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*Several factors influence the price college athletics administrators set for football tickets, but nearly all pricing decisions are established prior to the season commencing. The secondary ticket market allows college athletics administrators to observe real-time consumer valuation for tickets. The purpose of the current study was two-fold: (a) to examine how secondary ticket market prices fluctuate at different time periods leading up to game day and (b) to examine the relationship between several key demand variables and "Get In" price (GIP) during those different time periods. To conduct this study, individual game GIPs were collected from StubHub for all Power 5 home contests (N = 434) for the 2019 football season at four different time periods; (a) pre-season, (b) two weeks before game day, (c) one week before game day, and (d) the day before game day. Four categories of explanatory variables--(a) time/environmental factors, (b) game-related factors, (c) performance factors, and (d) home market factors--were also collected. Four regression models were conducted, predicting between 38.9% and 70.5% of the variance in GIP at each point in time. As game day grew closer, overall GIP diminished in a linear fashion at each data collection. Several explanatory variables were significant in each model and are interpreted in the discussion.*

Ticket sales have long been a major source of revenue for collegiate athletics departments. College football, in particular, generates significant revenue from ticket sales. The top 25 college football programs generated annual revenues of over $2.7 Billion in 2018, and 27% ($729 million) of that revenue is a result of football ticket sales (Smith, 2019). Berkowitz (2020) suggested the total football ticket revenue for all of Power 5 schools exceeded $1 billion in 2019, while sport economist Patrick Rishe estimated Power 5 schools would have generated an average of $18.6 million in football ticket sales in 2020 had the coronavirus pandemic not struck (Schlabach & Lavigne, 2020). According to the NCAA Finances of Intercollegiate Athletics Database, 17.5% of all revenue (generated and institutional support in FY 2019) came from sport ticket sales at FBS Autonomy institutions (Power 5 universities), with the large majority of those sales stemming from football (NCAA, 2020). Recently, ticket sales in professional team sports have undergone a major overhaul with new technology enabling sport marketers to learn better ways to maximize revenue. Charging the same price for every seat—and against every opponent--is no longer the most efficient way to sell tickets. Variable and dynamic ticket pricing strategies have led the way in promoting smarter, more efficient pricing approaches to create additional revenue (Shapiro & Drayer, 2012). From a college football perspective, it has never been more important for athletic departments to accurately price their catalog of events to produce revenue.

Traditionally, the predominant method for establishing ticket prices to live sporting events has been to raise prices incrementally over time by some arbitrary percentage or flat rate (Howard & Crompton, 2004). However, more recent scholarship has highlighted the positive impact of demand based pricing, including variable ticket pricing (Rascher, McEvoy, Nagel, & Brown, 2007), dynamic ticket pricing (Shapiro & Drayer, 2012, 2014), and other forms of discriminant pricing (Courty, 2003) that have been used in professional sport. These pricing strategies are largely in response to the secondary ticket market, which highlights inefficiencies in the primary market, particularly in high demand environments (Drayer, Shapiro, & Lee, 2013). According to Drayer et al., sport organizations typically underprice tickets due to the desire to increase attendance, increase ancillary sales, and create a better atmosphere at the stadium. Additionally, sport organizations want to avoid perceptions of price gouging for high demand events. The resale market capitalizes on these factors to create arbitrage opportunities. Thus, research on ticket pricing in the resale market has become more prevalent (Diehl, Maxcy, & Drayer, 2015; Diehl, Drayer, & Maxcy, 2016; Shapiro & Drayer, 2014). The majority of the strategic pricing research has been conducted within the context of professional sport. Our understanding of ticket pricing within the realm of college sport, and the inefficiencies in a dual-market environment such as college football, is limited.

Although some athletic departments are using demand-based pricing strategies for college football, these strategies are not consistent across all programs, further highlighting the need to investigate ticket prices across markets. College sport, and football in particular, presents some unique challenges with regards to ticket pricing. These challenges include the vast number of teams, competing in various divisions and conferences, each with differing policies and guidelines. Additionally, the revenue disparity is dramatic. In 2017-2018, there was a disparity of approximately $203.4 million between the Division I Football Bowl Subdivision (FBS) program that generated the most revenue (University of Texas: $219 million) and the program that generated the least revenue (University of Louisiana-Monroe: $15.6 million) (Berkowitz, Wynn,

& McManus, 2019). Finally, stadium capacity and demand for football tickets varies considerably with the largest college football stadiums seating over 100,000 fans and regularly selling out, while other programs have stadiums that hold fewer than 15,000 fans with no sellouts.

A handful of studies have either examined managerial theory associated with pricing strategy or secondary price markups in postseason play within college athletics (Morehead, Shapiro, Madden, Reams, & McEvoy, 2017; Rishe, Mondello, & Boyle, 2014; Rishe, Reese, & Boyle, 2015; Rishe, Sanders, Reese, & Mondello, 2016). Price disparities in the primary and secondary market, and factors that influence resale price during the college football regular season, however, have not been examined. Therefore, the purpose of the current study was to compare Division I FBS college football ticket prices across markets and determine which factors influence resale prices. Developing a model focused on ticket price disparities and resale determinants in college football will extend our knowledge on sport pricing in general, while advancing marketing and management theory within a diverse, non-profit, commercialized sport environment.

The following research questions were developed to guide this investigation:

RQ 1: How does resale "get-in" ticket price change over time periods from the Associated Press Poll release to the day before the game?

RQ 2: What variables predict Power 5 resale "get-in" price at various time periods leading up to game day?

## Literature Review

### *Pricing Theory in College Sport*

Optimal pricing strategies are important for sport organizations to avoid pricing too low and losing potential revenue, or pricing too high and either driving fans away or being perceived as price gouging (Shapiro & Drayer, 2012). The secondary ticket market has dramatically shifted pricing strategy in sport from a cost-based to demand-based focus (Drayer et al., 2013). Two common theories that have guided the ticket pricing literature are price discrimination (Rosen & Rosenfield, 1997) and revenue management (Kimes, 1989; Shapiro & Drayer, 2012).

Price discrimination, or charging different prices to different consumers, is a common practice in industries where costs do not significantly change with the addition of customers. Rosen and Rosenfield (1997) and Courty (2003) suggest price discrimination is effective in the live entertainment ticket market, where filling some additional seats in a facility has negligible costs, demand fluctuates throughout the sales period, and perceived value for tickets varies considerably. The effectiveness of price discrimination in maximizing sport ticket revenue has been demonstrated in the literature through variable ticket pricing (VTP) based on fixed factors such as opponent, day and time of the game, or in-game promotions (Rascher et al., 2007). Researchers have also suggested sport organizations may take financial advantage of price discrimination by not releasing all event tickets simultaneously, but rather holding back some tickets to be sold at higher price points since buyers who purchase closer to the event have been shown to be willing to pay a premium (Courty, 2003; Popp, et al., 2020).

Revenue management (Kimes, 1989), allows for price discrimination in real-time. In industries where demand fluctuates daily and the product is perishable, revenue management provides the opportunity to adjust prices based on instant changes in demand (Kimes 1989; Kimes, Lee, & Ngonzi, 2015). Shapiro & Drayer (2012), examined the effectiveness of revenue management in sport by examining dynamic ticket pricing (DTP). Results showed DTP closed the pricing disparity gap by as much as 60% between the primary and secondary market in Major League Baseball (MLB). Sport organizations can use revenue management to capture additional revenue by closing the gap between fixed primary and demand-based resale prices.

These theoretical frameworks are appropriate across the sport ticket spectrum, but the college sport environment presents a unique context due to its non-profit nature and connection to an academic institution. Price optimization may not be the only motive in this context. Morehead et al. (2017) conducted an extensive conceptual examination of the college sport ticket landscape. They suggested two theories, stakeholder theory and institutional theory, are instrumental in explaining sources of influence in this environment. Freeman (1984) identified a stakeholder as "any group or individual who can affect or is affected by the achievement of the organization's objectives" (Freeman, 1984, p. 46). Hester, Bradley, and Adams (2012), suggested "each component of a firm's operation is influenced by stakeholders because they fund, design, build, operate, maintain, and dispose of the systems for which they belong." College athletics departments have a vast array of stakeholders, which makes their diverse influence much more challenging to integrate into pricing strategy. Morehead et al. suggest athletic departments identify and segment constituents in order to more effectively inform pricing strategy.

Institutional theory reflects pressures of political influence and cultural expectations (Morehead et al., 2017). Organizations imitate the actions of others who have achieved success and, through socialization via professional, educational, or networking connections, devise pricing strategies. Stakeholder theory looks to those who have influence directly on the organization, while institutional theory proposes sport teams utilize external influences to set pricing. Administrators have to carefully balance maximizing revenue with an obligation to not outprice their stakeholders and fans. Every pricing decision, although an internal decision, is influenced by external factors. Additionally, these internal decisions, such as a required donation in order to purchase season tickets, have an impact on pricing strategy. Overall, these theories have served as a foundation for understanding pricing strategy and consumer response to price in commercialized spectator sport.

### *Pricing in Sport*

Early sport pricing research focused on the foundational factors influencing price in professional sport. Reese and Mittelstaedt (2001) discovered the most important factors National Football League (NFL) teams use to price tickets were team performance from the previous season, revenue needs of the organization, public relations issues, price sensitivities of the market, fan identification, and average league ticket price. Rishe and Mondello (2003) extended the pricing determinants literature through an analysis of factors that impact season price changes for teams over time. Findings showed differences in team performance, fan income, population, and playing in the first year of a new stadium influenced ticket prices across teams. Additionally, changes in win percentage from the previous season, reaching the conference championship game, playing in the first year of a new stadium, and the size of the previous

year's price increase, impacted seasonal changes in average ticket prices. Rishe and Mondello (2004) conducted a subsequent examination across the four major sports leagues in the U.S. The findings were generally consistent with previous literature, as price was influenced past prices and team performance, along with playing in a new facility and fan income. Additionally, by extending this work beyond the NFL, the authors found population size played a role in all other major professional sport leagues.

These seminal ticket price determinant studies were conducted prior to the wide implementation of demand-based pricing strategies, such as VTP and DTP. Subsequently, Rascher et al. (2007) examined VTP in MLB and found the strategy would have generated an additional $590,000 in ticket revenue per year for each team. Differential pricing strategy is an effective method for generating additional revenue, but the structure of this strategy could yield different price determinants.

Additionally, with the emergence of StubHub and other resale ticket markets, teams have been forced to change their strategies (Drayer et al., 2013). StubHub captures the capricious nature of demand and is the most accurate representation of consumers' willingness to pay for a particular event. The prices can change drastically for a variety of reasons such as team success, injuries, opponent success, weather, and coaching changes, amongst other factors.

Drayer and Shapiro (2009) provided an early assessment of factors affecting ticket resale prices, which include factors that change over time and provide a better reflection of consumer ticket value. Their study on NFL playoff ticket prices highlighted some factors consistent with previous research in the primary market, including team performance, population, and income. However, new variables not considered in primary market models were also found to be significant, including total number of transactions, time, day of the game, playoff round, and face value of the ticket. Many of these variables are unique to the secondary ticket market and provide a better representation of consumer demand. For example, this study was one of the first to suggest ticket price decreases as the game draws near.

Pricing research evolved as pricing strategy continued to shift to respond to the secondary ticket market. Shapiro and Drayer (2012, 2014) examined the impact of DTP in MLB through an examination of the San Francisco Giants inaugural implementation of the strategy. They found DTP significantly reduced the pricing inefficiency gap between the primary and secondary market, and confirmed the general trend of price decreases as an event draws near (Shapiro & Drayer, 2012). Additionally, a concurrent examination of ticket price determinants in the primary and secondary market showed team and individual performance, day of the game and time played a significant role in both markets. However, ticket availability and number of days before the game had a differing impact in the resale market, with largest fluctuations in price as the game draws closer and constant ticket availability in the marketplace impacting resale price.

Ticket pricing strategy and determinants in a demand-based dual market environment has been extended to the NFL (Diehl et al., 2015, 2016) and the Premier League (Kemper & Breuer, 2016), and has focused on topics such as DTP premiums (Paul & Weinbach, 2013) and price dispersion (Watanabe, Soebbing, & Wicker, 2013). These studies have all shown the resale market plays a significant role in how tickets are priced and what factors impact those prices in a demand-based environment. However, as mentioned previosuly college athletics presents some unique marketplace challenges that may influence pricing staregy and the relationship between primary and secondary markets.

### *Pricing in College Sport*

The research focused on ticket pricing in college sport is limited, but there are some foundational studies providing direction within this context. Patrick Rishe and colleagues conducted multiple studies examining resale markups for postseason Division I college football and basketball games. Rishe (2014) examined NCAA Final Four tickets on the secondary market and found tickets were priced in the inelastic portion of the demand curve. Additionally, specific sessions (i.e., Semifinals instead of an all session pass) had significantly higher markups and seat location was a significant factor in markup size. Rishe et al. (2014) extended this work and found team quality and university proximity to the Final Four location increased ticket resale price substantially.

Rishe et al. (2015) examined trends in secondary market ticket prices for college football bowl games and the Bowl Championship Series Championship game. Results showed inelastic pricing of tickets. Seat location and proximity to the game site increased markups as well. Rishe et al., (2016) expanded the college football postseason investigation by examining 55 different bowl games. They found consistent results regarding seat quality and university proximity to bowl game site, but interestingly not all bowl games were priced in the inelastic range of demand. This is most likely due to the large number of bowl games with a wide range of competitiveness and quality of opponents. In another study examining factors affecting what ticket buyers were willing to spend on the secondary market for tickets to attend a major college basketball tournament (Popp et al., 2018), the time in advance of when tickets were purchased and the number of regular season games attended both had a negative relationship with the amount paid per ticket, while age and income level of the ticket buyer, as well as seat location and number of prior tournaments attended all had a significant positive relationship with amount paid. These studies provide a fundamental understanding of resale price behavior in college sport. However, these studies were limited to postseason play and focused on a few price determinants. More depth regarding team performance, ticket, time, and market-oriented factors are needed to provide a comprehensive view of resale prices in FBS level college sport.

## Method

### *Sampling Frame*

The sample for the current study included all NCAA institutions with football teams in the Power 5 FBS conferences including Notre Dame. During every week of the 2019 college football season, approximately half of the teams hosted a home football game. Neutral site games, such as the Chick-Fil-A Kickoff or Georgia-Florida rivalry in Jacksonville, Florida, were not included as the games were not true home games, despite one team designated as the home squad. The sample allowed for an adequate comparison of primary and secondary market prices in an environment where resale is common.

### *Variables*

The main variable of interest in this study was ticket price, reflected in both the primary and secondary markets. The primary ticket price collected for this study was the lowest ticket price offered to the public from the official athletic department website, sans any special

promotions or deals. Universities sell single game tickets to the public, typically throughout the summer before the season, once they have exhausted season-ticket sales. Single game tickets can also become available (and sold) when an unsold portion of tickets allotted to the visiting team are returned. This typically occurs close to game day.

The secondary market price consisted of the StubHub "get-in" price (GIP) for each individual game, which was the lowest priced ticket on the resale platform at the time of data collection. GIP was collected on StubHub at four different time periods: (a) during the pre-season Associated Press (AP) Poll release, (b) two weeks prior to game day, (c) one week prior to game day, and (d) one day prior to game day. Neither athletic department price nor StubHub price included transaction or shipping fees.

In addition to ticket prices, a multitude of explanatory and control variables were collected for the study. Based on prior literature, four categories of variables were included: (a) time/environmental factors, (b) game-related factors, (c) performance factors, and (d) home market factors. Table 1 provides a detailed overview of all variables in this study. Time/environmental variables included: (a) time-related variables (i.e., month, day, and time of game), (b) proximity of opponent, and (c) weather-related variables (temperature and precipitation). Game-related factors included (a) whether the game was nationally televised, (b) conference affiliation for both teams, (c) whether the game was a conference or division matchup, and (d) betting related factors (betting line and total points). Performance factors included (a) current and previous year winning percentage for both teams in a matchup, (b) poll rankings for each team at the time of ticket price observation (using the Massey Rating Composite Ranking), (c) whether either team in a given matchup went to a bowl game in the previous year, and (d) recruiting rankings for each team in a matchup. Finally, home market factors included (a) primary market ticket price, (b) venue capacity, and (c) institutional enrollment for the home team.

Table 1
*List of Variables, Sources, and Justification*

| Variable Name | Variable Definition | Source | Citation/Justification |
|---|---|---|---|
| **DEPENDENT VARIABLES – RESALE TICKET PRICES (GIP)** | | | |
| STUBINITIAL | StubHub prices of the game when the AP Poll is first released | StubHub | (Popp et al., 2018); (Shapiro & Drayer, 2012); (Drayer & Shapiro, 2009); (Kemper & Breuer, 2016) |
| STUBTWO | StubHub prices of the game on two weeks prior to game day. | StubHub | (Popp et al., 2018); (Shapiro & Drayer, 2012); (Drayer & Shapiro, 2009); (Kemper & Breuer, 2016) |
| STUBWK | StubHub prices of the game on Monday of game week. | StubHub | (Popp et al., 2018); (Shapiro & Drayer, 2012); (Drayer & Shapiro, 2009); (Kemper & Breuer, 2016) |
| STUBDAY | StubHub prices of the game one day prior to the game date. | StubHub | (Popp et al., 2018); (Shapiro & Drayer, 2012); (Drayer & Shapiro, 2009); (Kemper & Breuer, 2016) |
| **TIME/ENVIRONMENTAL VARIABLES** | | | |
| MONTH | Categorical variable indicating the month of the game. | Team Websites | (Paul, Humphreys, & Weinbach, 2012); (Shapiro & Drayer, 2012) |

| | | | |
|---|---|---|---|
| DAY | Day of the game | Team Websites | (Drayer & Shapiro, 2009); (Shapiro & Drayer, 2012); (Falls & Natke, 2016); (Paul et al., 2012) |
| WEEK | Week of the season | ESPN.com | Organization |
| TIME | Time of kick off | Team Websites | (Shapiro & Drayer, 2012); (Falls & Natke, 2016) |
| PROXMITY | Distance away team had to travel to the venue in miles | Google Maps | (Popp et al., 2018); (Falls & Natke, 2016) |
| TEMPWK | High temperature (Fahrenheit) on game day measured on Monday before game. | Weather.com | (Falls & Natke, 2016); (Shapiro & Drayer, 2012) |
| TEMPACTUAL | High temperature (Fahrenheit) on game day measured one day prior game. | Weather.com | (Falls & Natke, 2016); (Shapiro & Drayer, 2012) |
| PRECIPWK | Chance of precipitation on game day measured on Monday before game. | Weather.com | (Falls & Natke, 2016); (Shapiro & Drayer, 2012) |
| PRECIPACTUAL | Chance of precipitation on game day measured one day prior to game day. | Weather.com | (Falls & Natke, 2016); (Shapiro & Drayer, 2012) |
| **GAME RELATED VARIABLES** | | | |
| HOMECONF | Categorical variable indicating the conference of home team. | NCAA Conferences | (Falls & Natke, 2016); (Price & Sen, 2003); (Paul et al., 2012) |
| AWAYCONF | Categorical variable indicating the conference of the visiting team. | NCAA Conferences | (Falls & Natke, 2016); (Price & Sen, 2003); (Paul et al., 2012) |
| CONF | Conference Matchup | NCAA Conferences | (Falls & Natke, 2016); (Price & Sen, 2003); (Paul et al., 2012) |
| DIVISION | Division Matchup | NCAA Conferences | (Falls & Natke, 2016); (Price & Sen, 2003); (Paul et al., 2012) |
| TV | National television broadcast status | ESPN.com | (Price & Sen, 2003); (Howard & Crompton, 2004); (Shapiro, Drayer, & Dwyer, 2016) |
| LINE | The betting line between the two teams | ESPN.com | (Paul et al., 2012) |
| TOTAL | Total number of points predicted between the two teams. | ESPN.com | (Paul et al., 2012) |
| **PERFORMANCE RELATED VARIABLES** | | | |
| HOMERANK | Rank of the home team at a given time period. | Masseyratings.com | (Paul et al., 2012)<br>Fans prefer to see best teams from biggest conferences |
| AWAYRANK | Rank of the away team at a given time period. | Masseyratings.com | (Paul et al., 2012)<br>Fans prefer to see best teams from biggest conferences |

| | | | |
|---|---|---|---|
| HOMEPREVWINP | Home team win percentage from year before | ESPN.com | (Paul et al., 2012); (Shapiro & Drayer, 2012); (Drayer & Shapiro, 2009) |
| AWAYPREVWINP | Away team win percentage from the year before | ESPN.com | (Paul et al., 2012); (Shapiro & Drayer, 2012); (Drayer & Shapiro, 2009) |
| HOMECURWINP | Home team win percentage measured Monday of game day week. | ESPN.com | (Paul et al., 2012); (Shapiro & Drayer, 2012); (Drayer & Shapiro, 2009) |
| AWAYCURWINP | Away team win percentage measured Monday of game day week. | ESPN.com | (Paul et al., 2012); (Shapiro & Drayer, 2012); (Drayer & Shapiro, 2009) |
| HOMEBOWL | Did the home team make a bowl game last year? | ESPN.com | (Falls & Natke, 2014); (Price & Sen, 2003) |
| AWAYBOWL | Did the away team make a bowl game last year? | ESPN.com | (Falls & Natke, 2014); (Price & Sen, 2003) |
| RECRUITHOME | Recruiting class ranking of the home team going into the 2019 season | 247Sports.com | (Paul et al., 2012) |
| RECRUITAWAY | Recruiting class ranking of the away team going into the 2019 season | 247Sports.com | (Paul et al., 2012) |
| **HOME MARKET VARIABLES** | | | |
| TIXPRICE | Cheapest price offered to the public for the particular game. | Team Websites | (Zhang, Lam, & Connaughton, 2003); (Falls & Natke, 2016); (Price & Sen, 2003) |
| VENUECAPACITY | The seating capacity of the home stadium | Team Websites | (Price & Sen, 2003) |
| ENROLLMENT | Total undergraduate student body enrollment of the home team at the main campus | University Websites | (Price & Sen, 2003); (Paul et al., 2012) |

### *Data Collection*

Data were collected from a variety of credible sources. Pricing data were collected from individual team websites and StubHub. Team performance, conference, scheduling, television broadcasting, and betting line data were collected from ESPN.com. Weather data were collected from Weather.com. Enrollment data were collected from individual university websites. Proximity data were collected from Google Maps. Team rank data were collected from the Associated Press polls and the Massey Rating Composite Rankings (see Table 1).

Athletic department ticket prices were collected as schools released and sold tickets online through their websites. All schools in the dataset posted prices for at least their first two home games prior to the season commencing and most released ticket prices for all home games at that time. However, a small number of schools released single game ticket prices for games later in the season, typically two to four weeks prior to those games taking place. Data collection

for ticket price on resale markets occurred at four time periods; when the initial AP poll was released, two weeks prior to game day, the Monday of game week, and one day before game day. All viable factors (i.e., team performance, rankings, betting lines) were collected at the same time as resale price.

### *Data Analysis*

To answer research question one, descriptive statistics were used to assess pricing trends over the four periods before game day. Real-time price changes on the resale market were compared to each teams' fixed single game ticket prices during these four time periods. To answer research question two, descriptive statistics and a correlation matrix were examined initially to assess normality of the data and variable relationships. Four fixed-effects ordinary least squares (OLS) multiple regression models were developed to empirically examine the factors influencing secondary market price at each time period. The fixed effects models were used to account for the data being in panel form. The data were observed across four time-periods, creating a cross-sectional time series. Multiple regression assumptions and multicollinearity were examined, after which a reduced final regression model was created. A significance level of .05 was established *a priori* in analyzing the regression model and related variable correlations.

## Results

A total of 434 unique games were included in the analysis. Over the course of 14 weeks, four prices per game were recorded for a total of ($N$ = 1,736) price observations. Single game tickets were never made available for 15 games in the sample, most of which featured one or two of the most popular teams in the country such as Clemson, Alabama, Ohio State, and Notre Dame. Removing those games left a total of 419 games hosted by a Power 5 football team in which single game tickets were available for purchase directly from the university athletics department.

Overall, the mean athletics department price for a single football game ticket was $50.42, with a minimum of $10 (Duke vs. North Carolina A&T, Louisville vs. Eastern Kentucky, and Mississippi State vs. Kansas State) and maximum of $175 (Oklahoma State vs. Oklahoma). To answer RQ1, these prices were compared to resale GIP on Stubhub over the four data collection periods. For the first data collection period--the AP Poll release in August--StubHub GIP had a mean of $38.45. In comparison to primary market prices, the resale price was $11.97 lower on the secondary market. When examining the top ten biggest discrepancies between the primary and secondary market during this time period, seven games had resale prices lower than the primary ticket price. The majority of games had resale prices slightly below their primary market price, and in terms of substantial spikes, there appears to be more games drastically overpriced than underpriced during this time period.

At two weeks prior to game day, the trend continued, as athletic department ticket prices exceeded the GIP on StubHub. The mean StubHub GIP was $37.35, $13.07 lower than the average primary market price and $1.10 lower (9.2%) than when the price was captured before the season started. On the Monday prior to game day, the mean StubHub GIP decreased to $36.04, $14.37 above the mean primary ticket price. Finally, on the day before game day, the

average StubHub GIP price dropped to $31.99, resulting in a difference of $18.43 below the average primary market price.

Capturing StubHub data over different time periods allowed for a trend comparison between primarily fixed primary market prices and fluctuating resale prices. It is important to note that, on average, athletic department prices are higher than the secondary market at every single time period. Additionally, the discrepancy increased through each time period as game day drew nearer, with a 9.2% increase in price discrepancy from the initial AP Poll until two weeks out, a 10% increase in price discrepancy from two weeks out to one week out, and a substantial 28.3% increase in price discrepancy from one week out until one day out. The difference between the prices is a direct result of the average StubHub GIP dropping at each time period.

To address RQ2, four multiple regression models (one at each time period) were developed to assess factors influencing resale GIP through Stubhub. Initially, models included a total of 29 explanatory variables. However, due to multicollinearity and an effort to create the most parsimonious model, while explaining as much unique variance in ticket prices as possible, explanatory variables were considerably reduced in each final model. Data reduction techniques included elimination of variables with variance inflation factors (VIF) above 10 or tolerance levels below .1 and elimination of non-significant variables that were not deemed essential to the model. Additionally, variance explained and F-statistics were assessed to identify the best fitting models.

The first model (AP poll release) included a total of 14 independent variables. The regression model was found to be significant $F(27, 418) = 34.69$, $p < .001$, explaining 70.5% of the variance in resale ticket price for the time period. Significant variables included primary market ticket price, road team factors (away team conference affiliation, recruit ranking of the away team, away previous year win percentage, and whether or not the away team made a bowl game the prior year), month the game took place, and whether the game was nationally televised Variables included in the model (and their significance) and beta coefficients are reported in Table 2. An examination of the unstandardized beta coefficients revealed a notable relationship; for every $1 increase in primary market ticket price, resale price rose 82 cents. Thus, a positive relationship exists between primary and secondary market price, but as primary market price increases, the gap between the primary and secondary market price increases as well. Additionally, it appears as if opponents play a considerable role in resale price during the initial time period.

The second regression model, examining resale prices two weeks prior to game day, included 13 determinants. This model was also significant $F(26, 418) = 26.51$, $p < .001$, explaining 63.7% of the variance in resale prices at this time period. Some of the significant explanatory variables in this model were also significant in the initial model, including athletics department ticket price, month the game took place, and away team conference affiliation (see Table 3). New significant variables in this model included proximity of the road team, away team poll rankings, and home team previous season winning percentage. Unstandardized beta coefficients revealed for every $1 increase in primary market ticket price, resale price rose 74 cents, extending the gap between primary and secondary market price compared to the initial model. Additionally, resale prices dropped approximately $.60 for each additional 100 miles between the campuses of the competing teams. Home team performance played a bigger role in the second model as game day drew closer, but away team factors still played a more prevalent role in the first two models.

Table 2
*Significant Variables at AP Poll Release*

| Variable | *Unstandardized B* | *Coefficients Std. Error* | *Standardized Coefficients Beta* | *t* | *Sig.* |
|---|---|---|---|---|---|
| TIXPRICE | .817 | .050 | .632 | 16.24 | **<.001** |
| PROXIMITY | -.004 | .003 | -.049 | -1.59 | .800 |
| RECRUITAWAY | .109 | .040 | .205 | 2.72 | **.007** |
| LINE | .188 | .119 | .092 | 1.57 | .116 |
| HOMEPREVWINP | 12.55 | 9.83 | .070 | 1.28 | .202 |
| AWAYPREVWINP | 17.57 | 8.58 | .099 | 2.05 | **.041** |
| HOMECURWINP | 6.52 | 4.56 | .053 | 1.43 | .153 |
| AWAYCURWINP | -1.11 | 4.69 | -.009 | -.238 | .812 |
| MONTH1 | -2.76 | 4.17 | -.022 | -.661 | .509 |
| MONTH3 | -5.12 | 2.98 | -.062 | -1.72 | .087 |
| MONTH4 | -8.39 | 2.92 | -.109 | -2.87 | **.004** |
| HOMECONF1 | -2.851 | 4.320 | -.033 | -.660 | .510 |
| HOMECONF3 | 4.284 | 5.412 | .046 | .792 | .429 |
| HOMECONF4 | -7.309 | 4.761 | -.085 | -1.535 | .126 |
| HOMECONF5 | 2.042 | 5.325 | .020 | .383 | .702 |
| HOMECONF6 | 14.038 | 9.393 | .046 | 1.495 | .136 |
| AWAYCONF1 | -7.138 | 5.984 | -.066 | -1.193 | .234 |
| AWAYCONF2 | -7.256 | 5.609 | -.073 | -1.294 | .197 |
| AWAYCONF3 | -14.557 | 6.236 | -.136 | -2.335 | **.020** |
| AWAYCONF5 | -19.385 | 6.155 | -.175 | -3.150 | **.002** |
| AWAYCONF6 | -.394 | 7.231 | -.002 | -.055 | .957 |
| AWAYCONF7 | -4.821 | 5.677 | -.050 | -.849 | .396 |
| AWAYCONF8 | .924 | 8.549 | .008 | .108 | .914 |
| HOMEBOWL | 4.782 | 3.546 | .060 | 1.348 | .178 |
| AWAYBOWL | 7.306 | 3.370 | .101 | 2.168 | **.031** |
| *Notes: $R^2$= .705* | | | | | |

The third regression model, examining ticket prices a week prior to game day, included 14 variables and was significant $F(15, 418) = 31.08$, $p < .001$, explaining 53.6% of the variance in GIP. Significant variables such as ticket price, proximity, and whether a game was nationally televised were consistent compared to previous models. However, multiple significant variables in this model did not appear in previous models, including poll ranking for the home team, betting line, whether the game was a divisional matchup, venue capacity, and enrollment. Additionally, this was the first model where weather was considered as a determining factor. The temperature and precipitation forecasts a week out from game day were both found to be significant as well.

There were some notable findings regarding the new significant variables. A divisional matchup increases resale GIP by $5.46, all else equal. The home team moving up one spot in the polls increases ticket prices by approximately 16%. Additionally, for every ten-percentage

increase in precipitation, the ticket price increase by $12.33, conflicting with the assumption that an increased chance of rain would naturally lower prices and lower fan interest in a game (see Table 4).

Table 3
*Significant Variables Two Weeks Prior to Game day*

| Variable | *Unstandardized B* | *Coefficients Std. Error* | *Standardized Coefficients Beta* | *t* | *Sig.* |
|---|---|---|---|---|---|
| TIXPRICE | .741 | .054 | .572 | 13.634 | **<.001** |
| PROXIMITY | -.006 | .003 | -.068 | -1.997 | **.046** |
| AWAYRANK | -.129 | .051 | -.147 | -2.538 | **.012** |
| HOMEPREVWINP | 23.683 | 10.220 | .132 | 2.317 | **.021** |
| AWAYPREVWINP | 15.964 | 9.233 | .089 | 1.729 | .085 |
| HOMECURRWINP | 8.790 | 4.792 | .071 | 1.834 | .067 |
| MONTH1 | .620 | 4.491 | .005 | .138 | .890 |
| MONTH3 | -4.001 | 3.297 | -.049 | -1.214 | .226 |
| MONTH4 | -9.210 | 3.166 | -.120 | -2.909 | **.004** |
| TV1 | 9.138 | 4.053 | .100 | 2.254 | **.025** |
| TV2 | 1.269 | 2.813 | .017 | .451 | .652 |
| HOMECONF1 | -5.969 | 4.813 | -.069 | -1.240 | .216 |
| HOMECONF3 | 1.658 | 5.983 | .018 | .277 | .782 |
| HOMECONF4 | -10.355 | 5.301 | -.120 | -1.954 | .051 |
| HOMECONF5 | -.088 | 5.879 | -.001 | -.015 | .988 |
| HOMECONF6 | 2.137 | 10.397 | .007 | .206 | .837 |
| AWAYCONF1 | -9.440 | 6.525 | -.086 | -1.447 | .149 |
| AWAYCONF1 | .741 | .054 | .572 | 13.634 | **<.001** |
| AWAYCONF2 | -.006 | .003 | -.068 | -1.997 | **.046** |
| AWAYCONF3 | -.129 | .051 | -.147 | -2.538 | **.012** |
| AWAYCONF5 | 23.683 | 10.220 | .132 | 2.317 | **.021** |
| AWAYCONF6 | 15.964 | 9.233 | .089 | 1.729 | .085 |
| AWAYCONF7 | 8.790 | 4.792 | .071 | 1.834 | .067 |
| AWAYCONF8 | .620 | 4.491 | .005 | .138 | .890 |
| DIVISION | -4.001 | 3.297 | -.049 | -1.214 | .226 |
| HOMEBOWL | -9.210 | 3.166 | -.120 | -2.909 | **.004** |
| AWAYBOWL | 9.138 | 4.053 | .100 | 2.254 | **.025** |
| *Notes: $R^2$= .637* | | | | | |

Table 4
*Significant Variables One Week Prior to Game day*

| Variable | *Unstandardized B* | *Coefficients Std. Error* | *Standardized Coefficients Beta* | *t* | *Sig.* |
|---|---|---|---|---|---|
| TIXPRICE | .656 | .060 | .516 | 10.941 | **<.001** |
| PROXIMITY | -.009 | .003 | -.109 | -3.091 | **.002** |
| HOMERANK | -.156 | .072 | -.142 | -2.168 | **.031** |
| AWAYRANK | -.081 | .065 | -.094 | -1.243 | .215 |
| LINE | .343 | .169 | .170 | 2.026 | **.043** |
| HOMEPREVWINP | 18.065 | 12.011 | .102 | 1.504 | .133 |
| HOMECURWINP | 9.030 | 6.388 | .074 | 1.413 | .158 |
| TV1 | 9.294 | 4.219 | .104 | 2.203 | **.028** |
| TV2 | -2.530 | 2.976 | -.034 | -.850 | .396 |
| DIVISION | 5.456 | 2.755 | .077 | 1.980 | **.048** |
| HOMEBOWL | 7.469 | 4.408 | .096 | 1.694 | .091 |
| VENUECAPACITY | .000 | .000 | -.131 | -2.585 | **.010** |
| ENROLLMENT | .000 | .000 | .113 | 2.783 | **.006** |
| TEMPWK | .179 | .080 | .086 | 2.245 | **.025** |
| PRECIPWK | 12.331 | 5.974 | .073 | 2.064 | **.040** |
| *Notes: $R^2$= .536* | | | | | |

Table 5
*Significant Variables One Day Prior to Game day*

| Variable | *Unstandardized B* | *Coefficients Std. Error* | *Standardized Coefficients Beta* | *t* | *Sig.* |
|---|---|---|---|---|---|
| TIXPRICE | .497 | .065 | .419 | 7.608 | **<.001** |
| PROXIMITY | -.008 | .003 | -.107 | -2.644 | **.009** |
| RECRUITAWAY | .070 | .026 | .142 | 2.675 | **.008** |
| HOMECURWINP | 14.844 | 4.823 | .130 | 3.078 | **.002** |
| AWAYCURWINP | 13.289 | 5.257 | .111 | 2.528 | **.012** |
| MONTH1 | 14.214 | 5.007 | .122 | 2.839 | **.005** |
| MONTH3 | -3.288 | 3.764 | -.044 | -.874 | .383 |
| MONTH4 | -1.329 | 3.604 | -.019 | -.369 | .712 |
| TV1 | 7.652 | 4.361 | .092 | 1.755 | .080 |
| TV2 | -2.742 | 3.127 | -.039 | -.877 | .381 |
| VENUECAPACITY | .000 | .000 | -.096 | -2.179 | **.030** |
| PRECIPACTUAL | -12.356 | 4.569 | -.108 | -2.704 | **.007** |
| *Notes: $R^2$= .389* | | | | | |

The fourth and final regression model, examining resale GIP the day before game day, was found to be significant $F(12, 418) = 21.57$, $p < .001$, explaining 38.9% of the variance in

resale prices at this time period. Nine factors were found to be significant in this model. All nine of these variables were significant at one point or another in previous models. The final model includes ticket price and proximity, which have been relatively consistent throughout the regression models, both home and away performance variables, month, whether the game was nationally televised, venue capacity, and weather (see Table 5). Resale GIP dropped by $12.32 for every ten-percentage increase in precipitation chance, much more in line with expectations that college football fans would pay less to watch games in unfavorable conditions. Also, for every dollar increase in primary market price, resale GIP only increases by $.50, which is the largest gap between primary and secondary market prices in all the models. Finally, the percentage of variance explained continued to drop for each model as game day drew near, indicating more uncertainty in pricing on days closer to game day. This appears to be counter to anecdotal expectations.

## Discussion

The goal of the current study was to examine how secondary market GIP fluctuates (particularly compared to single game ticket pricing assigned by college athletics departments) for Power 5 FBS football home games over the course of four time periods and to determine what factors have a relationship to resale GIP at various points in time leading up to a football game. Nearly all college athletics departments assign single game football ticket prices prior to a season commencing, with only a handful delaying the release of late-season single game ticket prices until weeks before the actual game is played. Tracking GIP pricing on the secondary ticket market enables researchers and administrators to evaluate secondary market ticket pricing trends and determine what factors may influence market price fluctuations over time.

Echoing the findings of prior studies of secondary marketing ticket pricing in MLB (Drayer & Shapiro, 2009; Shapiro & Drayer, 2012, 2014), the NHL (Dwyer, Drayer, & Shapiro, 2013) and for college football bowl games (Rishe et al., 2016), the current analysis determined that mean GIP for Power 5 college football games diminishes in a linear fashion as time moves closer to game kickoff. The current study is the first in the literature to document such a trend within college sport ticket pricing. For the entire sample, mean GIP prior to the start of the season was $38.45, while the mean GIP one day prior to game day was $31.99, a reduction of 16.8%. By comparison, the mean ticket price assigned to the most inexpensive single game tickets sold by athletics departments was $50.42.

The theoretical underpinnings of price discrimination (Courty, 2003; Rosen & Rosenfield, 1997) and revenue management (Kimes, 1989) suggest ticket price setting should become more dynamic and reflect buyers' perceived value in order for firms (athletics departments) to maximize revenue. However, past research by Morehead et al. (2017) suggests college athletics administrators are guided by motives other than simply revenue maximization, with stakeholder perception and the influence of competitors playing a key role in strategic decision making. The lack of congruency between secondary ticket market prices and initial ticket pricing established by college athletics departments suggest stakeholder and institutional theories are more likely to explain pricing decisions than price discrimination and revenue management.

For athletic departments wishing to maximize event attendance to appeal to key stakeholders and generate more ancillary game day revenues such as concessions or parking rather than focus on maximizing ticket revenue (Fort, 2004; Morehead et al., 2017), lower priced

ticket inventory available on the secondary market may have benefits. Theoretically, a wider variety of fans may find ticket prices to be attractive on the secondary market, but the department itself is not forced to devalue its own product by trying to match secondary ticket market prices. However, for administrators wanting to maximize revenue, declining secondary market GIP is problematic as it conditions ticket buyers to wait as long as possible in order to obtain the greatest discount on tickets, and to look for those discounts solely on the secondary market. As a result, departments may need to combat the availability of more affordable tickets on the secondary market by tactics such as: (a) increasing the value of tickets purchased on the primary market (i.e. providing concession discounts, access to specific seating sections, early venue entry, etc.); (b) dynamically pricing tickets on the primary market; (c) staggering the timing of when tickets go on sale; or (d) develop internal resale platforms and incentivizing season ticket holders to utilize the platform, which would allow the department to capture resale fees and consumer data.

When examining factors which seem to have a relationship with secondary market ticket price, a few trends emerged from the regression models. First, as game day drew nearer, the combination of the variables examined in the models explained less of the variance. Few prior ticket pricing studies have examined the impact of so many traditional demand variables on dynamic ticket price at multiple times leading up to a game. It was expected the further out from kickoff--and thus the greater uncertainty regarding team performance and weather conditions--the more difficult it would be to determine which factors would impact price variability. In actuality, the opposite was true. Each subsequent model in the study explained less of the variance in GIP, indicating unaccounted for explanatory variables (such as number of tickets available or intrinsic motivations) may be more influential on secondary market ticket price, closer to game day.

A second pattern emerging from the models was the influence of proximity between the opponents on GIP. In the initial pre-season model, the distance between opponents was not significant, while several factors related to the visiting team's quality, such as the team's previous season record, whether the team travelled to a bowl game the previous season, and the team's recruiting ranking, were significant. This might suggest secondary market ticket prices reflect sellers initially placing a high value on the quality of the opponent rather than where the opponent was located. In subsequent models, the importance of the visiting team's quality diminished, but opponents from closer distances were significantly related to higher ticket prices. This could be an indication ticket sellers will post higher prices when they believe more opposing team fans are likely to travel to the game. It could also be a signal that games played between opponents from closer geographic proximities are more likely seen as "rivalry" games, thus commanding higher ticket prices on the secondary market. In an examination of the secondary ticket market for NCAA March Madness games, Rishe et al. (2014) found prices also increased as the distance between the tournament host site and the home campus of the teams competing decreased, although other studies have suggested the further individuals travel, the more willing they are to pay higher ticket prices to sporting events including college football bowl games (Rishe et al., 2015).

Another intriguing finding from the current analysis was the impact of weather on ticket pricing. Predicted temperature for the day of the game had no relationship with GIP. Perhaps ticket sellers and buyers both readily acknowledge the college football season spans a time period in which temperatures can be extremely hot in August and extremely cold in November. The relationship between likelihood of precipitation detected in the models, however, paints a

different picture. The higher the predicted likelihood of precipitation for a game a week before it was played resulted in higher GIP. A day before the game, however, a more logical relationship was revealed, as higher likelihood of precipitation had a negative relationship with GIP, a result similar to those found in prior college football attendance studies (Falls & Natke, 2016; Price & Sen, 2003). Perhaps when season ticket holders who frequently attend games look at the extended forecast, they are more likely to make a decision to sell their tickets for that game, but believe other buyers will be willing to pay premium prices. As game day draws nearer and precipitation is still likely, perhaps ticket sellers realize it will be challenging to sell their tickets and they decide to drop the price in hopes of recouping some money rather than "eating" the tickets. As Ge, Humphreys, and Zhou (2020) note in their study of Major League Baseball attendance, the impact of precipitation is an important and significant variable to consider among dynamically priced tickets for sporting events.

Finally, the results highlight some interesting trends regarding the relationship between the primary market price and resale GIP. Findings showed a widening gap between these prices as a game draws near. This findings is consistent with Shapiro and Drayer (2012), who suggest fixed primary market prices create arbitrage opportunities through pricing inefficiencies. Resale ticket prices have the ability to fluctuate based on game, time, market, and environmental related factors highlighted in this study, where primary market prices are static.

Interestingly, the results from the current study showed primary market prices were higher than resale GIP at all time periods, which is contrary to what Shapiro and Drayer (2012) found in Major League Baseball. This contradiction was not surprising, as Morehead et al. (2017), suggested multiple factors make college sport ticket pricing different from professional sport, including a wider array of stakeholders, organizational structure differences, and cultural differences. Ultimately, college athletics departments must consider the inefficiencies created by fixed pricing, highlighted through a growing resale market for college football tickets.

### *Limitations*

The four models generated did possess some limitations. First, the ticket price recorded from both the athletics department price and StubHub price are the cheapest available without capturing any fees. Potentially, the overcharge by athletics departments mentioned in the results could be smaller when fees are taken into account. However, for the purposes of the study, the fees were not collected in order to conduct an "apples to apples" comparison. Additionally, some of the time periods are inconsistent over time. Using AP Poll as a baseline to see where prices start based on the first rankings makes sense, but the next measure did not take place until two weeks prior to game day. With fourteen weeks in the regular season, ticket prices for games later in the season are recorded in August but may not be revisited until October or November. One final limitation stems from the way game day was recorded as a dichotomous variable of Saturday or any other day of the week. Future datasets which include more seasons or non-Power 5 conferences may want to operationalize day of week as a categorical variable.

Moving forward, our models and dataset lay a strong foundation and a noteworthy amount of information to continue into future studies. The models could be used in conjunction with future datasets to evaluate relationships between predictor variables and ticket pricing, perhaps to observe what prices seem to be overvalued or undervalued. Ultimately, such analysis could lead to more effective ticket price setting. In fact, one limitation of the current study is that data collection was limited to a single season. A multi-year study would allow for the

observation of longitudinal trends and could enable researchers to utilize the current regression models to predict the overpricing or underpricing of future game tickets. The data can also be used to supplement other research in the college football literature, perhaps not related to ticket price itself. Overall, the study lays a framework for additional future research into college football prices on the primary and secondary market while also still capturing significance and comparison over four distinct time periods.

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