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 (Boraimo, 2008; Forrest, Simmons, & Boraimo, 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 (Fowles & 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 (Boraimo & Simmons, 2015; Downward, Dawson, Dejonghe, 2009; Noll, 1974; Watanabe, 2015). Mediated content for the league constitutes approximately 76% of total league revenue, with only 12% of revenues generated from live events (Fowles & 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.

**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>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPVBUYS&lt;sup&gt;a&lt;/sup&gt;</td>
<td>total number of PPV purchases for a given UFC event</td>
</tr>
</tbody>
</table>

**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<sup>%</sup>: Difference in recent win % (last 3 fights) between fighters in the main event
  - COMAINRECENTWIN<sup>%</sup>: Difference in recent win % (last 3 fights) between fighters in the co-main event
  - MAINCAREERWIN<sup>%</sup>: Difference in career win % between fighters in the main event
  - COMAINCAREERWIN<sup>%</sup>: Difference in career win % between fighters in the co-main event
  - MAINYEARSINUF<sup>c</sup>: Difference between the number of years main event fighters had been competing in UFC
  - COMAINYEARSINUF<sup>c</sup>: 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
  - 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**

- MANDIFFCOUNTRY: Indicator for main event fighters being from different countries
- COMANDIFFCOUNTRY: Indicator for co-main event competitors being from different countries

**Control Variables**

- PRICE<sup>a</sup>: PPV purchase price for a given UFC event
- TREND<sup>a</sup>: Monthly trend variable
- CHAMPS<sup>4</sup>: Number of current or former UFC champions on the PPV card
- HOLIDAYWEEKEND<sup>a</sup>: Indicator for whether event took place on a US holiday weekend
- TITLEMATCH<sup>4</sup>: Indicator for a title match on the PPV card
- TUFAPPEARANCE<sup>a</sup>: Number of fighters who have appeared on TUF on a given UFC PPV card
- MAINODDS<sup>s</sup>: Difference in betting odds between two main event fighters
- COMAINODDS<sup>s</sup>: Difference in betting odds between two co-main event fighters
- MAINTITLEDEF<sup>+</sup>: Number of consecutive title defenses for the title holder in the main event
- COMAINTITLEDEF<sup>+</sup>: Number of consecutive title defenses for the title holder in the co-main event

**Note.**<sup>+</sup> Tainsky et al. (2012);<sup>a</sup> Watanabe (2012; 2015)
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 fighmatrix.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.

### Table 2. Descriptive Statistics for Continuous Variables

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

### Table 3. Descriptive Statistics for Categorical Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>N</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>POSTER</td>
<td>2 fighters</td>
<td>44</td>
<td>36.1</td>
</tr>
<tr>
<td></td>
<td>&gt;2 fighters</td>
<td>78</td>
<td>63.9</td>
</tr>
<tr>
<td>MAINREMATCH</td>
<td>Not first fight</td>
<td>28</td>
<td>23.0</td>
</tr>
<tr>
<td></td>
<td>First fight</td>
<td>94</td>
<td>77.0</td>
</tr>
<tr>
<td>COMAINREMATCH</td>
<td>Not first fight</td>
<td>12</td>
<td>9.8</td>
</tr>
<tr>
<td></td>
<td>First fight</td>
<td>110</td>
<td>90.2</td>
</tr>
<tr>
<td>MAINDIFFCOUNTRY</td>
<td>Same country</td>
<td>54</td>
<td>44.3</td>
</tr>
<tr>
<td></td>
<td>Different countries</td>
<td>68</td>
<td>55.7</td>
</tr>
<tr>
<td>COMAINDIFFCOUNTRY</td>
<td>Same country</td>
<td>53</td>
<td>43.4</td>
</tr>
<tr>
<td></td>
<td>Different countries</td>
<td>69</td>
<td>56.6</td>
</tr>
<tr>
<td>HOLIDAYWEEKEND</td>
<td>Holiday</td>
<td>15</td>
<td>12.3</td>
</tr>
<tr>
<td></td>
<td>Non-holiday</td>
<td>107</td>
<td>87.7</td>
</tr>
<tr>
<td>TITLEMATCH</td>
<td>Title match</td>
<td>92</td>
<td>75.4</td>
</tr>
<tr>
<td></td>
<td>No title match</td>
<td>30</td>
<td>24.6</td>
</tr>
</tbody>
</table>
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.
TABLE 4. Unit Root Tests

<table>
<thead>
<tr>
<th>Test</th>
<th>Coefficient</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADF Constant</td>
<td>-10.60</td>
<td>.001</td>
</tr>
<tr>
<td>ADF Constant and Trend</td>
<td>-10.50</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

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

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.
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, 2009). 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 COMAINCAREERWIN% (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,
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. MAIN-RANK 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.

MAIN-SALARY, MAIN-CAREER-WIN%, and COMAIN-SALARY were all positive and significant determinants, indicative of the influence of long-term performance success (i.e., historical parity) on demand. In contrast to MAIN-RANK 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 dif-
ference 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 per-
son 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 deservingsness 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), repeat-
ed 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 or-
ganization 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 COMAINYEAR-
SINUFC 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. Al-
though 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 consum-
er 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. McGe-
gor 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 devel-
oped 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 sim-
ilar “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-per-
formance 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 in-
dicate that the general marketplace is not as informed
on the specific intricacies of fighting styles and inter-
action 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. Dep-
ken, 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.

References


