INVENTORY DEPLETION PROVIDES PRICING INSIGHTS FOR WINERIES

Depletion Optimization: Pricing and inventory management drives profitability for wineries' DtC businesses.

By Nathan Hart, Consultant and Matthew Lulay, Managing Director
Mather Economics
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The U.S. wine industry enjoyed a 27% increase of direct-to-consumer shipments in 2020 compared with 2019. The unprecedented growth was more than two-and-a-half times that of the annual average during the previous decade. The bump continues into 2021, as COVID-19 has driven wine consumers to buy directly and bypass in-person tasting rooms, restaurants, and wine stores.

Despite the remarkable DtC volume growth, the average price per bottle decreased by 9.5% to $36.83, causing the value of the 2020 DtC shipments to increase by only 14.9%, according to annual research about America's more than 11,000 wineries, by Sovos ShipCompliant and Wines Vines Analytics.

The growing DtC disruption to the wine industry has underscored the need for winemakers to apply data science to their operations to optimize their inventory and grow profitability. Data science and analytics give wineries a 360-view of their DtC operation, optimizes inventory and pricing, and identifies sales opportunities using wineries' own customer data.

Mather Economics, the leader in wine industry analytics and consulting, is unlocking profitable results with their clients' customer data. In this report, these essential strategies and tactics will be explored:

- Inventory depletion optimization
- Price elasticity estimation
- Customer data dashboards that reveal revenue opportunities

Mather Economics partners with wineries to aggregate their wine club and other DtC customer data, prepare the data for analysis, and make it easily accessible in a dashboard format. This dashboard enables winery executives to make informed decisions based on fact-based insights. These decisions can include segmenting customers, increasing brand focus, optimizing pricing strategies, designing sales for look-alike customers, forecasting sales and revenue, and much more.

Among the dashboard's features are:

- 360-degree view of a varietal's historical inventory depletion velocity across a winery's entire portfolio
- Estimation of price sensitivity by varietal
- Comparisons of performance year-over-year or for any historical trend
- Projections for incremental sales
- Ability to quantify and forecast revenue and inventory impacts by adjusting prices

MATHER'S DEPLETION OPTIMIZATION TOOL

Inventory depletion rates and price sensitivity are key insights from DtC data. Here's how Mather works with wineries to combine and leverage these impactful indicators to drive revenue and help make more informed business decisions.

Step 1: Plot inventory depletion for current and previous vintages

Optimizing inventory depletion is a key pain point for wineries. Mather's inventory dashboards maintain a real-time snapshot of year-over-year sales, distributor performance, pricing trends and the "flow" of sales across the year. Mather's dashboards allow winemakers the ability to track DtC sales by brand and vintage and uses econometrics to accurately predict inventory depletion in the future. These tools give wineries the ability to maximize price and manage inventory in anticipation of a sell-out in a specific time frame, allowing for more predictability in sales and profitability.

Mather's data management process automates the steps of ingesting, cleaning, organizing, and combining this inventory transaction data with sales data to provide a complete picture of inventory depletion.

Mather's DtC management dashboards track and store a wealth of data, but making sense of this ocean of information requires considerable time and expertise. Figure 1, below, is a sample of an inventory transaction report, showing location descriptions, debit/credit adjustments and other notes that underscore the depth and breadth of data for even one product in wineries' inventory databases.

Warehouse	OPSKU	Part No	Title	Date	Qty	Transfer	Reason
Winery Warehouse	999999-99999	55555	2018 Vintage	12/20/2019	-18	No	Order #123456
Winery Warehouse	999999-99999	55555	2018 Vintage	12/20/2019	-11	No	Order #123457
Winery Warehouse	999999-99999	55555	2018 Vintage	12/20/2019	-9	No	Return order #123456
Winery Warehouse	999999-99999	55555	2018 Vintage	12/20/2019	-11	No	Order #123457
Winery Warehouse	999999-99999	55555	2018 Vintage	12/20/2019	-9	No	Return order #123456
Winery Warehouse	999999-99999	55555	2018 Vintage	12/20/2019	-11	No	Order #123458
Winery Warehouse	999999-99999	55555	2018 Vintage	12/21/2019	-22	Yes	From Winery Warehouse to Winery Tasting Room B
Winery Warehouse	999999-99999	55555	2018 Vintage	12/21/2019	-22	Yes	From Winery Warehouse to Winery Tasting Room A
Winery Warehouse	999999-99999	55555	2018 Vintage	12/22/2019	-34	Yes	From Winery Warehouse to Tasting Room B
Winery Warehouse	999999-99999	55555	2018 Vintage	12/22/2019	-11	No	Order #123459
Winery Warehouse	999999-99999	55555	2018 Vintage	12/22/2019	-15	No	Order #123460
Winery Warehouse	999999-99999	55555	2018 Vintage	12/23/2019	-22	No	Order #123461
Winery Warehouse	999999-99999	55555	2018 Vintage	12/23/2019	-11	No	Order #123462
Winery Warehouse	999999-99999	55555	2018 Vintage	12/23/2019	-11	No	Order #123463
Winery Warehouse	999999-99999	55555	2018 Vintage	12/23/2019	-10	No	Return order #123462
Winery Warehouse	999999-99999	55555	2018 Vintage	12/23/2019	-8	No	Return order #123461
Winery Warehouse	999999-99999	55555	2018 Vintage	12/26/2019	-11	No	Order #123464
Winery Warehouse	999999-99999	55555	2018 Vintage	12/27/2019	-22	Yes	From Winery Warehouse to Winery Tasting Room A
Winery Warehouse	999999-99999	55555	2018 Vintage	12/28/2019	-22	Yes	From Winery Warehouse to Winery Tasting Room B
Winery Warehouse	999999-99999	55555	2018 Vintage	12/30/2019	-12	No	Order #123465
Winery Warehouse	999999-99999	55555	2018 Vintage	12/31/2019	-89	No	-EOY
Held for later Shipment	999999-99999	55555	2018 Vintage	11/21/2019	-11	No	Order #123466
Winery Warehouse	999999-99999	55555	2018 Vintage	12/22/2019	-5	No	-correcting inventory
Winery Warehouse	999999-99999	55555	2018 Vintage	12/22/2019	170	Yes	From Winery Warehouse to Winery Tasting Room B - CORRECTION
Tasting Room A	999999-99999	55555	2018 Vintage	12/22/2019	18	No	Adjustment
Tasting Room A	999999-99999	55555	2018 Vintage	12/22/2019	-70	No	adj.
Tasting Room B	999999-99999	55555	2018 Vintage	12/22/2019	55	No	adjustment
Winery Warehouse	999999-99999	55555	2018 Vintage	12/3/2020	5470	No	adding initial inventory
Winery Warehouse	999999-99999	55555	2018 Vintage	12/3/2020	-110	No	Error - correction
Winery Warehouse	999999-99999	55555	2018 Vintage	12/3/2020	5000	No	initializing inventory
Winery Warehouse	999999-99999	55555	2018 Vintage	12/5/2020	-5470	No	error - adjustment

Figure 1 – Raw inventory transaction data from DtC platform

These transaction data files are large and cumbersome documents that multiply in complexity across different products, tasting rooms, and time periods. To add to this complexity, sales data must be combined with inventory data to have a complete understanding of depletion.

Mather appends all of the data available across multiple years and uses text mining to comb through employee notes and adjustment descriptions to get a full picture of starting inventory and changes over time for each wine across the product portfolio. Mather then combine this cleaned inventory database with unique, detailed sales transactions, removing duplicates in the process, to ensure that all purchases (point of sale, tasting room, club shipments, and e-commerce transactions) are being captured accurately. Mather's custom scripts are designed to quickly and accurately take the inventory transaction and sales reports from massive, raw, and disaggregated to succinct, clean, and visually appealing, so wineries can make data-driven pricing and inventory-management decisions on a portfolio of wines in seconds.

Once a portfolio of wines is placed into our framework and aggregated with its previous vintages, Mather layers each of the wine's vintages together based on the first sale date of the specific vintage. Figure 2, below, shows the cleaned depletion data, starting with the week of first purchase, by vintage, which is produced after the years of raw and disaggregated data have been ingested and run through Mather's custom scripts. Each cell represents the remaining inventory for each vintage in percentage terms.

week	2014 Vintage	2015 Vintage	2016 Vintage	2017 Vintage	2018 Vintage	2019 Vintage
1	1	0.93426347	0.99171924	0.98878482	0.994796	0.97934838
2	0.97317092	0.90803745	0.98723149	0.97787275	0.99292256	0.96682059
3	0.9437977	0.87804765	0.96578789	0.96205026	0.99063281	0.95580151
4	0.92267366	0.84773338	0.94753643	0.94744021	0.99417152	0.94314545
5	0.89052502	0.82293501	0.9262055	0.93231487	0.99188177	0.92836782
6	0.86770488	0.80304997	0.90453658	0.91449183	0.98608303	0.9131667
7	0.84457636	0.79285251	0.88711131	0.88263466	0.97163078	0.89992019
8	0.82391489	0.77857606	0.86739522	0.86644843	0.93410253	0.88436072
9	0.79708581	0.7484472	0.84520054	0.85136856	0.88414417	0.85440641
10	0.77621874	0.7382961	0.82048971	0.83592495	0.85996788	0.83107332
11	0.75921928	0.71755354	0.79912123	0.80434058	0.84849431	0.81603101
12	0.74034384	0.68656716	0.77895448	0.77509018	0.83433944	0.79228664
13	0.7067304	0.66339112	0.76243052	0.76078324	0.81991198	0.74988395
14	0.68576054	0.64809493	0.74432177	0.74733715	0.79683597	0.68389162
15	0.65263537	0.62932233	0.73043413	0.73462459	0.76278696	0.61064282
16	0.61475599	0.57986465	0.70313204	0.71389167	0.74699655	0.5926686
17	0.59031686	0.55441735	0.6737269	0.69673547	0.72450042	0.58137262
18	0.56464421	0.53812459	0.63853838	0.67119315	0.71606994	0.56441643
19	0.50420168	0.51307129	0.61067298	0.65418346	0.70257424	0.53976398
20	0.47552232	0.48553815	0.58734227	0.64612773	0.66798501	0.50502394
21	0.42995914	0.45522388	0.57823344	0.64145979	0.64544427	
22	0.39418703	0.43413368	0.56219769	0.63065685	0.6213572	
23	0.32541824	0.41072587	0.549309	0.61984582	0.60369335	

Figure 2: Clean data example after custom scripts

The depletion paths for each vintage can then be plotted to quickly assess the performance of the current release's sales against previous vintages. Figure 3, below, shows the formatted depletion path curves for a sample wine SKU across several vintage sales years. The data has been edited to ensure anonymity of the source.

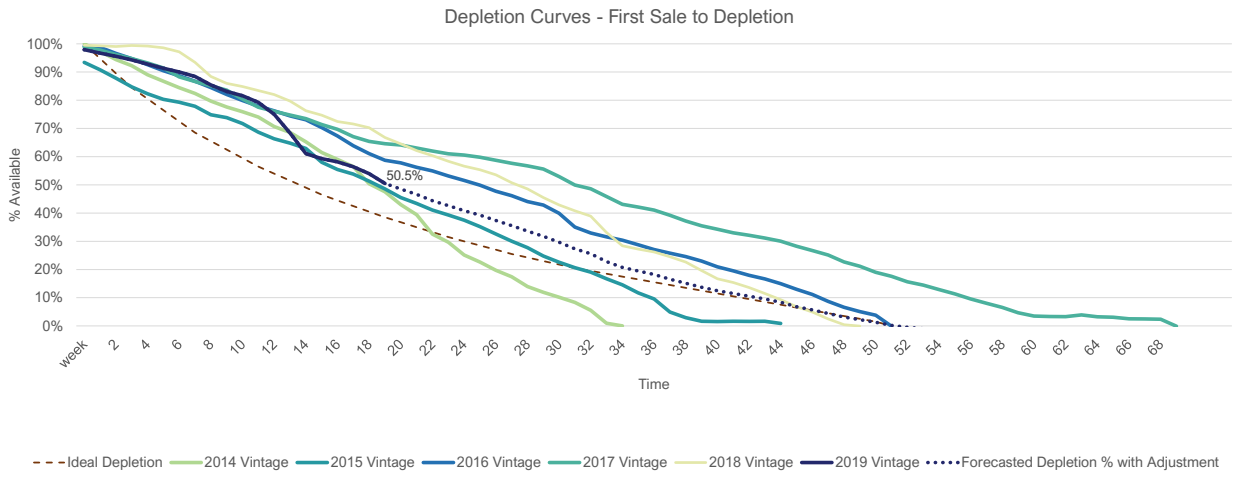

Figure 3: Inventory depletion plot example

Step 2: Estimate price sensitivity

Understanding how consumers will respond to changes in price is fundamental to optimizing pricing for wineries. Overestimating price sensitivity leads to quick sellouts, the inability to expose new tasting room customers to the entire product portfolio and leaving revenue on the table. Alternatively, underestimating price sensitivity leads to painfully slow depletions, high carrying costs, and the need for heavy discounting to clear inventory to make room for future releases.

To help solve these issues, Mather has developed an analytical approach for accurately estimating the price sensitivity for wine. Mather develops econometric models of demand for vintages, which measure the responsiveness of DtC sales to changes in key factors that affect sales volume. In this case, Mather uses transaction sales data to measure the relationship between the net bottle price of a given winery SKU with the quantity of bottles purchased (demand). Mather introduces other variables into these models to control for other factors that may contribute to demand outside of price. We find variables such as macroeconomic activity (unemployment rate, equity market indicators, economic growth, etc.), seasonality, and number of winery club members helpful in predicting wine demand.

These economic models provide an estimated price elasticity, which is the relationship between the price and sales volume of a given SKU. This analysis yields price elasticity estimates that typically fall between –1.5 and -0.1 for most wines. Figure 4, below, shows the range of price elasticity estimates for a sample winery across its product portfolio.

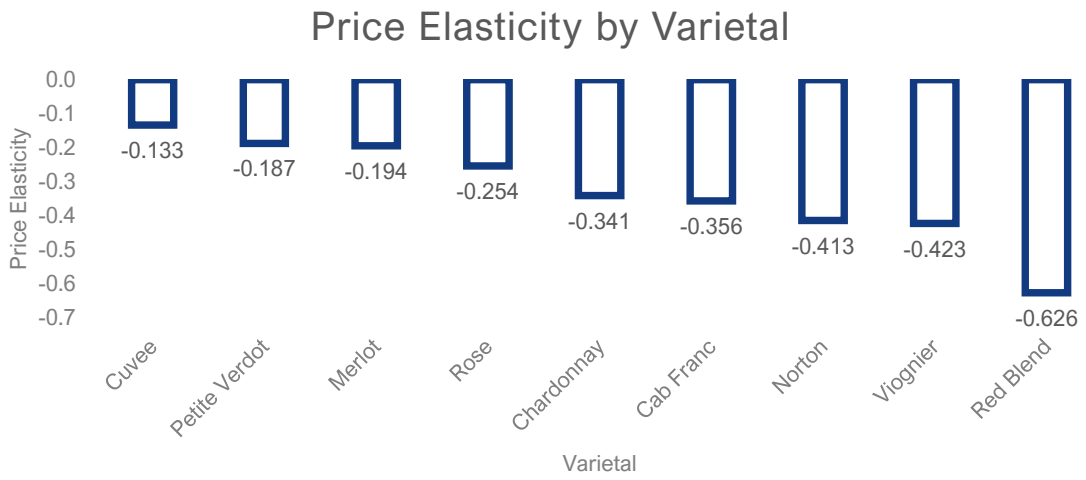

Figure 4: Price elasticity estimates by varietal

A price elasticity of –1 indicates unit elasticity, which means a certain percentage change in price will yield a proportional change in sales volume. Under unit price elasticity, a 10% increase in price would decrease sales by 10%. The range of elasticities above represent significantly different outcomes for wines across the demand spectrum. For example, a wine with a price elasticity of –0.25 would only lose about 2.5% of its sales from a 10% price increase, while a wine with an elasticity of –1.5 would see its sales drop by 15% for the same percentage increase. As we will see in the next section, estimating these elasticities provides valuable intelligence to wineries when evaluating pricing decisions.

Step 3: Match depletion scenarios with objectives to make efficient pricing decisions

Once inventory data is combined with sales transactions, and price elasticity estimates have been calculated, the final step is to combine these inputs into a dynamic scenario modeling framework to provide wineries the insights needed to drive business decisions. A side-by-side "factsheet" of vintages during their time in the market, using metrics like gross and net price, discount percentage, first sale date, and supply, combined with the depletion curves, allows stakeholders to assess historical actions that were beneficial or detrimental to the vintage's ability to track an ideal depletion path. In addition, a price adjustment lever allows users to understand the price point, net revenue, and demand impacts of any decision on any product.

The depletion path framework Mather has developed can be used as a scenario planning tool, giving wineries the ability to answer challenging questions such as those below:

- Am I on track to sell out of a current varietal too quickly this year, and how much should I raise prices to ensure I have enough inventory to last until my next release?
- How has the COVID-19 pandemic affected my inventory depletion against prior vintages, and how should my pricing respond to meet my year-end inventory management objectives?
- We ran a major case sale promotion in the fall. What impact did that have on my depletion rate?
- We implemented a steep price increase on last year's vintage. Will that impact my ability to sell my current vintage at my desired pace?
- How will a price adjustment affect my cash flow for the upcoming year?

Two examples of the application of this scenario planning tool are below. Figures 5.1 and 5.2 show the panels incorporated into the depletion path analysis dashboard for the current vintage cabernet sauvignon of a new winery in the Central Coast of California, while Figures 6.1 through 6.4 show the depletion path analysis for a red blend from an established Washington State winery.

Case 1: Cabernet Sauvignon for Central Coast California winery

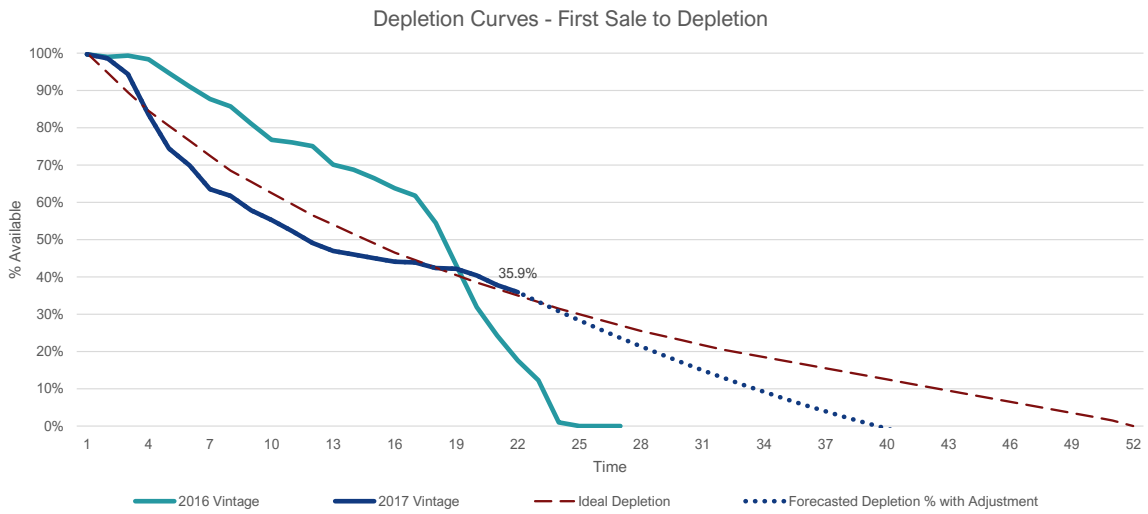

Figure 5.1 – Depletion curves - Cabernet Sauvignon for Central Coast California winery

	2016 Vintage	2017 Vintage	Price Adjustment Impact	
Supply	301	1,404	List Price	$80.00
Avg. Gross Price	$75.00	$78.84	**New List Price**	**$96.00**
Avg. Net Price	$68.95	$73.24	New Net Price	$89.16
Avg. Discount %	8.06%	7.13%	Inventory Available	504
First Sale Date	1/1/2020	8/17/2020	**Estimated Revenue Impact**	**$8,021.83**

Figure 5.2: Historical data/estimated impact - Cabernet Sauvignon for Central Coast California winery

In the case of the California winery's cabernet sauvignon, an upward price adjustment was recommended, as the forecast for current release indicates running out of inventory between weeks 35 and 36. Mather was able to measure the effects of the closed tasting room due to COVID-19, which slowed the velocity of depletion compared to what it might have been otherwise. With our estimates of price elasticity for this vintage, the scenario planning tool allowed the proprietor to evaluate various price adjustment scenarios, and they ultimately decided on a 20% increase. This tool enable an optimization of the available inventory's depletion and an understanding of the true value of the vintage to their customers. The rate adjustment has a forecasted positive net revenue impact of more than $8,000.

Case 2: 2019 red blend for Washington State winery

In the case of a red blend from the Washington State winery, the proprietor was able to understand how the excess inventory after 52 weeks from the 2017 vintage impacted the depletion velocity of the 2018 vintage after its release into the market. The scenario planning tool provided the proprietor an understanding of how the winery's products work together in the market, and it underscores the need for close monitoring of the depletion of wines currently in the market. The average gross price adjustment from 2017 to 2018, holding inventory relatively constant, also showed how past pricing decisions have affected demand and depletion velocity. The panels below show that full depletion was forecasted to occur at the 44-week mark with the business-as-usual approach.

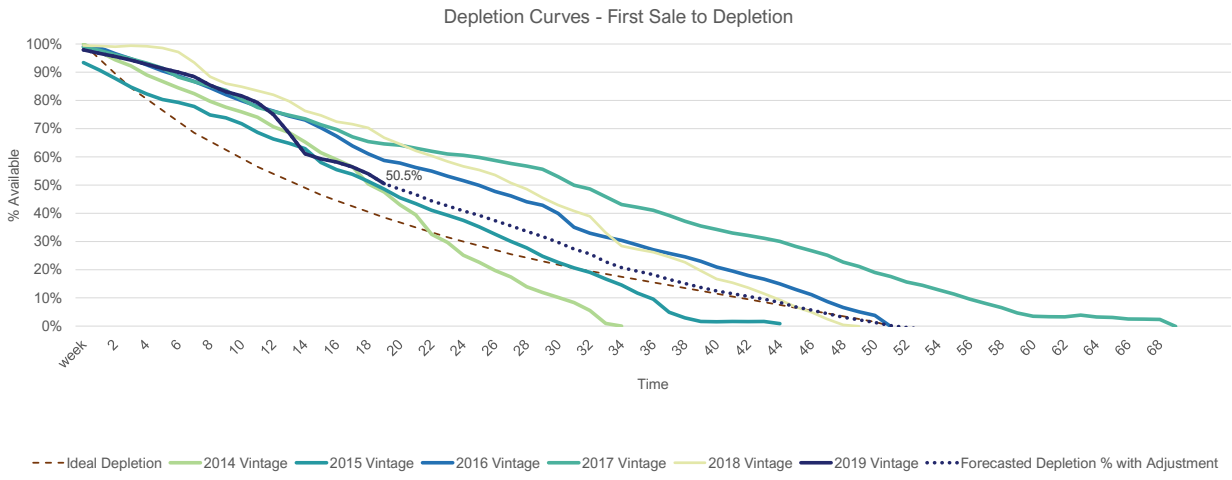

Figure 6.1: Depletion curves - 2019 red blend for Washington State winery

	2014 Vintage	2015 Vintage	2016 Vintage	2017 Vintage	2018 Vintage	2019 Vintage
Supply	1,853	3,082	3,804	4,713	4,804	5,847
Avg. Gross Price	$18.04	$18.10	$19.40	$20.10	$18.59	$20.89
Avg. Net Price	$16.23	$16.05	$17.18	$18.45	$18.56	$19.77
Avg. Discount %	10.03%	11.33%	11.44%	8.21%	0.16%	5.36%
First Sale Date	3/23/2016	11/19/2016	8/17/2017	8/6/2018	8/16/2019	8/24/2020

Figure 6.2: Historical data - 2019 red blend for Washington State winery

Once a winery is able to see the full picture of a given wine, the conversation moves to how to best optimize the depletion path to achieve the winery's goals. The panels below show how our dynamic model inputs/outputs allow wineries to easily estimate the impact of price adjustments and allow us to relax or tighten assumptions/ forecasts based on client feedback or external variables.

Model Inputs	
Price Adjustment (%)	0.12
Income Elasticity	0.99
Price Elasticity	-1.25
Projected 2021 Income Growth (WA)	1.11%
% Change Demand (Income Elasticity)	1.10%
% Change Demand (Price Elasticity)	-15.00%
Current Vintage Avg. Depletion Rate	2.50%
Avg. Income Elasticity Adjustment	0.00015
Avg. Price Elasticity Adjustment	-0.00198
Target Depletion Weeks	52

Price Adjustment Impact	
List Price	$22.00
New List Price	**$25.00**
New Net Price	$23.66
Inventory Available	2,953
Estimated Revenue Impact	**$11,485.09**

Figure 6.3: Dynamic model inputs/outputs for 2019 red blend for Washington State winery

The panel below illustrates how a 12% increase in the price of the wine smooths out the forecasted depletion curve, allowing a winery the flexibility to make an adjustment that would better optimize their remaining inventory. This adjustment would allow the winery to sell out inventory at the expected rate and also generate an incremental $11,500 in revenue for the current release.

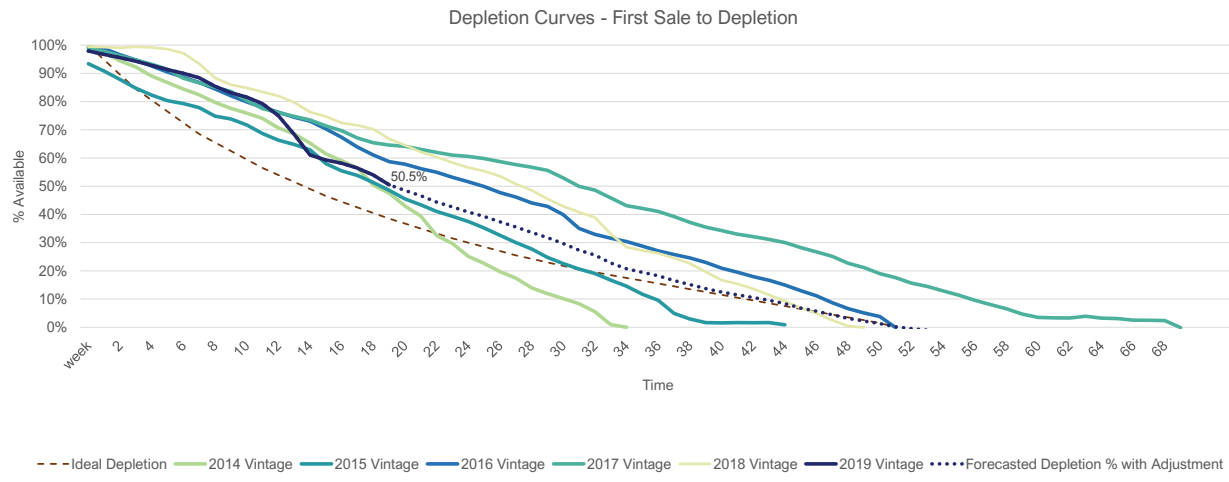

Figure 6.4: Post-adjustment depletion curves for 2019 red blend for Washington State winery

While the inventory depletion dashboard is clean and intuitive in its final form, a tremendous amount of work needs to happen before important data-driven decisions can be made, from data cleaning and validation to product-specific econometric analysis. Mather Economics provides its clients this intuitive decision-making tool and the support and contextualization of scenario planning options by our dedicated team of consultants who understand that key business decisions cannot be made with a “black box” approach.

Conclusion

Wineries possess the information needed to make intelligent, data-driven pricing decisions. The only piece missing is the expertise and experience to unlock the potential of this data to drive revenue and optimize inventory management. At Mather Economics, we believe that insights are meaningless if they are not actionable, which is why our team of economists have focused on building a pricing and inventory management tool designed to provide wineries with the information they need to make informed and highly impactful business decisions. Mather Economics’ goal is to provide world-class, cost effective analytics for wineries so they can spend more time doing what they do best—making great wine! ■