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The Impact of Rivalry Antecedents on Mediated Demand for an Individual Sport

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Abstract

In contrast to research examining the social-psychological aspects of how sport fans perceive rivalry games in team sports, far less is known regarding the impact rivalries have on mediated consumer demand, a marketing outcome of interest to sport researchers and practitioners. Guided by economic demand theory, the current study developed a model to empirically examine the impact of Tyler and Cobbs' (2015) rivalry antecedents (conflict, peer, bias) on fan interest for an individual sport. The three-dimensional framework provided the foundation for the selection of thirteen rivalry-related variables, in addition to control determinants established from prior literature. Results from the estimation indicate rivalry conflict is the primary driver of demand for Ultimate Fighting Championship pay-per-view buys, while peer and bias are less influential dimensions. Short-term performance similarities (recent winning percentage) and long-term performance dissimilarities (historical winning percentage) among the main and co-main event fighters are significant to generating increased buyrates. Organizational marketing activities (i.e., event poster - defining moment) were the strongest overall predictor of pay-per-view buys. Conceptual discussion and practical implications are provided, including recommendations for future research.

Keywords: rivalry, consumer demand, pay-per-view, Ultimate Fighting Championship, combat sports

Introduction

Rivalries are ubiquitous in sport (Berendt & Uhrich, 2016), consisting of contests featuring opposing teams or athletes that share contentious relationships (Benkwitz & Molnar, 2012) and experience heightened stakes when they compete (Havard, Gray, Gould, Sharp, & Schaffer, 2013). Havard et al. (2013) defines rivalry as "a fluctuating adversarial relationship existing between two teams, players, or groups of fans…" (p. 51). To date, the extant work on rivalry in sport management has primarily centered on team sports (cf. Baimbridge, Cameron, & Dawson, 1996; Havard, 2014; Havard & Eddy, 2013; Havard, Reams, & Gray, 2013), with minimal empirical attention provided to the unique aspects of individual sports (e.g., tennis, golf, boxing, mixed martial arts, swimming, etc.), leagues (Tainsky, Salaga, & Santos, 2012), and characteristics of athletes that may influence consumer behavior (McCutcheon, Lange, & Houran, 2002). Although the research on the social-psychological components of rivalries in team sports is becoming relatively robust (cf. Havard & Reams, 2016; Tyler & Cobbs, 2015), current knowledge lacks data that shows what aspects of these contests most influence televised market demand for individual sports. This gap in the literature is noteworthy, as how rivalries are marketed, perceived, and manifest in individual versus team sports can be different.

For example, in team sports many rivalries have historical foundations where teams compete on an annual basis, and in some cases (e.g., baseball, basketball, football, hockey, etc.) multiple times per season (Kilduff, Elfenbein, & Shaw, 2010). This dynamic comes in contrast to individual competitor

sports, where rivalries can develop rapidly through actual competition (e.g., Michael Phelps vs. Chad Le Clos; Conor McGregor vs. Nate Diaz, etc.), marketing (e.g, the rivalry between Roger Federer and Rafael Nadal is considered to be largely media contrived [Billings, 2009]), and occur with significantly less frequency than the regularly scheduled contests prevalent in team sports. In 2015, Manny Pacquiao fought arguably his greatest rival ever in Floyd Mayweather (Daniels, 2015), on a single occasion. To the contrary, the New York Yankees will play the Boston Red Sox multiple times each season in Major League Baseball (MLB), without fail. Given the structural dissimilarities regarding the frequency of the scheduling of contests, and the varying wagers associated with team and individual sport leagues (e.g., game trophies at stake in team sports vs. generating pay-per-view [PPV] buys in combat sports), sport organizers are left to determine how rivalries can generate the most consumer interest across different sport settings.

Previous demand estimations have examined rivalry's impact on attendance as a dummy variable (cf. Beckman, Cai, Esrock, & Lemke, 2012; Turner, 2013), with researchers deciding a priori (yes/no) which games in a team's season are against rival opponents. While this approach serves a functional purpose in many demand estimations, it could lead to underspecifying rivalries, a practical and conceptual limitation given that rivalry is often being examined through the lens of multi-dimensional theoretical structures (Tyler & Cobbs, 2015). From a marketing perspective, the binary variable approach also limits the acquisition of precise data that sport practitioners can use to improve strategies on attendance and televised viewership.

Across many North American professional leagues broadcast revenues have begun to surpass gate receipts (Noll, 2007; Watanabe, 2015), leading some commentators to suggest mediated viewership is of greater importance than live attendance (Buraimo, 2008; Forrest, Simmons, & Buraimo, 2005). The professional mixed martial arts (MMA) organization Ultimate Fighting Championship (UFC) is one of these sport properties, where PPV buys generate considerably greater revenue than live gate attendance figures (Watanabe, 2015). Mediated content for the league constitutes approximately 76% of total league revenue, with only 12% of revenues generated from live events (Fowlkes & Marrocco, 2016). Further, unlike most team sport properties, UFC does not sell season tickets or have a single home arena where attendance can be reasonably predicted.

Given the gap in the literature pertaining to the impact of the multiple dimensions of rivalries that most contribute to televised demand for individual sport, the purpose of this research was to assess rivalry's impact as a multi-faceted phenomenon on UFC PPV demand. To achieve this, a somewhat unique approach was employed—the use of an econometric model using secondary data, examining antecedents of rivalry within a longitudinal dataset.

Literature Review

Economic Theory

Fan interest is the crux of demand for sporting events, expressed in quantities through live gate attendance and mediated viewership numbers (Buraimo & Simmons, 2015; Downward, Dawson, Dejonghe, 2009; Neale, 1964; Tainsky et al., 2012; Watanabe, 2015). Akin to attending a sport venue in person, PPV purchases are a direct source of demand (Borland & Macdonald, 2003) from which fans derive utility (Watanabe, 2015). The seminal work of Noll (1974) provided an impetus to many sport analyses that have examined attendance as a proxy for demand (cf. Baade & Tiehen, 1990; Davis, 2009; Kahane & Shmanske, 1997; Lemke, Leonard, & Tlhokwane, 2010; McDonald & Rascher, 2000; Scully, 1974); however, few studies have estimated demand for televised sporting events (Buraimo & Simmons, 2015; Tainsky et al., 2012; Tainsky & McEvoy, 2012; Watanabe, 2015). The expense and difficulties associated with acquiring television viewership ratings have previously impeded research in this area (Buraimo & Simmons, 2015), although this is less of an issue with readily accessible UFC PPV data.

Economic demand theory posits that determinants of sport attendance can be categorized into one of five groups: price, quality of viewing, consumer preferences, characteristics of the contest, and supply capacity (Borland & Macdonald, 2003). Provided the inherent differences between attending a live contest and televised viewership (e.g., sitting in a stadium with thousands of fans in contrast to watching a game at home with a few friends), Borland and Macdonald's (2003) model requires adaptation to mediated settings (Tainsky & McEvoy, 2012). The primary difference in UFC is that PPV purchases are theoretically unlimited, in contrast to venue capacity, which is fixed. As such, supply capacity does not apply in this context (Tainsky et al., 2012). Although many factors can affect demand for sport (Watanabe, 2015), the central focus of this study is on rivalry-related characteristics of UFC PPV contests.

Rivalry in Sport

In contrast to the economic theories that guide demand estimations, social identity theory has provided

the foundational framework for many social-psychological sport rivalry studies, most of which have focused on fans' perceptions of rivalry games, and supporters of rival teams, specifically within intercollegiate football and basketball (cf. Havard et al., 2013; Havard, Wann, & Ryan, 2013). Additional works like Berendt and Uhrich (2016) examined the positive and negative aspects of rivalry on the identity and self-concept of sport fans, and Levine, Prosser, Evans, and Reicher (2005) explored how fans respond to out-group supporters of rival teams when confronted with an emergency (i.e., falling down while wearing a rival team's t-shirt). Rivalry contests have been noted to precipitate deviant fan behaviors, such as fighting, defacing landmarks (Havard, 2014; Havard, Wann et al., 2013), and a willingness to engage in aggressive behaviors (Wann & Waddill, 2014). The aberrant behaviors of rival team fans has led to researchers encouraging industry professionals to responsibly market these contests (Dalakas & Levin, 2005; Havard, Wann, et al., 2013), in a manner to generate fan interest and excitement without inspiring socially undesirable behaviors. To date this practice has been somewhat non-existent, as many rivalry games are advertised generically with less effort devoted to marketing the underpinning aspects of rivalries that influence consumer behavior.

Antecedents to rivalry

Factors defining dyadic rivalries are both dynamic and complex (Benkwitz & Molnar, 2012), so little consensus has been reached with respect to operationalization of rivalry (Kilduff, 2014; Tyler & Cobbs, 2015). Kilduff et al. (2010) examined antecedents to rivalry, finding geographic, academic, and sport status similarities were all positively related to rivalries between college sport teams. The greater frequency in which teams play and parity of the contests were also predictors of the strength of team rivalries. Kilduff (2014) labeled the contributing factors to rivalries as similarities between individuals or organizations, repeated competitions, and evenly matched contests. In a recent study grounded in social identity theory (SIT) designed to capture the dimensions of rivalry across team and individual sports, Tyler and Cobbs (2015) identified conflict, a relevant peer, and bias as rivalry's primary components.

Conflict. Conflict refers to the actual competition between two teams or athletes involved in the contest, and this dynamic cascades down to the fans who are psychologically invested in these events. The degree of conflict experienced is believed to increase with more regularly scheduled contests, and the level of recent and historical parity associated with the matchups. Defining moments, or notable occurrences between the teams that have impacted the rivalry (e.g., a fight between players, fans tearing down goal posts, etc.) and notable star athletes were also identified as elements of conflict (Tyler & Cobbs, 2015).

Peer. The parties involved in a salient rivalry must perceive one another as comparable and distinct, but not so different that one entity perceives the other as irrelevant. This aspect of rivalry manifests itself in the form of similarities across the cultures or playing styles of the sport entities. In addition to culture, geographic proximity is also critical to the formation of rivalries, as the less physical space there is between two teams, the greater the perceptions of threat and the increased likelihood of regular competitions. Lastly, peer entities will display a heightened propensity to compete for the same resources. In team sport settings this occurs when organizations solicit (i.e., recruit) the services of the same athletes and other personnel (Tyler & Cobbs, 2015).

Bias. Consistent with the in-group and out-group tenets of SIT, teams or individual athletes involved in rivalries compare themselves to their adversaries (Tajfel, 1974; Wann & Grieve, 2005). One approach to accomplish this is when members exaggerate the two parties' differences. These distinctions may manifest in relation to countries of origin, socioeconomic status, personal/religious beliefs, etc. Further, if one team in the rivalry dominates the competitions, this aspect of the contests can evolve into a feeling of unfairness, particularly among fans (Tyler & Cobbs, 2015).

Rivalry outcomes

In terms of televised viewership, National Basketball Association (NBA) fans increased their willingness to watch a rival team play on television if they were more likely to lose, or if the contest had a direct impact on the fan's favorite team (Mahony & Moorman, 1999). These findings were later mirrored by Havard (2014), who asserted that a college sport fan was more likely to watch the games of a rival team to make social and competitive comparisons to the favorite team. Additionally, fan identification influences a person's attitudes (Dalakas & Melancon, 2012) and evaluations of a rival team's sponsorship messages (Bee & Dalakas, 2015). In other words, more highly identified fans perceived the rival team's sponsor more negatively (Bee & Dalakas, 2015) and less objectively (Dalakas & Melancon, 2012) than those who were of lower levels of identification.

When rivalry has been analyzed in demand estimations, the models have mostly examined professional baseball (cf. Boyd & Krehbiel, 2003; Lemke et al., 2010; McDonald & Rascher, 2000; Turner, 2013). In Turner (2013), rivalry games within the major and minor

leagues were not significant predictors of attendance at home games. This is in contrast to Lemke et al. (2010) and McDonald and Rascher (2000), where rivalry games led to increased attendance numbers. When combined with targeted promotions, rivalry games had a greater impact on attendance at MLB games in comparison to when the rival game was not accompanied with a promotion (Boyd & Krehbiel, 2003). It stands to be noted that each of these works assessed rivalry as a dummy variable (yes/no). As such, we were unable to locate any previous analyses that accounted for the impact of rivalry's multiple facets on a direct source of demand.

Televised Sport Demand

Demand for televised sport has received much less attention in the literature (Van Reeth, 2011; Watanabe, 2015) than live gate attendance. Research that has substituted television ratings as a proxy for demand has largely centered on North American football (Tainsky & Jasielec, 2014; Tainsky & McEvoy, 2012), MLB (Bruggink & Eaton, 1996), soccer (Buraimo & Simmons, 2009), and professional basketball (Mongeon & Winfree, 2012), all of which are team sports. Berkowitz, Depken, and Wilson (2011) provided one of the few analyses to examine an individual sport (stock car auto racing), finding that race uncertainty and competitions scheduled on days with other major sporting events led to decreased television ratings. With respect to combat sports, previous models examined PPV buys as a proxy for demand (cf. Reams & Shapiro, 2017; Tainsky et al., 2012; Watanabe, 2012; 2015); however, none of these analyses examined the impact of rivalry.

Findings gleaned from the UFC studies showed consumers displayed preferences for events after the debut of the league's reality television series (i.e., The Ultimate Fighter), and those that featured main event fighters who were former participants on the show. Betting odds, title defenses, and fight cards on holiday weekends were also impactful in Tainsky et al. (2012). Contrarily, Watanabe (2012) found that fights at international locations and the number of cable television events between marquee contests negatively influenced PPV buys. Watanabe (2012) and Tainsky et al. (2012) both established a penchant for weight classes, although a recent

TABLE 1. **Variable Descriptions**

Dependent Variable	**Description**
PPVBUYS[ab]	total number of PPV purchases for a given UFC event
Rivalry-related Variables	
Conflict	
MAINRANK	Difference in ranking between fighters in the main event
COMAINRANK	Difference in ranking between fighters in the co-main event
MAINRECENTWIN%	Difference in recent win % (last 3 fights) between fighters in the main event
COMAINRECENTWIN%	Difference in recent win % (last 3 fights) between fighters in the co-main event
MAINCAREERWIN%	Difference in career win % between fighters in the main event
COMAINCAREERWIN%	Difference in career win % between fighters in the co-main event
MAINYEARSINUFC	Difference between the number of years main event fighters had been competing in UFC
COMAINYEARSINUFC	Difference between the number of years co-main event fighters had been competing in UFC
MAINSALARY	Difference between main event fighters' salaries for the event
COMAINSALARY	Difference between co-main event fighters' salaries for the event
POSTER	Indicator set to 1 if only two fighters were featured on the event poster
MAINREMATCH	Indicator for whether main event competitors had fought before
COMAINREMATCH	Indicator for whether co-main event competitors had fought before
Peer	
MAINFIGHTSTYLE	Difference between main event fighters' ratios of striking to takedowns and submissions
COMAINFIGHTSTYLE	Difference between co-main event fighters' ratios of striking to takedowns and submissions
Bias	
MAINDIFFCOUNTRY	Indicator for main event fighters being from different countries
COMAINDIFFCOUNTRY	Indicator for co-main event competitors being from different countries
Control Variables	
PRICE[ab]	PPV purchase price for a given UFC event
TREND[ab]	Monthly trend variable
CHAMPS[a]	Number of current or former UFC champions on the PPV card
HOLIDAYWEEKEND[ab]	Indicator for whether event took place on a US holiday weekend
TITLEMATCH[ab]	Indicator for a title match on the PPV card
TUFAPPEARANCE[ab]	number of fighters who have appeared on TUF on a given UFC PPV card
MAINODDS[a]	Difference in betting odds between two main event fighters
COMAINODDS[a]	Difference in betting odds between two co-main event fighters
MAINTITLEDEF[a]	Number of consecutive title defenses for the title holder in the main event
COMAINTITLEDEF[a]	Number of consecutive title defenses for the title holder in the co-main event

Note. [a] Tainsky et al. (2012); [b] Watanabe (2012; 2015)

TABLE 2. **Descriptive Statistics for Continuous Variables**

Variable	Min.	Max.	Mean	SD
PPVBUYS	115,000	1,650,000	510,901.64	306005.33
MAINRANK	0	43	4.94	5.90
COMAINRANK	0	219	16.32	35.30
MAINRECENTWIN%	0.00	67.00	18.55	20.81
COMAINRECENTWIN%	0.00	67.00	23.26	19.67
MAINCAREERWIN%	0.00	26.00	9.93	7.13
COMAINCAREERWIN%	0.00	64.30	12.47	9.74
TUFAPPEARANCE	0	4	.84	1.01
MAINYEARSINUFC	0	11	3.25	2.90
COMAINYEARSINUFC	0	16	3.31	3.50
MAINSALARY	0	1,000,000	398,538.87	475424.24
COMAINSALARY	0	1,800,000	238,693.57	305050.97
MAINFIGHTSTYLE	1	82	18.29	16.17
COMAINFIGHTSTYLE	0	77	19.52	17.88
PRICE	54.99	59.99	55.93	1.96
TREND	1	111	55.65	31.30
CHAMPS	1	10	2.75	1.26
MAINODDS	210	2700	655.57	494.04
COMAINODDS	221	2500	525.45	352.73
MAINTITLEDEF	0	9	1.81	2.642
COMAINTITLEDEF	0	7	0.28	1.078

TABLE 3. **Descriptive Statistics for Categorical Variables**

Variable	Category	N	Percentage
POSTER	2 fighters	44	36.1
	>2 fighters	78	63.9
MAINREMATCH	Not first fight	28	23.0
	First fight	94	77.0
COMAINREMATCH	Not first fight	12	9.8
	First fight	110	90.2
MAINDIFFCOUNTRY	Same country	54	44.3
	Different countries	68	55.7
COMAINDIFFCOUNTRY	Same country	53	43.4
	Different countries	69	56.6
HOLIDAYWEEKEND	Holiday	15	12.3
	Non-holiday	107	87.7
TITLEMATCH	Title match	92	75.4
	No title match	30	24.6

study by Reams and Shapiro (2017) asserted that weight class could be underestimating the influence of star fighters, who represent their individual brands beyond a measure of weight.

Method

Sample

The data for this study consisted of numbered UFC PPV events from June 2007 (UFC 72) to August 2016 (UFC 202). Data were collected from fightmatrix.com, mmapayout.com, sherdog.com, tapology.com, and ufc.com due to the accuracy of their data and use in previous UFC PPV demand studies (cf. Reams & Shapiro, 2017; Tainsky et al., 2012; Watanabe, 2012; 2015). The selected range of events was chosen because the availability of data before UFC 72 becomes more inconsistent and less reliable. Additionally, the TUF reality television show began in 2005, which is considered a catalyst for UFC's current status (Umstead, 2009). Since the impact of the TUF series was included in the analysis, UFC 72 was considered an appropriate starting point for the dataset. Eight of the events during this time period were either offered on network television or were cancelled; as such, they were removed from the dataset, yielding 122 data points for analysis.

Variable Descriptions

Two sets of independent variables (rivalry-related and control) were used to examine effects on UFC PPV buys (the dependent variable). Descriptions of all variables used in the study can be found in Table 1 and descriptive statistics can be found in Tables 2 and 3 for the continuous and categorical variables, respectively. Fighter-specific performance data (e.g., winning percentages, rankings, etc.) were only included for the main and co-main events, due to the increased importance of these fights compared to the rest of the event card (Tainsky et al., 2012). The control variables included factors from the literature that have been previously found to influence demand for UFC PPV (cf. Reams & Shapiro, 2017; Tainsky et al., 2012; Watanabe, 2012, 2015). The definitions and measurement of the control variables were established directly from the previous studies.

The rivalry-related variables, on the other hand, required greater adaptation. Broadly, the chosen factors represent elements of rivalry from the literature within the conflict, peer, and bias framework defined by Tyler and Cobbs (2015). All continuous rivalry-related variables were calculated as difference scores, or the absolute value of differences (e.g., main event winner's current ranking minus main event loser's current ranking) to capture the magnitude of similarity on each factor between the competitors in the fight, per the procedure of Kilduff et al. (2010).

Thirteen variables were used to operationalize conflict, which according to Tyler and Cobbs (2015), is comprised of several rivalry elements including recent parity, historical parity, star factor, frequency of competition, and defining moment. Competition for personnel, the final conflict-related rivalry element, was omitted as it does not fit within the setting of an individual sport like MMA. First, recent parity was operationalized by current ranks (at the time of the event) and recent winning percentages, and historical parity was measured through career winning percentages. Next, two pairs of variables were used to measure star factor, namely the number of years the fighters had been participating in UFC, as well as the fighters' salaries for the event. Finally, since repeated competition is less common in UFC (only 16% of the fights in this dataset were between fighters that had fought before, see Table 3), it would not have made sense to measure frequency of competition with a continuous variable, as has been done in college sport rivalry research (Kilduff et al., 2010). Thus, a dummy variable was used to indicate whether the fight was a rematch or not.

The last variable used to operationalize conflict was the poster variable. This was an indicator variable representing whether the promotional fight poster included either a group of fighters, or just two fighters. The poster variable was created to serve as a proxy of the defining moment rivalry element previously mentioned. Given the relative rarity of extensive competition histories between fighters, as well as the difficulty/subjectivity associated with identifying specific defining moments of conflict (e.g., trash talk between fighters, a fight at the weigh-in preceding an event), we believe the style of the fight poster represents the UFC's effort to highlight particular fights as potentially defining moments across the league. By examining past fight posters (e.*g., UFC 94: St-Pierre vs. Penn II, UFC 114: Rampage vs. Evans, and UFC 202, Diaz vs. McGregor II*), it appeared that when UFC marketers believe an upcoming fight could become a defining moment, the accompanying posters featured just those two fighters. Thus, it was decided that the poster variable would be a more objective measure of defining moment, as opposed to the authors' attempting to subjectively identify fights or other events that represented defining moments.

To operationalize the peer factor, differences in the fighting styles of the participants were examined to assess the cultural similarity rivalry element. Tyler and Cobbs (2015) reported that similarity in playing styles of athletic teams is one manner in which cultural similarity between rivals can be assessed. In MMA, there are a multitude of different fighting styles employed by fighters that can be very broadly broken down into two groups, namely strikers (e.g., Conor McGregor, Anderson Silva) and wrestlers/grapplers (e.g., Brock Lesnar, Demian Maia). Rather than assigning a label of one category or the other to each fighter, the authors used data from UFC.com to define the ratios of striking to takedowns and submissions employed by each fighter. Larger values indicated that the fighter was predominantly a striker, and smaller values indicated the fighter was predominantly a ground fighter. This approach also removed issues associated with categorizing fighters that are more balanced in style.

For the final rivalry factor of bias, Tyler and Cobbs (2015) found that cultural differences associated with nationalistic elements (such as pride or political tension) contribute to rivalries. Since the UFC is an American organization that employs fighters from all over the world, we added a variable to account for the fighters' country of origin. More specifically, the indicator variable was set to 1 when the fighters in the match self-identified as being from different countries (according to their fighter profiles on UFC.com), and 0 when both fighters were from the same country.

Data Analysis

In order to examine the effects of the rivalry-related variables, the the regression equation was used to estimate PPV buys in SPSS version 23.0 (See Figure 1).

Since these were panel data (cross-sectional time-series) across numerous markets and years, a stationarity test was performed to assure that no structural changes occurred that could have influenced PPV buys over the time period (Tainsky et al., 2012). The Augmented Dickey-Fuller unit root test was selected to test for stationarity (see Table 4). The test was significant, suggesting that PPV buys in the sample were stationary, and the use of all observations over the time series was appropriate. The ratio of observations to predictors for the model was about 4.5:1, which is below the preferred 5:1 ratio (Hair, Black, Babin, &, Anderson, 2010). Earlier studies in this area have estimated models with ratios of approximately 4:1 (cf.

$$PPVBUYS = \beta 0 + \beta 1MAINRANK + \beta 2COMAINRANK + \beta 3MAINRECENTWIN\% + \beta 4COMAINRECENTWIN\% + \beta 5MAINCAREERWIN\% + \beta 6COMAINCAREERWIN\% + \beta 7MAINYEARSINUFC + \beta 8COMAINYEARSINUFC + \beta 9MAINSALARY + \beta 10COMAINSALARY + \beta 11POSTER + \beta 12MAINREMATCH + \beta 13COMAINREMATCH + \beta 14MAINFIGHTSTYLE + \beta 15COMAINFIGHTSTYLE + \beta 16MAINDIFFCOUNTRY + \beta 17COMAINDIFFCOUNTRY + \beta 18PRICE + \beta 19TREND + \beta 20CHAMPS + \beta 21HOLIDAYWEEKEND + \beta 22TITLEMATCH + \beta 23TUFAPPEARANCE + \beta 24MAINODDS + \beta 25COMAINODDS + \beta 26MAINTITLEDEF + \beta 27COMAINTITLEDEF + \varepsilon$$

FIGURE 1. **PPV Buys Regression Equation**

TABLE 4. **Unit Root Tests**

Test		Coefficient	p value
ADF	Constant	-10.60	.001
ADF	Constant and Trend	-10.50	<.001

Note: ADF – Augmented Dickey-Fuller Unit Root Test, number of lags = 1

Tainsky et al., 2012; Watanabe, 2015); thus, the sample size was considered acceptable for this model within the context of an individual sport league.

PPV buys are a type of count data, which suggests a generalized linear model (GLM) using maximum likelihood estimation (such as Poisson or negative binomial regression) should be preferred over OLS regression (Long, 1997). In this case, however, there are no zero counts of PPV buys and the mean is quite large, which can make the data appear more continuous. Therefore, a GLM that assumes a normal distribution could be preferred. However, skewness and kurtosis values, histograms, and a significant Kolmogorov-Smirnov test ($p < .001$) indicated that the dependent variable (as well as several of the independent variables) did not follow a normal distribution. Subsequently, an additional significant Kolmogorov-Smirnov test indicated the data did not follow the Poisson distribution ($p < .001$) either, seemingly due to overdispersion given that the variance of PPV buys was much greater than its mean (Hilbe, 2011). Thus, a negative binomial regression using the identity link function (to return unaltered coefficient estimates) was conducted. A rival model using the log link function was also run for the purpose of comparing model fit, but the initial model had smaller values on the Bayesian Information Criterion, as well as deviance to degrees of freedom (1.347), confirming the choice of the identity link (Hilbe, 2011).

Results

Prior to interpreting the model results, assumptions of negative binomial regression were assessed. In addition to the dependent variable appropriately fitting the negative binomial distribution, a non-significant Koenker test ($p = .218$) indicated that heteroscedasticity was not present in the model. As in any type of regression model, predictors are also assumed to have minimal correlation with one another (Hilbe, 2011). Variance inflation factors (VIFs), as well as bivariate correlations, were examined to determine the degree of multicollinearity in the model. Six of the original 33 variables were removed from the model due to higher VIFs and numerous bivariate correlations with other variables above .5. These variables were not listed in the variable description, but included factors such as presence of a female fight, knockout to technical knockout ratio, and outcome (win or loss) of the fighter's last fight. The 27 predictors remaining all had VIFs below 2.1, and few significant correlations between them, suggesting that an acceptable (if not minimal) level of multicollinearity was present in the model.

The results for the negative binomial regression model can be found in Table 5. The omnibus likelihood ratio Chi-square test was significant (81.303; df = 27, $p < .001$), indicating that the overall model was significantly predicting PPV buys, and the overdispersion parameter was .162. Seven of the rivalry-related variables were significant predictors of PPV buys

TABLE 5. **GLM (Negative Binomial) Regression Results**

Variable	β	SE	Wald χ^2	Sig.
Intercept	-249680.034	1051127.3637	.056	.812
MAINRANK	-8416.886	2750.2365	9.366	.002**
COMAINRANK	-591.523	610.1937	.940	.332
MAINRECENTWIN%	-3162.121	1099.3333	8.274	.004**
COMAINRECENTWIN%	-1870.565	1255.2940	2.221	.136
MAINCAREERWIN%	8196.901	3100.5080	6.989	.008**
COMAINCAREERWIN%	279.982	2096.3272	.018	.894
MAINYEARSINUFC	4324.619	6189.5560	.488	.485
COMAINYEARSINUFC	-7898.110	5765.4779	1.877	.171
MAINSALARY	.403	.1562	6.671	.010**
COMAINSALARY	.838	.3210	6.811	.009**
POSTER	150161.271	43443.8787	11.947	.001**
MAINREMATCH	-56507.382	45079.8974	1.571	.210
COMAINREMATCH	215131.721	91947.0060	5.474	.019**
MAINFIGHTSTYLE	-486.066	1183.6001	.169	.681
COMAINFIGHTSTYLE	-245.029	1134.1991	.047	.829
MAINDIFFCOUNTRY	51814.632	35194.1937	2.168	.141
COMAINDIFFCOUNTRY	40588.392	41919.7668	.937	.333
PRICE	10431.912	19759.3178	.279	.598
TREND	-2727.171	1068.0440	6.520	.011**
CHAMPS	30182.401	21475.5078	1.975	.160
HOLIDAYWEEKEND	11516.873	52172.6066	.049	.825
TITLEMATCH	44428.424	48606.4262	.835	.361
TUFAPPEARANCE	-6927.382	21870.1450	.100	.751
MAINODDS	-25.963	47.0602	.304	.581
COMAINODDS	170.635	71.4078	5.710	.017**
MAINTITLEDEF	2299.708	9347.8434	.061	.806
COMAINTITLEDEF	-6769.081	30471.1091	.049	.824

($p < .05$), all of which were categorized as conflict factors. Among the five statistically significant continuous rivalry-related variables, MAINRANK (β = -8416.886; p = .002) and MAINRECENTWIN% (β = -3162.121; $p = .004$) both had negative influences on PPV buys. Because these variables are mostly related to the short-term performance history of fighters, this would suggest that similarity in recent performance led to more interest in the main event, thereby pushing PPV buys. On the other hand, MAINSALARY (β = 0.403; $p = .010$) and MAINCAREERWIN% (β = 8196.901; $p = .008$) had positive relationships with PPV buys. The effect of MAINCAREERWIN% was particularly large, suggesting that an additional 1% difference in the fighters' career winning percentage resulted in 8,197 more PPV buys. These variables would appear to be related more to the long-term performance of fighters, so unlike the short-term similarity mentioned previously, PPV buys were greater when the two main event fighters had more dissimilar long-term histories. A similar effect was observed with COMAINSALARY (β = 0.838; $p = .009$), though COMAINCAREERWIN% was not significant.

Two of the categorical rivalry-related variables were also statistically significant. Although only one of the continuous variables measuring aspects of the co-main event was significant, COMAINREMATCH was significant ($p < .019$), suggesting that when the fighters in the co-main event had previously fought each other, an additional 215,131 buys were generated (representing approximately $12 million in additional revenue). Additionally, POSTER was significant ($p = .001$), suggesting that when the event poster only featured two fighters, 150,161 more PPV buys were purchased (approximately $8.3 million in revenue) compared to when more than two fighters were featured on the poster.

Finally, two of the control variables (TREND and COMAINODDS) were also statistically significant ($p < .05$). For every one unit increase in the difference between betting odds on each fighter in the co-main event (COMAINODDS), PPV buys increased by approximately 171,000, suggesting that competitiveness was preferred in the co-main event. The negative effect of TREND on PPV buys indicated that PPV buys have been decreasing over time. PRICE had no significant relationship with PPV buys, although it should be noted that there were only two price points in these data: $54.95 and $59.95. Thus, it is possible that the variance associated with the price change could be getting captured within TREND, thereby muting any effects of PRICE.

Discussion

The current study aimed to improve collective knowledge related to the multiple dimensions of rivalry that most contribute to an individual sport league's mediated PPV viewership, a topic of great importance to marketers and sport stakeholders (Fort,

2003). This analysis builds upon previous UFC estimations (e.g., Reams & Shapiro, 2017; Tainsky et al., 2012; Watanabe, 2012, 2015), namely by its focus on the empirical impact of rivalry and the investigation of a larger (122 data points) and more recent (the years 2007–16) dataset than the earlier studies. Prior models analyzed events and years when MMA was still not sanctioned in many states and the general public may not have been aware of the league. As such, this study extends the literature in several ways.

First, after a thorough review of the literature we believe this is the first PPV sport model using secondary data to compute absolute value difference scores to develop rivalry-related determinants. Although Tainsky et al. (2012) and Reams and Shapiro (2017) both analyzed differences in betting odds, these researchers did not examine rivalry variables. The analysis of secondary data and difference scores supplements extant rivalry research by showing the influence of conflict, peer, and bias on fan interest and revenues.

Moreover, examining individual performance statistics of the four fighters involved in the main and co-main events more accurately reflects consumer preferences and characteristics of UFC contests. Because performance data are critical to demand (Berri, Schmidt, & Brook, 2004) and are used in the league's marketing and advertising strategies, these findings provide a more holistic view of how the performances of fighters drive demand for PPV events. Previous demand for team sports research broadly examined rivalries using subjective dummy variables assigned by the researchers.

Third, given the statistical significance of the rivalry-related conflict determinants, it would appear the tenets of SIT (i.e., the crux of rivalry) are impactful on sport fans' PPV expenditures, potentially suggesting a connection between the former and economic demand theory. Thus, the rivalry-related determinants analyzed in this research extend the individual sport literature conceptually, and also provide a foundation for practical marketing implications. A detailed discussion of the implications associated with rivalry's antecedents is provided in the following sections.

Conflict

Findings from this analysis show that conflict rivalry determinants mostly influenced mediated demand for this individual sport league. This finding also provides empirical evidence to support Tyler and Cobbs (2015), who asserted that conflict was a more influential rivalry dimension than peer and bias. The significance of the comparative difference conflict determinants extends Tainsky et al. (2012) and Watanabe (2012; 2015), who found fans displayed preferences for specific weight classes. In line with Reams and Shapiro (2017), we believe using the performance data of athletes more accurately reflects the fan preferences and characteristics of fights, as they represent precise data associated with each of the four athletes competing in the main and co-main events.

Given the role of aggressive (physical) engagement in combat sports, this is not a surprising finding. MAINRANK and MAINRECENTWIN%, which are both proxies for short-term performance similarities (i.e., recent parity) between fighters, had a positive relationship with PPV buys. In other words, main event fighters who were more closely aligned on ranking and recent winning percentage led to greater consumer interest. This finding is similar to results from previous UFC demand analyses (cf. Reams & Shapiro, 2017; Tainsky et al., 2012; Watanabe, 2012, 2015) that found comparable determinants as significant predictors of PPV buyrates, and provides additional support for empirical and anecdotal claims that competitions featuring highly ranked fighters are of greater interest to fans (Hudson, Jr., 2012), and consistent with rivalries, competitiveness between the actors is expected (Kilduff et al., 2010).

The competitiveness of contests is also related to the uncertainty of outcome hypothesis (cf. Alavy, Gaskell, Leach, & Szymanski, 2010; Buraimo & Simmons, 2015). Measures of uncertainty typically manifest as betting odds in previous research. Tainsky et al. (2012) found main event odds to be a significant driver of PPV demand in their analysis of events from 2001–11, whereas Watanabe (2015) did not analyze these. Although betting odds was not significant in this study that encompassed a larger PPV dataset than its predecessors (cf. Reams & Shapiro, 2017; Tainsky et al., 2012; Watanabe, 2012, 2015), highly competitive divisions have contributed to fighters experiencing tremendous difficulty retaining their championship belts in recent years (Reams & Shapiro, 2017). In cycling and stock car racing uncertainty of outcome impacted Tour de France (Van Reeth, 2011) and National Auto for Stock Car Auto Racing (NASCAR) television ratings (Berkowitz et al., 2011). The results of the previous studies are in contrast to Buraimo and Simmons (2015), who found that uncertainty of outcome did not influence ratings for televised English Premier League (EPL) games.

MAINSALARY, MAINCAREERWIN%, and COMAINSALARY were all positive and significant determinants, indicative of the influence of long-term performance success (i.e., historical parity) on demand. In contrast to MAINRANK and MAINRECENTWIN%, this finding suggests that PPV buys increased when there were greater discrepancies

between the salaries and career winning percentages of the main event fighters over the long-term. A larger difference in the salaries across the co-main event fighters also significantly influenced demand. These findings could suggest that consumers are more interested when they perceive a discrepancy between how much money each fighter earns, and a significant difference in their career win percentages. The underdog factor could be at play here, as previous research suggests that intrigue may be heightened if consumers perceive that one person is disadvantaged in some manner (Thomson, 2006; Vandello, Goldschmied, & Richards, 2007). Kilduff et al. (2010) referred to a similar phenomenon as the "top dog" effect, where high status and prestige evokes greater rivalry conditions, and in this case, increased PPV buys. A sense of deservingness could also be driving UFC interest, as it's an integral component of schadenfreude, or joy at the misfortune of others (Sesen & Erturk, 2016). In this setting, fans may feel as if one fighter "deserves" to lose against his or her adversary (*e.g., UFC 193: Rousey vs. Holm*).

In Kilduff (2014) and Tyler and Cobbs (2015), repeated competitions were identified as an instrumental component of rivalries, although that was not elicited in our analysis of main event rematches. In contrast, COMAINREMATCH was a significant driver of PPV buys, potentially indicating that because headlining fights are usually desirable matchups for a number of factors (e.g., championships, female fight, heavy favorite vs. underdog), co-main rematches may simply serve to add interest to a fight card that might not gain as much attention in comparison to the more highly regarded main event fight. It should also be noted that in most cases within this dataset, the majority of the main event fighters had never fought their current opponent previously; therefore, there was a limited number of observed rematches for analysis.

In an effort to assess the historical sub-dimension of Tyler and Cobbs's (2015) conflict antecedent, we analyzed the difference in years competing in the organization across the main and co-main event fighters, respectively. We presumed that a smaller difference in the number of years in the organization could lead to a greater number of PPV buys. The rationale behind this proposition was that fighters of comparable tenure with the league would potentially have a shared history (e.g., fighting on the same card, attending a workshop) that could precipitate rivalry. To that end, neither MAINYEARSINUFC nor COMAINYEARSINUFC were predictive of PPV buys in this model.

With respect to the event POSTER that is produced by the UFC for each numbered league event, this marketing tool was found to have the greatest impact on PPV buys of all the variables in the model. Although we are not suggesting that the poster is solely responsible for driving demand, this visual form of advertising appears to be consistent with the broader marketing strategies used by UFC to generate consumer interest in events featuring marquee rivalries. As previously noted, *UFC 94: St-Pierre vs. Penn II, UFC 114: Rampage vs. Evans, and UFC 202, Diaz vs. McGregor II* featured some of the league's all-time greatest rivalries, and the accompanying posters featured just the two main event fighters. To that end, our results indicate that if the event poster featured the pictures of just two fighters in comparison to four or more, then demand for PPV was increased. This finding could be indicative of the importance of highlighting one rivalry matchup and its star factors (Reams & Shapiro, 2017; Tyler & Cobbs, 2015) as a main focal point of event marketing strategies, in contrast to the entire fight card. Further, Havard, Wann et al. (2013) suggest that adversarial relationships can be effectively used to increase interest in both existing and recently developed rivalry contests.

Peer

The fighting styles of the main and co-main event fighters were not significant predictors of PPV buys. Based on the premise of cultural similarity in Tyler and Cobbs (2015), where an adversary who is too similar "will not be seen as distinct" (p. 15), we presumed that purchases would have increased when contrasting styles were present among the fighters (e.g., a dynamic striker vs. a submission artist). From a microeconomic perspective, it seems plausible that these non-performance based variables are not as important to MMA fans, at least at this stage of the UFC's product lifecycle. The combined multi-disciplinary approach of MMA and recent evolution of the league, compared to more established professional sport leagues, could indicate that the general marketplace is not as informed on the specific intricacies of fighting styles and interaction between them, nor the technical components of the matchups.

Bias

Although cultural and geographic factors have been found to drive rivalry in other sport contexts (cf. Depken, 2000; Havard, Gray et al., 2013; Tyler & Cobbs, 2015), differences in home country between fighters in the main and co-main events were not significant predictors of demand in this setting. The reason for this could be due to the global nature of mixed martial arts as a sport. There are a multitude of cultures that exist in UFC, many of which manifest through the variety of martial arts that permeate the sport (e.g.,

taekwondo, Brazilian jiu-jitsu, karate, wrestling, boxing). League fighters frequently adopt multi-disciplinary fighting and training approaches from a throng of cultures. Thus, fighters' identities, and fan perceptions thereof, may not be as closely tied to nationality, contrary to what is observed in international team sports (Porat, 2010) or the Olympic Games.

Practical Implications

Findings from this study suggest that conflict antecedents to rivalry were significant drivers of UFC PPV buys. It seems reasonable to suggest that in other individual sports, displaying conflict in marketing and advertising content could similarly increase mediated consumer interest (e.g., auto racing, swimming, boxing). For example, anecdotal evidence suggests that NBC ratings spiked when viewers perceived conflict between Michael Phelps and Ryan Lochte during the 2012 Olympic Games in London (Zurawik, 2012). By combining both anecdotal situations with empirical data from this study, sport marketers should feel encouraged to highlight the interpersonal conflict between athletes to generate increased fan interest.

It stands to be noted, however, that this content should be tactfully created as some approaches may not be perceived as proper decorum in all settings (e.g., tennis in contrast to boxing). Tyler and Cobbs's (2015) framework suggests that regular competitions, parity (historical and recent), stardom, and defining moments between two actors are all aspects of conflict. When developing new strategies geared towards garnering greater mediated interest, we would recommend that marketers use the attractive aspects of their sports within these categories to bolster viewership. For example, the Professional Golfers' Association (PGA) may consider illustrating the performances and earning similarities and differences between Jordan Spieth, Jason Day, and Rory McIlroy in their promotional efforts.

An overarching concern with marketing rivalries are the potentially detrimental outcomes associated with contentious competitions spilling over to live, stadium attendees (Dalakas & Melancon, 2012; Havard, Wann et al., 2013). On the contrary, however, it seems reasonable to suggest that this is not as great of a concern as it relates to mediated viewership. Particularly for the live audience, fears of fan violence, hooliganism, and the like are all legitimate risk management concerns for sport organizers. Because the marketed conflict between two actors tends to generate greater interest (Buraimo, 2008), this creates a conundrum. One method to circumvent this issue would be to not solely highlight interpersonal or emotional conflict, but include performance-related competitive statistics in marketing materials (e.g., winning percentage, salary difference). To that end, for some individual sports it may be advantageous for marketers to highlight these similarities and differences, and withhold from manufacturing emotionally driven rivalries based on inauthentic, contentious relationships.

Finally, the findings associated with the conflict variables indicate that fights between competitors that have similar short-term performance, but dissimilar long-term performance and stature in the league (e.g., salary differences), drive PPV buys the highest. These findings might suggest that a future matchup between Conor McGregor and Khabib Nurmagomedov, mentioned frequently in the media since UFC 205, could be a PPV blockbuster. Although the two have similar career records, their similar recent form and McGregor's clear advantage in star power and popularity suggest he would earn a substantially higher salary than Nurmagomedov. Thus, such a fight would appear to fit the overall findings of the model very well, and potentially drive high PPV buys.

Limitations

As with all empirical analyses, this study is not without limitations. First, sample size was limited and the focus of this analysis was primarily centered on the main and co-main events of each fight card. Although the sample size and ratio of data points to predictors in this study were greater than in past work (cf. Tainsky et al., 2012; Watanabe, 2015), this study could be revisited to examine rivalry in the future after more UFC PPV events have occurred.

Second, access to data pertaining to fights other than the main and co-main events has proved difficult for researchers to obtain in the past, and was again the case in this study (particularly for the salary variables). While the main and co-main fights generally receive the most attention in the leadup to a UFC event, there are occasionally deeper cards where there are more than just two fights that have the potential to draw significant fan interest.

Finally, the authors believe that rivalry in UFC is also driven by a perception of "bad blood" between fighters. Although the appearance of dislike between fighters can be manufactured for marketing purposes (i.e., akin to professional wrestling), this undoubtedly plays a role in generating rivalries between fighters. With the data that were available, no appropriate proxy for bad blood could be defined. Although the poster variable was used to give some indication as to how particular rivalries were being pushed in the broader marketing realm for individual events, this variable may not have accounted for cards where multiple rivalries were present.

Future Research

This research has established the significance of conflict as a primary driver of mediated viewership of an individual sport. Previous frameworks (cf. Kilduff et al., 2010; Kilduff, 2014; Tyler & Cobbs, 2015) have provided theoretically grounded approaches that can elicit meaningful marketing and social-psychological data to improve strategies that may influence direct demand across sport. Provided this data, it would behoove industry practitioners and sport researchers to more closely analyze each dimension (i.e., conflict, peer, and bias) to determine their effectiveness in marketing. To accomplish this, comparable measures examined in this analysis should be assessed in other settings. For example, rematches are somewhat uncommon in UFC and were utilized as a proxy for repeated competitions in this estimation. In contrast, other individual sports regularly see two competitors challenge each other (e.g., tennis, golf, stock car auto racing), indicating that how these variables perform in different models and settings merits further empirical analysis.

As mentioned in the limitations, it would appear that "bad blood" between fighters would also drive rivalry, and may replace the repeated competition in creating contentious relationships between fighters. Measuring bad blood was beyond the scope, and available data, in this study; however, future work should define and analyze relationships between fighters to account for feelings of dislike or lack of respect.

With regard to the defining moments sub-dimension of conflict, the poster was the strongest predictor of demand in this estimation. Given this finding, it could be that in UFC and other individual sport leagues, marketing activities that precede a major event could be more impactful on demand than in team sports. Because of the differences between the two settings, what constitutes a defining moment could vary and should be explored in subsequent research.

Conclusion

Rivalry contests in sport are a significant contributor to increasing fan interest, in terms of live gate attendance and mediated (television) viewership. Prior to the current demand estimation, previous analyses generally examined rivalry as a pre-determined binary variable set at the researchers' discretion. To advance economic demand theory as it relates to specific characteristics of contests in individual sport, the current model included conceptually established antecedents to rivalry on an increasingly important outcome that encompasses salient economic and marketing implications. The findings from this study display the influence of conflict on mediated demand for an individual sport, representing important progress to the field of sport marketing and the impact of rivalry antecedents on market demand.

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