Customer Lifetime Value Formula

Concepts, components and calculations involving CLV
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1. Customer Lifetime Value

Customer Lifetime Value (CLV) is an important predictive metric, at the intersection of marketing and finance, providing business managers and senior decision makers with forward-looking information on customer relationship performance.

Customer relationship performance is a key driver of firm value, risk management and profits. In addition, a focus on CLV enables a customer centric business culture and is the core of customer value management. This section provides a definition of CLV, grounded in finance, accounting and marketing theory.

There are many variations on the definition of Customer Lifetime Value (CLV). Central to all definitions of CLV is the idea that it is an economic value derived from the firm’s relationship with its customers.

Inside the concept of economic value is the notion that money has a time value. Economic value also includes the idea that value is based on what someone would pay “today” (in the present) to consume or own something.

The firm’s relationship with its customers is an economic relationship. Economic relationships are evaluated based on the value exchanged over time periods. While past transactions maybe a predictor of future transactions, by definition, past transactions have no present value. For example, you can’t consume the same piece of cake twice. Eating a piece of cake may be a predictor that you will consume a piece of cake in the future, but, once the present piece of cake is consumed, it cannot be sold or consumed again. The present value (what someone would pay today) for an eaten piece of cake is zero.

As a consumed piece of cake has no economic present value, past customer transactions have no economic present value for the customer relationship. However, past customer transactions may be used as a predictive driver of the economic value of a firm’s customer relationship. For CLV, the economic value of this relationship is measured over future time periods.

Within this economic value context, Customer lifetime value (CLV) is defined as a measure of the “present value of future cash flows attributed to the customer relationship.”[1] It is a forward looking concept, and as such can be considered a leading indicator of financial performance. This definition is grounded in the finance theory concept of “value”, the accounting concept of “going concern” and the FASB characterization of “assets”. All three concepts apply on a look-forward basis.

The finance theory concept of “value” is founded on the notion that money has a time value. In addition, risk of loss and opportunity cost informs the value of money. These ideas will be explored in the next section.
The accounting concept of “going concern” is an assumption that a business will continue to operate for the foreseeable future to earn a return (cash flow) from its assets. It is on the basis of this assumption that financial statements are prepared. When there is uncertainty about a firm’s ability to realize future cash flow from assets, attention shifts to liquidation, and assets are evaluated by fair market value.

Customers can be considered assets from the perspective of generating a return (future cash flow) on the investment in creating (acquiring customers) and maintaining (retaining customers) the customer relationship.

The Financial Accounting Standards Board (FASB) defines an asset as “probable future economic benefits that involve[s] a capacity…to contribute directly or indirectly to future net cash inflows”. [2] Within this perspective is the view that customers are assets and their intrinsic value is derived from valuation of future cash flows. Future cash flows from customers are dependent on the relationship between the firm and its customers. It is intuitive that strong customer relationships would predict frequent and continued purchases, and stable (possibly higher) future cash flow. Weak customer relationships would predict infrequent purchases, increase in lost-for-good customers and less stable, more volatile, and lower future cash flow.

On this foundation, a focus on three key aspects of this definition will deepen the understanding of CLV: present value, future cash flows, customer relationship.

In the next section, we will explore in more detail the basics of finance theory which impact customer lifetime value calculations. We will provide a usable **customer lifetime value formula** and provide specific instructions on **modeling customer lifetime value** in practice.
2. Using present value of future cash flows in CLV

In section 1, we discussed the basic concepts behind CLV and explained how the CLV analytics forms the cornerstone of customer value management. Customer lifetime value is defined as a measure of the present value of future cash flows attributed to the customer relationship. This section illustrates the concept of present value of future cash flow, central to the CLV formula.

Value, Present Value & Future Cash Flow

Central to the financial concept of “value” is the idea that money has a time value. Time value of money is represented as an interest, or discount, rate.

Interest is the compensation paid to an owner of capital (a lender, saver, investor) in consideration for risk of loss and opportunity cost (foregone investment or consumption). If you were to purchase future money (invest in a future cash flow), to determine the present value of that future money (what you would pay today for a future cash flow) you would need to discount the future money, by some rate, to compensate you for risk and opportunity cost.

To illustrate how the time value of money concept is applied to the valuation of a future cash flow (investment), consider the following scenario:

Consider that you are offered today the opportunity for an investment where you would receive payments of $100 each year for the next three years. At the end of each year you receive $100.

How would you calculate the value of that investment to purchase it today? If we assume an interest (discount) rate of 5%, the formula for the present value of future cash flow for this scenario would be:

\[
\text{Price Today} = \frac{100_1}{(1 + 0.05)^1} + \frac{100_2}{(1 + 0.05)^2} + \frac{100_3}{(1 + 0.05)^3}
\]
The discount rate (r) is applied to future cash flows (FV) over time (t) to derive present value (PV):

$$PV = \sum_{t=0}^{n} \frac{FV_t}{(1 + r)^t}$$

The present value of cash flow formula, applied to the future cash flows from the customer relationship, forms the basis of the CLV calculation.

The next section will focus on the basic CLV formula and the challenges associated with evaluating the key factors inside the CLV model.

3. Components of a basic formula for CLV

This section reviews a basic formula for Customer Lifetime Value and the challenges associated with some of the component values required to build the CLV metric.

Basic Customer Lifetime Value formula

Depending on where you are in the value chain, customer value can look different. From the perspective of a sales agent, customer value equals the value of the transaction; from a product or service originator perspective, customer value includes upgrades and integrated solutions. Customer Lifetime Value (CLV) provides a view into the long-run value of a customer for the firm.

Below is a basic CLV formula:

$$CLV = CM_i \left( \frac{R_r}{1 + \delta - R_r} \right) - AC_i$$

Where:

- $CM_i$ = Customer Contribution Margin
- $R_r$ = Retention rate for customers
- $(\delta)$ = Discount rate (Cost of capital)
- $AC_i$ = Customer acquisition cost
This model assumes a constant rate of retention and discount.

Several component values, that drive the CLV metric, can be challenging to construct and imprecise in compilation. Consequently, CLV should be viewed as an approximation of customer value on a forward-looking basis.

**CLV Components**

The component $CM_i$ references the contribution margin ($CM$) of an individual customer ($i$). Contribution margin is customer revenue less variable cost associated with customer demand

$$CM_i = RV_i - VC_i$$

Where:

$RV_i$ = Customer revenue

$VC_i$ = Customer variable cost

Variable costs are costs that vary directly and proportionately with volume (in this case customer sales volume). Variable costs for CLV are costs of customer demand. Examples of costs of demand are cost of goods sold, costs-to-serve, delivery and unique product packaging. Contribution margin can be derived from income statement components and the application of contribution analysis. As you can see, compiling individual customer contribution margin can be an inexact process.

Contribution margin (and retention rate) should be measured by longitudinal customer cohort ($CC$). Measurement by cohort allows for assignment of acquisition cost to the cohort. Acquisition cost ($AC$) is the value of the investment required to generate a sale (to create a customer). Components that contribute to acquisition cost are costs-to-sell, advertising, marketing collateral and events.

$$AC_i = \frac{AC_{t-1}}{N_{cc}}$$

Where:

$AC_i$ = Customer Acquisition cost

$N_{cc}$ = Number of customers in cohort

$AC_{t-1}$ = Total acquisition cost from previous period
The timeline chart below illustrates cash flow associated with customer contribution margin and customer acquisition costs.

To appropriately value the cash flow associated with a customer, the time value of money concept is applied to the CLV metric. Risk and opportunity cost drive the cost of capital. Cost of capital is represented by the discount rate ($\delta$). The discount rate is applied to cash flow to derive a present value of cash flows from the customer. The present value formula was illustrated in the previous article on CLV.

To summarize, we presented the calculations for two of the main components of the basic CLV formula: the contribution margin ($CM_i$) and the acquisition costs, ($AC_i$) for a customer, ($i$). But we still need mechanisms to compute the retention rate, ($R_r$) and discount rate, ($\delta$).

The next section will present a commonly used means to compute the discount rate and the retention rate.
4. Commonly used Methods for CLV components

This section presents commonly used methods for computing discount rate and retention rate components of a basic CLV formula.

Basic Customer Lifetime Value formula

This basic CLV model, illustrated in previous article, assumes a constant discount and retention rate. To appropriately value the cash flow associated with a customer, the time value of money concept is applied to the CLV metric. Risk and opportunity cost drive the cost of capital. Cost of capital is represented by the discount rate (δ). The discount rate is applied to cash flow to derive a present value of cash flows from the customer. The present value formula was illustrated in the previous article on CLV.

The discount rate (or cost of capital) for a firm may be as simple as finding the cost of debt (interest rate charged by lender to the firm). When the capital structure of a firm includes debt and equity, a weighted average of cost of capital (WACC) calculation is required to determine discount rate.

The formula for WACC is:

\[ WACC = w_d \cdot k_d + w_e \cdot k_e \]

Where:

- \( w_d \) = Debt percentage of capital structure
- \( k_d \) = Interest rate of debt (or cost of debt)
- \( w_e \) = Equity percentage of capital structure
- \( k_e \) = Expected return on equity (or cost of equity)

For publicly traded companies, expected return on equity (\( k_e = E(R_i) \)) can be derived using capital asset pricing model (CAPM):

\[ E(R_i) = R_f + \beta \left[ E(R_m) - R_f \right] \]

Where:

- \( R_f \) = Risk free rate (rate for short term US Treasury bills)
- \( \beta \) = beta (sensitivity of expected returns to return of the stock market; publicly available)
- \( E(R_m) \) = Expected return of the market (6%)
For privately held companies, an opportunity cost discount rate can apply to the value of owner invested capital. Opportunity cost is the value of the next best alternative forgone investment (an investment not chosen). Most finance departments maintain, on a yearly basis, cost of capital calculations. For publicly trade firms, cost of capital can usually be found in the Management’s Discussion and Analysis (MD&A) section of financial statements.

The component $R_r$ refers to the retention rate for customers. It is reasonable to assume that not all customers remain loyal to a business over time. As mentioned previous, retention rate should be measured within a longitudinal cohort. To determine retention rate it is necessary to determine churn (defection) rate. A simple formula for churn rate is:

$$C_r = \frac{(C_0 + A_1 - C_1)}{C_0}$$

Where:

$C_r$ = Customer Churn rate

$C_0$ = Customers at beginning of period (month, quarter, year)

$A_1$ = Customers acquired during the period

$C_1$ = Customers at end of period

Retention rate is simply:

$$R_r = 1 - C_r$$

It is easier to estimate retention rate when customers have a contractual relationship with the firm. CLV models have been developed to address variation in retention rates due to non-contractual customer relationships.

**Duration of Customer Lifecycle:**

In the basic CLV formula, no customer lifecycle duration is specified. Some CLV models suggest durations of 3 to 5 years. This is supported by the assumption that customer migration is positively correlated with the ever increasing rapid rate of economic change. Another assumption for this time frame is based on amortization rates for intangible assets. Since CLV is a measure of an intangible asset (customer as asset) retention rate is analogous to amortization rate.

This basic CLV formula does not specify customer duration because retention and discount rate account for the change in customer value over time.
A retention rate of 90%, on a customer set of 100, results in 66 customers (from the cohort) remaining with the firm at year five.

\[ Customers_{t5} = N_1 R_t^4 \]

\[ 66 = 100 \times 0.9^4 \]

From data in Customer Tenure chart in previous section the net present value of customer contributions, with discount rate \((\delta)\) if 10%, at year five is:

\[ CM_i = \frac{\$79.5}{(1 + 0.1)^5} = 49.05 \]

For most firms, the most significant source of cash flow is the customer. CLV provides an estimation of the present value of future cash flows from the customer. When aggregated, CLV approximates the value of the firm. Consequently, in additional to business managers, investors, creditors and financial analysts can also use CLV to support decisions on equity valuation, investment allocation and credit risk.
5. The Use and Significance of CLV

CLV emphasizes that value is derived from the customer relationship. This emphasis orients the firm towards the customer, enabling a customer-centric business culture. Customer-centricity is contrasted with product or service-centricity. Direct marketing theory is based on customer-centricity.

Customer relationship measurements include customer satisfaction (CSAT), customer effort score (CES) and net promoter score (NPS). All three measurements have predictive power. Some extensions of the basic CLV model link measures of customer satisfaction and loyalty with customer equity (the sum of all individual customer CLVs) to predict firm market value.

Customer lifetime value is used in marketing for the purposes of customer selection, resource allocation and marketing campaign design. It is sometimes used in finance to derive the value of customer equity (CE), an important driver of firm value. At the intersection of marketing and finance functions, CLV provides a means to evaluate return on marketing investment (ROMI).

Firm success is dependent on the efficient allocation and utilization of limited resources to create and capture value. Capital is a limited resource and its allocation and utilization within the marketing function is not exempt from concern for return on invested capital (ROIC). Capital costs money, whether represented by a weighted average cost of debt and equity (WACC), an interest rate or opportunity cost. Firm activities that return an economic rate less than the cost of capital employed destroy firm value.

The great American retail merchant and marketing pioneer, John Wanamaker (1838-1922) is credited with the quote:

"Half the money I spend on advertising is wasted; the trouble is I don't know which half."

This quote captures the frustration associated with measuring ROMI. CLV helps measure the financial performance of marketing, and directs the efficient use of capital, for the purposes of capturing value from customers and creating value for the firm.
References & Sources


About SimaFore

SimaFore was established with the express objective of helping small and medium businesses find the right analytics tools for the right problems in order to convert data into information assets. Our team of experts come from different backgrounds but the analytical techniques each have applied in their experience have several common threads: using data to understand cause and effects, building models to simulate systems or processes, and using a combination of analytics tools for forecasting. Our team shares a common vision - to help businesses remove the complexity involved in applying and deploying analytics. To make analytics accessible and affordable to anyone who has data. We invite SMBs to sign up for a preview of our specialized analytics portal here.

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