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A Gender-Based UFC Demand Analysis

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While writing this thesis, I have not witnessed any wrongdoing, nor have I personally violated any conditions of the Skidmore College Honor Code.

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Abstract

The Ultimate Fighting Championship (UFC) has grown rapidly since its inception in the early 1990s. An important aspect of understanding the explosion of Mixed Martial Arts into mainstream appeal is the relationship between consumer demand and specific attributes of the sport. The UFC first began featuring female events in 2013. A robust division of women's UFC fighters has developed in the years since. In this study I will be using econometric methods to evaluate the degree to which specific gender related variables influence consumer demand for the UFC. The Pay-Per-View format of UFC events is of critical importance because it inherently informs the degree to which consumers are willing to spend their money on consuming the UFC. Specifically, I will be using linear econometric models in my analysis to determine how variables such as *The Ultimate Fighter*, weight class and star effect interact with gender to drive demand for the UFC.

Introduction

Among the lineup of popular American sports, mixed martial arts represent a new member of the pack. Various martial arts have been practiced in countries all over the globe for centuries. Since the 1700s, boxing has been regarded as the premier combat sport in America. The Ultimate Fighting Championship (UFC) was founded in 1993, introducing MMA (Mixed Martial Arts) competition to mainstream consumers.

Since its inception, the UFC has been laden with controversy due to the "no holds barred" nature of its bouts, wherein bleeding is commonplace, and fighters are susceptible to significant injury. For the first ten years of its existence, the UFC struggled due to its profoundly negative public image. It faced bans within several states, in addition to overt criticism in the media. This cycle of bad press resulted in low viewership and effectively sent the organization into financial turmoil. In 2001, American business magnates Frank and Lorenzo Fertitta founded a company called Zuffa, which they used to acquire the struggling UFC for a mere $2 million. This marked the beginning of the transformation that would see the UFC evolve from a controversial fringe sport into an MMA powerhouse. Zuffa sought to professionalize the sport and propel it to mainstream success by implementing improved production quality, stricter regulations, and acquiring star fighters. Most importantly, Zuffa was able to use its deep pockets to secure lucrative television deals and build strong relationships with sponsors.

In 2013, the UFC held its first event featuring female fighters. UFC 157 was also the first instance of female fighters in the headlining event, with Ronda Rousey and Liz Carmouche as the two contenders for the women's bantamweight title. Rousey was the victor and her popularity skyrocketed after the fight, cementing her status as the most publicized female MMA fighter in history. In the years following UFC 157, the UFC has increasingly included more and more female fights in the lineup for event. Marketing for female fighters was supplemented though the television program "The Ultimate Fighter" (TUF). TUF is a series that follows specific fighters over the course of their training leading up to events within a season. Season 20 of TUF aired in 2014 promptly after the initial debut of female MMA fights in the UFC and featured an all-female cast of fighters. Female

My main question is how variables such as gender and star power affect Pay-Per View demand for the UFC. Additionally I am interested in how specific weight classes interact with fighter gender identity on demand for the UFC. The inclusion of women in MMA is a highly controversial topic. I've found some magazine publications that applaud the UFC for including women and praise the organization for its progressiveness. Others have criticized the UFC for capitalizing on shallow marketing tactics that advertise fighter diversity solely for the sake of increasing revenue. Given this controversy, I am curious how the UFC's decision to grow its offerings of female fights has effected PPV demand.

For my literature review, I am expanding to cover publications that cover the subject of fighter compensation, social media marketing, and lawsuits. From my own experience, social media interaction plays an important role in the marketing for UFC fights, and I am reviewing a section of the literature that addresses the importance of social media as a marketing tool. I think that this will be crucial for addressing how the UFC's specific strategies of marketing diverse fighter identities plays into PPV buyrates. The most important publications for this review pertain to factors that influence the demand for fights. Direct demand for the UFC comes in the form of Pay-Per View (PPV) purchases and live attendance ticket sales.

Literature Review

UFC Demand Studies

The most pertinent literature for constructing my thesis are prior studies regarding the demand for PPV UFC events. The first of which was published in 2012 by Steven Salaga, Carla Santos, and Scott Tainsky. They use a regression to evaluate the influence of several key variables upon PPV buyrates for the UFC in addition to live attendance tickets. The long list of independent variables includes factors such as title fight weight class, title fighter appearing on The Ultimate Fighter (UFC's reality TV show) , number of start fighters on event card (more on star fighters later), and whether the main event contains a title defender. Additional variables include indicators for events that overlap broadcasts with other high profile sporting events (NBA, NFL, MLB), holiday weekends, and the associated PPV pricing. The authors also accounted for uncertainty of outcome as a driver for demand by including variables for betting odds for each event's title fight. The uncertainty of outcome hypothesis in sports economics literature states that higher levels of uncertainty in a given event will correlate with higher demand and viewership for the event. This hypothesis is formed on the basic belief that sports fans are most invested in those contests where the outcome is least predictable and will elicit higher degrees of excitement. Another variable accounted for all fighters that appeared on "The Ultimate Fighter", evaluating wheter their presence on the program would incite higher demand for following events. The authors found a strong link between heavier weight classes and increased consumer demand. Furthermore they find a moderate positive relationship between the variable for defending champion fighters in a given event and PPV demand. (Salaga, 2012) Other significant variables included betting odds, which aligned with the UOH hypothesis: higher difference between the betting odds of main event fighters is positively related to demand. The author's TUF variable also elicited positive significance on demand, indicating that TUF program incites higher consumer interest in those specific fighters. I am hesitant to agree with their usage of the TUF variable, given that many of the most popular fighters during this period were featured on the show.

The data was sampled from a ten-year period, wherein TUF had featured many of the biggest names in UFC, along with up-and-coming fighters. It is very likely that most events during this period featured a fighter previously included in TUF, and I suspect that this variable could get muddled with their variable for Star fighters which produced a similar level of significance and positive effect on demand. Furthermore, the Star variable identified all fighters who were champions of any weight class prior to the event. I think that this method for accounting Star power is far too broad, and fails to encapsulate the profoundly higher demand associated with a small handful of fighters, (McGregor, Rousey, Jones, etc.) Nonetheless, this study is highly influential for my own research, and inspired me to construct specific gender variables that accounts for Star power across female fighters and the effect of an all-female season of TUF (TUF20).

These authors published another study in 2012 which follows a similar methodology but focuses on the dependent variable of live attendance for UFC events. Given the nature of their study, a large portion of their independent variables pertain to the physical location of events. Although there is a slightly different dependent variable (albeit related), this study aligns more closely with my interests for this thesis by evaluating more specific independent fighter variables besides weight class. Specifically, these variables encapsulate the different style matchups of fighters in the ring. For context, the MMA as a combat sport medium allows for various techniques and disciplines to be employed by participants, and these authors aimed to figure out which of these styles are most sought after by consumers. Some examples include "strikers" matched up with grapplers or "submission" fighters. These are similar to the type of nuanced variables that I included in my own regression. In terms of weight class variables, this study only included four: Welterweight, Middleweight, Light-Heavyweight, and Heavyweight. The data was collected from a 10 year period similar to the authors' previous demand study on PPV buyrates, which contained events that featured title fighters across seven different male weight class categories. (Salaga, 2012) This study fully ignores the lowest three weight classes (Bantamweight, Featherweight, and Lightweight). Some of the highest grossing male UFC events of all time were headlined by Lightweight or Featherweight fighters (Conor McGregor for example), and the authors give no explanation for removing these weight classes from their evaluation. Their inclusion of weight variables inspired me to flesh this out further by including the full spread of possible weight classes in title fights, in addition to female weight classes which were entirely exempt from their study. It is understandable that each of these demand studies failed to include gender related variables given that nearly all of them were published prior to the inception of women's UFC. Those published after 2013 were too recent to make concrete observations regarding the role of gender as a driver for demand.

The next study was published in 2015 by Nicholas Wantanabe and is nearly identical to prior studies in all regards except for the addition of a few control variables. This study examines both PPV buyrate and live attendance simultaneously, utilizing an expanded list of weight class variables. As I mentioned previously, expanding the weight class variables is essential for understanding the full scope of their effect on demand. Wantabe has similar findings to Salaga's live attendance study, in that higher weight classes have an increasingly stronger relationship with increased PPV purchases. Wantanabe (2015) Interestingly, his evaluation of live attendance found that only featherweight main events were significantly correlated with higher live ticket sales. Wantanabe mentions that this discrepancy may be due to variation in the method for identifying weight class variables. Salaga's earlier studies identify when each weight class is featured as the main event, regardless of the fight's status as a championship

fight. Championship fights occur when the highest ranked fighter for a given weight class is challenged by another fighter. These fights determine the "top dog" for a given weight class, wherein the champion may be dethroned from their position. Wantanabe is interested in these championship fights and identifies his weight class variables based on when each weight class is featured as a main event and is concurrently a champion-determining fight. After considering this distinction for my own weight class variables, I decided to opt for Salaga's method, as it provides a consistent data point for each event and does not ignore those main events that are non-championship fights. Wantanabe's study motivated me to include a fully fleshed-out variable class that included all male and female weight classes. This was largely due to his finding that lower weight classes (Featherweight on Live Attendance) may be significant drivers for demand.

The next demand study for the UFC was published in 2015 by Richard McGowan and John Mahon. Their study similarly focusses on measuring the effect of several weight class variables on PPV demand. They evaluated weight classes similar to Wantanabe's study, identifying only those UFC events where there were title fights as either the main or co-main event. This study is partially concerned with understanding the effects of "supercards" which are highly marketed UFC events that feature title fights in both the main events and the co-main event (co-main events are those that directly precede the main event). Thus, McGowan utilized a dummy variable to encapsulate those events where championship fights were present in both the main and co-main event. Interestingly, this variable was not significant. Additionally, the study utilized variables identifying individual fighters across any main or co-main event they appeared in. These variables were used to track how specific fighters were associated with demand regardless of their weight classification. What I found most compelling about this study was the finding that a handful of individual fighters generated a more significant positive correlation with demand compared to the weight classes variables that they fight within. The only exception to this finding was the Heavyweight title fight variable, which produced a highly inflated positive coefficient. Essentially this implies that specific "star" fighters are the more important drivers for the UFC's revenues, as opposed to holistically marketing all fighters due to their position in favorable weight classes. This paper also included a variable that identified fights for the Women's Bantamweight title, making it the only demand study that I've read which accounts for gender in any of the independent variables. It failed to include any variables for the other two female weight classes (Strawweight and Featherweight), but this was likely due to the fact that it was published in 2015, focusing only on title fights within the main (or co-main) event. Since 2015 there have been multiple main events featuring both Women's Strawweight and Women's Featherweight, but during the time when it was published women's UFC was in its infancy and the only title fights were those featuring Ronda Rousey in the Women's Bantamweight division. Their finding that demand was increased significantly by individual star power motivated me to include a female specific "star" variable in my own study, along with a variable that identified solely those UFC events that contained Ronda Rousey. Given more time and resources, I would be interested in utilizing a similar method and making individual variables for every single female fighter across sample period of events. This would allow me to differentiate their respective levels of "star" power.

Social Media and the UFC

Social media is a significant tool utilized by the UFC for promoting their events. (Steven Salaga et al., 2022) which aimed to determine the impact of social media on PPV purchasing intentions of UFC fans. They formulated a series of research questions and with respective methods that break their investigation into two distinct parts. The first section focused on determining the motivational factors of UFC fans utilizing social media. Their first methodology utilized a qualitative study consisting of individual interviews presented to a sample group of UFC fans following official UFC social media accounts. The sample consisted of 12 fans from diverse socio economics and national backgrounds. The ages of participants ranged from 25 to 41 years old, which overlaps with the largest age percentage of fans (the 18-35 age group holds 40% of MMA consumers. Salaga (2022)

The second method utilized another questionnaire administered through an online survey tool called Qualtrics. This questionnaire contained questions pertaining to Scale of Social Media Motivation (SSMM), fan identification, consumption behavior, and background variables. (Salaga, 2022) This method sought to explain their second research question which asked whether social media motivations influenced UFC fan's intentions to purchase PPV and live event ticket.

Their results support that UFC fans utilize social media in part due to motivations of acquiring information, social interaction, and entertainment. Salaga et al., (2022) Additional motivational variables of convenience and economic considerations played a significant role in fan interaction with UFC social media. This is largely a result of the UFC's unique PPV payment structure, which is considered burdensome by many fans. Salaga et al. (2022) Unlike other sports consumed through readily available streaming services, UFC social media content may serve as a significant substitute for viewing the event itself. This finding made me consider the significance of substitutes for the UFC when attempting to make concrete studies about demand for the sport. The PPV structure is clearly a deterrent for many fans of the UFC causing them to seek other avenues in order to consume the sport. Fan preference for social media as substitute for actual PPV events is damaging to revenues in its own right, but this phenomenon also has implications for more pervasive substitutes such as illegal streaming sources for full events. It is common knowledge that illegal streams are a viable alternative for actual PPV viewership, and my intuition tells me that a significant portion of viewership and revenue is lost due to illegal streams. Unfortunately, there are no publications that specifically address or quantify the decree to which illegal streams distort the full picture of UFC consumption. This is likely due to the inherent futility of such endeavors, given that it is nearly impossible to obtain concrete data regarding the viewership statistics of such streaming platforms. This issue is something that prior studies on UFC demand have ignored, which is admittedly understandable. For this reason, I chose to include an additional proxy variable for demand that captures all Google searches for the UFC over the sample period. My intention is that this may provide a clearer picture of demand given that it broadly accounts for all searches for the UFC, and not solely the number of sold PPV packages. Proxy variables are inherently victim to measurement error and validity concerns, but this seemed like a reasonable method to roughly account for the the issue of illegal streams.

Star Effect in The UFC

The effects of "star" athletes on demand is a frequently discussed topic within the field of sports economics. Reilly et al. (2023) finds a significant negative correlation between viewership of televised NBA games and the absence of "star" players. Given this finding, one can assume that the UFC would likely follow a similar trend. Sure enough, Robbins et al. (2017) find that UFC PPV buy rates fluctuate significantly depending on the inclusion of celebrity fighters in main card events.

Their study evaluates PPV buy rates associated with events over a 12-year period. They selected a group of 57 "popular" fighters who had appeared in a minimum of 4 main card bouts, and then further narrowed down their selection to 8 fighter variables who exhibited extraordinary relevance. Within this group, only 3 fighters identified as celebrity fighters exerted the most influence over PPV buy rates. Conor McGregor was, unsurprisingly, the most influential variable over PPV buy rates - as he embodies a profoundly marketable celebrity persona. Ronda Rousey was also significantly correlated with demand not far behind McGregor and was the only female fighter that achieved star fighter status. The other fighters were associated with a positive effect on PPV buy rates, but to a far less degree than McGregor. Many of these fighters represent accomplished personalities within MMA but lack the widespread celebrity appeal required to attract significant new audiences. I think that understanding this "star" factor would enrich my specific study because it could parse out reasons for certain fighters generating high PPV earnings. There are more male "star" fighters than female, and most studies on UFC demand solely include these male fighters in their variable for star fighters (with the exception of Ronda Rousey). Robbins et al. (2017) mainly focusses on the effects of male fighters partially because it was published relatively close to the point when female fighters entered the discussion. This study, along with previous UFC demand studies that identify star effects, provided me with ample reason to justify including multiple star variables for female fighters in my own research. Based on their findings, I am interested in how the most popular female fighters from the past decade of women's UFC contribute to demand. Rousey is an isolated case of an especially popular female fighter; thus, I've decided to create a separate variable that identifies when she is present in each event, regardless of bout status.

Fighter Compensation and MRP

I've also been reviewing a section of literature that approaches the issue of fighter compensation. This is one of the more controversial topics in UFC economic literature. Multiple articles have been published addressing the Marginal Revenue Product (MRP) of UFC fighters, with some contentions between authors. Paul Gift attempts to determine the MRP of UFC fighters in a publication from 2019. He utilizes Google Trends data to estimate Marginal Product, if more popular fighters generate more interest and therefore contribute more to content revenue. Gift presents two series of regressions, with the first series evaluating the effect of variables for measures of winning on PPV purchases. The second series substitutes the measure of winning variables for Google Trends proxy measures of interest. Gift concludes that the MRP of all UFC fighters is zero across the board. (Gift, 2019)

Shortly after the Gift published his estimation of fighter MRP, Kevin Caves, Ted Tatos, and Augustus Urschel raised a few contentions to his methodology. Their paper points out the limitations of his variable for fighter popularity. Google Trends activity is a common variable for measuring interest, but a proxy variable, nonetheless. Caves, et al. (2022) show that Google Trends index for a given keyword may fall even if in the presence of higher searches if the total number of searches declines. They provide the example of Facebook's Google Trends index, which declined steadily over a period of eight years, whilst the company's annual revenues steadily increased. Caves et al. (2022)

The disagreement over athlete payment and the calculation of MRP is a longtime debate within the community of sports economists. Gerald Scully (1974) published an influential paper which estimated the MRP of professional baseball players. His model served as the traditional method for determining by linking player performance to team success, which is effectively tied with team revenue. Krautmann (1999) points out that limitations arise with Scully's method due to long-term contracts dictating athlete

compensation and team revenues. Caves, et al. (2022) refer to these developments in literature surrounding athlete MRP in their critique of Gift. An additional paper that supports their critique is Berri et al. (2015) which indicates that leagues with significant fixed broadcast revenues cause the traditional metrics of MRP to imply that athletes are overpaid most of the time. The debate over MRP for UFC fighters is pertinent for my research because it gives insights into the actual value of the fighters themselves. Increases in demand based on certain fighter specific attributes such as weight class, gender, and star effect modify each fighter's individual contribution to UFC revenues. By understanding how these variables interact upon demand for PPV events, it may enlighten our understanding of which fighters are most productive and deserving of higher wages.

ZUFFA Class-Action Trial and Fighter Rights

Zuffa exercises an undeniable reign over the market for MMA competition. In December of 2014, Cung Le, Brandon Vera, and a few other former UFC fighters filed a class-action lawsuit, which asserted that Zuffa had committed anti-trust violations and was actively exploiting fighters. The original claims were that Zuffa had established itself as a monopsony power within the market for professional MMA fighters. This essentially means that Zuffa is the sole buyer of talent with significant control over fighter compensation. To be specific, the plaintiffs asserted that Zuffa had violated Section 1 of the Sherman Antitrust Act, which forbids agreements or schemes that hinder trade or business between states or internationally. Essentially this section aims to prevent practices that render a given market uncompetitive.

Plaintiffs appealed for class action status at the outset, identifying two distinct classes affected by Zuffa's practices: The Bout Class and the Identity Class. The Bout Class is defined as all fighters who competed in one or more live UFC promoted bouts taking place from 2010 to 2017. (Cung Le, et al. v. Zuffa, 2023) The Identity class refers to every UFC fighter whose identity was exploited by the UFC through the sale of licensed merchandise or promotional materials between 2010 and 2017. (Cung Le, et al. v. Zuffa, 2023) Only the Bout class was granted class-action status. Nonetheless, this group contains a massive number of individuals, with over 1,200 current and former UFC fighters represented.

Shortly after the case achieved its class action certification in April 2023, the target date for the trial was set for April 8th, 2024. Although there is a "set" date for the trial it can be continuously delayed due to appeals made by Zuffa in response to rulings from the judge.

The class action certification is of particular importance in this trial. Milas (2022) notes that no other anti-trust sports lawsuit has encompassed the entire population of the league. He mentions that "Class actions, due to their size and publicity, often bring about substantive changes to an industry." (Milas, 2022)

Milas also touches on a series of potential solutions in his paper. Two of the most common proposals for addressing the issue are extending the Ali Act to include MMA fighters and creating an MMA fighter's union. The Ali Act refers to a law enacted in 2000 which protects the rights of boxers. It requires contract transparency to boxers and prohibits certain conflicts of interest between managers, promoters, and boxers. Milas (2022) Unfortunately, attempts at forming a UFC fighter union haven't gained overwhelming traction or recognition from the UFC. Milas proposes two other solutions for the issue of inequitable fighter payment. The first of which is the institution of a fighter's council, which is distinct from a union in that it places fighters into governing positions within the organization. (Milas, 2022) This would require specific court orders for the UFC to change its business model going forward.

The second alternative solution is for the court to rule MMA fighters as employees as opposed to contract fighters. This ruling could allow UFC fighters to enjoy increased bargaining rights and legal protection. Granted, becoming verified employees would also bring additional tax burdens and alter their compensation structure, but it seems likely that the benefits would outweigh the costs.

The economic literature on the UFC will likely expand further in the coming years because of the Zuffa case approaching its climax. If the court rules in favor of the plaintiffs, it will stand as a monumental victory for professional athletes and may set an example for future anti-trust lawsuits against other professional sports leagues in the US.

Milas (2022) describes the history of the UFC and its transformation into the successful MMA powerhouse that it is today. He describes the “Dark Ages” wherein MMA faced significant challenges due to limited regulation and opposition, notably from Senator John McCain, who labeled the sport as "human cockfighting." This led to the establishment of state commissions and the formulation of the Unified Rules of MMA, providing structure and oversight to the sport. The Zuffa era saw the UFC's resurgence, fueled by initiatives like The Ultimate Fighter reality show, which attracted new audiences and bolstered the sport's popularity. This period also marked aggressive expansion as the UFC acquired several rival promotions, consolidating its dominance in the MMA landscape. Notable fighters emerged as household names, and the UFC's promotional efforts intensified, including partnerships with Reebok for standardized fight kits and an increase in event frequency.

In the current “Endeavor” era, the UFC underwent further transformations, including its acquisition by Endeavor and strategic partnerships such as an exclusive broadcast deal with ESPN and collaboration with Venom for fight kits. Notably, the UFC transitioned into a publicly-traded company, distinguishing it from other major sports organizations. This evolution reflects the UFC's journey from a controversial spectacle to a mainstream sport with global recognition and commercial success. Milas also describes the Zuffa trial in detail and provides some potential solutions for going forward with some solutions for equitable fighter compensation. (Milas, 2022)

In the Zuffa trial, the Bout class made several claims regarding antitrust violations by Zuffa LLC, the parent company of the UFC. These claims generally centered around allegations of monopolistic practices and anti-competitive behavior in the mixed martial arts (MMA) industry. The class argued that Zuffa had unlawfully maintained a monopoly in the market by engaging in practices such as exclusive contracts with fighters, acquisition of rival promotions, and predatory pricing strategies. They also claimed that Zuffa's actions had harmed competition, deprived fighters of fair compensation, and limited consumer choice.

The next steps for the sport of MMA remain uncertain as ongoing litigation determines potential remedies. The court has the authority to impose various penalties, including monetary fines or even the breakup of the company, as seen in historical cases like Standard Oil. Additionally, the court can suggest changes to business practices, much like United States v. Paramount Pictures, and Congress may enact legislation in response to antitrust lawsuits.

The two main proposed solutions for MMA's issues are extending the Ali Act or forming a fighters' union. However, both initiatives have faced hurdles. While the Ali Act expansion was introduced to Congress, it did not progress further. Efforts to establish a fighters' union have also faltered, despite some high-profile attempts. Although unionization has substantial support among fighters, legal complexities remain due to their classification as independent contractors rather than employees.With these proposed solutions facing challenges, alternative options emerge for the court, such as creating a UFC Fighter's Council or reclassifying fighters as employees rather than independent contractors.

A pragmatic solution could involve establishing a fighter's council, granting fighters a voice in decision-making processes. This model, similar to athlete councils in other sports, provides shared governance and addresses fighter concerns without the collective bargaining power of a union. The council would offer representation across various categories and advocate for fighter needs, potentially influencing policy changes within the UFC.

Alternatively, the court could rule that fighters are employees rather than independent contractors, granting them the right to unionize and access workplace protections. This legal distinction would have significant implications for fighters' rights and could reshape their relationship with the UFC.

The legal status of athletes varies across sports, with team athletes typically classified as employees and individual athletes as independent contractors. Recent developments, such as the NLRB memo on collegiate athletes, highlight evolving perspectives on athlete employment status.

Factors such as the UFC's control over fighters' opportunities for profit and loss, both inside and outside the cage, suggest a potential employee relationship rather than independent contractor status. Additionally, the UFC's influence over fighters' sponsorship opportunities indicates a level of control more aligned with employment. Similar to the debate over the MRP of UFC fighters, I think that understanding the Zuffa trial is supplemented by demand studies. Such research sheds light on specific variables and attributes that correlate with increased consumer demand for events. Not only do the findings give insights for the UFC in how they should market their events, but they also provide justification for fighters to argue their importance as crucial moneymakers for the company.

I think that my demand research on the UFC is beneficial for forming a better understanding of the Zuffa trial. Women are historically underpaid relative to their male counterparts. The gender component of my study serves to explain how female fighters contribute to demand and may help to justify arguments for increased pay for female fighters. If the results reveal consumer preferences for certain fighters and weight classes, it would validate these fighters' argument for increased compensation. Not to mention, if the demand for PPV UFC events is highly inelastic given the price increases of the PPV access over the past decade, then it would further enforce the argument that Zuffa is exercising uncompetitive behavior (UFC as the sole purveyor of MMA with no alternatives).

Data

This study will focus on evaluating the relationship between several gender related variables and demand for the UFC. Additional variables will account for other factors such as weight classes and star effects. The data used for this study was pulled from a combination of UFC enthusiast websites and the official UFC website itself. PPV buyrate info for each event was pulled from Tapology.com. The event specific data for the fighter/weight class variables were taken from both Tapology.com and UFCSTATS.com and cross referenced. Sherdog.com and MMAJunkie.com were also used when either of the other sites were missing information on a specific event. A demand proxy variable was easily extracted from Google Trends, which allows users to download time series data across a desired sample period.

A list of summary statistics is included in Table 1. The primary dependent variable for evaluating demand is the PPV buyrate for individual UFC events over time. Buyrate value is the number of times that viewers purchase PPV access for a given event. An alternative metric for demand is in-person attendance, measured through ticket sales. My issue with this metric is that UFC events are hosted at

various venues all over the U.S. and in other countries, each with its own limit for maximum attendance, and with varying degrees of local UFC engagement. PPV purchases are available to all fans with internet access and seem to form a more consistent picture of demand. I have also decided to run an additional regression with a separate dependent variable for engagement. Instead of PPV Buyrate, I've substituted a proxy for consumer interest by collecting the monthly Google Trends data for "UFC" searches. Google Trends data is normalized, meaning that the highest value of searches within a specific range is set to "100", and all other values are calculated relative to that peak value. I consider Google Trends data an ideal proxy variable for consumer interest as it captures general interest in the UFC exhibited online. One of the unavoidable issues with PPV demand studies is the inability to account for viewers that circumvent the PPV paywall. The unfortunate reality is that people can easily access events on illegal streaming services. Without legitimate consequences for consuming the UFC in this manner, it remains a very viable, cost-effective option for fans. Google Trends data may be able to capture some additional engagement from "black market" viewers given that it accounts for online searches pertaining to UFC events - many of which are likely seeking illegal streams.

The current dataset consists of seventeen independent variables and 196 total observations. Each observation accounts for a single UFC event. My sample contains any main UFC events with accessible PPV buyrate data from 2004 to early 2022. I chose to limit the sample to this period for a few reasons. Firstly, the data on PPV buyrates from 1993 until the early 2000s is sporadic at best, with many large gaps between observations. I also wanted the time frame for both dependent variables to align, and Google Trends data is limited to observations from 2004 onward. The third reason is due to the fact that my study focuses primarily on evaluating gender related variables in the UFC. Given that the first women's fight did not occur until 2013, it feels reasonable to balance observations evenly on either side of this initial event. My intention is that this sample can account for any significant changes upon dependent variables following the addition of women's UFC.

Within each observation are a combination of numerical and categorical independent variables. UFC events are divided into three levels: the main event, the main card, and the prelim card. The main event refers to the main fight for the event, which is generally the most highly anticipated bout. The main card contains three or four other fights that feature similarly high ranked fighters to those in the main event. The prelim card is reserved for newer fighters looking to make a name for themselves as a UFC fighter. Some of the variables in this study make distinctions between the levels of the event. The weight class variables are specific only to the main fight in an event. Other variables such as StarFemale or TUF20 Cast are marked regardless of the fighter's location in the event.

Several of the independent variables are binary variables that take the value of 1 or 0, to indicate whether the observation contains an instance of that variable. The first of these variables is "Event Contains Women" which accounts for all events that contain a women's fight, regardless of weight class or placement in the overall event. "Number of Women's Fights" is a numerical variable that identifies the number of women's fights within an event. "Female Main Fight" is a binary variable which accounts for observations where the main event is a women's fight. "Fight with TUF20 Cast" is a binary variable that accounts for all events that contain one or more cast members from *The Ultimate Fighter 20: A Champion Will Be Crowned*. *The Ultimate Fighter* (TUF) is a reality TV series that follows a group of fighters as they compete throughout a season. TUF20 aired in 2014, roughly one year after the advent of Women's UFC, and was the first season to feature a fully female roster of fighters. Given that the cast consisted of

rookie fighters and that TUF is a popular series, my assumption is that this variable will help capture any significant fan interest in women's UFC that was garnered by TUF20. Prior studies on UFC demand have tended to include a variable for TUF, with mixed results on its degree of significance and positive correlation. "Star Female" is a binary variable that accounts for any event that contains one or more female "star" fighters that I've identified. The significance of "star" athletes on demand for sports cannot be understated, and several studies have confirmed that celebrity athletes play a significant role in generating demand. (Reilley et al., 2023) (Mahon, 2015) Because Salaga (2022) found that UFC fans interact with social media as a substitute for the events themselves, I decided to track the UFC's accounts across two of the most popular social platforms: Instagram, and X (Twitter). From here, I located the accounts of all female fighters appearing in main events or co-main events since 2013 and identified eight of those fighters with the highest combined followers between their personal accounts on each platform. Those fighters with the highest social media interaction were: Valentina Shevchenko, Holly Holm, Amanda Nunes, Ronda Rousey, Amanda Ribas, Rose Namajunas, Joanna Jedrzejczyk, and Miesha Tate. This variable is entirely based on social media interaction, but I believe it may be more accurate for identifying star power than metrics of fighter performance, given that prior studies such as Robbins (2017) found that several of the highest ranked fighters lacked significant "star" power (draw on demand for PPV).

The other "star" related variable that I've included is a binary variable, "Rousey Present" that accounts for any UFC events when Ronda Rousey is fighting, regardless of her location on the different card tiers. Ronda Rousey was an extremely popular fighter during her time in the UFC and she is largely credited as the fighter that pioneered women's UFC. My rationale is that this variable may help encapsulate the degree to which she contributed to the UFC's revenue. Rousey is so popular amongst UFC fans and broader sports culture that I was hesitant to include her in the previously mentioned "Star Female" variable due to my fear that she would artificially inflate the coefficient. I think that this potential issue is resolved by my decision to make the "Star Female" variable identify all observations where female star fighters are present, regardless of their place in main-event or below it. Rousey has headlined in more main events than most of the other star female fighters and would most certainly inflate results if I tracked the variable solely based on main or co-main events.

The next series of variables are binary variables which account for the weight class of the main fight in an event. I've included separate variables for men's and women's weight classes. For instance, the variable "Women's Bantamweight Main" takes a value of 1 in any observations when Ronda Rousey (or any other Women's Bantamweight fighter) is fighting in the main event. Prior studies on demand tend to designate weight class variables based on one of two methods. The first of these methods simply identifies the weight class of the main fight for each event or observation. The other method only identifies weight class when the main fight in an event/observation is also a title fight. The rationale for the title fight method is probably due to title fights being inherently more publicized and thus more likely to generate demand. I chose to use the holistic approach that accounts for all main fights across all events, regardless of title-fight status. I think that isolating title fights may exaggerate the demand for specific weight classes. Furthermore, Wantanabe (2015) produced anomalous results compared to the other studies that used the holistic method, with no positively significant effect of higher weight classes on in-person attendance. The final independent variable, "PPV Price", accounts for the price of PPV UFC events at the time of each observation. I was motivated to include this variable as it controls for price increases in the PPV offerings of UFC events over the course of the sample period.

Methodology/Model

I will be using STATA to run two separate OLS regressions on my data. The first of which will use *PPV Buyrate* as the dependent variable. The second regression will simply substitute *PPV Buyrate* with *Trends Proxy.* Equation 1 is used to explain my model for examining both *PPV Buyrate* and the *Trends Proxy*. The equation uses identical independent variables for evaluating both dependent variables. Because the values for *PPV Buyrate* are significantly larger than any other variables in the dataset, and these values increase significantly over time from the first observations, I've chosen to estimate a double-log function in Stata for this variable. This will help to make the coefficients generally more manageable and easier to interpret.

My hypothesis is that heavier weight classes will be positively significant. People tend to favor higher weight classes, but sports fans are also notably swayed by star effects. For this reason, I hypothesize that *StarFemale, TUF20Cast,* and *RouseyPresent* will each be significant at either the 1% or 5% level. Each of these variables plays upon star effects to some degree. *TUF20* may be less significant than *StarFemale* or *RouseyPresent,* given that the variable accounts for a specific handful of fighters appearing in an isolated season of "The Ultimate Fighter." The weight of TUF20's influence on demand would likely decrease the further we get from its debut.

Checking for multicollinearity in the initial equation that included all independent variables, indicated that several independent variables had VIF scores above five. The mean VIF for this first regression was 6.28. This means that there is excessive multicollinearity in both of the models. The variables with VIF scores higher than 5 in the PPV Buyrate regression were: FemaleMain, WomensBantamweight, LightHeavyweight, Middleweight, Heavyweight, Welterweight, WomensFeatherweight, Lightweight, and NumberWomensFights. After testing several combinations of independent variables, I concluded that the variable *FemaleMainFight (Fmain)* was highly multicollinear and causing all regressions to result in mean VIF scores higher than 5. In order to solve this issue for all subsequent regressions, I removed the variable *FemaleMainFight* from Equation 1. As mentioned previously in the Data segment, this variable captured those observations where the main fight in the event was between two female fighters. It makes sense that this would be multicollinear with several of the other gender related variables such as *EventContainsWomen, NumberWomensFights, TUF20Cast, StarFemale,* and *RouseyCard.* Most of these are similar dummy variables that also identify those events where the main event features female fighters – particularly *RouseyCard* and *StarFemale.* I was content with removing this variable for the sake of reducing multicollinearity across subsequent regressions and effectively bolstering the soundness of my model.

<u>Equation 1:</u>

$$\text{PPV Buyrate/Trends Proxy} = \beta_0 + \beta_1\ \text{EventContainsWomen} + \beta_2\ \text{NumberWomenFights} + \beta_3\ \text{TUF20Cast} + \beta_4\text{StarFemale} + \beta_5\ \text{Bantamweight} + \beta_6\ \text{Featherweight} + \beta_7\text{Lightweight} + \beta_8\text{Welterweight} + \beta_9\text{Middleweight} + \beta_{10}\text{LightHeavyweight} + \beta_{11}\text{Heavyweight} + \beta_{12}\text{WsStrawweight} + \beta_{13}\text{WsFeatherweight} + \beta_{14}\text{WsBantamweight} + \beta_{15}\text{RouseyCard} + \beta_{16}\text{PPVPrice} + \varepsilon$$

The base equation (Equation 1) features a total of sixteen independent variables after removing *FemaleMainFight.* VIF scores for this model are included in the "Model 1" column of Table 3. This VIF test indicated that there are still a handful of variables with VIF scores higher than 5 present in the model. These are primarily those independent variables that identify the male weight classes of main events: *LightHeavy, Middleweight, Heavyweight, Welterweight,* and *Lightweight.* The only gender related variable from Equation 1 with a VIF score higher than 5 was *NumFight.* This is the variable that contains the number of female fights that occur within a given event/observation. The mean VIF for Equation 1 was 4.51, and thus the model should be relatively safe from issues caused by excess multicollinearity.

In order to address some of the higher VIF scores from Equation 1, I formulated a second equation (Equation 2) that isolated the gender related variables from the first equation. Equation 2 contains a total of nine independent variables after removing all male weight class variables that were highly multicollinear in the preceding equation's VIF test. The VIF scores for Equation 2 are presented in the column "Model 2" of Table 3. None of the independent variables in Equation 2 sported VIF scores higher than 5, indicating that they are at little risk of multicollinearity. *NumFight* still had the highest VIF score of the gender-related variables, with a score of 4.13, but this value is lower than 5 and thus I am content with it. Furthermore, the mean VIF for this equation was significantly less than that of Equation 1, with a score of 2.37.

Equation 2:

$$\text{PPV Buyrate/Trends Proxy} = \beta_0 + \beta_1\ \text{EventContainsWomen} + \beta_2\,\text{NumberWomenFights} + \beta_3\ \text{TUF20Cast} + \beta_4\text{StarFemale} + \beta_5\text{WsStrawweight} + \beta_6\text{WsFeatherweight} + \beta_7\text{WsBantamweight} + \beta_8\text{RouseyCard} + \beta_9\text{PPVPrice} + \varepsilon$$

Discussion of Results

I have included the results from both regression equations in Table 2. Column 1 and Column 2 contain the results for the two regressions that utilized PPV Buyrate as the dependent variable, while Column 3 and Column 4 contain the regressions where Google Trends was the dependent variable. Each of the regressions elicited a few independent variables with high levels of significance that I will discuss.

PPV Buyrate Demand

The Equation 1 regression for PPV Buyrate produced an overall p-value of 0, indicating that there are at least one or more independent variables with high levels of significance. Seven of the independent variables were significant at the 1% level. *Lightweight, Welterweight, Middleweight, LightHeavyweight,* and *Heavyweight* were the weight class variables that returned highly significant positive coefficients. This finding aligns with those of prior demand studies, in that the highest four men's weight classes are significant and positively correlated with demand. Prior studies indicated that the highest weight class (Heavyweight) elicits the strongest positive effect on demand. This is a conclusion present in Salaga(2013), Wantanabe(2015), and McGowan (2015), but my regression showed that Welterweight was the weight class variable that exerted the strongest effect on PPV demand. It's coefficient was 1.356, meaning that the inclusion of a Welterweight main fight in a UFC event should exhibit a 1.356 unit

increase in the natural log of PPV Buyrate. Given that Heavyweight has only the fourth highest coefficient of these significant weight class variables, I believe that the UFC might be led astray by following previous recommendations for hyper-fixate on marketing for Heavyweight events.

Additional variables significant at the 1% level were *RouseyCard* and *PPVPrice.* Rousey's presence within UFC elicited a 1.017 unit increase in the natural log of PPVBuyrate compared to events where she was absent. This finding supports the conclusions from prior studies that found Star power to be significant driver for demand. Salaga (2012), Robbins (2017), and McGowan(2015) each stress the importance of star power on UFC demand. Given the high significance and positive effect of *RouseyCard*, this variable makes a convincing case for the UFC to focus on marketing similarly dominant female fighters as they did in 2013 with Ronda Rousey. Generating new, and highly popular female personalities in the UFC would not only increase the company's revenues, but also help increase the popularity of the women's MMA a whople. My other two-star fighter related variables were much less significant than *RouseyCard*. *StarFemale* was insignificant altogether, while *TUF20* was moderately significant at the 5% level. Contrary to my initial expectations *TUF20* was negatively correlated with PPV demand, sporting a coefficient of -.335. This variable's negative relationship with demand was unanimous across all four regressions, although this was the only instance where the variable was significant at the 5% level or above. My suspicion is that *TUF20's* focus on only a single season of TUF, along with the cast's status as rookie fighters made this variable inadequate for encapsulating a group of female fighters that carry "star" appeal. The negative correlation may be explained by only a handful of the cast becoming accomplished fighters in their UFC career, and thus being sorted into "filler" events that occurred between big headline fights. *EventContainsWomen* was moderately significant at the 5% level, showing a weakly negative effect on PPV Buyrate with a coefficient of -.411. I think that the meaningfulness of this variable may be limited by the fact that there are very few events that *don't* contain female fights since their initial debut in 2013. This makes it difficult to ascertain whether simply the presence of female fights is driver for demand if nearly all events since 2013 contain them.

My second regression for PPV Buyrate utilized Equation 2, which held out the male weight classes variables that were identified as variables with higher VIF scores. This regression summary can be found in Column (2) of Table 2. This regression largely supported the findings from the first PPV model, with both *PPVPrice* and *RouseyCard* showing significance at the 1% level. It makes sense that PPV price has correlated positively with higher demand over time given the drastic increase in the UFC's popularity over the course of the sample period. It seems that price increases over time have been implemented adequately over the years to ensure that this variable does not become negatively correlated with demand. *PPVPrice* is strongly significant across all the regressions in my study, with marginally positive effects on PPV Buyrate and Trends proxy. In this regression, *EventContainsWomen* was also significant at the 1% level with a negative coefficient of -.56. My theory for why this variable produced a negative correlation is that the UFC may be placing an emphasis on marketing "supercards" like those referenced in McGowan (2017). In this scenario, the UFC is actively assembling mega events that feature more than one popular title fight, as opposed to spreading popular title fights and fighters evenly across the full schedule of events for a given season. This would effectively result in the highest portion of their revenues being derived from a small sliver of the total events offered for PPV purchase. Most of these "supercards" do not feature female fights as the main event. This would explain why this second regression for PPV Buyrate produced moderate negative significance for the female weight classes variables *WsStrawweight* and *WsFeatherweight*. These are weight classes that are historically far less

publicized compared to *WsBantamweight* (Rousey's weight class), or the higher men's weight classes, and thus elicit comparatively lower demand.

Google Trends Demand Proxy

The first regression on the dependent variable *Trends* is included in Column (3) of Table 2. Using Equation 1 as the model, this regression produced results that echo my earlier findings regarding the significance of male weight classes on demand. *Lightweight, Welterweight, Middleweight, LightHeavyweight,* and *Heavyweight* were, once again, significant at the 1% level. The resulting coefficients for these five variables also support my earlier conclusion that higher weight classes are not strictly dominant over comparatively lower weight classes when it comes to demand. *Lightweight (23.611)* maintained its position as the weight class variable with the highest draw on the dependent variable. In fact, the results showed that coefficients of these five most significant weight class variables incrementally decreased as weight class increased, with *Heavyweight* (19.132) having the lowest coefficient. This finding is ample evidence to negate the conclusion from prior studies that the Heavyweight class reigns supreme as the strongest positive driver for demand. Once again, the *PPVPrice* variable was significant at the 1% level. Other variables that were significant at the 5% level were *WsBantamweight (20.311), Bantanweight(18.698),* and *Featherweight(17.906).* Women's Bantamweight features a coefficient even higher than *Heavyweight* (19.132). Google Trends data provides an alternative picture of demand for the UFC, and it is potentially more accurate for capturing the interest of those fans who tend to utilize illegal streaming as opposed to purchasing PPV events. The strong positive effect of *WsBantamweight* provides a valid argument for the UFC to increase its marketing for this specific weight class and possibly other women's weight classes as well. Such a finding may also contribute to the prior conclusions regarding the importance of star effects (Salaga (2012), McGowan (2015), and Robbins (2017)). This is because Ronda Rousey fought her entire UFC career in the Women's Bantamweight division, along with Amanda Nunes (who later dethroned Rousey as champion). Each of these fighters are not only two of the biggest female UFC stars (particularly Rousey), but both also fought in a large portion of those main event fights identified in the *WsBantamweight* variable.

This first regression for *Trends* also produced two minorly significant variables at the 10% level: *TUF20 (-6.988)* and *StarFem (7.182).* TUF20's Cast variable continued to show a negative correlation - likely for the same reasons as mentioned in my prior analysis of the first PPV Buyrate regression. The Star female fighter variable has a positive coefficient, lending to my conclusion that star effects are crucial for female fighters to become stronger drivers of demand (e.g. Rousey). That being said, this variable is only loosely significant, and thus I am wary of overweighting its importance.

My second regression on the dependent variable *Trends* is included in Column (4) of Table 2. This regression utilizes Equation 2 as its model, leaving out the male weight class variables. As with all prior regressions *PPVPrice* is significant at the 1% level and has a small, positive coefficient. The most interesting finding from this final regression is that the only other significant variable is *StarFem* at the 5% level. Its significance greater than the preceding *Trends* regression that utilized Equation 1. Not only this, but the coefficient is also slightly higher (7.427). Such increased significance and power of Star female fighters on *Trends* indicates that female fighters with star effects drive consumer interest in the UFC to some extent. This variable was entirely inconsequential in my earlier regressions on PPV Buyrates, which may be partially due to creating the *StarFem* variable based on social media interaction.

The alternative method would be using fighter ranking or another performance-based metric to determine who the "star" fighters are.

Conclusion

The findings from this study generally corroborate the conclusion from other demand studies that men's weight classes in the main event have a significant effect on PPV Buyrates. This is where the similarities end. My results did not prove that higher weight classes are directly correlated with higher PPV buyrates when compared with lower weight classes.

Variables for star effects (*StarFem*, *RouseyCard*) were significant and positively correlated with demand to some degree in each of the four regressions. *RouseyCard* was significant in the two Buyrate regressions, while *StarFem* was significant in the two Trend regressions. These findings regarding star effects reinforce earlier studies by McGowan (2015) , Robbins (2017), and Reilly (2023) that have each stressed the magnitude of specific hyper-popular athletes as drivers for consumer demand.

In terms of the gender component, my results do not indicate that women's UFC alone is a strong driver for demand. The power of star effects still applies to women's UFC fighters. The few that have strong star effect will likely be capable of increasing demand for individual events. This conclusion is supported strongly by the significant positive effects of the *StarFem* variable and the *RouseyCard* variable. The variable *WsBantamweight* also contributes to a lesser degree, given that I am only inferring that its high weight is due Rousey's presence in many of those observations. The high positive coefficient of *WsBantamweight* could also be indicative of a growing consumer interest in female fighters within the division.

The other star-related variable was *TUF20,* which was negatively correlated with demand across all four regressions and moderately significant in the PPV Buyrate regression that utilized Equation 1. This finding contradicts prior studies that found there to be a significant effect on demand from TUF veterans appearing in events. I think that this is due to the limited lineup of fighters featured in TUF20, in addition to my choice of making the variable identify all events containing a TUF20 cast member *regardless of bout status.* Prior studies like Salaga (2012) used the TUF variable only to identify those events where a TUF cast member was present in either the main fight or the co-mainfight. This approach weeds out any less skilled or popular fighters from the program as these fighters are less likely to appear in highly publicized main events.

There are some obvious limitations for using Google Trends data as a proxy for UFC demand. Proxy variables are fundamentally at risk of validity issues because they don't directly quantify the thing that they seek to encapsulate. In this case, I am hoping to use the Trends data to roughly account for demand that is not captured in the PPV numbers for each event. Given that illegal streams are hugely prevalent methods for consuming the UFC, I feel that this proxy variable is beneficial for further developing an understanding of how these gender related variables interact with consumer interest.

Another shortcoming of my methodology for this research is the lack of control variables compared to other UFC demand studies. Each of these other studies utilized more developed datasets than my own, with control variables that identified events which had overlapping substitutes on the same day. These substitute control variables tended to include concurrent popular American sporting events such as the NFL, NBA, NHL, and MLB. Other control variables accounted for events taking place on holidays or during a recession. Including fully developed control variables is something that I wish I could have

included in my model, but the process of compiling this data for each of the ~200 observations would have required more time than I could realistically commit to this endeavor.

Another limitation of my study was my inability to track individual fighters in a similar manner to that of McGowan (2015) and Robbins(2017). Compiling individual variables for every female fighter would have been a powerful way to compare the star effects of specific fighters. It would also make it possible to evaluate which fighting styles of female fighters are most favored by consumers. This undertaking is more than I am capable of with the time I've allotted for completing this undergraduate thesis. Nonetheless the absence of truly detailed fighter specific data on fighting style and other attributes limits the potential insights of my research compared to studies with more resources allocated to data collection.

Considering my findings from this research, I think that the UFC ought to focus less on marketing the highest weight classes or headlining these weight classes in main events. There seems to be negligible differences between the degree to which the four or five highest weight classes positively affect demand. Instead of marketing a specific weight class, the UFC could pivot their goal to be maximizing the star effects of fighters across several weight classes and genders. In terms of the women's division, the UFC should increase the number of Women's Bantamweight fights offered on PPV events. Women's Bantamweight was the most significant and positively correlated women's weight class upon demand, so this makes sense to me. Furthermore, using social media to generate interesting stories and personalities for these fighters may help contribute to star effects. Although Rousey has since retired from competing in the UFC, it could be legitimately helpful to offer her a contract as a commentator for UFC events or even a role as a coach in future seasons of TUF. Overall, I think that the most crucial part of further building out the women's UFC division is boosting fighters into the realm of superstar notoriety.

Beyond the UFC's marketing tactics, these findings also provide insights for policy makers. In the case of the ongoing Zuffa lawsuit, a primary topic of debate is fighter MRP and lack of fighter compensation. Seeing how strongly star power affects demand would help lawmakers reach conclusions about which fighters generate a significant portion of the UFC's revenues. Specifically, the proof of female star power seen through the Rousey variable and star female variable in my study provides a great rationale for lawmakers to advocate the rights of female UFC fighters in the ongoing Zuffa lawsuit.

I am interested in further unpacking the relationship between Women's UFC and PPV demand. In future research I would like to evaluate the specific fighting styles that are most favored by consumers for male and female fighters respectively. Along with this, I would like to evaluate the draw of a female weight class champion on demand and compare these findings with their male counterparts. Fighter rivalries and rematches are another thing that I am interested in looking into. I am curious how rematched fights effect demand, in addition to qualitatively measuring the amount of "trash talk" preceding events and then observing the associated event's PPV Buyrates. The UFC is still relatively new, and there are limited econometric studies on the topic compared to other sports that have dominated the scene for decades. I am excited to see what future research will bring to the table in light of my own recent foray into the economics of the UFC.

Tables and Data

Table 1. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
PPV Buyrate	195	491621.36	346105.6	80000	2400000
Event Contains Women	195	.41	.493	0	1
Number of Women's Fights	195	.738	1.04	0	4
Female Main Fight	195	.077	.267	0	1
Fight with TUF20 Cast	195	.108	.311	0	1
Star Female	195	.159	.367	0	1
Bantamweight Main	195	.031	.173	0	1
Featherweight Main	195	.056	.231	0	1
Lightweight Main	195	.108	.311	0	1
Welterweight Main	195	.149	.357	0	1
Middleweight Main	195	.164	.371	0	1
Light Heavyweight Main	195	.246	.432	0	1
Heavyweight Main	195	.154	.362	0	1
Women's Strawweight Main	195	.005	.072	0	1
Women's Bantamweight Main	195	.046	.21	0	1
Women's Featherweight Main	195	.021	.142	0	1
Popularity Proxy	195	39.667	17.027	3	100
Rousey Present on Card	195	.041	.199	0	1
PPV Price	195	54.949	9.138	30	75

Table 2: Regressions for Buyrate and Trends

Variables:	(1) Ln_Buyrate	(2) Ln_Buyrate	(3) Trends	(4) Trends
Event Contains Women	-.411**	-.56***	.798	-1.948
	(.195)	(.201)	(4.263)	(4.209)
Number of Women's Fights	.147	.16	-.487	-.095
	(.097)	(.097)	(2.108)	(2.034)
Fight with TUF20 Cast	-.335**	-.176	-6.988*	-5.05
	(.168)	(.173)	(3.662)	(3.615)
Star Female	.15	.157	7.182*	7.427**
	(.171)	(.179)	(3.725)	(3.745)
Bantamweight Main	.524		18.698**	
	(.4)		(8.728)	
Featherweight Main	.711*		17.906**	
	(.361)		(7.889)	
Lightweight Main	1.194***		23.611***	
	(.34)		(7.424)	
Welterweight Main	1.356***		22.349***	
	(.335)		(7.326)	
Middleweight Main	1.019***		20.683***	
	(.338)		(7.377)	
Light Heavyweight Main	1.166***		20.462***	
	(.33)		(7.214)	
Heavyweight Main	1.129***		19.132***	
	(.335)		(7.317)	
Women's Strawweight Main	-.583	-1.769**	5.64	-16.605
	(.724)	(.687)	(15.822)	(14.389)
Women's Bantamweight Main	.426	-.621*	20.311**	-.113
	(.432)	(.319)	(9.432)	(6.688)
Women's Featherweight Main	.295	-.742**	9.034	-10.707
	(.44)	(.342)	(9.615)	(7.15)
Rousey Present on Card	1.017***	1.062***	-4.409	-2.83
	(.331)	(.346)	(7.235)	(7.238)
PPV Price	.023***	.022***	1.174***	1.217***
	(.007)	(.007)	(.143)	(.142)
_cons	10.629***	11.772***	-45.018***	-26.538***
	(.441)	(.346)	(9.636)	(7.237)
Observations	195	195	195	195
R-squared	.276	.161	.445	.409

Standard errors are in parentheses
**** p<.01, ** p<.05, * p<.1*

Table 3: VIF Scores for final regression models

Model 1: Base Regression

Variable	VIF	1/VIF
lightheavy	10.73	0.093173
middle	8.30	0.120537
heavy	7.75	0.129097
welter	7.55	0.132439
light	5.89	0.169905
numfight	5.31	0.188382
femalein	4.89	0.204675
wbantam	4.35	0.229729
feather	3.68	0.271631
bantam	2.52	0.396095
rousey	2.29	0.436958
wfeather	2.06	0.484439
starfem	2.06	0.485141
ppvprice	1.89	0.527726
tuf20	1.43	0.698301
wstraw	1.42	0.704537
Mean VIF	4.51	

Model 2: Gender Variables

Variable	VIF	1/VIF
numfight	4.83	0.206951
femalein	4.65	0.214889
rousey	2.24	0.446885
wbantam	2.14	0.467764
starfem	2.04	0.491095
ppvprice	1.83	0.546479
tuf20	1.36	0.733573
wstraw	1.15	0.871874
wfeather	1.12	0.896538
Mean VIF	2.37	

References

Tainsky, S., Salaga, S., & Santos, C. A. (2013). Determinants of pay-per-view broadcast viewership in sports: The case of the ultimate fighting championship. Journal of Sport Management, 27(1), 43-58.

Watanabe, N. M. (2015). Sources of direct demand: An examination of demand for the ultimate fighting championship. International Journal of Sport Finance, 10(1), 26-41. https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip&db=eoh&AN=1501602&site=ehost-live&custid=s6847256

Cung Le, et al. v. Zuffa, LLC d/b/a Ultimate Fighting Championship

Berri, D. J., Leeds, M. A., & von Allmen, P. (2015). Salary determination in the presence of fixed revenues. International Journal of Sport Finance, 10(1), 5.

Caves, K., Tatos, T., & Urschel, A. (2022). Are the lowest-paid UFC fighters really overpaid? A comment on gift (2019) ['moving the needle in MMA: On the marginal revenue product of UFC fighters']. Journal of Sports Economics, 23(3), 355-365.

Gift, P. (2020). Moving the needle in MMA: On the marginal revenue product of UFC fighters. Journal of Sports Economics, 21(2), 176-209.

Kim, A., Kim, M., Salaga, S., & Zhang, J. J. (2022). Impact of social media on intention to purchase pay-per-view and event attendance: The case of the ultimate fighting championship. International Journal of Sport Communication, 15(1), 10-22.

Krautmann, A. C. (1999). What's wrong with scully-estimates of a player's marginal revenue product. Economic Inquiry, 37, 369-381.

Milas, J. (2022). Out of the octagon and into the courtroom: The UFC's antitrust lawsuit. DePaul J.Sports L., 18, 1.

R. Robbins, T., & E. Zemanek, J., James. (2017). UFC pay-per-view buys and the value of the celebrity fighter LLC CPC Business Perspectives. doi:10.21511/im.13(4).2017.04

Reilly, P., Solow, J. L., & von Allmen, P. (2023). When the stars are out: The impact of missed games on NBA television audiences. Journal of Sports Economics, , 15270025231174616.

Scully, G. W. (1974). Pay and performance in major league baseball. The American Economic Review, 64(6), 915-930.

Tainsky, S., Salaga, S., & Santos, C. A. (2012). Estimating attendance for the ultimate fighting championship: A demand theory approach. International Journal of Sport Management and Marketing, 11(3-4), 206-224.

McGowan, R. A., & Mahon, J. F. (2015). Demand for the ultimate fighting championship: An econometric analysis of PPV buy rates. *Journal of Business and Economics, 6*(6), 1032-1056.

Watanabe, N. M. (2012). Demand for pay-per-view consumption of ultimate fighting championship events. *International Journal of Sport Management and Marketing, 11*(3-4), 225-238.

Reams, L., & Shapiro, S. (2017). Who's the main attraction? star power as a determinant of ultimate fighting championship pay-per-view demand. *European Sport Management Quarterly, 17*(