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Customer Lifetime Valuation to Support Marketing Decision Making

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ABSTRACT

Customer lifetime value (LTV) is an important construct in designing and budgeting for customer acquisition programs and a number of other decision areas. This article adapts a simple taxonomy of buyer-seller relationships to distinguish basic approaches for LTV estimation.

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BACKGROUND

The "customer franchise" has been a key concept in marketing for decades. Levitt's classic article from 1960 (9), challenged firms to "buy customers," and to take aim at providing goods and services that would lead to reliable repeat business from satisfied accounts. Perhaps the cornerstone premise of the marketing concept, the franchise underlies any firm's interest in brand loyalty, and is manifest in many cross- and up-selling strategies.

Direct marketers have been at the forefront in using database technologies to "harvest" systematically the customer franchise. With customer identities and other behaviors accurately coded, direct marketers can segment markets with relative precision, tailor programs for narrow segments, and assess those programs fairly accurately. Often a primitive or vague notion of the "lifetime value" (LTV) of customers surfaces in the evaluation customer acquisition strategies or media tests.

Ambitiously moving beyond the "polemics" of the coveted customer franchise, LTV represents the present value of the expected benefits (e.g., gross margin) less the burdens (e.g., direct costs of servicing and communicating) from customers. By giving gross consideration of LTV, programs that do less than break-even on a short-run basis may be "scored" favorably on the expectation of future business. For example, a half-price subscription offer may lose money on initial subscriptions, but crude recognition that only, say, 20 percent need to *renew* to show profitability will often sustain a program.

THE PROBLEM

With relatively few exceptions (e.g., Spiegel, Time-Life Books), most firms seem to give LTV little more sophisticated regard than just discussed. Indeed, Jackson (7) indicates that only two insurance companies formally evaluate customer LTV. The following considerations are likely impediments to more careful estimation:

1. Neither professional nor academic writers have effectively disseminated the technology.
   - **a.** In the trade magazines (e.g., *Catalog Age, Direct Marketing*) the authors are consultants. They seem reluctant to reveal their proprietary models and know-how—or lack thereof (cf., [5]).
   - **b.** The Direct Marketing Association's *Manual Release* (4), its guide for professional members, emphasizes *only* customer migration through various *recency cells,* each with different proclivities to repeat purchase.
     - **1)** In contrast, there are many LTV situations in which recency plays a minimal role, e.g., magazine subscriptions and financial services (cf., [10]).
     - **2)** Data requirements for model calibration are neglected.
2. Seemingly crippling the application of the recency model outlined in the *Manual Release,* many computerized customer account systems do not retain the needed historical purchase data.
3. Finally, as Blattberg (2) outlines, a major problem is combining the marketing strategy (e.g., how many mailings or phone calls to a customer) into the matrix of purchase probabilities for each recency cell. It's difficult for any decision maker to give separate, *cet. par.* consideratiomn to both facets of the LTV model. "Clearly, the greater the mailing frequency, the higher the chances of buying again" (p. 13).

OBJECTIVES

This article describes the nature of customer lifetime valuation and summarizes and extends the procedures for its estimation. First, it will be necessary to develop a taxonomy of LTV problems. Within each category of problems, brief procedural demonstrations and directions for model improvements are featured.

The article contributes to the body of knowledge in direct marketing in three ways. First it is less context-specific—more general—than previous treatments of LTV, and thus affords broader dissemination and transference. Second, as the LTV taxonomy is grounded in careful assumptions of customer behavior, the article should direct managerial attention to key facets of market structure. Finally,

the above benefits combine to illuminate marketing activities for improved long-term profitability.

TYPES OF BUYER-SELLER RELATIONSHIPS

In her provacative book on relationship marketing, Barbara Jackson (6) groups industrial buyers into two major categories: *always-a-share* and *lost-for-good* customers. The former category includes purchases of office supplies or bearings; customers may rely on several vendors and can adjust their share of business done with each. Although Jackson's label may connote the inevitability of a supplier's assured minimal level of volume, it is intended to denote the *buyer's* ability to taper purchases with existing suppliers and to give *any* vendor a *portion* of their business.

"Lost-for-good" customers have made long-term commitments to a vendor because switching vendors is costly and assets dedicated to the transaction cannot be redeployed easily, e.g., computers and telecommunications systems. If a customer decides to leave a supplier, the account is lost forever. Accentuating the positive, we can also regard this group as "won-for-good," but that designation may tend to diminish the imperative for account retention.

Indeed, this simplistic dichotomy brings key buying behaviors into focus and thereby enables appropriate marketing activities. Both models illuminate the necessity for a competitive product. But the always-a-share model is apt to emphasize the "core product," its relatively easily evaluated physical and functional utilities, and simpler bundle of performance attributes. The lost-for-good customer looks for suppliers to solve a more complex array of problems, perform a more elaborate set of roles, and exhibit the capability to continue to perform in a number of anticipated futures. Thus, at the always-a-share pole customers count on good "back end" performance but are apt to respond to price and promotions; lost-for-good customers have less need for price deals. Lost-for-good accounts principally and critically depend on empathetic and competent sales support, innovative technical capability, responsive service systems, and distribution and logistical accuracy and efficiency.

RELATIONSHIP TYPES IN DIRECT MARKETING

Barbara Jackson developed her account typology primarily for the sales intensive business marketer. Indeed, telecommunications, office automation, and "Just-in-Time (JIT)" inventory systems dominate her examples. With a little extrapolation, however, we can apply the taxonomy to business arenas with more intensive direct marketing efforts. To illustrate, catalog buying seems to reflect always-a-share buying: customers can easily adjust their purchase volume, evaluate merchandise, make trial purchases from new merchants, and exhibit heavy buying even after a number of periods of inactivity.

Insurance, other financial services, magazine subscriptions, automatic replenishment, and other continuity programs exhibit lost-for-good properties (1). Customer participation in these exchange systems typically involves significant resource commitments (physical exam, account membership fee) or "contractual" pledges of continuity (agree to buy X quantity at the regular price over the next Y months). For the seller, this continuity provides a measure of certainty regarding sales volume—and a number of opportunities to up-sell and cross-sell relatively durable accounts. Customers who withdraw from the relatively explicit structure of these exchange relationships, however, return to the "vast sea of prospects;" their proclivity to do additional business with the supplier is typically no different than the general population of prospects.

IMPLICATIONS OF CUSTOMER TYPES FOR LIFETIME VALUATION

The general principles of LTV analysis—estimating the discounted benefits (gross profit) less burdens (e.g., account servicing, communication, claims) of customers—apply equally to both types of buying. Nevertheless, it is impossible to apply meaningfully the LTV techniques described in the trade press without first discerning the type of transaction relationship at issue and reflecting on the merits of alternative marketing objectives.

To illustrate, the "recency model" outlined by Courtheoux (3,4) reflects customers' *gradual* withdrawal from exchange relationships. We now recognize that even short periods of purchase inactivity

by the lost-for-good buyer signal an end to the relationship.[1] The following paragraphs outline two fundamental LTV approaches corresponding to the two poles of direct marketing relationships: lost-for-good and always-a-share phenomena.

The Customer Retention Model

A lost-for-good situation is best modeled as a customer retention—or its flip side, attrition—problem. Lifetime value derives from revenue from customers who persist in the relationship, less fulfillment costs (including GOGS) and direct costs associated with *maintaining* the account. Estimates of the benefit stream can be made from a historical analysis of cohorts of previously "acquired" accounts, perhaps modified by adjustments in pricing policy or fulfillment costs. The analysis of previously acquired accounts should reflect detailed effects of up-selling and cross-selling activities.

Meanwhile, estimating account maintenance costs requires great care and experienced judgment. Of course, a firm can easily access past marketing expenditures and roughly gauge the percent of effort dedicated to account "husbanding," i.e.; newsletters, customer service, and missionary "calls." But it is difficult to anticipate and track the effects of these efforts on both the annual level of business and the customer retention rate. Furthermore, with retention derived from a supplier's "all hands" effort—ordering systems, buying expertise, production quality, packing, as well as marketing—direct costing account maintenance is inherently ambitious and ought not to bog down in an elaborate fiction of presumed precision. Despite great progress in cost accounting and database technology, some facets of commitment to the customer are maintained by myths and corporate culture more than ledgers (11).

Exhibit 1 outlines a very simple retention model of LTV for a consumer magazine. Although it has relied on a variety of new subscriber programs, its most successful efforts have used a "save 25%" promotion plus a premium (alarm clock, tote bag). Customer retention rates have been estimated from cohorts of past customers acquired with similar promotions. With advertising revenue typically matching circulation revenue, suscription prices represent about half the per customer revenue.

In each future period, we estimate renewals rates based on historical data. Revenue projections hinge on an articulated pricing strategy. The example increments base suscription price by $1 per year. Of course, it is not costless to maintain accounts nor to obtain renewals. The example shows a simple element of account husbanding in the form of a holiday greeting card. Three waves of renewal mailings are budgeted in each period.

We use a relatively high discount rate because the retention rates are estimated from customer behavior in the past—responding to former editorial emphasis, bygone economic environments, and yesterday's competitive options. It seems judicious not to bank too heavily on future net benefits unless the relationship is more tightly cemented and exhibits considerably low variance in retention and returns across cohorts. This same reasoning applies when selecting an LTV horizon. Analytically, it is possible to project the nth year's renewal rate based on the behavior of customer cohorts acquired n years ago. Practically, however, because the retained account base typically is shrinking and net benefits are so heavily discounted, the preponderance of LTV accrues in the first four or five years.

Finally, the timing of benefits and burdens is summarized for clarity and completeness. (See Section A.4. of Exhibit 1.) Practically, timing specifications imply a level of precision in LTV analysis that outstrips the quality of our cost data and revenue projections. Plus or minus a half-year should not materially affect the LTV estimate, and the business decisions in which LTV is a consideration.

Although not explicitly framed as a customer retention model, Jackson (7,8) outlines LTV analysis at an insurance company. With more significant customer switching costs and accurate mortality and other risk tables supporting retention/claims estimates, a 10-year LTV horizon may be reasonable. But even in this context, where 88 percent retention holds in years 6–10, the contribution from these years to LTV (excluding acquisition costs) is less than 20 percent.

Jackson also gives fuller regard to other account management issues unique to insurance and illus-

1. We recognize that book club members, say, can exhibit different tendencies to exercise the "negative option"; and that recent buyers may be better prospects than nonbuyers. When the account stops replenishing shipments, cancels insurance, tells the book publisher to send no more monthly selections, and lets subscriptions expire, ***an account is lost-for-good.***

Exhibit 1

LTV Analysis: A Customer Retention Model

A. Background

1 Cohort retention rates

	Subs and renewals by acquisition year (renewal % prior subs)						Retention rate est.
	1983	1984	1985	1986	1987	1988	
Initial subs	50K	56K	54K	60K	61K	63K	
1st renewal	35K (70)	39K (71)	38K (70)	43K (71)	42K (69)	44K (70)	70%
2nd renewal	28K (80)	30K (77)	30K (79)	35K (81)	34K (81)	?	80%
3rd renewal	22K (79)	24K (80)	25K (83)	27K (77)	?	?	80%
4th renewal	18K (82)	19K (79)	20K (80)	?	?	?	80%

2. Contribution estimates

Initial subs: 75 ($20) sub price + ad revenue @ $20, less ($28 direct costs + $5 premium). 1st renewal: $21 sub price + ad revenue at sub price, less 70% direct cost. Other renewals previous sub price + $1 (5%) + ad revenue at sub price, less 70%.

3. "Account maintenance"

Renewal mailings @ $275/M:
- Wave 1 nets 55% of eventual renewals
- Wave 2 (to nonrespondents) nets 35% of eventual renewals
- Wave 3 (to nonrespondents) nets 10% of eventual renewals

Good will seasonal "Greeting" to all subs at $350/M

4. Discount and timing of benefits and burdens

Discount rate: 20%
Subscription revenues and premiums at start of year
Ad revenues, direct costs and goodwill at midyear (ave.)
Renewal mailings at end of year

B. LTV/M Calculation

YR1 1000 new subs @ $15 − $5 premium	$10,000
+ ad revenue @ $20/1.2**.5	18,257
less: direct costs @ $28/1.2**.5	25,560
renewal efforts: ($275/M*(1 + (1 − (.7*.55)) + (1 − (.7*.90)))/1.2	447
Good will greeting @ $350/M/1.2**.5	320
	1,930
YR2: 700 renewals @ $21/1.2	$12,250
+ ad revenue @ $21/1.2**1.5	11,183
less: direct costs @ .7*$42/1.2**1.5	15,656
renewal efforts: ($275/M * (.7 + (.7 − (.7*.8*.55)) + (.7 − (.7*.8* 90)))/1.2**2	246
Good will greeting @ $350/M*.7/1.2**1.5	186
	7,345
YR3: 560 renewals @ $22/1.2**2	$ 8,556
+ ad revenue @ $22/1.2**2.5	7,810
less: direct costs @ .7*$44/1.2**2.5	10,938
renewal efforts: . .	202
Good will greeting @ $350/M*.56/1.2**2.5	124
	5,102
448 renewals @ $23/1.2**3	$ 5,963
+ ad revenue @ $23/1.2**3.5	5,443
less: direct costs @ .7*$46/1.2**3.5	7,620
renewal efforts: . . .	120
Good will greeting @ $350/M*.448/1.2**3.5	83
	3,583
358 renewals @ $24/1.2**4	4,144
+ ad revenue @ $24/1.2**4.5	$ 3,782
less: direct costs at .7*$48/1.2**4.5	5,075
renewals efforts: . .	72
Good will greeting @ $350/M*358/1.2**4.5	55
	2,724
Total NPV/M	$20,684

trates how policy upgrades and cross-selling can increase LTV. Once the spreadsheet notations for specific insurance phenonena are understood to correspond to the basic structure of retention analysis from Exhibit 1, Jackson's model may stimulate LTV "technology transfer." That is, it illustrates how a variety of cross- and up-sell enhancements and contextual nuances can be incorporated into the model from Exhibit 1.

The Customer Migration Model

Exhibit 2 depicts a simplified LTV analysis characteristic of the always-a-share scenario. The model pivots on deep empirical evidence of purchase recency to predict repeat purchase behavior. In each season, customers have opportunities to purchase—or not to purchase. From past data the purchase propensities of each recency cell have been estimated. Section A.1. of Exhibit 2 summarizes the probability of purchase—P(purchase)—and the expected (average) level of purchases—E(purchase $)—from members of each recency cell. At the expiration of each period, purchasers "move up" to recency cell No. 1, while nonpurchasers "age" into the next older recency cell. As the behaviors of 1000 acquired customers are projected into the future, the customer base can be differentiated on an increasing number of recency segments. For example, in period 1, 300 of 1000 accounts (30%) from recency cell 1 buy—and stay in recency cell 1; 700 of the 1000 (1–30%) do not buy, and therefore "age" into recency cell 2. Those in cell 2 in period 2 still have a .2 probability of purchasing in period 3, thereby returning to recency cell 1. Thus, in contrast to the customer retention/attrition pattern of Exhibit 1, Exhibit 2 projects a map of customer migrations.

Although account maintenance (circulation management) is a given in Section A.2. of Exhibit 2, it is fitting for firms to test the responsiveness of each recency segment to several levels of communication intensity. The evaluation process is somewhat more complicated than gauging short run profitability on a segment-program. For example, the four catalogs sent to recency cell No. 4 cost $1,300/M, while netting only $800/M margin (1,000 * .05 * $40 * .4 mgn). Because these 50 buyers from cell No. 4 provide $762 in LTV, the current circulation policy is profitable. Whether there are more profitable circulation strategies is a matter for testing.

LTV AND DECISION MAKING

Courtheaux (4) has illustrated the utility of LTV estimates for a number of managerial problems. Like Jackson (7,8) he gives top billing to the challenge of budgeting and marketing programming for customer acquisition. LTV provides a ceiling on spending to acquire new accounts and enables an assessment of customer sources (media classes (mail vs. TV) and particular vehicles (list A vs. list B)) and specific offers and programs. Obviously, a marketer may foreclose productive acquisition programs if each program must pay for itself in the short run. If customers are truly a valuable asset for the firm, a capital budgeting—not a short-run break-even—analysis should guide acquisition strategies and programs.

One word of caution, however: sharp departures from the programs upon which the LTV model is calibrated may jeopardize the accuracy of projections. For example, customer retention should be less for a half-price introductory offer than for a "25% off" offer. Similarly, deteriorating product quality or service shading may impair repeat purchase tendencies. And again, tracking backend performance is not a simple task; experiments with LTV criteria are much more expensive, complex and longer-running than tests with discrete and immediate criteria (e.g., response rate, cost per order).

A second, related use of LTV, particularly in always-a-share environments, is for account reactivation. Rekindling long-dormant accounts may be regarded as an acquisition problem, perhaps pivoting on appeals which recall a once mutually satisfying exchange relationship.

I have already mentioned LTV considerations in what Courtheaux (4) calls circulation policy, that is, which accounts get mailed and how many times. Importantly, "circulation" is a narrow construal of the more significant challenge of *account management.* Experiments to calibrate the effects on retention and "upward" migration rates from various "husbanding" resources will be more illuminating when LTV implications are accounted.

Finally, Courtheaux argues that LTV can play a key role in list valuation in business acquisition decisions. Likewise, LTV estimates seem germane in litigation—e.g., specifying damages from a disruption of business.

Exhibit 2

LTV Analysis: A Customer Migration Model

A. Background

1 Migration and purchase patterns

The following depicts a direct marketer's evaluation of net benefit stream from 1000 customers. After analyzing past purchase patterns under "normal" account management marketing activities, we have the following purchase tendencies by recency cell:

Recency cell	Description	For the period t + 1	
		P (purchase)	E (purchase $)
1.	If a customer purchased in year t,	.30	$100
2.	If a customer last purchased in t − 1,	.20	80
3.	If a customer last purchased in t − 2,	.15	60
4.	If a customer last purchased in t − 3,	.05	40

2. Contribution and account maintenance

Gross margins average 40%, shipping and handling are self-liquidating, and the discount rate is 20 percent. For simplicity consider the following catalog distribution program as the extent of account management activities. Benefits and burdens are evenly distributed throughout the year.

Recency cell	Seasonal catalogs ($400/M)	Promotional catalogs ($250/M)	Total CPM/cell
1	4	8	$3,600
2	4	6	3,100
3	2	6	1,800
4	2	2	1,300

B. LTV Estimation

We have the following transitions in the customer file, starting with a base of 1000 customers:

Recency cell	P (pur)	E ($)	Distribution of accounts in t periods following acquisition				
			t = 0	t = 1	t = 2	t = 3	t = 4
1	.3	$100	1000	300	90	69	58.5
					+ 140	+ 42	+ 32.2
					230	84	25.2
						195	23.8
							139.7
2	.2	80		700	210	161	136.5
3	15	60			560	168	102.5
4	.05	40				476	128.8
5	?	?					452

NPV1: (300*$100*.4 mgn − $3,600)/1.2**.5 $7,668

NPV2: (.4(90*$100 + 140*$80) − (.3*$3,600 + .7*$3,100))/1.2)**1.5 4,090

NPV3: (.4(69*$100 + 42*$80 + 84*$60) − (.23*$3,600 + .21*$3,100 + .56*$1,800))/1.2**2.5 2,303

NPV4: (.4(58.5*$100 + 32.2*$80 + 25.2*$60 + 139.7*$40) − (.195*$3,600 + .161*$3,100 + 168*$1,800 + 476*$1,300))/1.2**3.5 1,180

Total NPV/M $15,241

DISCUSSION

The number and significance of marketing decisions well supported by LTV analysis belies minimal evidence of its use in the field. Attributing this state of affairs, in part, to some confusion about the procedure for lifetime valuation, this article distinguished two types of relationships and the LTV

model—retention or migration—implicated by each. By relating specific features of other models in the professional literature to the basic structures illustrated, I hope to seed LTV analysis in new contexts.

With the basic structure of the analysis outlined, even the many firms with database or software capabilities unable to provide inputs to Courtheaux's or Jackson's models can bootstrap LTV analysis. For example, a direct merchant of branded sports equipment relied on a system that maintained a very lean record on each account. We had only:

a. Date of account opening
b. Date of most recent purchase
c. Total number of orders
d. Total dollars spent

In this context we used a heuristic to estimate LTV. By selecting three cohorts acquired more than three years ago (yet shortly after the firm's computerization of order taking), we mapped distribution of "most recent purchases" quarter-by-quarter up to the present. We assumed a rectangular distribution of total number of orders between first and most recent purchase, used an average order size from the entire sample, and discounted the contribution flows in each cohort. LTV estimates from each cohort differed by no more than 10 percent from the other two estimates, and the results were subsequently used with confidence in new acquisition programs.

In a nonbusiness context we have applied principles of the migration model in blood donor recruitment. Active, committed donors represent a reliable and high-quality source of blood for the community. Former donors can be rekindled with behavioral influence tactics and new donors need to be acquired on the basis of internalized values and psychophysical reinforcement (not peer pressure). The initial success of segmented "account management" programs has prompted investment in enhanced database capabilities at the blood center.

Finally, I have tried to address the LTV impediment identified by Blattberg (2), namely the inherent complexity of simultaneous consideration of marketing effort and customer response probabilities. It takes more patience and scrutiny to calibrate the response functions on longer-run criteria. In the midst of this complexity, direct marketers can lose sight of whether best customers get more mailings because they provide enough margin to afford it, or because marginal revenue from each mailing more than covers marginal costs. Perhaps a kind of schizophrenic tension arises from 1) the required tolerance for ambiguity and the mind-bending complexity of the simultaneity problem in LTV, and 2) the professional ego attachment to accountability, response rate measureability, targeting efficiency, and the like. Intellectual growth and sustained professional development of the field will not result from the suppression of either force, but from their healthy balance of power. ■

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