



"turning data into dollars"

Tom's Ten Data Tips – April 2009

Life Time Value

Life Time Value (LTV), also called Customer Lifetime Value (CLV), is an elusive concept that has strong intuitive appeal to marketers. Future income streams are discounted and summed to calculate the *total* value of the customer over the course of a "lifetime." For marketers it may be intuitive to treat customers as assets. LTV (CLV) provides a quantitative "bridge" to link investment in marketing and customers to profit and ultimately market capitalization. It helps make ROI on marketing expenses accountable and quantifiable.

Because eternity is a very long time away, for practical purposes LTV is sometimes referred to as *Long* Term Value. Depending largely on the discount rate (see tip # 4) and attrition rates, the difference may be inconsequential.

1. Keep It Simple, Sam (KISS)

For a rough but reasonable estimate of Life Time Value (LTV), it suffices to know only *three* variables: discount rate, (annual) customer profits, and retention rates. A simple but defensible formula calculates:

$$\text{Customer Lifetime Value (CLV)} = m * (r / (1 + i + r)) ;$$

where m = annual profit, r = retention rate, and i = discount rate (Gupta & Lehmann, 2005).

Because calculating LTV requires several assumptions and imprecise estimates (see also tip# 3-4-5), we find it preferable to have a simple and transparent formula rather than a more elaborate and complicated (data intensive) one. As organizations become familiar with dynamics and assumptions in these formulas, nothing will stop them from getting more sophisticated. A more elaborate formula we like was provided by Wayland & Cole (1997):

$$\text{Customer Equity (CE)} = \sum_{t=1-n} Q_t \pi_t d^t - \sum_{t=1-n} (D_t + R_t) d^t - A_t ;$$

where $\sum_{t=1-n}$ is the sum over period 1-n (the "lifetime"), Q_t = volume of purchases over period t , π_t = margin of purchase after tax during t , d^t = the period you are integrating, D_t = development costs during

period t , R_t = retention costs during period t , A_t = acquisition costs. This latter formula has the advantage that marketing investments in Acquisition, Development and Retention costs are explicitly broken down, and the impact of their relative allocation can be more precisely (and explicitly!) monitored.

2. Compounded Attrition Gets *Underestimated*

The multiplicative aspect of an exponential model has proven hard to “estimate” by humans. Such a model closely resembles the annuities in a mortgage where the first few years despite constant furnishing of the prime, the capital hardly seems to grow. Because time is represented in the exponent of the equation, and many calculations require logarithms, the outcomes are sometimes counter intuitive. One example of this is the effect that attrition has on LTV. Sometimes what appears to be a *small* change in attrition, can have a *large* effect on LTV due to the nature of the (exponential) calculation. This holds in particular for low attrition rates (see also tip# 6).

3. Tenure Must *Often* Be Estimated From Censored Data

Depending on the nature of the relationship, you will have different ways of defining and identifying churn. When the onus is on the customer to end a contract (as in many subscription businesses), the termination point of the relation is unambiguous.

However, in many cases, customer tenure (and the converse, attrition) must be *estimated*. The problem is that for a customer on a current buying streak, you never know if and when the stream of purchases will end. The end part of the relation is at present unknown (hence the purchase distribution is right-truncated), and must be *predicted* from historic transactions. And as Yogi Berra said: “It’s tough making predictions, especially about the future.”

4. The LTV Discount Rate Is Arbitrary

When you calculate LTV, future revenue streams are discounted in much the same way as your mortgage is amortized. What this requires is a discount rate, equivalent to the interest rate in a mortgage calculation. So if you expect \$100 next year, for which amount should you add it to *today’s* value? Clearly less than 100, but by how much less? That’s your discount rate.

There is no sound theoretical basis for arriving at 'the right' discount rate. It is 'merely' a parameter that needs to be plugged into the model, and that should be explicated. It can make sense to provide multiple calculations under, say, three scenarios to see what the impact would be on decisions to be made. A reasonable lower bound is probably either the cost of capital (maybe 8%) or at least the corporation's hurdle rate (their target for profit growth, usually ~10-12%). Higher, and more realistic is probably the Risk Adjusted Return On Capital (RAROC). This will vary from about 12-20% for a mature and low-risk business to 15-25% (and up) for start-ups and turbulent markets.

Incidentally, because of the multiplicative nature of future discounts, the effect of this rate on the value of revenue far out into the future tends to get *underestimated* (this is the corollary to tip# 1). When the discount rate goes up, the value of future revenues goes down quicker than most people would guess by "intuition".

5. Acquisition Is Easier To Measure (&Manage) Than Churn

One of the challenges in calculating LTV (CLV) is that the beginning of a customer relation is clearly defined by the initial purchase, but no equivalent exists (in most contexts) for the *endpoint* of the relation (see also tip# 3). Yet retention tends to be a strong determinant of LTV (CLV) in most industries (see also tip# 6).

The fundamental problem is that a customer who hasn't purchased for a while (significantly longer than could be expected by chance), may have *either* lapsed *or* become dormant, or may just be in a lull. And until they make their next purchase (or not), you will never know for sure. Purchasing *patterns* differ per customer. Some may buy regularly, some may go on "buying streaks." This makes calculating the "expected" time between purchases tricky, because *individual* patterns should be taken into account to make that estimate.

6. Retention Is Usually The Strongest Driver Of LTV (CLV)

Under many realistic scenario's LTV is most dramatically influenced by relatively small changes in retention rates. This holds in particular for low(ish) discount rates and high retention rates.

If we use Gupta & Lehmann's (2005) simple formula under a scenario with \$100 annual customer profit, 12% discount rate, and 80% retention (realistic numbers in a variety of industries), $CLV = \$250$.

Increasing margin by 1% leads to CLV = \$252,50, decreasing the discount rate from 12% to 11% gives us CLV = \$258,06 and improving retention from 80% to 81% translates into a CLV = \$261,29.

When we recalculate elasticities at profit = \$100, discount rate = 12%, *but retention is now 90%*, CLV = \$409,09. Corresponding changes of 1% now come down to the following. Increasing margin by 1% leads from a CLV = \$409,09 to a CLV = \$413,18. When the discount rate drops from 12% to 11%, CLV goes up from \$409,09 to \$428,57. Improving retention from 90% to 91% translates into an improvement of CLV = \$409,09 to a CLV = \$433,33. Note that improving retention now plays a much larger role (relatively) in growing customer value.

7. To Discriminate Between Loyalty And Inertia, You Need Psychological Measurements

In some texts, loyalty is defined as repeat purchases or the absence of churn. The shortcoming in this definition is that inertia (sometimes referred to as "transactional loyalty") and "true" loyalty are lumped together. Unfortunately, behavior *alone* is insufficient to tell the difference, which everyone understands to be real. Besides repeat purchases, some measure of the quality of the relation and unconditional credit mark the difference. When you are *loyal*, a disappointment or bad experience will not cause you to switch (immediately), or question the relationship. To assess loyalty versus inertia, it seems unavoidable to measure psychological constructs.

8. LTV Deserves A Place In Mergers & Acquisitions

Mergers and acquisitions are sometimes accompanied by highly sophisticated financial modeling. We have no qualms about that. However, the drawback of such complicated modeling is that the extent and nature of assumptions being made becomes murky in these advanced models. We advocate accompanying "traditional" M&A models with relatively simple LTV models as an alternative and complimentary method.

The simplest LTV model would calculate the price per customer by dividing acquisition cost minus "fixed assets" (real estate, patents, machinery, IT-systems, etc.) by the number of customers. You can expand by including *projected* customer acquisitions. If you then look at current revenues and operating profits (if any) you have an estimate of anticipated earnings. Better vaguely right than precisely

wrong. The fundamental value for most firms derives from current and future revenue streams for existing customers. Because of simplicity and transparency this helps making explicit what the assumed customer acquisition and retention rates ought to be for the acquisition to create value. If you then compare the customer-based value with market price, you can see how big the option price is. Any premium over this is paid for option values and expansion potential, and you can then consider how likely that is to materialize.

9. An Optimal Retention Rate Exists (But It's Not 100%)

Most factors that influence LTV (CLV) have a more or less obvious impact on the bottom-line, like customer profitability and discount rate. Retention rates tend to be less visible as a driver of customer equity. Interestingly, it isn't a "good" thing to try and improve retention rates indefinitely. For every company, given their set of economic and marketing parameters, there is some level of retention where optimum shareholder value is generated.

As you continue to improve retention rates, it becomes prohibitively expensive to achieve. So there is *one* trade off. Additionally, the lower churn becomes, the smaller the customer base will be for which this specific proposition "fits." You are then essentially squeezing yourself out of the market. These two forces need to be balanced when determining how much to spend on retention, and what the desired target rate for churn should be, which is unique for each company.

10. Opportunity Gains Need To (Far) Outweigh Decision Costs

Because of its intuitive appeal to marketers and researchers, LTV (CLV) has gained wide acceptance, albeit not yet at the board level. One of the problems often is that although an LTV score may be available, it is not immediately apparent how to put this to (profitable!) use. Investing in customer specific knowledge is only profitable when the expected yield from better relationship management decisions outweighs the cost of acquiring and maintaining that knowledge. The 'right' investment level here at which to manage the customer portfolio is where the value of making better decisions about investing in customer relationships is higher than the cost of acquiring and using that knowledge. Marketers who can make that case will have gone a long way to getting the right kind of attention from their boards.