Marketing Analytics & Marketing Assets: Brand Equity, Customer Equity, & Dynamic Pricing

Introduction

The growing availability of data on market demand and customer behavior is creating an environment for sports organizations that involves a new set of opportunities and challenges. In particular, increased data availability provides opportunities to quantify the link between marketing actions and team revenues and profits. A longstanding challenge to sports marketers has been to understand how brand equity is created. Research suggests sports brand equity is created through a history of success and by the creation of a fan community (Holt 1995). However, while this logic is clear, what is not obvious is how teams can measure brand equity or how teams can quantify the relationship between brand equity and other elements such as on-field achievements or even mascots. *One objective for sports marketers is to use data to measure and manage the value of their brand assets* (maximize brand equity).

However, brand equity is only one type of "marketing asset." Detailed data on customers and customized communications technologies now enable teams to conduct individual level marketing. As teams become able to understand the relationships between marketing actions, team results and customer behavior, they will be increasingly able to pursue policies that maximize customer asset metrics such as Customer Lifetime Value (CLV) and customer equity. Other information technology developments are creating opportunities for teams to maximize the value of seat inventory. In particular, event level demand data can be used in dynamic pricing systems that improve event level revenues. In brief, sports marketers increasingly possess both the data and the tools to implement marketing policies that maximize the value of the marketing assets: brands, customers and events. A second objective for sports marketers is *how to balance these multiple marketing assets*.

In this paper, we address two issues related to managing marketing assets in sports contexts: calculating brand equity and integrating the multiple goals of marketing assets. First, we provide a method for calculating measures of teams' brand and social equity. These measures rely on information on published attendance levels and observable social media data to benchmark the strength of teams' brands. One valuable use of our brand equity measure is that it provides a means for quantifying the long-term value of team achievements such as playoff appearances and championships. This is accomplished by developing statistical models of the relationship between historical measures of team success and current estimates of brand equity. We illustrate our approach to measuring brand and social media equity in college football and the NBA. We also use the brand equity estimates to calculate the value of playing in BCS bowls. The second goal of our paper is to provide a framework for integrating the multiple objectives of the marketing assets: brand equity, customer equity and event level revenue management. Special attention is paid to potential conflicts between each objective.

Modeling Brand Equity

Brand equity is an intangible asset that provides value indirectly by increasing customer loyalty, lowering price sensitivity and otherwise positively impacting consumers. Because brand equity is just one factor that influences customer behavior, brand equity measurement is a challenging endeavor. The most advantageous brand equity measurement methods are based on market outcomes. For instance there is currently a great deal of interest in using price and revenue premium measures to assess brand equity. The basic insight is that high equity allows a brand to outperform low equity brands of similar quality. In the case of brand equity measurement, a common issue with methods related to price and revenue premiums (Ailawadi et al. 2003) is the difficultly in identifying brands of similar quality but different brand equity. An advantage of considering brand equity in the context of sports is that an objective and easily observable measure of quality exists: winning rates.

The starting assumption of our model is that team revenue may be predicted based on team performance, market characteristics and other team factors. Equation (1) provides a general version of a revenue forecasting model that may be estimated using linear regression. In this equation the dependent variable is Revenue of team *i* during season *t*.

(1) $$Revenue_{i,t} = \beta_1 + \beta_2 Performance_{i,t} + \beta_3 TeamFactors_{i,t} + \beta_4 Mkt\ Potential_{i,t} + \varepsilon_{i,t}$$

In this equation *Performance* can be factors such as winning percentage, post-season appearances (playoffs, March Madness, bowl games), and championships. *Team Factors* could include variables such as payroll, stadium characteristics, All-Stars, or other aspects that impact the entertainment value provided by the team. Finally, *Market Potential* may include the population of the Metropolitan Statistical Area (MSA), the median income of the market, and the average education level of the market. β is a vector of coefficients. We use the revenue forecast from equation (1) to estimate brand equity. Specifically, we subtract the forecasted revenue from the actual revenue, as in equation (2).

(2) $$Brand\ Equity_{i,t} = Rev_{i,t} - \widehat{Rev_{i,t,}}$$

This difference between actual and forecasted revenues represents a premium (or deficit) relative to expected performance. The logic is that the "excess" revenue performance is driven by the level of loyalty of the fan base.

The revenue premium based approach to brand equity includes an implicit assumption that teams are revenue maximizers. In other words, the revenue premium approach assumes that teams set prices in a manner that maximizes the revenues produced by their finite seat capacity. A problem experience by firms with finite capacities is that true demand is often censored. One potential solution to the problem of capacity constraints is to identify consumer interest metrics that are not constrained. The world of social media can provide this type of metric. Earned media, such as Facebook and Twitter followers, can be thought of as a "currency" that sports organizations attempt to amass. As before, we can use social media data to determine whether a team is

over or underperforming based on team performance and market potential. In equation (3) below we model Social Following as a function of the variables we used in the revenue premium model. We then compute social media equity by comparing a team's actual social following to the predicted following based on team quality and market characteristics.

(3) $$Social\ Following_{i,t} = \beta_1 + \beta_2 Performance_{i,t} + \beta_3 Team\ Factors_{i,t} + \beta_4 Mkt\ Potential_{i,t} + \varepsilon_{i,t}$$

(4) $$Social\ Brand\ Equity_{i,t} = Social\ Following_{i,t} - \widehat{Social\ Following}_{i,t,}$$

This model of social brand equity follows the same intuition as our previous model of brand equity. *Social Following* can be measured by the number of Twitter or Facebook fans of an organization. The other factors are similar to Equation (1), with the addition of the social media activity (e.g. tweets and Facebook posts by the team) as part of *Team Characteristics*. Social brand equity represents a *financially unconstrained measure* of a team's brand.

Empirical Applications

We illustrate our brand equity models using data from college football and the NBA. For college football we derive a revenue premium based ranking of FBS teams and for the NBA we report revenue premium and social media based rankings. We also discuss how the results can be used to understand how past achievements create brand equity using the college football results.

Brand Equity. In order to adapt the general "revenue premium" model of brand equity to the specific context of college football we first need to define the appropriate performance measures.[1] We assume that team performance or quality is captured by team winning percentage and level of post-season bowl (Minor, Major, or National Championship Game). We also include a dummy variable that indicates if a school is a member of an AQ (Automatic Qualifying) conference.

(5) $$Rev_{i,t} = \gamma_{CL} + \gamma_{CL,AQ} AQ_{i,t} + \gamma_{CL,WIN} WIN\%_{i,t} + \gamma_{CL,MIN} Minor_{i,t} + \gamma_{CL,MAJ} Major_{i,t} + \ldots + \gamma_{CL,NC} NCG_{i,t} + e_{i,t}$$

The estimation results are reported in Table 1. The estimated coefficients are then used to predict revenue based only on team success in the current year and conference affiliation. We next compare each school's self-reported revenue with the model's predictions to determine which schools over and under achieve in terms of revenue. A listing of the best and worst performing schools according to our measure of brand equity is provided in Table 2. The top schools are Texas, Notre Dame, Georgia, Ohio State and Penn State. The worst performing schools include Wake Forest, Maryland and Cincinnati.

We also examined the drivers of brand equity by regressing the brand equity estimates against measures of historical success and market characteristics. The number of previous major bowls and past championships yield positive significant effects, while the estimate for minor bowls is insignificant (see Table 3). Thus, BCS bowl games are important for building the brand equity of a team while minor bowls provide little or no lasting equity. In terms of the market characteristics, we find that having a larger

[1] We are using a simplified version of the full revenue premium model due to space limits. The study uses data from 2002-2011.

student body is associated with greater brand equity, while a larger market population has a negative effect on brand equity. The framework may be extended to consider how additional factors also influence brand equity. For example, we have also investigated the impact on brand equity of non-team level achievements such as producing a Heisman trophy winner or even non-performance related brand elements such as using a Native American or live animal mascot (Cacciola 2013; Keating 2013; Lewis & Tripathi 2013).

Social Media Equity. We also developed brand and social media equity models for the NBA.[2] For the 2013 regular season, we found that the New York Knicks had the top ranked revenue premium equity. The Knicks were followed by Chicago, Boston, Portland and Dallas. However, as noted previously, the revenue premium based metric assumes that teams price optimally. In order to evaluate brand strength in the absence of capacity constraints and pricing policies we also measured the social media equity in the NBA.[3] The LA Lakers ranked first in social media equity and the Miami Heat were second. It is interesting to note that both of these teams have individual players with high "star" appeal. The case of the Charlotte Bobcats illustrates the value of our model based approach. The Bobcats were ranked fourth in social media equity. In absolute terms, Charlotte ranks fairly low in terms of number of followers. However, when we adjust for team performance and market size, the team ranks well. This indicates that the Charlotte market has resilient fans, and likely speaks to the potential of the market if a consistent winning team is developed. Partial NBA fan and social brand equity rankings are presented in Table 4.[4]

Marketing Assets Framework

The preceding discussion illustrates how brand equity may be measured and created. However, brand equity is only one of several "assets" managed by marketing organizations. For instance, sports organizations are currently investing significant resources into areas such as dynamic pricing. Dynamic pricing has its roots in the yield management systems popular in the airline and hotel industries. The sports industry shares an important trait with the travel industry as capacity is a perishable asset. Just like an airline flight taking off with an empty seat, when a seat is unsold for a game, the organization loses that unit of inventory forever. Dynamic pricing systems typically are designed to maximize the revenue produced by seat inventory.

While managing the value of a team's brand and seat inventory are important considerations for sports organizations, the ultimate goal for any marketing function should be to maximize customer equity (the value of its customer relationships) since current and future customers are, by definition, the source of all revenues and profits. Maximizing the value of current and future CLV through appropriate marketing is therefore the key to optimizing long-term profits. The basic structural model of CLV (without discounting) is given as, $CLV = \sum_{t=0}^{T} \propto^{t} (R_t - C_t)$ where t indexes the time period, R_t is the revenue from the customer in period t;

[2] For the NBA analysis, box office revenue is modeled as a function of team performance, payroll, stadium capacity, All-Stars, and MSA level demographics.
[3] Social media based measures have an advantage in that observed demand is not constrained by fixed arena capacities or teams' pricing decisions.
[4] We should also note that the social media equity studies rely on much less data than the fan equity studies. As additional data is produced, the social media equity results are likely to become more robust.

C_t is the total cost in period t, T is the number of time periods and α is a retention rate.

A first step in relating marketing actions to CLV is to acknowledge that key elements of the CLV equations are dependent on marketing tactics. In equation (6) below, the CLV equation is rewritten to make explicit that retention rates, revenues and costs may all be functions of marketing activity, M and customer characteristics X. Writing the equation for CLV as a function of marketing actions alters how CLV is viewed. Rather than as a static quantity that may be used to segment customers, CLV is now an objective to be maximized by selecting marketing actions. The marketing actions could include variables such as prices, winning percentage and brand equity. It is also possible that the marketing activity includes information about the marketing offers provided to other customers. For example, if dynamic pricing results in a customer paying above average prices, this might adversely affect retention. In addition to including marketing actions in the CLV calculation, it is useful to include observable customer data such as transaction history or demographic data. Specifically, marketing tactics may have differential effects across transaction history or demographics defined segments. For instance, there is some belief that long-term customers may be less price sensitive than newer customers.

(6) $$CLV = \sum_{t=0}^{T} \left(\alpha(M_t, X_t)^t \right) \times \left(R_t(M_t, X_t) - C_t(M_t, X_t) \right)$$

The marketing problem for a team wishing to maximize customer equity is how to map the right marketing actions to customer states. For example (dynamic) pricing may increase per period revenues but simultaneously decrease retention. The proper pricing strategy therefore involves balancing short-term revenue with long-term retention.[5]

The building blocks for customer equity marketing are models of customer retention, acquisition and revenues. For instance, a model of customer retention should include factors related to brand equity such as team performance and factors related to inventory management such as pricing and seat quality. In addition, there may be more subtle factors that should be included in the CRM models. For example, it may be necessary to include both current performance and also performance relative to some historical reference level. In the case of dynamic pricing, customer loyalty may be impacted by both the prices they have paid but also by how their past prices compare to prices paid by others. These latter two points highlight that brand equity management and dynamic pricing efforts may also impact customer relationship management. However, with suitable databases it is straight-forward to include these types of variables in a logistic regression model that predicts season ticket holder retention.

If customers are the eventual source of profits then why should marketing solely focus on CRM? Customer relationships and potential customer relationships may be difficult to directly manage for multiple reasons. Customers may be reluctant to engage in relationships with firms and customer relationships may also play out over decades. In contrast, an organization can quickly assess how investments in payroll impacts winning rates or how a dynamic pricing program increases event level revenues.

[5] For example, Lewis (2005) uses a logistic regression model of retention and a dynamic programming model to compute optimal dynamic pricing policies.

Marketing organizations may find it easier to manage according to more readily observable metrics, but should do so while considering the ultimate objective of maximizing customer equity.

Figure 1 provides a schematic of the various marketing objectives we have discussed. At the top of the pyramid we have the overarching objective of maximizing the value of a team's customer assets. At the bottom of the pyramid we have the two supporting objectives of managing the value of brand and inventory assets. Under each asset we list the needed analyses to accomplish each objective. In the case of Customer Equity, teams need to understand the drivers of customer retention, customer acquisition and individual level revenues. These model results can then be combined to understand how marketing and team quality influence customer lifetime value. In the case of Inventory Equity, teams need models that forecast segment and event-level demand. In addition, a dynamic optimization tools are needed to maximize revenues. As noted, Brand Equity management can be supported by revenue premium models that link marketing elements and team performance to revenues. A key point is that management of each "marketing asset" requires detailed data and sophisticated statistical modeling.

Sports organizations have multiple objective and assorted tools to achieve each goal. Table 4 provides a brief listing of the relationships between management of customer, brand and inventory equity. For example, increases in brand equity can have a positive impact on customer relationships if higher equity translates to increase loyalty or diminished price sensitivity. However, there can also be negative consequences if past on-field successes raise customer expectations. The relationship between inventory optimization and customer equity is perhaps the most concerning. *If dynamic pricing results in feelings of unfairness, then event level optimization may come at the cost of reduced customer loyalty*[6].

Conclusion

In this paper, we addressed several issues related to how "data" is creating new opportunities and challenges for sports organizations. We have discussed a method for measuring team brand equity and shown how this method can be used to value different brand elements. We have also considered the interrelationships between efforts to manage brands, inventory and customers. In total, sports marketers face an increasingly complex environment that requires sophisticated analytics and extensive databases. But, in addition to the challenges of incorporating business analytics, the relationships between customer equity, brand equity and inventory management may require that teams adopt more holistic approaches to managing their organizations. Since brand equity is developed through on-field success then should payroll be viewed as a marketing decision? If dynamic pricing is viewed as price discrimination then should teams intentionally create non-optimal pricing policies in order to prevent damage to customer relationships? These types of questions are likely to be at the heart of future sports marketing analytics research.

[6] The principle of dual entitlement suggests that while firms deserve to make a profit, consumers should also receive a fair price. If consumers feel that dynamic pricing is maximizing team profits by extracting all "consumer surplus" then teams may well damage their customer relationships. For example, reactions on Facebook to dynamic pricing by Michigan: "Dynamic pricing = worst idea ever" (Laurel Gaffney) & "RIP OFF! Embarrassed to be a Michigan fan today" (Tim Moonitz)

References

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Tables

Table 1 Revenue Premium Equation

Model	**Performance**
Variable	Coefficient (std. err.)
Intercept	-.040 (.052)
AQ Membership	1.05*** (.038)
Win Percent	.69*** (.12)
Minor Bowl	.10** (.05)
Major Bowl	.33*** (.08)
NC Game	.74*** (.15)
R-Square	.54
Obs	1141

****** p<.001, ** p<.05, * p<.1***

Table 2: Highest and Lowest Brand Equity

Top 10	**School**
1	The University of Texas
2	University of Notre Dame
3	University of Georgia
4	Ohio State University
5	Pennsylvania State University
6	University of Michigan
7	University of Alabama
8	Auburn University
9	University of Florida
10	University of Tennessee

Bottom 5	
5	Baylor University
4	University of Kansas
3	University of Cincinnati
2	University of Maryland
1	Wake Forest University

Table 3: Drivers of Brand equity

Variable	Coefficient (std. err.)
Intercept	-.36*** (.038)
Previous Minors	-.0022 (.0025)
Previous Majors	.030*** (.003)
Previous NC	.032*** (.009)
Population	-.0000083*** (.0000010)
Students	.013*** (.0017)
R-Square	.32

****** p <.001, ** p<.05, *p<.1***

Table 4: NBA 2013 Fan and Social Equity Rankings (Top 10)

RANK	BRAND EQUITY	SOCIAL BRAND EQUITY
1	New York	LA Lakers
2	Chicago	Miami
3	Boston	Boston
4	Portland	Charlotte
5	Dallas	Golden State
6	Phoenix	New Orleans
7	Orlando	Sacramento
8	Miami	Milwaukee
9	San Antonio	Portand
10	Denver	Cleveland

Table 4: Interrelationships between Marketing Assets

	Customer Equity	
	Synergies & Opportunities	**Conflicts & Questions**
Brand Equity	• Increases Loyalty • Reduces Price Sensitivity (support dynamic pricing efforts) • Facilitates Customer Acquisition	• Increased Operations Cost • ROI on Brand Investments (championship payroll versus value of brand equity created) • Can Raise Expectations – "The Dark Side of Delight
Inventory Equity	• Increased Game Level Revenues • May be used to "Frame" Season Ticket Prices as Discounts • Deep discounts can Facilitate Acquisition	• Viewed as Price Discrimination / Customer Exploitation • Reduce Brand Equity

Figure 1: Sports Marketing Asset Pyramid