Head in the Clouds: A Lesson on Customer Lifetime Value

March 1, 2016

Proliferation

As of January 2016 there were 146 venture-backed private companies with reported valuations north of $1B. That’s 101 more than there were just two years ago. Growth has largely been driven by an increase in the number of platform businesses garnering exceptionally high valuations. The proliferation of non-GAAP metrics created specifically to address issues of cash flow lag in the platform model, have played a critical role in the model’s widespread adoption. Most prominent among these are Customer Lifetime Value (LTV) and Customer Acquisition Cost (CAC). Together, these metrics are being used by investors to evaluate the health and vitality of platform businesses and by management teams to make decisions on capital allocation. In fact, the metric for Customer Lifetime Value has become so relevant in today’s investment culture that the Harvard Business Review recently felt compelled to publish an HBR Tool to help managers calculate and interpret the results of the LTV metric.

While both metrics have been adopted widely, the risks that are being underwritten are not fully acknowledged or understood by investors and management teams. This paper will review the merits of both LTV and CAC and examine several ways in which they are being applied today.

It’s All About Lag

The rise to prominence of LTV and CAC can be attributed to the fact that they attempt to solve a time lag between revenue and expense recognition. Let’s compare the following:

In a traditional software sale... a company sells a perpetual license to the customer. The customer pays the company up front and the company recognizes both the Revenue and the Expenses associated with this sale in the same period.

In a SaaS sale... a company sells a subscription to the license that will be ongoing. The customer then pays the company on a monthly or annual basis as agreed upon for the length of the contract. The company is only able to recognize Revenue as the subscription services are delivered ratably over the life of the contract. If any portion of the contract is paid for in advance, that advance payment is booked as a liability on the balance sheet under Deferred Revenue until the service is delivered. However, the Expense associated with acquiring the customer will be recognized up front in the period in which they were incurred.

This dynamic of front-loading most Sales & Marketing Expenses, but stretching Revenues out over the duration of the service contract creates a lag in cash flow. With cash flow misaligned it can be difficult to discern a clear relationship between expenses and revenues when relying on traditional GAAP metrics. Looking at one of the largest and most well-known SaaS companies, Salesforce.com (Salesforce), we can see this dynamic very clearly.

The next page shows the 14-year public filing history for Salesforce. Over this decade and a half stretch the company has delivered a cumulative $20.7B in Revenues and $16B in Gross Profit.

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A 77% gross margin for $16B in cumulative Gross Profit is an impressive feat.

However, as indicated earlier, most SaaS companies assume significant customer acquisition costs before obtaining customers and Salesforce’s experience has been no different.

Over the same 14-year period, Salesforce spent a staggering $10.6B on Marketing and Sales expenses. That results in 51 cents of every dollar earned in Revenue spent on customer acquisition and retention efforts.

When you incorporate the G&A and R&D expenses required to support the business, Salesforce has a negative $300M cumulative Operating Profit over the 14-year period.

### Salesforce Financial Highlights

<table>
<thead>
<tr>
<th>($ in M)</th>
<th>FY'02</th>
<th>FY'03</th>
<th>FY'04</th>
<th>FY'05</th>
<th>FY'06</th>
<th>FY'07</th>
<th>FY'08</th>
<th>FY'09</th>
<th>FY'10</th>
<th>FY'11</th>
<th>FY'12</th>
<th>FY'13</th>
<th>FY'14</th>
<th>FY'15</th>
<th>Cumulative</th>
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<tbody>
<tr>
<td>Revenue</td>
<td>22</td>
<td>51</td>
<td>96</td>
<td>176</td>
<td>310</td>
<td>497</td>
<td>749</td>
<td>1,077</td>
<td>1,306</td>
<td>1,657</td>
<td>2,267</td>
<td>3,050</td>
<td>4,071</td>
<td>5,374</td>
<td>20,702</td>
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<tr>
<td>COGS</td>
<td>6</td>
<td>10</td>
<td>17</td>
<td>33</td>
<td>69</td>
<td>119</td>
<td>172</td>
<td>220</td>
<td>258</td>
<td>324</td>
<td>489</td>
<td>684</td>
<td>968</td>
<td>1,289</td>
<td>4,659</td>
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<tr>
<td>Gross Profit</td>
<td>16</td>
<td>41</td>
<td>79</td>
<td>143</td>
<td>241</td>
<td>378</td>
<td>577</td>
<td>856</td>
<td>1,048</td>
<td>1,333</td>
<td>1,778</td>
<td>2,367</td>
<td>3,103</td>
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<td>Gross Margin %</td>
<td>73%</td>
<td>80%</td>
<td>82%</td>
<td>81%</td>
<td>78%</td>
<td>76%</td>
<td>77%</td>
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<td>78%</td>
<td>78%</td>
<td>76%</td>
<td>76%</td>
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<td>Research &amp; Dev.</td>
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<td>5</td>
<td>7</td>
<td>10</td>
<td>23</td>
<td>45</td>
<td>64</td>
<td>100</td>
<td>132</td>
<td>188</td>
<td>295</td>
<td>429</td>
<td>624</td>
<td>793</td>
<td>2,719</td>
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<td>Marketing &amp; Sales</td>
<td>25</td>
<td>34</td>
<td>55</td>
<td>96</td>
<td>150</td>
<td>253</td>
<td>376</td>
<td>534</td>
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<td>1,614</td>
<td>2,168</td>
<td>2,757</td>
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<td>General &amp; Admin.</td>
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<td>13</td>
<td>17</td>
<td>30</td>
<td>48</td>
<td>84</td>
<td>117</td>
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<td>256</td>
<td>348</td>
<td>434</td>
<td>597</td>
<td>680</td>
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<td>Other</td>
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<td>0</td>
<td>0</td>
<td>0</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>4</td>
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<td>-11</td>
<td>4</td>
<td>7</td>
<td>20</td>
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<td>20</td>
<td>64</td>
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<td>97</td>
<td>-35</td>
<td>-111</td>
<td>-286</td>
<td>-146</td>
<td>-294</td>
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</tbody>
</table>

Source: CRM Public Company Filings, AFR Calculations

Without passing judgment on Salesforce, it is worth highlighting that one of the largest and most often cited SaaS success stories is still not profitable. By continuing to invest in Sales and Marketing, Salesforce has made a huge bet that their customer base will stick around long enough for the company to deliver on the level of profitability necessary to justify the investment. Will Salesforce ever be able to take its foot off the accelerator and reduce Sales and Marketing expense?

**What are LTV & CAC?**

Before we go any further, let’s define LTV and CAC. Keep in mind that these are non-GAAP metrics and the methodology used to derive these statistics is open to interpretation and assumption in many cases.

The CAC of a business is calculated by dividing the sales and marketing expense of a company in a period by the number of new customers acquired in the corresponding period.

\[
\text{Customer Acquisition Cost (CAC)} = \frac{\text{Sales & Marketing Expense in Period}}{\text{New Customers Acquired in Period}}
\]
Taken in isolation, the CAC offers limited insight into the viability of a platform business as CAC is only a cost driver in the P/L equation. CAC is an upfront investment that a company incurs to build brand awareness and drive adoption of their platform. Companies and investors then hope to recoup this up-front investment by taking in high margin revenue associated with the customer for several periods into the future. This estimate of gross margin to be earned over the life of a customer is referred to as Customer Lifetime Value (LTV), which can be calculated as:

\[
\text{Customer Lifetime Value (LTV)} = \frac{\text{Annual Recurring Revenue} \times \text{Gross Margin}}{\text{Churn Rate} + \text{Discount Rate}}
\]

LTV/CAC is THE ratio that management teams and investors rely upon to evaluate the health of a platform business. The justification is that if you know how profitable each customer will be, you know exactly how much money you can invest in acquiring that customer without jeopardizing ultimate profitability. Using LTV/CAC, investors can more easily assess the vitality of a platform business and the comparable attractiveness of all platform businesses as they compete for capital. Assuming that LTV/CAC is calculated uniformly, this appears to be a powerful tool for management teams and allocators alike. But let’s take a further look at the assumptions and risks being underwritten.

**LTV in Action: as applied by a venture capitalist**

The clearest illustration of how the investment community applies LTV/CAC is to examine it through the eyes of a venture capitalist. Andreessen Horowitz, who coined the phrase, *Software is Eating the World*, is a renowned venture capital firm that has built their reputation on a series of successful SaaS and platform investments over the past decade.

Andreessen Horowitz (AH) wrote a paper in May 2014 titled *Understanding SaaS: Why the Pundits Have it Wrong*, in which AH demonstrates how a leading venture capital firm would apply the LTV framework to analyze one of the younger public market darlings, Workday². Workday is a provider of cloud applications for finance and human resource functions.

We used public company filings by Workday to reconstruct the analysis conducted by Andreessen Horowitz to better understand the assumptions required in the calculations of LTV and CAC.

To calculate the CAC, Andreessen Horowitz was forced to make the following assumptions:

- Sales and Marketing Expense Allocation for New Customers: 70%
- Number of New Customers

<table>
<thead>
<tr>
<th>Estimating Customer Acquisition Cost (CAC) ($ in M)</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales and Marketing</td>
<td>37</td>
<td>70</td>
<td>123</td>
<td>197</td>
</tr>
<tr>
<td>70% new customer allocation</td>
<td>70%</td>
<td>70%</td>
<td>70%</td>
<td>70%</td>
</tr>
<tr>
<td>Sales and Marketing for New Customers</td>
<td>26</td>
<td>49</td>
<td>86</td>
<td>138</td>
</tr>
<tr>
<td>Customers</td>
<td>160</td>
<td>259</td>
<td>400</td>
<td>600</td>
</tr>
<tr>
<td>New Customers</td>
<td>46</td>
<td>99</td>
<td>141</td>
<td>200</td>
</tr>
<tr>
<td>CAC</td>
<td>0.56</td>
<td>0.5</td>
<td>0.61</td>
<td>0.69</td>
</tr>
</tbody>
</table>

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² Andreessen Horowitz, *Understanding SaaS: Why the Pundits Have It Wrong*, Scott Kupor and Preethi Kasireddy, [http://a16z.com/2014/05/13/understanding-saas-valuation-primer/](http://a16z.com/2014/05/13/understanding-saas-valuation-primer/)


To calculate the LTV, Andreessen Horowitz was forced to make even larger assumptions:

- Annual Churn Rate: 3%
- Discount Rate: 8%
- Average Revenue per Customer

<table>
<thead>
<tr>
<th></th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Churn Rate</td>
<td>3%</td>
<td>3%</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>Discount Rate</td>
<td>8%</td>
<td>8%</td>
<td>8%</td>
<td>8%</td>
</tr>
<tr>
<td>Subscription Services Revenue</td>
<td>37</td>
<td>89</td>
<td>190</td>
<td>354</td>
</tr>
<tr>
<td>Customers</td>
<td>160</td>
<td>259</td>
<td>400</td>
<td>600</td>
</tr>
<tr>
<td>Average Revenue per Customer</td>
<td>0.2</td>
<td>0.3</td>
<td>0.5</td>
<td>0.6</td>
</tr>
<tr>
<td>Subscription Services GM%</td>
<td>69%</td>
<td>75%</td>
<td>79%</td>
<td>80%</td>
</tr>
<tr>
<td>LTV</td>
<td>1.4</td>
<td>2.3</td>
<td>3.4</td>
<td>4.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>LTV/CAC</td>
<td>0.56</td>
<td>0.5</td>
<td>0.61</td>
<td>0.69</td>
</tr>
<tr>
<td>LTV/CAC Ratio</td>
<td>2.6x</td>
<td>4.7x</td>
<td>5.6x</td>
<td>6.3x</td>
</tr>
</tbody>
</table>

Andreessen Horowitz concludes a LTV/CAC ratio of greater than 3x implies that the business is healthy. But let’s circle back to a number of the assumptions that they underwrite to arrive at their conclusion.

1) AH assumes that only 70% of the sales and marketing expense would be allocated to new customer acquisition and the remaining portion would be incurred for retention and relationship management. Although this assumption may be too high or too low, a public company does not need to report this amount and may not even be able to accurately measure it.

2) AH uses net change in number of customers as a proxy for New Customers because Workday only reported customer count at the end of the period. Operating on this limited amount of information, while common practice for public company reporting, does not allow an investor to observe how many customers left during the period.

3) AH estimates the Average Revenue per Customer by dividing Subscription Services Revenue by end of period Customer count. This estimation is probably conservative given a growing customer count year over year, but not knowing the average customer count in the period can distort the calculation meaningfully.

4) AH uses an 8% discount rate. We believe that a discount rate should be a required rate of return unique to every individual but must certainly exceed the cost of capital at the company level.
5) AH was most aggressive in estimating the Churn Rate to be 3%.

The implied customer lifetime on a 3% Churn Rate is 33 years! (customer lifetime = 1/Churn) Workday’s business is only 10 years old, and the market is willing to operate under the assumption that the average customer lifetime will be 3.3x the age of the business.

To add more context to how aggressive a 3% Churn Rate should be received, below is the survival rate for all US Establishments as reported annually by the Bureau of Labor Statistics. Following a fairly consistent curve, only half of all new establishments survive 5 years, and only ~1/3rds survive 10 years. When applied to AH’s assumptions, this data would imply either a) that the remaining Workday customers need to survive for quite a long time or b) that Workday’s customer churn would need deviate meaningfully from a consistent national survival rate average.

![Establishment Survival Rate (1994-2010)](image)

Source: US Bureau of Labor Statistics BED

We believe that using the LTV and CAC metrics can be helpful in assessing the health of a business. However, it is important to understand the significant assumptions and estimations that an investor is required to underwrite. This is particularly true when applying these assumptions to companies in the public markets, where publicly available data is insufficient.

**Taser: SaaS’ing up a valuation**

Many platform businesses trade at exorbitant valuations when compared to traditional valuation metrics such as P/E, EV/EBITDA or EV/Sales. The valuation premium for SaaS businesses is the envy of many marketplace constituents and is perhaps best exemplified by Taser International (Taser).

Taser International owns the market for a product synonymous with its name, the Taser, a conducted electronic weapon (CEW) primarily used by law enforcement as a less-lethal alternative to traditional firearms. The hardware for the CEW

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is assembled onshore in Scottsdale, Arizona. Taser has virtually 100% market share in the domestic market, as they own the patent for Neuromuscular Incapacitation via electricity at the required wavelengths. The only issue the business faces is a near full level of penetration in the domestic market.

Seeking growth, Taser is attempting a big leap into the on-officer video market. To solidify their market position in the absence of a foundational patent like they own in CEW, Taser’s go-to-market strategy included both a hardware solution (camera) and a SaaS offering for digital evidence management.

To further align Taser as a SaaS business, CEO Rick Smith has recently begun drawing analogies between Taser and Salesforce, which he offers to investors as a “comparison company”.4 In line with other SaaS managers, Rick takes a step further to dismiss the appropriateness of GAAP metrics.

“...as a management team, you really can’t use GAAP revenue and earnings to assess the relative levels of investment and spend, especially in the business that’s growing at greater than 100% year over year right now.”5

- Rick Smith, CEO of Taser

Taser’s management team is willing to commit to an aggressive growth strategy that is predicated on the LTV and CAC tools employed by SaaS predecessors such as Salesforce.

“...we want to share with you the key metrics we are using as a Management team and our Board are also reviewing constantly with us. These include lifetime value of the customer compared to the customer acquisition cost ratio, which keeps us focused on the return on our sales and marketing investments in the business. In the third quarter of 2015, our lifetime value per customer to acquisition cost ratio was 4.7. So as a reminder, conventional wisdom indicates that anything greater than three means that investments are well placed.”6

- Daniel Marc Behrendt, CFO of Taser

While we are supportive of Taser’s decision to enter the on-officer video market, we are cautious of the tools they are using to analyze marketing spend. By investing heavily in Sales and Marketing, Taser could potentially harm shareholder value if they are unable to retain customers long enough to become profitable. Thus far Taser has been successful in generating awareness and has shown solid bookings growth by signing customers into multiyear contracts. However, there is a key difference between Taser’s customer contracts and Salesforce. Due to municipal government funding rules, the contracts are subject to budget appropriation and other cancellation clauses. This opens Taser up to significantly higher potential for churn if the assumptions made in their LTV calculations do not accurately reflect the level of risk they are underwriting. This lack of rigid contract duration represents a risk profile that is more commonly observed in a B2C market where customers can terminate service either monthly or at will.

One Step Further: taking LTV and CAC beyond SaaS

The term SaaS is typically used to describe software services that are sold to enterprise customers. Experts expect enterprise customers to exhibit sticky revenue as IT decisions have migrated from a top down decision by the CTO to the department level. This dynamic increases reliance on the SaaS provider for heightened service and should forge

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4 Rick Smith, CEO of Taser, 2/26/15, Q4’14 Earnings Call Transcript
5 Rick Smith, CEO of Taser, 11/3/15, Q3’15 Earnings Call Transcript
6 Daniel Marc Behrendt, CFO of Taser, 11/3/15, Q3’15 Earnings Call Transcript
stronger and more lasting relationships. Additionally, B2B sales often include well-structured contracts that define the duration of the contract.

But what happens when the LTV and CAC concepts applied outside of a B2B SaaS business? Could these tools be used to drive decision making in a consumer market where contract duration can be as short as 1 month or non-existent? Let’s take a look at Spark Networks.

Spark Networks operates a series of online dating platforms that allow registered users to discover and communicate with other members of the community. Once registered, customers begin a paid subscription service that typically renews on a monthly basis. There is no contractual obligation for a subscriber to renew at the end of the month.

Spark’s largest dating network is Christian Mingle, a brand the business began to scale in 2011. Management relied on a LTV/CAC ratio to drive their capital allocation decisions and investments in the brand. Based on a flawed analysis, Spark’s management team increased their Direct Marketing Expense for their Christian Mingle platform by a factor of 10x from $5M in FY’10 up to $48M in FY’13.

“I think it is important to reiterate the way we measure the return on marketing investments for our subscription-based dating businesses and that is over the life of a subscriber. Due to the nature of our business, marketing spend does not immediately translate into GAAP revenue. Although we expense marketing dollars the day we spend them, there is a natural sales lag after we spend those dollars which is compounded by our recognition of revenue over the life of any individual subscription purchase.”

- Greg Liberman, ex-CEO of Spark Networks

For 13 straight quarters the company’s outlay on direct marketing expense exceeded revenues for the Christian Mingle segment. Similar to Salesforce, this strategy will only lead to success if at some point in the future your customers stick around long enough to recoup that initial investment.

Source: Company Public Filings

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7 Spark Networks Inc. Public Company Filings and AFR Calculations
8 Greg Liberman, ex-CEO of Spark Networks Inc, 3/7/13 Q4’12 Conference Call Transcript
In Q3’13, Spark Networks began cutting their Direct Marketing Expense. What followed was a drastic decline in average subscriber count, as Christian Mingle began to experience customer churn at much greater levels than management had anticipated. Relying on LTV and CAC metrics with inaccurate customer churn assumptions led management to invest over $100M in cumulative marketing dollars behind Christian Mingle which may never be recouped.

Certainly estimating LTV is not an easy task. The absence of long-term customer contracts amplifies this challenge. Management teams must take considerable liberties in estimating customer churn and win-back rates at many junctions over the life cycle of a customer. More importantly, they must fully understand the nature of these assumptions and appropriately evaluate the level of risk associated with them when committing to a level of customer acquisition spend.

Awash in Opportunities

Anytime the market combines inconsistent, non-GAAP financial metrics such as LTV and CAC with unbridled optimism, (such as a 33-year customer life on a young business), market inefficiencies will arise and corrections will inevitably follow.

We at AFR believe that many of these platform businesses are building world-class companies. These companies investments will be rewarded with strong market share and future profits. However, not every business will see a positive return on CAC, and these businesses will undoubtedly fail to generate positive free cash flow. Our job at AFR is to identify mispriced businesses and to express this identification by investing long in a business where fundamentals are being undervalued and short in businesses whose inherent risks are being overlooked. Irrespective of our investment direction, we believe that the risks being underwritten in platform businesses are not fully understood by the market. This will create a fertile investment opportunity set for years to come as the 146 unicorns and others join the four case studies discussed above in the public markets.