How to Analyze Customer Lifetime Profitability

A Step-by Step Approach

In this whitepaper, we will cover the following concepts.

1. Customer level profitability and business use cases
2. Datasets to consider for profitability analysis, and the fixed and variable costs associated with each
3. Steps in an accurate profitability analysis
4. Common mistakes to avoid when building profitability models

Who is Retina

We are your CLV experts. Retina is the customer intelligence partner that empowers businesses to maximize customer-level profitability.

Retina maximizes value by helping you attract more high-value customers, avoid unprofitable customers, and boost lifetime value for those in themiddle. We calculate CLV early in the customer journey to inform your strategies and predict your future valuation.

Boost revenue with the earliest and most accurate customer lifetime value metrics. Optimize your business and increase your valuation with action plans from our strategy consultants.

What is Customer Level Profitability Analysis?

In the most simple terms, a profitability analysis represents the magnitude of profits associated with each individual customer.

You can analyze current customer profitability using historical customer data, but this analysis is flawed. Recent customers will automatically appear to be less profitable. In this article, we will walk through how to account for recency bias by forecasting every customer's future profits to a fixed time horizon. This process is often referred to as customer equity analysis.

The blending of historical and predictive data is challenging. We will cover some of the common dos and don'ts.

Business Impact and Use Cases

Customer level profitability provides value to:

1. Product Management: Highlighting which products tend to bring in higher value customers
2. Finance: Reporting on the health of the businesses historically and predicting future health
3. Acquisition: Finding lookalikes of high profit customers and preventing acquiring low profit or unprofitable customers
4. Growth: Defining marketing programs which helps grow the overall profitability of each customer
5. Retention: Focusing retention marketing efforts on profitable customers
6. Logistics: Prioritizing shipping to high profit customers first
7. Customer Service: Prioritizing customer tickets by high profit customers

Questions Answered

A customer level profitability analysis can also answer some fundamental business questions:

1. What percent of my customers are unprofitable? What percent of my customers bring in 80% of my revenue or value?
2. How much does the business depend on whales (big-spenders)?
3. How diversified are my revenue/profit streams?
4. What makes my high value customers different from my low value customers?

When and Why

Ideally, profitability analysis begins once a business has passed its initial growth phase and has enough historical data to understand and predict customer behavior. This analysis becomes even more relevant when the company decides to focus on growing profits and is looking for cost efficiencies. When done correctly, the data team can automate this analysis and run it daily.

Ownership

While the data team does the majority of the analysis and data storage, the strategy or finance team should really be responsible for profitability analysis. The data team keeps the analysis up-to-date and serves as a single source of truth.

Other downstream teams like product and marketing can raise concerns about the outputs when strategy or finance teams own the analysis. If these teams interfaced directly with the data team, there would be siloed data sets and mismatched reporting. Additionally, incentives for marketing, sales, and other downstream teams may introduce bias to show higher revenue or lower costs.

Organizationally, the finance and strategy team should be the central stakeholders and the data team would report to them. For this effort, the data team should create a centralized data warehouse repository that serves as the single source of truth that all the other teams can use.

What Data Sets to Consider

Revenue Data

Extract revenue data from invoice tables (i.e. line items tables) at the individual invoice level. Typically, invoice tables include Customer ID, order date, order ID, line item, and line item details such as SKU, price, and subtotal.

Aggregate the data to an order level table that has one row for each order and shows the total revenue earned at the order level. The subtotal is revenue minus taxes and shipping fees. Note that shipping fees are different from the actual shipping cost.

$$revenue_{order} = \left(\sum_{items\ in\ order} price_{item} \right) + (shipping\ fees)_{order} + taxes_{order} - promotion_{order}$$

$$revenue_{customer} = \sum_{orders\ by\ customer} revenue_{order}$$

Cost of Goods Sold Data

Cost of goods sold (COGS) is the unit cost of all items in the invoice, including the cost of packaging. Aggregate COGS back to the order level by joining and summing SKU data grouped by order.

Shipping Costs

Shipping costs are often a function of the size and weight of the order. These costs make up an order level dataset that may or may not exist. If the data doesn't exist, you can use a blended rate and add it to each shipment.

Credit Card Fees

Credit card transaction fees are typically a small percentage of the grand total paid by the customer for each order. It typically varies by credit card used and payment processor fees.

Returns & Appeasements

A certain percentage of orders are almost always fully or partially returned. If the return is partial, deduct the amount from the original order. If the return is full, exclude the order completely. For this analysis, the return shipping costs and restocking fees are considered to be a part of the Selling, General, and Administrative (SG&A) costs for the company.

Total Order Level Costs & Order Level Profit

$$cost_{fulfillment} = (shipping\ fees)_{order} + (credit\ card\ fees)_{order} + taxes_{order}$$

$$cost_{inventory} = \sum_{items\ in\ order} (cost_{item} + (restocking\ fees)_{item} + appeasements_{item} + returns_{item})$$

$$cost_{order} = cost_{fulfillment} + cost_{inventory}$$

$$profit_{order} = revenue_{order} - cost_{order}$$

$$profit_{customer} = \sum_{orders\ by\ customer} profit_{order}$$

Customer Acquisition Costs (CAC) & Promotions

The marketing team often conducts some level of marketing attribution work that allocates acquisition costs to customer groups. If CAC cannot be obtained at the customer level, you can use an aggregate value, either by cohort or period. Promotions should be added to customer acquisition costs.

Customer Service & Logistics Costs

Customer service and logistics costs can be estimated by the hours to pack, ship, and service the customer. If the data is not available at the order and customer level, you can use a blended number here as well.

Step by Step Guide

In the step-by-step guide below we consider multiple data approaches for each step and walk through the pros and cons of different methodologies. The general recipe for the customer level profitability analysis looks like the following:

1. Collect revenue and variable costs data
2. Collect the fixed cost data
3. Build a basic analysis at the customer level to show current profitability
4. Project out profitability for recent customers so you don't confuse them with unprofitable customers
5. Leverage results for insights and business improvement

Step 1: Collect the right revenue & variable costs data

First, aggregate all order level data, grouped by order_id. At the order level, compute the values for Total Revenue (Grand Total) and Total Costs per the simple equations mentioned above. Let's call the profits column order_value.

The resulting data should look like the following:

Observations: 137,618

Variables: 5
$ customer_id   <dbl> 23666, 25746, 24368, 27131, 27131, 27131, 27131...
$ order_id   <dbl> 3999, 4142, 4779, 11818, 7164, 6081, 5310, 6114...
$ order_date   <date> 2017-03-16, 2017-03-15, 2017-03-21, 2017-05-17...
$ order_value   <dbl> 28.50, 28.50, 28.50, 27.00, 27.00, 27.00, 27.00...

Now, your table has one row for each order ever made by any customer. Subscription and non-subscription businesses can use this method, and it can even be customized to incorporate engagement data for mobile games or streaming applications.

Step 2: Collect the fixed cost data

Next, collect all the customer level costs that cannot be attributed to an order, such as, cost of customer acquisition, retention, and SG&A costs. Individual SG&A and other overhead costs can be calculated by dividing the SG&A line item by total active customers that month. Similarly, customer service costs not attributable to customers cannot be directly calculated.

The data might look like the following:

Observations: 137,618

Variables: 4
$ customer_id *<dbl> 23666, 25746, 24368, 27131, 27131, 27131, 27131, 2...*
$ order_id *<dbl> 3999, 4142, 4779, 11818, 7164, 6081, 5310, 6114, 1...*
$ order_date *<date> 2017-03-16, 2017-03-15, 2017-03-21, 2017-05-17, 2...*
$ order_value *<dbl> 28.50, 28.50, 28.50, 27.00, 27.00, 27.00, 27.00, 1...*
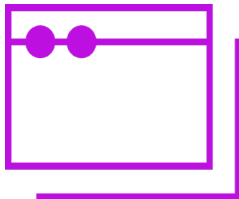
Step 3: Build a basic analysis at the customer level to show current profitability

Aggregate profits at the customer level and subtract the fixed costs. This is close to customer level profitability, but two components are still missing: (1) A discount rate to calculate net present value and (2) a component to account for future profits.

The data might look like the following:

Observations: 32,144

Variables: 5
$ customer_id *<dbl> 13897, 13922, 13928, 13932, 13940, 13...*
$ order_profits *<dbl> 775.00, 1205.00, 65.00, 190.00, 65.00...*
$ cac *<dbl> 104.04, 120.93, 75.88, 106.83, 82.88,...*
$ service_cost *<dbl> 2.26, 2.65, 2.34, 1.92, 2.37, 2.58, 2...*
*$ cust_value_historical <dbl> 668.70, 1081.42, -13.22, 81.25, -20.2...*
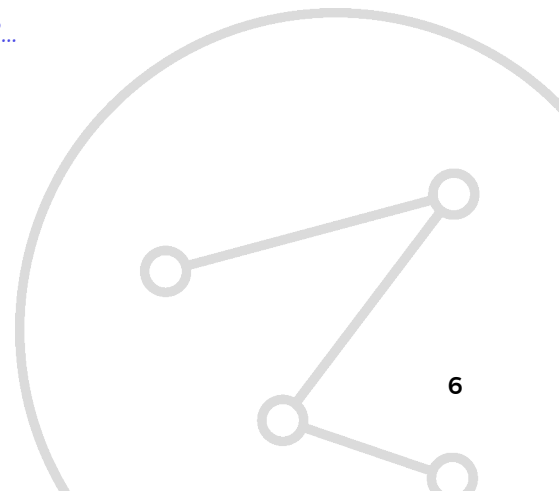
Historical Customer Profitability Curve

Plot the historical profits in ascending order on a curve of 0% to 100% of customers. The graph should look like the following:
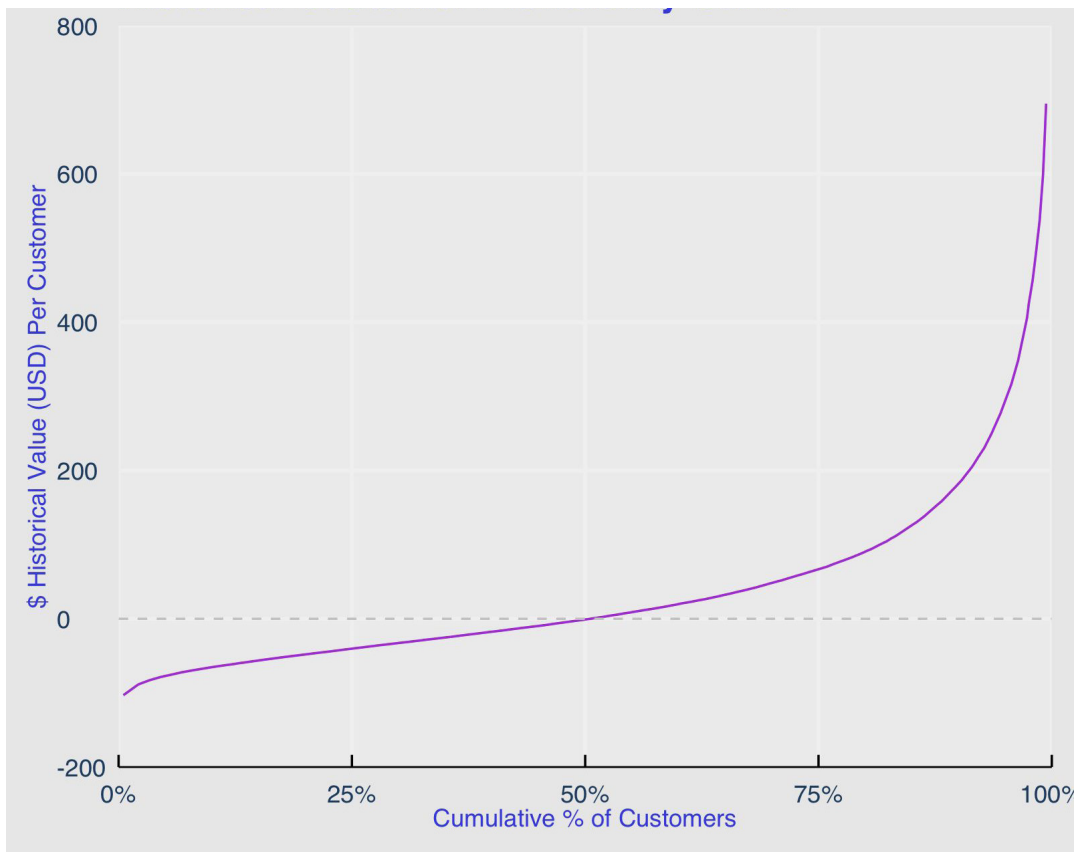
This graph might suggest that 50% of customers are unprofitable, but at this stage, the analysis is flawed and underestimates the profits from recent customers. This flaw will be amplified if you have a growing customer base. You must look at all customers on the same time horizon to account for recency bias. For example, if we pick a 5-year horizon, then we must: (1) only consider the first 5 years of profits for all customers older than 5 years and (2) forecast the profits for all customers with less than 5 years of tenure.

Key Concept: Just looking at historical profits at the customer level is flawed because it doesn't give recent customers the chance to spend to their full potential.
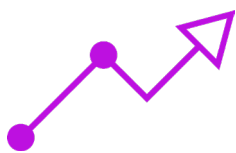
Step 4: Use Retina's platform to calculate LTV

If you have coding experience, there are open source packages in Retina's CLV tool, that can help you make forecasts. You can get time horizons of one, two, five, or ten years. Use the table we created in Step 1 and run it through Retina.

The tool takes 1-2 hours to reliably forecast individual customer predictions and the output looks like the following:

Observations: 29,921

Variables: 12
$ customer_id   <dbl> 145643, 28018, 42093, 42192, 71822, 8…
$ predicted_churn_date   <date> 2018-02-28, 2017-04-10, 2017-06-12, …
$ num_orders   <dbl> 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1…
$ total_order_value   <dbl> 10.5, 12.0, 12.0, 12.0, 12.0, 12.0, 1…
$ first_order_date   <date> 2018-02-22, 2017-04-03, 2017-06-06, …
$ probability_alive   <dbl> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
$ predicted_total_ltv_01yr   <dbl> 10.5, 12.0, 12.0, 12.0, 12.0, 12.0, 1…
$ predicted_total_ltv_02yr   <dbl> 10.5, 12.0, 12.0, 12.0, 12.0, 12.0, 1…
$ predicted_total_ltv_05yr   <dbl> 10.5, 12.0, 12.0, 12.0, 12.0, 12.0, 1…
$ predicted_total_ltv_10yr   <dbl> 10.5, 12.0, 12.0, 12.0, 12.0, 12.0, 1…
$ ltv_seg   <chr> "Low", "Low", "Low", "Low", "Low", "L…
$ palive_seg   <chr> "Lapsed", "Lapsed", "Lapsed", "Lapsed…

The table above still does not contain fixed costs. To add them in, join this table with the customer costs table from Step 3. Compute customer profitability by subtracting fixed costs from the 'total_predicted_clv' column from the Retina Go tool. You may want to use a specific time horizon relevant to your business. This fixed time horizon metric is known as "Total Predicted Customer Lifetime Value," or CLV.

You should now have a table at the Customer ID level that shows each customer's respective profits:

Observations: 23

Variables: 3
$ customer_id   <dbl> 279154, 289458, 198379, 35466, 130448, 148…
$ historical_value   <dbl> -12.72, -9.06, 23.87, 508.08, 22.89, -54.7…
$ fixed_hrz_5yr_value <dbl> -7.65, 248.82, 225.27, 1153.11, 22.89, -54…

Now, for every customer you not only have historical profits but also projected profits for a fixed period of time.
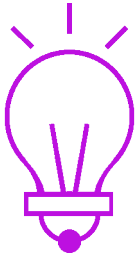
Step 5: Leverage results for insights & business improtement

Profitability Insights: A customer level profitability analysis shifts value from transactional events to lasting relationships. The profitability equation now takes into account the value of the relationship over a fixed time period, not just from the lens of each transaction.

Profitability Curves

To illustrate customer level profitability, take the final table from Step 4 and sort it from lowest to highest value. When you plot it, it should look like this:
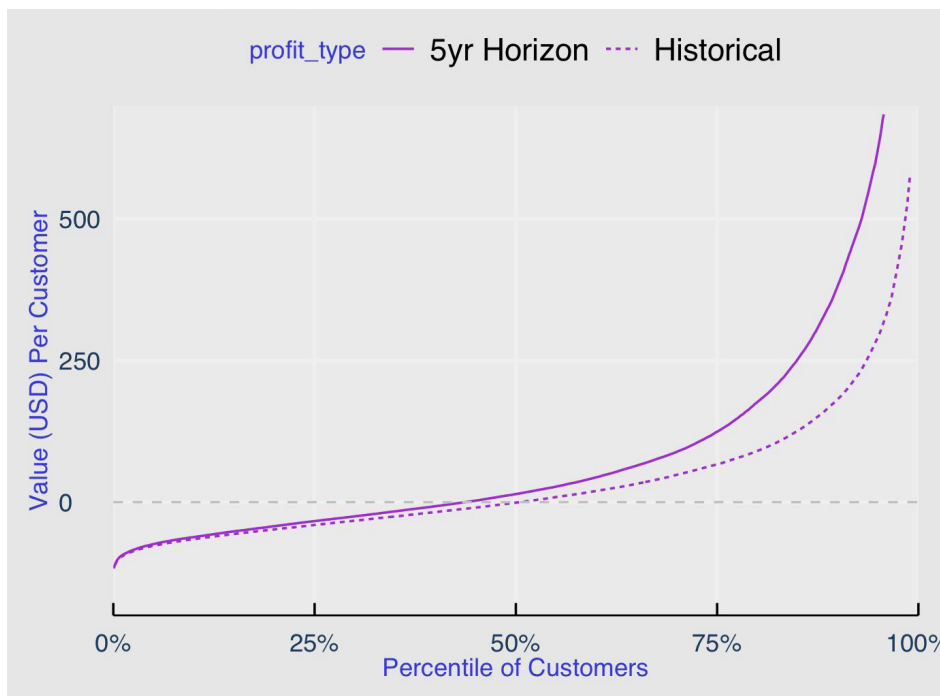
The curve above shows a large spike in value that you expect to capture in the future. You get to profitability at the 44% percent mark using a '5-year Fixed Horizon' versus at 50% percent using a 'Historical Profit' curve.

Key Concept: By looking at historical profits you are likely underestimating the value of customer relationships.

The lion's share of customer value is generated after the initial sale. Subscription or repeat purchase models flip the risk from the customer (in the form of adoption risk) to the vendor (in the form of customer retention risk). You can find even more information about the value of your customers with metrics like NPS scores, engagement, clicks, etc.

Customer level profitability shows you what your customer acquisition spend should be. For example, if in the above chart Customer Acquisition Cost (CAC) was reduced by $50, it would make the business profitable at the 16th percentile of customers rather than 44th.

You can also illustrate customer level profitability with cumulative profits. Take the same curve above and integrate it over the customer base (cumulative sum). The resulting chart looks something like the following:

Relative Cumulative Profits

Assuming Max Value of Historical was = 1
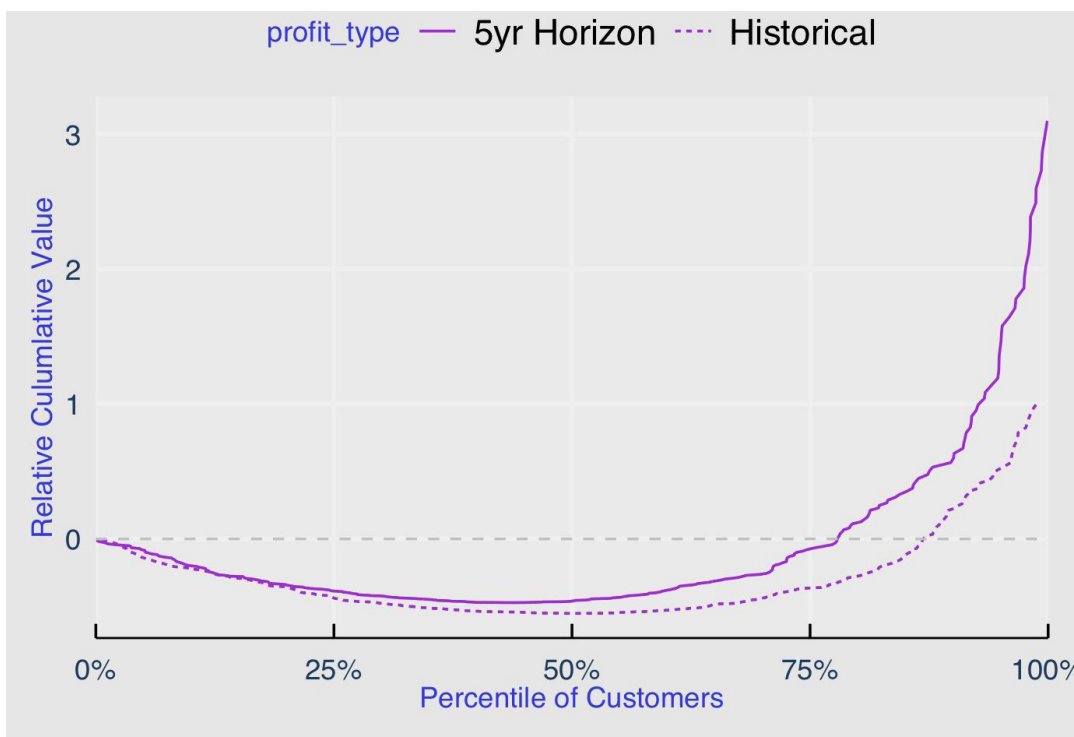
The chart above demonstrates that the value of the long term relationship is more than 3X higher than the historical profits.

Additionally, three segments of customers appear. The first segment (customers from 0-44%) represents customers you are losing money on in the long run. These customers are so poisonous to the business that your next customer segment (44-78% percentile) has to make up for the losses of the first segment. The top segment (78-100% percentile) makes up the lion's share of the profits.

Many marketing departments have a separate growth team responsible for lowering CAC. However, the growth team acquires all types of customers, including low value, unprofitable customers. The result is a double whammy for the business: for each bad customer acquired, the business must acquire a profitable customer to make up for it.

Key Concept: Acquiring unprofitable customers is extremely poisonous, and with growth teams focused on low CPAs, they are incentivized to bring in all kinds of customers.

Avoid this trap by incentivizing the growth team to not only lower CAC but also to lower Customer Lifetime Value to CAC ratios. Most advertising platforms such as Facebook and Google now enable value-based lookalike targeting. Great news! Brands can now focus on acquiring new customers that look like their best customers, not just low cost customers.

Other Use Cases

Look at Customer Lifetime Value by acquisition medium, source, channel, and campaign. In other words, look at the CLVs of customers acquired through CPC, Facebook, or display advertising. As before, you want to measure CLV to determine whether you are underspending or overspending to acquire customers. For example, a marketer may focus on finding undervalued keywords to acquire customers very cheaply, when instead there may be overpriced keywords that attract customers worth far more than the extra cost of a keyword.

The CLV analysis can be applied to other metrics, such as coupon codes, Groupons, or landing pages. Think about the different "levers" your marketing team has, i.e. the activities you can change to drive different consumer behaviors.

You can also compute segment CLVs by what product was purchased first or by most popular product category, to name a few. For example, a customer who first buys a low-margin item might appear to be low value. But those customers could turn out to be repeat purchasers of high-margin products. If that is the case, you may change what product you feature on your homepage and in advertisements.

Conclusion

We looked at all the components typically included in customer level profitability analysis. Next, we highlighted how analysis of historical customers is flawed and introduced the concept of using a fixed horizon for all customers. This fixed horizon allows you to truncate profits for customers whose tenure has surpassed that horizon and forecast profits for customers who are short of that horizon. You can only accurately analyze each customer's profitability once all customers are normalized to the same time horizon.

At Retina, we partner with our clients to analyze customer-level profitability. We turn customer data into business growth by focusing on customer lifetime value at every point in the customer journey.

A few of our customers include:

DOLLAR SHAVE CLUB   Capital One Shopping   MADISONREED®   BRICKELL MEN'S PRODUCTS

Schedule a demo to see what Retina can do for you.

Retina empowers brands to make data-driven business decisions that boost revenue, all while maximizing customer-level profitability. Schedule a demo to speak with one of our experts.

To learn more go to: www.retina.ai