = ptwt.phrmcy_nbr
WHERE ptwt.is_tob = 0;
```

Subsequent analysis and data exploration was done in Python, and was divided into 3 sections:
1. Section 1 -- Tobacco and Cigarette Sales Impact to Overall Revenue and Profit
2. Section 2 -- Branch Level Impacts
3. Section 3 -- Associated Item Sales

The analysis done in Python utilized both the PyCharm Professional IDE (primarily used for the bulk of coding and refactoring) and Jupyter Notebooks (primarily used for creating charts and graphs). Both the Python file and Jupyter Notebook file are included as attachments, but the Jupyter Notebook file is the recommended source due to the fact that it is well suited for this type of step by step analysis.

Results

Impact to Overall ABC Pharmacy Revenue and Profit

In the second half of FY2016 (January 1, 2016 - June 30, 2016), the total revenue of ABC Pharmacy was $17,283,852. ABC Pharmacy operates with a 21.8% percent profit margin (Fein, 2019), resulting in profits of $3,767,879 for that time period.

During the same period, tobacco products accounted for $677,873 (3.9% of revenue) and associated products accounted for $86,979 (0.5% of revenue). Tobacco products have a lower profit margin of 16.1% (Conway, 2019) compared to the company's average margin, whereas we assume that associated items have the same average margin as the company as a whole. This means that while tobacco and associated items account for 4.4% of revenue, they account for a smaller share of profit (3.4%).

While a 3.4% reduction in profit would hurt our bottom line, overall ABC Pharmacy is likely to remain profitable with this potential loss of revenue.

Type	Overall Total	Not Tobacco Total	Tobacco Total	Assoc. Item Total	Percent of Tobacco	Percent of Tobacco w/ Assoc. Item
Revenue	$17,283,853	$16,519,000	$677,874	$86,979	3.9	4.4
Profit	$3,767,880	$3,601,142	$109,138	$18,961	2.9	3.4

Profit Loss Report:
- Projected profit reduction for six months: $ 128,099
- Percent of profit from tobacco and assoc. items: 3.4
- New projected six month profit: $ 360,114

## Branch Risk Assessment and Categorization

The impact to ABC Pharmacy as a whole appears to be a manageable level of risk to our revenue, however the level of impact across our 106 individual branches varies widely. First, 79 of our 106 branches do not sell tobacco products (nearly 75%). Among the 27 branches that sell tobacco products, there is a wide variation in the degree to which each branch's revenue depends on tobacco product sales.

Percentage of Tobacco Revenue by Branch
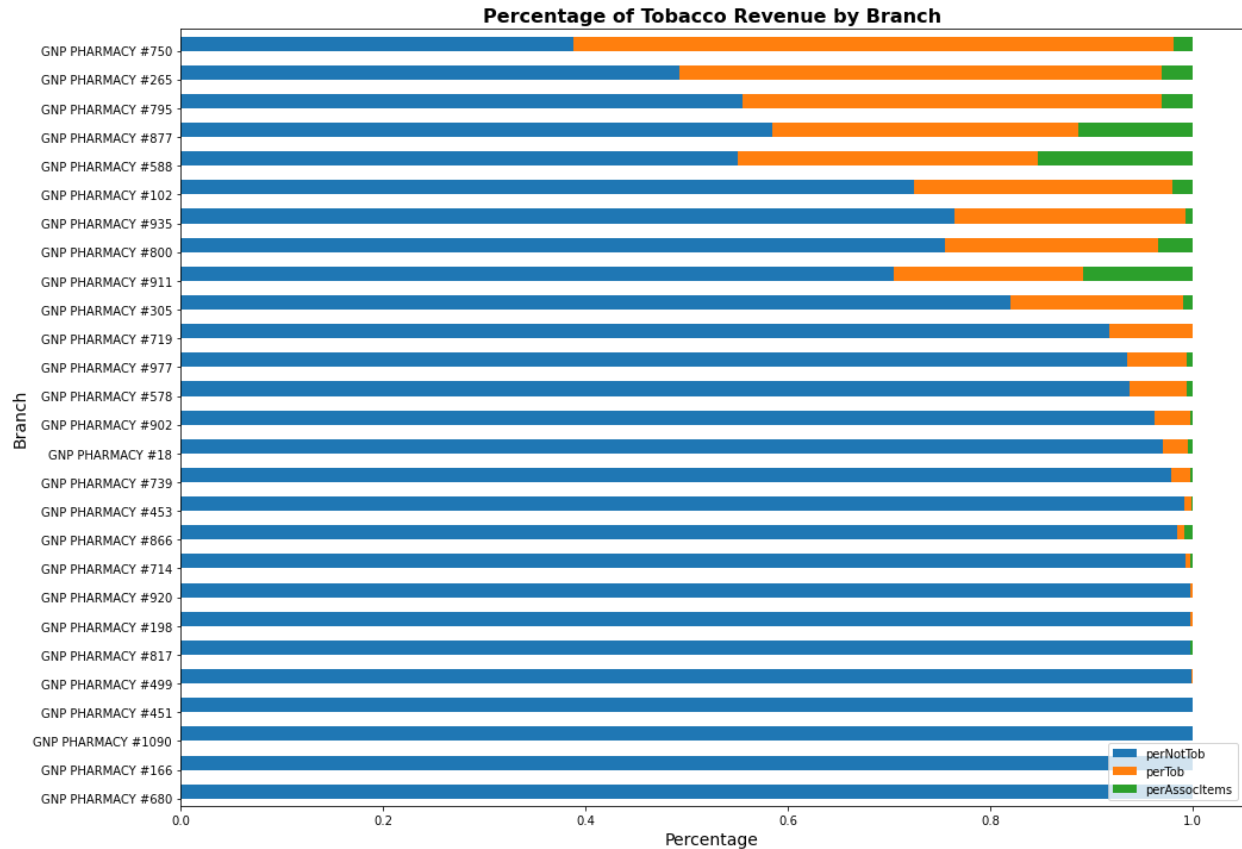
It is informative to look at branches categorized by the amount of revenue at risk, as follows:

Risk Level	Count	Definition
None	79	Branches that do not sell tobacco products
Low	14	Branches where tobacco and associated item revenue accounted for less than 5% of revenue
Medium	4	Branches where tobacco and associated item revenue accounted for more than 5% of revenue but less than 21.8% of revenue
High	9	Branches where tobacco and associated item revenue accounted for more revenue than the company's 21.8% profit margin

Revenue Distribution by Risk Category

Total Revenue by Risk Level
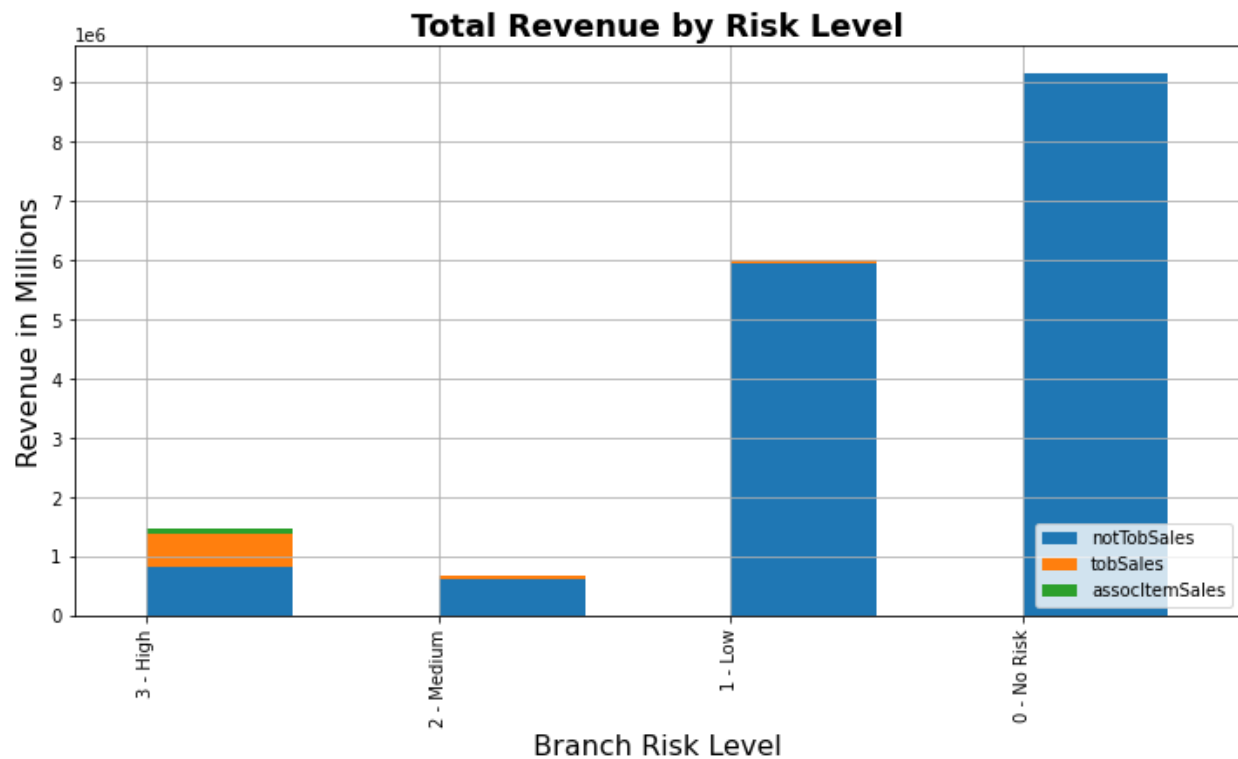
riskLevel	notTobSales	tobSales	assocItemSales	revenueSum	revenuePercent	notTabPer	tobPer	assocItemPer
0 - No Risk	9162714.0	0.0	0.0	9162718.0	53.0	100.0	0.0	0.0
1 - Low	5951248.0	40902.0	7244.0	5999394.0	34.7	99.2	0.7	0.1
2 - Medium	602817.0	66523.0	4075.0	673415.0	3.9	89.5	9.9	0.6
3 - High	802220.0	570449.0	75659.0	1448330.0	8.4	55.4	39.4	5.2

Looking at revenue risk distribution helps to gauge the overall risk to the ABC Pharmacy franchise. About 53% of our revenue comes from branches that do not sell tobacco. At "Low Risk" branches, tobacco products and associated items make up less than 1% of sales. If we cease tobacco product sales at those branches, then it is likely that 87.7% of our revenue will not be affected, resulting in losses to revenue of less than $50,000 (~0.3% of revenue). Our first recommendation is for the company to phase out tobacco product sales by first ceasing sales at our "Low Risk" branches (see "Conclusions and Recommendations" section).

There are only 4 "Medium Risk" branches with tobacco product sales between 5% and 21.8% of revenue. Therefore, the impact to the overall franchise revenue is fairly low, about 3.9%. On average, tobacco products and associated items at these 4 branches makeup around 10.5% of revenue at any one branch. Given the moderate level of risk to these branches, but the relatively minor impact to our overall revenue, it is recommended that these branches are phase 2 of overall phase out strategy. Phasing out tobacco product sales at these 4 branches is a

small risk to the overall franchise, but will provide insights on what it will mean to cease sales at our "High Risk" branches.

The 9 "High Risk" branches account for over 8% of the overall ABC Pharmacy revenue. This is important to note because some of these branches are dependent on tobacco product sales to stay profitable and it is questionable as to whether they can continue to operate without these sales. Should these branches close, then ABC Pharmacy may risk losing 8% of revenue (which translates to $283,220 in profits, ~7.5% of ABC Pharmacy's overall profit). This requires a deep dive to get a better understanding of these branches. This potential revenue risk is also why this group comes last in the proposed phased approach, only after getting a better understanding of the potential impact from ceasing sales at our "Medium Risk" branches.

Deep Dive into High Risk Branches

A high-risk branch's dependence on tobacco product sales varies substantially from just over the threshold of 21.8% to above 50% of revenue (with associated items included).

Percentage of Tobacco Revenue by High Risk Branch
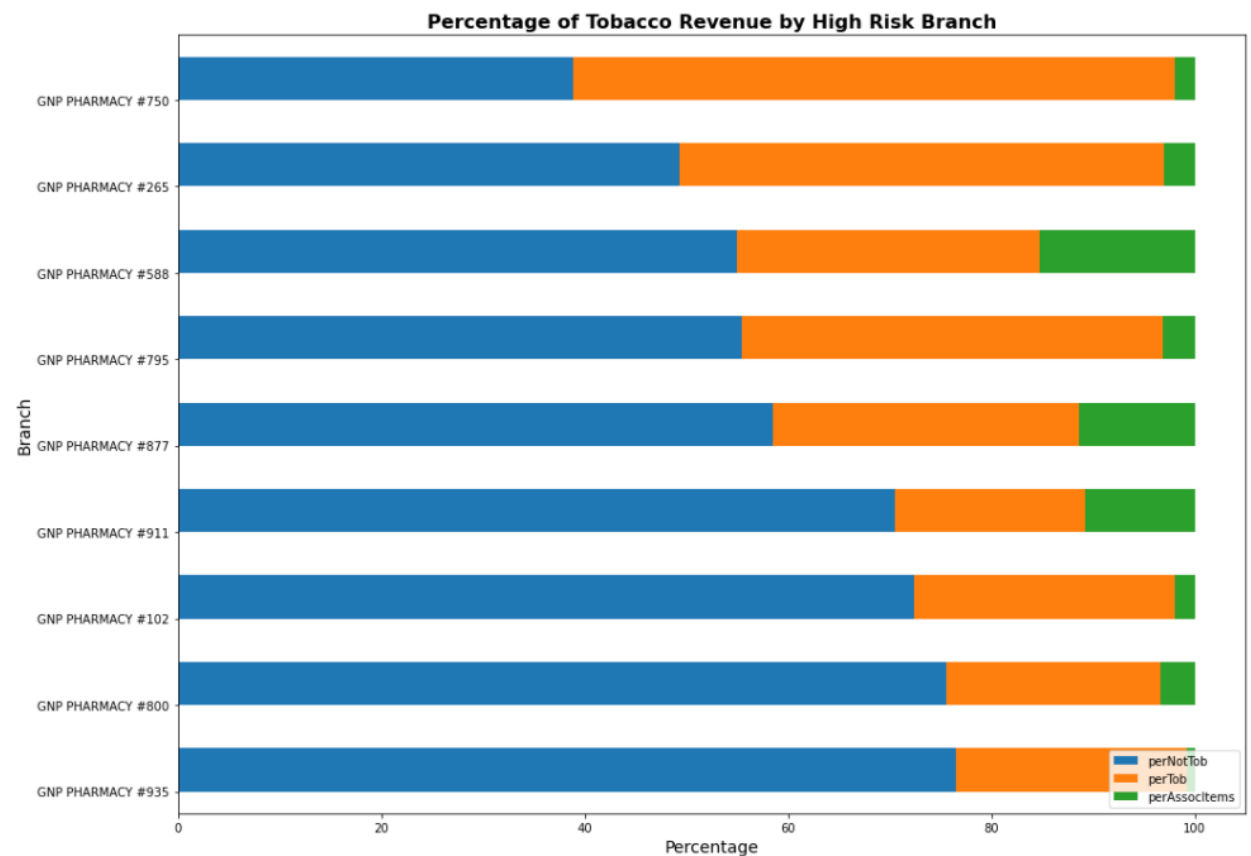
PHRMCY_NAM	notTobSales	tobSales	assocItemSales	totalRevenue	perNotTob	perTob	perAssocItems	st_cd
GNP PHARMACY #935	83768.0	24939.0	849.0	109556.0	76.5	22.8	0.8	NY
GNP PHARMACY #800	1829.0	510.0	82.0	2421.0	75.5	21.1	3.4	ME
GNP PHARMACY #102	84461.0	29834.0	2308.0	116604.0	72.4	25.6	2.0	NY
GNP PHARMACY #911	39525.0	10484.0	6088.0	56096.0	70.5	18.7	10.9	CT
GNP PHARMACY #877	50001.0	25757.0	9704.0	85462.0	58.5	30.1	11.4	CT
GNP PHARMACY #795	288139.0	215068.0	16302.0	519509.0	55.5	41.4	3.1	NJ
GNP PHARMACY #588	120771.0	65145.0	33597.0	219513.0	55.0	29.7	15.3	CT
GNP PHARMACY #265	8859.0	8554.0	552.0	17965.0	49.3	47.6	3.1	NJ
GNP PHARMACY #750	124868.0	190159.0	6177.0	321204.0	38.9	59.2	1.9	NJ

The key question for these branches is whether they can remain profitable without tobacco product sales. Therefore, it is important to calculate profitability on the branch level using the same methodology as we use for the overall franchise. These branches have a high percentage of tobacco product sales, which have a lower profit margin (16.1%) than other goods (average of 21.8%), therefore there is a noticeable gap between revenue and profit margins. Additionally, this analysis takes the very conservative approach of assuming that 100% of associated item sales will be lost along with tobacco products.

PHRMCY_NAM	CurrentBranchProfit	NewProfit
GNP PHARMACY #800	499.0	399.0
GNP PHARMACY #265	3429.0	1931.0
GNP PHARMACY #911	11632.0	8616.0
GNP PHARMACY #877	17163.0	10900.0
GNP PHARMACY #935	22462.0	18261.0
GNP PHARMACY #102	23719.0	18412.0
GNP PHARMACY #588	44141.0	26328.0
GNP PHARMACY #750	59183.0	27221.0
GNP PHARMACY #795	100994.0	62814.0

Profit impact from "High Risk" branches:
- Sum of current profit for High Risk Branches is $ 283,222 which accounts for 7.5 % of overall profit
- Sum of projected new profit for High Risk Branches is $ 174,882 which accounts for 4.6 % of overall profit
- This represents a loss of $ 108,340 and 2.9 % in profit

Even with the conservative approach of assuming all associated sales will be lost, it is projected that all branches remain profitable, although several branches are just barely profitable.   This means that the worst case scenario of losing the entire 7.5% of profits (which translates to $1,448,330 in revenue which is over 8% of ABC Pharmacy's overall revenue) is unlikely.

Unfortunately, it is projected that the worst case scenario can be avoided, tobacco products and associated item sales at these branches will have a measurable impact to ABC Pharmacy's overall profit. As discussed above, across the franchise, tobacco products and associated item sales make up 3.4% of profits, of which 2.9% comes from these 9 branches. For this reason, the recommendation is to pause the phasing out of tobacco products before this last group while further assessment can be done based on the impact on "Medium Risk" branches.

Associated Products Analysis

As previously stated, the analysis for the overall franchise and individual branches has taken the approach of assuming that all associated item sales would be lost with a decision to stop selling tobacco products. In this section, we aim to better understand the sale of some of those associated items to investigate whether some may be retained after the change of policy.

Due to the wide variety of products included as associated items, the default profit margin of 21.8% was used to calculate the profit from these sales. Associated items therefore account for 0.5% of revenue and profit overall, however their sale is more meaningful for some of the "High Risk" branches, where they can account for up to 15% of sales.

There is not a lot of commonality across what customers are buying along with tobacco products. Customers bought 2,372 distinct associated items, with the mean of revenue per product representing $36.67 in revenue but with a very skewed distribution. It is difficult to make conclusions at the individual product level, so instead this analysis looks at the product subcategory level.

Associated items grouped at the product subcategory level show the same skewed distribution. There is still a wide variety of items (161 distinct subcategories) with the large percentage accounting for few sales (75% of subcategories accounting for $251 or less in sales). It is notable that the 75th percentile ($251) is well below the mean ($540) with a large standard deviation ($3,210). This indicates that only a few subcategories make up a large percentage of associated item sales. Therefore, this analysis will focus on the small percent of associated item subcategories that account for a large percentage of associated item sales.

Revenue by Product Subcategory

Revenue by distinct associated product:

count	mean	std	min	25%	50%	75%	max
161	540.24	3,209.52	1.83	23.46	78.31	250.72	40,107.00

Looking at just the top 5.0% of associated subcategories (9 subcategories) provides a short list of the subcategories that account for $62,893 in sales (72.3% of the total $86,978 in associated sales).

	sub_cat_desc	lineTotal
100	MISC HOME HEALTH CARE	40107.00
4	ALL OTHER GREETING CARD LINES	4772.56
101	MISC VITAMINS	4466.49
22	BEVERAGES	3096.30
140	SNACKS & DESSERTS	3068.93
26	CANDY, MINTS & GUM	2587.98
114	PAIN RELIEF	1952.89
41	COUGH, COLD, FLU & SINUS	1572.26
57	EXTERNAL PAIN RELIEF	1268.82

Looking at this list, it can be assumed that the "Beverage", "Snacks & Desserts", and "Candy, Mints, & Gum" will be lost because those customers are not buying anything that is unique to ABC Pharmacy (*i.e.*, a gas station or convenience store is likely to carry what that customers wants). However the bulk of these associated products, including "Misc Home Health Care" and "Greeting Card Lines", and a variety of vitamins and medications are not likely to be found at other stores that sell tobacco (gas stations, convenience stores, etc.). Therefore, it can be assumed that those customers may likely still visit ABC Pharmacy to make those purchases. These subcategories account for 62.2% of the overall associated item sales, and are likely to be retained.

While this makes little impact to the overall franchise (associated items make up 0.5% of overall revenue), it is meaningful to our "High Risk" branches. This projection that those branches will be able retain a sizable percentage of associated item sales helps to provide clarity that these branches can remain profitable without tobacco products. However, this assertion should be closely followed to either confirm or dispel during the proposed rolling phase out, particularly at the "Medium Risk" branches.

Conclusions and recommendations

This analysis projects that eliminating the sale of tobacco products will impact the overall franchise by reducing revenue by 4.4% and profits by 3.4%. However, overall ABC Pharmacy will remain profitable without the sale of tobacco products.

The potential impact at the individual branch level is more nuanced, but in conclusion, the impacts will range from minor to moderate for all but 9 branches which we consider to be "High Risk" based on a disproportionate dependence on tobacco product sales. The 4 "Medium Risk" branches will provide further insight into the impact for the 9 "High Risk" branches, and for this reason the primary recommendation is a rolling phasing out approach moving from Low to Medium to High risk branches.

While 9 branches are at high risk due to being heavily reliant on tobacco and associated item sales, it is projected that all are likely to remain profitable without them.

This analysis assumed that all associated item sales would be lost. However, we believe, based on a more targeted analysis, that over 60% of associated item sales will be retained. This results in a minor impact to the overall franchise, but has a moderate impact on the "High Risk" branches and should be tracked and confirmed during the phased out approach.

Facts/Figures/Assumptions Used:

1. ABC Pharmacy Company Structure:
   a. This analysis assumes that ABC Pharmacy has a central organizational structure which cares about overall profitability, opposed to a decentralized franchise model where each branch operates like a separate business.
2. Pharmacy Profit Margin:
   a. This analysis assumes a 21.8% profit margin for ABC Pharmacy based on a report from Drug Channels: Expert Insights on Pharmaceutical Economics and the Drug Distribution System. (Fein, 2019).
3. Cigarette/Tobacco Sale Profit Margin:
   a. This analysis assumes a 16.1% profit on tobacco sales based on data made available by Statista on profit margins on cigarettes. (Conway, 2019)
4. General Retail Profit Margin:
   a. Due to the number of products sold, the default profit margin of 21.8% was used.

Works Cited

CVS Health. (2014, February, 05). *Message from Larry Merlo, President and CEO.*https://cvshealth.com/thought-leadership/message-from-larry-merlo-president-and-ceo

Fein, A. J. (2019, December 03). *The State of Retail Pharmacy: Independent Pharmacy Economics Stabilize—But Dropping, Owner Salaries Are.* Drug Channels: Expert Insights on Pharmaceutical Economics and the Drug Distribution System.

https://www.drugchannels.net/2019/12/the-state-of-retail-pharmacy.html

Conway, J (2019, August 19). *Cigarette gross profit margins in U.S. convenience stores, by subcategory 2017.* Statista.

https://www.statista.com/statistics/888025/gross-profit-margin-cigarettes-convenience-store-us/