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The Impact of Key Performance Indicators (KPIs) on Listed European Football Clubs

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Abstract

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Keywords: Champions League, Liquidity, Revenue, Stock Price and Underinvestment

Purpose: The purpose of this paper is to investigate and shed light on the critical success factors for investors, management and academia for listed European football clubs. This paper is the first of its kind in that it analyses the Key Performance Indicators and their respective impact on the stock price for 23 listed European football clubs.

Methodology: The quantitative methodology approach utilised the FGLS regression model for 23 listed European football clubs spanning between the periods from December 2009 to March 2019 inspecting the relationship between Market-to-Book ratio (MTB) and six explanatory variables namely Revenue, Net Income Margin, Current Ratio, Debt-to-Assets, League Position and participation in the Champions League.

Theoretical Perspectives: Free Cash Flow Theory; Underinvestment Problem; Panel Data Regression; Trade Off Theory

Empirical Foundation: Football club data was collected from the STOXX Football Index including international stock exchanges. Data for each club was collected and collated from the Bloomberg Terminal, Thomson Reuters Data Stream, Thomson Reuters IKON, Capital IQ, transfermarkt.com and each clubs' financial reports.

Conclusions: The main findings of this paper are that an increase in revenue, participation in the Champions League and a reduction in leverage all have a positive effect on the stock price of these clubs. Investors reward clubs who have a high current ratio but then penalise them after a certain threshold consistent with financial theory. A surprising conclusion is that profitability measured through Net Income Margin has a negative impact on a club's share price, indicating that at the time of reporting financial results to the market, spurious events are having a material impact on the clubs share price. These results show that capitalising on revenue-generating capabilities and avoiding financial distress are key for listed European football clubs both for on- and off-the-field performances.

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1. Introduction

The football industry has become increasingly important over the last decades to the extent that it has formed its own sector within the sports industry. This industry has seen a sectoral shift from clubs focusing on winning trophies to being concerned with the money it generates due to the amount of financial resources flooding into the industry. This has seen supporters crying out for clubs to get back to their roots, a sport associated with the working-class as opposed to the financial elite. However, there are no signs that this is going to stop any time soon with European football clubs experiencing a compound annual growth ("CAGR") rate of 7.2% between 2012-2017 (Franck, 2018) which is higher than many established industries including the European apparel market which experienced 2.5% CAGR over the same period, with this trend expected to be maintained in the near future. The increasing economic power and importance of European football clubs are discussed by Birkhäuser et al. (2019) who stated that since the 1990s, European football clubs have been enjoying a constant increase in revenues mainly because of the growing broadcasting and marketing revenues which enlarged their budgets, specifically those of major clubs. This ties in with the notion that the football industry has been growing both in its economic and financial influence.

The football industry has not just increased in terms of growth in money but has transcended societal boundaries to the greater good of society. There are industries that can be significant from a financial perspective but have a relatively little social impact which cannot be said regarding the football industry. One only has to look into how local government in international cities have renamed airports such as Belfast City Airport in memory of the Northern Ireland and Manchester United great, George Best, in March 2006. The popularity of the sport has influenced many professionals from a range of fields including the astrophysics research field with the naming of the discovery of the Cosmos Redshift 7 galaxy to CR7 inspired by footballer, Cristiano Ronaldo - a galaxy said to exist only 800 million years after the occurrence of the big bang – 13 billion years ago. However, the industry has not only inspired cities and countries, but has helped under- privilege local areas and poverty-stricken countries across the worldwide with charities and foundations. For example, worldwide clubs like Manchester United and AS Roma through their MU foundation and Roma Cares engage in corporate social responsibility which offers help and aid to improve the lives of disadvantaged people worldwide. This charity work is not exclusively for the major elite clubs with smaller clubs like Aalborg striking up a partnership with Danish kit manufacturer, Hummel, where both parties donate part of the proceeds generated from the selling of Aalborg's third kit to charities. Unfortunately, not all the social impact is positive and this has marred the image of football as a whole in that success is the be all and end all, which shown through the murdering of the "Gentleman", Andrés Escobar, after the 1994 FIFA World Cup, where his own-goal contributed to the knockout of his Colombian national team against the USA leading to the murdering by Colombian sicarios. The passion for the sport has fuelled and impaired the rationalities of football clubs, players, fans and government alike. The importance of the success of football in a country is evident even from the most recent FIFA World Cup staged in Russia in 2018. This mega event cost the Russian government USD 20 billion (approximately 5% of the Russian Federation annual budget) which was spent on new stadiums, training grounds, hotels, airport terminals and transportation upgrades (Müller, 2017). This was a country that was experiencing a financial crisis due to the devaluation of Russian Rouble as a result of a decline in crude oil prices and from the sanctions imposed by the West as a result of the annexation in Crimea in 2014. Yet, due to the global appeal of football, it was found justified to spend billions of dollars for this

one-month spectacle while leaving a legacy, of further straining their economy and citizens, with only the reminiscence of "white elephants"[1] been left.

Due to this, the industry is deemed economically, financially and socially relevant which is one of the main reasons why research should be conducted on it.

For public companies, stock prices reflect the market value of the equity shareholders of a certain company own. Listed football clubs are no different to any other list company, in that most of the strategies firms design and implement, both in the short- and long-term are aimed in maximising their stock price. Stock prices are a prime indicator that measures the performance of a company which is vital for shareholders and management alike. This is why many authors, such as Johnson and Soenen (2003) and Plumley et al. (2017), focus their work on identifying the value drivers that make stock prices fluctuate. The fundamental goal of these studies is to create a control board for which both managers and investors can use to govern and oversee the performance of the company. Furthermore, as discussed by Hegazy (2012), Key Performance Drivers ("KPIs") are constantly analysed by managers who tailor their tactical and strategic decisions to the response that each KPI generate. The ultimate goal of this behaviour is to positively impact these indicators raising the stock price of clubs consequently, transfer value to all stakeholders involved with a respective club. Additionally, managers have their own personal motives to improve the KPIs as their executive compensation schemes are often intrinsically linked to the clubs' share price through the usage of stock options.

A different reality is dealt with by private clubs, like Manchester City, Paris Saint-German (PSG) and Chelsea who all have been acquired by foreign capitalists "Sugar Daddies" who have pumped money into the clubs in order to try to buy success. These clubs do not have to worry about market expectations nor about recuperating their investment in the short-term to the same extent if they were listed. Therefore, they place a different emphasis on KPIs, as the ultimate motive is to satisfy their empire building ambitions and yearn for gratitude through winning by any means. This changes the whole dynamic of both the operative and financial decisions for these clubs. Thus, it is necessary to clarify that the scope of this paper is limited to public European football clubs, which focus their efforts in applying strategies to maximize their market equity value through the stock price. As football is notoriously associated with the expression of "winning at all costs", the identification and analysis of the key KPIs and their impact on listed European football clubs is an interesting area to research from an investor and managerial perspective, as this paper will hopefully shine a light on how to become profitable and sustainable. This is a novel research that has not been discussed and will provide valuable insight into the finer mechanics of the operation of football clubs.

This will also aid investors in the evaluation of a new selection of stocks in an enigmatic industry. A perfect illustration of this point is how Juventus S.p.A stock behaved when the senior team secured a place in the final of UEFA flagships competition, the UEFA Champions League in the 2016/2017 season. During the period leading up to the securing a final spot against Real Madrid F.C. on the 9th May, Juventus stock price rose by 81% in under a month from a price of €0.49 before defeating FC Barcelona in the quarter-finals on the 11th of April to €0.89 following their semi-final triumph over AS Monaco on the 9th May. However, in that same period, Juventus were generating a loss of €14.6 million to the semi-annual period ending June 2017, with its stock showing no ill effects on the announcement of such results. The devoid

[1] White elephants is a term associated with possession of a grand asset which cannot be disposed of and costs of maintenance are greater than benefit of usage gained recognition following the conclusion of the 2010 FIFA World Cup in South Africa.

from economic rationale on the stock price is very interesting to all stakeholders which motivates the investigation of the KPIs that are most valuable to investors on listed European clubs and to try and rationalise such erratic behaviour. Having explicitly stated the motivations of this paper, the research question bases its structure on the analysis of a selected KPIs from which a myriad of indicators is available to choose from.

KPIs are a group of assimilated information which is translated into specific parameters critical to corporate success (Hegazy, 2012). Economic success is measured both by managers and investors, themselves deciding the present value of the company which, in aggregate, make the market value of the company. In that context, stockholders scrutinise a specific group of KPIs depending on the industry which they will utilise as the main source of information to make their forecasts and valuations. Given this setting, the Market-to-Book ratio (MTB) was established as the dependent variable and the main proxy for share price for this paper with a selection of 6 KPIs as the independent variables. KPIs are subdivided into two categories; financial and non-financial. Financial KPIs, such as growth, profitability, liquidity and capital structure are pivotal to the market capitalisation of large firms (Johnson & Soenen, 2003; Plumley et al., 2017). Non-financial KPIs are industry-specific which are used in the hopes of identifying and making clear what unique indicators make these firms fluctuate. This paper selects a blend of financial and non-financial KPIs according to what current literature deems as the most influential for the stock price of firms. In short, the independent variables are Revenue, Net Income Margin, Current Ratio, Debt-to-Assets, League Position and Champions League Participation which are judged to be the most influential "industry-specific" variables.

The main findings of this paper are that increases in revenues, participation in the UEFA Champions League, and a reduction in leverage have positive effects on the stock price of listed European football clubs. Holding a considerable current ratio has a positive impact on the stock price, however, it quickly turns negative when a certain threshold is surpassed. Surprisingly, Net Income Margin has a negative impact on the stock price. The mentioned results paint the picture that listed European football clubs are highly influenced by their revenue-generating capabilities and financial flexibility.

The structure of this paper is as follows. First, the literature review will be discussed, where the different perspectives of authors about the main research area will be assessed. The third and fourth section will be devoted to theoretical background and hypothesis. Finally, the fifth and final discloses the findings and conclusions of this paper.

2. Literature Review

This section provides a thorough review of previous peer academic research papers. The purpose of this section is for the reader to gain an insight into what has been studied and the progression of research with respect to football clubs. Furthermore, attention will be devoted to papers relating to identified KPIs in an overall basis and for the football industry, which will be important for the empirical analysis.

2.1 Football Industry

Football is one of the most popular sports worldwide. This is evident through the enormity of the media attention surrounding it (Bell et al. 2012; Benkraiem et al. 2009). The sport's impact does not only have to do with the revenues it produces to investors, owners and organisations but also with the social impact it creates across the world. The importance of this industry has translated into many academic researchers studying various aspects about it, however there are not a myriad of academic articles relating to the analysis of listed football clubs as a whole (Ferreira et al. 2017).

Delving into the importance of one of the main sport's competitions, Hummel (2018) studies the social impacts of the 2014 FIFA World Cup hosted in Brazil. In his paper, he explained the popularity of the World Cup was transformed into an infusion of 14 billion USD into the Brazilian economy thanks to this global football competition. Hummel (2018) main purpose was to study the impact of this competition have in its host country. To achieve this, he carried out a research utilising surveys to interview Brazilian street vendors following the 2014 FIFA World cup. Among his results he concluded that the competition was tainted with corruption and only those street vendors which were connected to the organizers in some way, mainly by paying bribes, were the only ones to benefit from this competition. Additionally, Butler and Aicher (2015) summarised the political impact the football industry has on countries, which helped in providing a much more "complete" perspective than the one presented by Hummel (2018) who studied the socio-economic impacts of the FIFA World Cup. Butler and Aicher (2015) achieved this by studying the political impact the 2014 FIFA World Cup had on the Brazilian government before and during the competition. In order to do this, they collected and analysed various academic and news related articles related to this topic, where they found that there were many social protests stemming from the tax hikes and public fund mismanagement made by the Brazilian government staging this global event. In that context, the government adopted a combative position while making some concessions. Meanwhile, FIFA, the organizer of the event, focused its energies and resources in making sure the competition went as planned. Both Butler and Aicher (2015) and Hummel (2018) emphasised the importance of the football industry, both positively and negatively with reference to FIFA World Cup hosted in Brazil. Between the positive impacts they found the competition increased and improved the public image, cultural understanding, commercial activity, sporting facilities and opportunity. On the other hand, they discussed how the FIFA World Cup generated societal displacement with the sole purpose of the "beautification" of Brazil, a rise in crime and poor management of public funds.

Both Butler and Aicher (2015) and Hummel (2018) assessed the importance of the football industry through the staging of the FIFA World Cup in a developing country. However, Müller (2017), broaden this perspective by studying the impact of the same competition however this time in a developed country; Russia. In his paper, the researcher studied how this competition maintained captive its host country during the period previous to its initiation while also discussing the astronomical costs hosting this competition has. According to the author, Russia

spent approximately USD 20 billion to host the FIFA World Cup in 2018 in investments towards sport and recreational (Müller, 2017). In conclusion, the author stated Russia did not seize the opportunity from hosting the mega event. Instead the mega event seized Russia. He explained that this seizure took part in three dimensions. First, there was an infrastructure seizure; where a revolution in infrastructure investment and changes took place. Then, a legal seizure; where many Russian legislations were modified to adapt to the better development of the FIFA World Cup. And finally, financial seizure; where Russia spent close to USD 20 billion, which was nearly 5% of the Russian Federation annual budget.

The above articles focus on the macro-impact of the football industry however a micro-perspective of this industry would provide value in explaining the structure of European football by evaluating the different strategies divergent football clubs across Europe have. Şener and Karapolatgil (2015) studied 50 European football clubs with the sole goal of analysing the different groups that embodied the football industry where they identified three different groups separated by financial resources, strategies, and brand values. The first group; Industry Leaders followed an offensive strategy supported by their vast resources who had the objective to maintain their power position in the industry. These tactics ranged from capitalizing on financial resources, in the case of Manchester United, or on their popularity, in the case of Real Madrid. The, second group; the Runner Ups were composed of clubs that did not have such vast resources nor had to address their niche markets with a distinct market strategy based on the identity the fans maintained with the clubs (e.g. Liverpool FC and their "You Will Never Walk Alone" mantra which is embedded in the DNA of the club). Finally, the last group; Weak Clubs, incorporates those clubs who have the least financial resources and brand value, and whose strategy is to defend their position against the competitive actions from stronger clubs. The tactics these clubs follow is training and selling players at a profit and/or making strategic partnership with commercial brands that might bring the financial resources they desperately need. This paper concluded that the football is heterogeneous and highlighted the importance of the domestic leagues in terms of how these groups are conformed. For instance, it could be that the best performing clubs of weak leagues, such as Benfica S.L. in Portugal, was categorized as less powerful than low-performing football clubs in the second division of a globally known football league, such is the case with Aston Villa who competes in the second tier of the English Football League (EFL) system.

2.2 Ownership Structure

An important topic to delve into is the ownership structure of European Football clubs. There are many factors involved with different types of ownerships which could, ultimately, impact the financial state of the clubs. This, in turn, depicts the importance of discussing different perspectives from various authors.

Wilson et al. (2013) studied the relationship that exists between ownership structure and club performance. In their paper, they explained that for the ten years leading to 2013, there had been a "wave" of privatisation of football clubs under foreign capital which had previously been organized under the form of either the stock market model or the supporter trust model. This wave has conformed to outside investors usually not involved with the football industry at all, known also as "Sugar Daddies" (Peeters & Szymanski, 2014) to invest in clubs to satisfy their empire building cravings. The stock market model is based on the maximisation of profits whereas the supporter trust model takes a democratic approach where no ownership prevails, but members pay to increase the influence that supporters have over the club they support. To analyse the performance of clubs under different ownerships structures, the authors studied different indicators that aimed to represent the ability to create profits and to pay their existing

liabilities. As a result, they found that clubs which operate under the stock market model (instead of being privatized under foreign capital) have a much better financial performance as their goals are better aimed with those of the investors. Despite the influx of foreign investment into football clubs accompanied with increasing revenues, profitability had been decreasing. This explained the shift of focus of clubs from profit maximisation to improving performance by recklessly spending money in attempt to buying success (Wilson et al. 2013) which the football industry is renowned for nowadays. In other words, the economic rationale has taken a precedent position to the performance of the football teams.

A similar study was performed by Rohde and Breuer (2016) who studied the impact that majority ownership of foreign capital has on "elite" European football clubs. In their findings they agreed with Wilson et al. (2013) that foreign investment brings a negative impact on a clubs' financial performance in addition to explaining that there is a greater likelihood for these clubs to go into bankruptcy or insolvency proceedings given the amount of money spent of transfers, even when the rules of the Financial Fair Play regulations are being applied. Furthermore, they explained that private investors have actually a "positive" impact on the clubs' financial health given that they invest time and effort in governance activities to keep management in line and the strategy correctly aligned to maximise profits, which in turn, improves the financial state of the company.

Acero et al. (2017) expanded on this viewpoint of governance and ownership structure by examining the relationship between ownership structure and financial performance as a consequence of monitoring effects. The governance system of European football is hierarchical with FIFA and UEFA at the top of the pyramid, followed by national members associations, professional leagues and the individual clubs' governance structure (Peeters & Szymanski, 2014) underneath them. In their paper, Acero et al. (2017) presumed that when European football clubs have a strong monitoring and governance scheme, this will in turn steer the club into a better financial state. A prime example of the importance of governance is shown in the German Bundesliga where, thanks to the "50+1" rule, fans must have 50% ownership of the clubs (Acero et al. 2017). In this case, the greater the influence of supporters guarantees that the clubs' activities will be motivated by the improvement of communities and not only by private interests as supporters have a intrinsic connection with the club and will fight for the survival of their club. As a result, German clubs are the most economically profitable thanks to this ownership structure that stimulates monitoring and governance undertakings. Furthermore, Acero et al. (2017) conclude that high levels of ownership concentration have adverse ramifications on financial performance, regardless of the presence of Financial Fair Play regulations. In other words, the so-called "Sugar Daddies" are negative for the financial health point-of-view for European Football clubs as opposed to regular investors or supporters who, as owners, drive the club into better financial shape.

2.3 Share Price Performance

This paper focuses on listed European clubs and therefore academic articles pertaining to the share price performance and what are the key components to make football ticks are discussed.

Football stocks comprise of 3 different stakeholders; a principal shareholder ("blockholder"), institutional investors and a large number of individual investors, mainly supporters (Renneboog & Vanbrabant, 2000). Due to this composition, football stocks are traded based on two fundamental characteristics; investor sentiment and the economic rational of the investment (Duque & Ferreira, 2005; Renneboog & Vanbrabant, 2000; Benkraiem et al. 2009). In other

words, investors can be split between those who trade on sentiment while others trade on the economic rationale of the stock.

Most studies about football stocks investigate the impact of football results on stock returns and the market reaction to them (Ferreira et al. 2017; Dimic et al. 2018). These studies not only focus on sporting results on the abnormal returns of the stocks but also the effect investor sentiment has on a stock.

In (Edmans et al. 2007) paper, they studied the impact on market indices post international football results and showed that there is a change in investor's rationality which is brought upon from football results. This shows, the power of football in that it can obscure investors rationality and therefore investor sentiment can be a contributing factor to the positive impact these results have on individual football stocks.

Floros (2014) investigated the effect of match results (i.e. wins, losses and draws) on four listed football clubs namely; Ajax, Benfica, Juventus and FC Porto stock returns. His results highlighted that both Benfica's and Ajax's stocks increased after a draw which is contrast to that of Juventus, while FC Porto's stock had a neutral reaction. The variation in results could be explained because Juventus were the leading team in the Italian Seria A during Floros (2014) sample period of January 2006 to December 2011, thus the market expected them to win due to their tight-hold of the league. Despite Floros (2014) providing new evidence compared to previous papers which primarily focus on wins and losses, his sample of 4 clubs was low. Though his result expanded the results of (Berument et al. 2009) who reported that the leading Turkish clubs; Beisktas, Fenerbache and Galatasary stocks experienced positive retunes following wins (though were not statistically significant).

Both Floros (2014) and (Berument et al. 2009) used a small sample focusing on a small number of leagues more than not introduced concentration bias within their results, which (Dimic et al. 2018) paper reduced by researching the impact of soccer results on stocks returns and the market sentiment of 13 publicly traded football clubs from six European Leagues. They observed that a win generates an average increase of 0.47% on the clubs' stock, with losses and draws producing -1.28% and -1.04% returns respectively. In addition to providing more robust results, (Dimic et al. 2018) found that the stock market reacts more adversely to home defeats compared to away defeats with (Benkraiem et al. 2009) reporting that a respective club's stock price drops by 2.3 per cent after a home defeat, while away defeats generated a price drop of only 1.68 per cent. These results showed that investors have an asymmetrical response penalising football club's stocks more severely than rewards based on football results. In addition, (Dimic et al. 2018) found that market responds and absorbs wins slower than losses highlighting that investors rationality and consequently sentiment is impacted by teams losing rather than winning. According to (Benkraiem et al. 2009), this could be as a result of the information been included in the stock price before the day of the match as the market anticipates a win, and consequently as a result of this expectation, share prices experience a greater fall than rise depending on the result of the game. This could be associated with "the allegiance bias" (Edmans et al. 2007), pertaining from supporters holding stocks in their club.

All these articles focus on one component, investor sentiment, and there are very few articles pertaining to the economic rationale for investing in listed European stocks, and if so, only qualitatively and not quantitatively.

2.4 Performance Indicators

In order for this article to provide a conclusive answer to the question; what are the key KPIs and their impact on listed European football stock prices?, it is necessary for it to be nourished with the insights from other authors as to what are the key KPIs for any given company, without it having to be specifically related with the football industry.

A perfect representation of this is discussed by Plumley et al. (2017) who researched the idea of an experimental model to measure the holistic performance of professional football clubs. In order to do this, they established different financial and sport-related indicators which they thought would be influential to the financial performance of clubs. One valuable takeaway from this article is the specific group of variables they deemed as influential. Among them, one would find indicators related to profits, leverage and cash management. However, they dedicated a group of three indicators to football-related indicators which they thought would be of importance to the financial performance of a company; the win ratio, league positions and capacity utilisation (or 'match attendance'). The last variable provided a new perspective on the importance of football-performance influencing the financial performance of listed European football clubs. In turn, it opened the door for academic articles to study the impact of financial performance on listed football clubs.

As Andonov-Acev et al. (2008) explained; '… financial and non-financial measures are used to quantify objectives to reflect strategic performance of an organization' (p. 185), therefore from this certain KPIs will adopt similar values and/or behaviours among those companies that have certain levels of success. This perspective is discussed by Hegazy (2012) who studied the key KPIs for UK construction companies. To achieve this, the author selected what he called 'best in practice' companies based on their latest turnover for the year in which the research paper occurred; 2008. The main takeaway from this article was that most value was derived from the comparison of five groups of KPIs which were deemed as the 'most important' and 'widely used' relative to industry peers. These were liquidity ratios, leverage ratios, activity management ratios, profitability ratios and market values (Hegazy, 2012)

Demydyuk (2012) provided a similar view on the importance of profit and revenue driven KPIs by studying the airline industry and its most important KPIs. The researcher analysed 27 carriers over a 5-year period (2004-2008). In their findings, the author concluded that revenue and profit driven KPIs, specifically the Operating Profit per Seat, when consistently applied, will lead to better financial performance. This ties in with the findings of Hegazy (2012) in the construction industry. However, Kucukaltan et al. (2016) provided a contrasting conclusion to Hegazy (2012) and Demydyuk (2012) where they concluded that non-financial KPIs were the most important when investigating the importance of a broad range of both financial and non-financial indicators with respect to the logistic industries. Furthermore, they explained educated employees and managerial skills are more important for the success of logistic firms than profitability and cost ratios, which came second in their prioritized list of KPIs for the logistics industry (Kucukaltan et al. 2016).

Another perspective on the key KPIs for any company was presented by Johnson and Soenen (2003). These authors analysed what specific factors differ between those of financially sound company and those of a weak financial company. To achieve these, they selected 478 companies spanning the period between 1982–1998 and analysed their monthly data while closely monitoring 10 specific indicators to see what was their behaviour which included; size of the company, sustainable growth, profitability, capital structure, liquidity and volatility. For each of these indicators, the authors selected different 'proxies' that best represented the 'broad-range' of indicators they were analysing. For instance, for profitability, they used Return on Assets (ROA). In their findings, Johnson and Soenen (2003) found that successful companies

had first, an efficient working capital that did not create roadblocks in the daily operations of the companies, but also they had what they called a 'certain degree of uniqueness' which goes to show the importance of strategy and brand value of each company.

2.4.1 Revenues

Revenues are one of the most important factors for any company, both private and public. Without revenues companies can't make any profit, positive cash flow or value creation. It is central cog that drives the entire firm. With respect this paper, it is expected that revenues are pivotal to the movements of the stock price of listed European football clubs as many authors have stated in existing literature.

One example of this is presented by Pinnuck and Potter (2006) who studied the relationship on-field performance has on off-field financial performance for football clubs. In their paper, they explained that football clubs have different revenue streams. Revenue according to the authors can be decomposed to include revenue generated from the leagues which clubs compete in, matchday revenues clubs receive for selling tickets when they play at their own stadium, in addition to income produced from marketing and merchandising activities, and, revenues related to the different social fundraising activities these clubs engage in.

A similar perspective is discussed in the annual publication of Deloitte Sports Business Group (2019) where revenues are separated into three different categories; Matchday revenues, Commercial revenues and Broadcasting revenues. This decomposition is consistent with the one investigated by Pinnuck and Potter (2006).

Since this paper focuses on clubs situated in Europe, the paper from Rohde and Breuer (2016) who studied the revenue factors, the effect of team investments and the impact of foreign owners on transfer investment for European football clubs is important to review. In their study, they highlighted the fact that there are "revenue asymmetries in Europe's "Big Five" leagues (i.e. Premier League (England), Bundesliga (Germany), La Liga (Spain), Seria A (Italy) and Ligue 1 (France). These leagues are known for captivating millions of people worldwide and generating the biggest revenues to their competitions (Bullough, 2018). Wilson et al. (2013) provided a complementary view of the above where they stated the revenues has been increasing in the English League by analysing the relationship between the ownership structure and club performance for the English Premier League. However, they cited that the profitability of English clubs has in fact been decreasing despite the surge in revenue due to the high level of expenses that private investors have incurred. This has generated a lot of controversy in the last decade and gave birth to new "Financial Fair Play" ("FFP") rules which aim to prevent these deep pocket "private investors" affecting the European football clubs' business model and maintain competitiveness across Europe. This regulation will be reviews in section 2.5. Additionally, Acero et al. (2017) arrived at similar conclusions by studying the ownership structure in European football clubs where they found that over the last decades the most famous European clubs have been utilising most of its revenues to "improve sporting success" instead of focusing on profitability which highlights the importance of the FFP rules.

2.4.2 UEFA Champions League

Clubs not only compete in their domestic leagues, from which they get a fair share of the revenues generated, but they also compete in European cup competitons that consist of the best clubs from different domestic leagues throughout Europe for the last year prior the beginning of these competitions, which guarantees qualification based on "merit" (Bullough, 2018). The

best representative of this is the Champions League which is bigger that any European domestic competition with participation in this competition vital for clubs as it is represents significant cash inflows.

Pawlowski et al. (2010) stressed the importance by analysing the level of competitive balance in the "Big 5 leagues" before and after the increase in pay-outs to European football clubs appearing in the Champions League. Among their results the authors found that for those clubs that have a consistent participation in the Champions League year after year receive "ever-increasing pay-outs from persistent Champions League appearances". In other words, once a club enters the competition and performs well initially, it enters a cycle where there is a higher chance it will obtain large payments for future years based on the Champions League participation. This will invariably allow the generation of "small group of elite clubs" to focus on improving on-field performance (Rohde & Breuer, 2016) with this revenue which increases their chances of qualifying for the next season Champions League again and obtaining this revenue once again. In other words, bigger clubs not only have strong revenues coming from local revenues distributions, marketing activities and matchday ticket sales, but they also have strong incomes coming from the participation in the Champions league which ends up with these organisation being at the "top in the game in financial terms" (Bullough, 2018). Rohde and Breuer (2016), and Bullough (2018) therefore concluding that the Champions League pay-out system has changed the focus of clubs from concentrating on domestic leagues to this continental competition, due to the considerable revenue sources associated with participating in this competition. Thus, this could be the prime explanation of the finding from Peeters and Szymanski (2014) that close to 96% of all clubs that have won the CL since 1996 have come from the countries from where the "Big 5 Leagues" are and have received approximately 71% of all Champions League proceeds from 2004 to 2014.

2.4.3 Sporting Performance

An important variable that generates expectations in terms of its impact in the stock price of listed European football clubs is the on-field performance of the football teams. An interesting perspective on this topic is discussed by Pinnuck and Potter (2006) who investigate the 'association between the on-field football success of clubs and their level of off-field financial performance'. To do this, these academics observed clubs in the Australian Football League (AFL) over the period from 1993 to 2002 and studied how a broad range of performance-related variables might affect match attendance, which was used as a proxy of the revenues generated by these clubs. This method was found particularly valuable for this paper given that revenues are pivotal for the stock price of companies. The performance-related variables analysed by the authors were particularly interesting and were found valuable to discuss, those being the uncertainty of outcome, short run and long run success, facilities etc. As part of the results, Pinnuck and Potter (2006) discussed that both the short- and long-term success of the teams are key for the revenues of the clubs. This gave this paper a whole new perspective on the importance of results and league positions for the revenues, and in turn, the stock price of the clubs which constitutes the usage of performance as one of the independent variables in this paper.

Complementing this view, Carmichael and Thomas (1995) who study the factors that contribute to success in English Rugby teams. They analyse a wide variety of variables including goals in favour and against, to age, height and weight of the rugby players to hopefully identify key indicators. In their results they find that the defensive abilities of the team are more important than attacking to the overall performance of the team. This seems counter-intuitive as attackers are directly involved with the creation of "tries" which is the main way of scoring and winning

in this sport. The value of this paper is the perspective that the authors present when they classify the positive match results as the 'final product' of the team. Moreover, they explain that there is a production function which should be taken into consideration when analysing this final product (that being the wins). This is composed of different variables that have direct impact with the final product of the club. Finally, Peeters and Szymanski (2014) explained that in England a 1% increase in the relative number of points, leads to a 0.26% increase in revenues. In fact, they provided evidence showing a positive relationship between performance and revenues for all leagues. These findings are pivotal to assess the performance of European football clubs is fundamental for the generation of revenues of the clubs which makes them essential for their stock prices.

2.4.4 Leverage

The notion of leverage is vital for listed companies given that a company's financial obligations can drive a company into bankruptcy, even when it is operating under profitable terms (Almeida & Philippon, 2008). The dominant metric for financial distress is market leverage. However, the paper from Davydenko (2005) provided a different assessment for this metric in which he found the market value of assets as a fraction of book debt as the best indicator to analyse probability of default. Furthermore, he determined the current ratio was the second-best indicator for assessment of distressed firms with a lower quick ratio lead to greater volume of bankruptcies renegotiation to occur.

On the other hand, a company might be benefited by the market as there is a premium assigned in the valuation process when the leverage of a company increases as there are tax benefits that can be obtained (Blouin et al. 2010; Graham, 2001). Moreover, with the increase of leverage a new party is introduced into the governance structure of the company. The financial institutions which issue debt become major shareholders motivated to monitor the actions of management which could be taken positively by the markets (Bebchuk & Fried, 2003). On top of that, according to Jensen (1986), debt brings the benefit of reducing excess funds for management curtailing empire building behaviours.

As a fruit of this complex relationship between leverage and stock price, there are a plethora of articles pertaining to this field of study discussing the effects of leverage on a company. A prime example of the literature review on leverage is presented by Cai and Zhang (2011) who studied the monthly changes in leverage ratio for each month between years 1975-2002 by analysing U.S. stocks' quarterly statements stored in Compustat and the Center for Research in Security Prices databases. As part of the results, they found that there is a negative effect generated by the increase in leverage ratio over the portfolio returns with an annual difference of 6.8% value-weighted return of those stocks that increased their leverage compared to those that did not. Moreover, they eluded that this negative effect is even greater for those companies that are already highly levered, given the increasing probability of default. Additionally, Cai and Zhang (2011) explain that a possible explanator of this issue is the probability of underinvestment of these companies. In effect, they found that "a 10% increase in leverage ratio in the current quarter on average generates a reduction of 6.23% in the investment rate and 7.5% of capital expenditures in the next four quarters" (Cai & Zhang, 2011). As a result, the underinvestment issue prevents managements from pursuing projects with an expected positive NPV and, coupled with the increasing probability of default, end up with the negative effect that an increase in leverage has on returns. Expanding on the importance of growth opportunities, leverage and stock price changes, Pilotte (1992) who studied stock prices responses after the company obtained new financing either through debt or equity. Among their results they found that leverage has a positive impact on the stock price, only when the organization has growth

opportunities. In other words, investors will rewards firms that assume straight debt in order to finance expected positive NPV projects due to the expectations that the value will accrue to them.

A new angle to the importance of stock returns and industry leverage was analysed by Hull (1999) who studied the changes of leverage in firms and how their difference with the debt-to-equity ratio of the industry might or might not affect stock returns. To attain this, the researcher analysed 338 firm financing announcements during 1970 to 1988 from respectable sources such as the Moody's Industrial Manual. Hull (1999) found that firms that change their leverage "away from" the industry's average get substantially more negative results that those firms that hover around the industry's mean. In fact, the author states that there is a 1.50% difference in returns between these firms. In other words, investors might value the company better when its leverage stays between the boundaries of the industry (Hull, 1999).

Delving into the view of the importance that leverage has on other KPIs, Hodgson and Stevenson-Clarke (2000) studied the relationship between leverage, earnings and stock returns by analysing 743 years of firms listed on the Australian Securities Exchange (ASE) using an arctan regression model. Given that the main aim of the paper was to "measure financial risk and analyse how it directly affects the value of the firm" (Hodgson & Stevenson-Clarke, 2000). They approached the study by inspecting the importance investors gave to earnings at the time of valuing the company with different levels of leverage. As a result, they concluded that when a listed company is highly levered, there is a greater risk of failure and a company engaging in earnings management to reduce the possibility of triggering debt covenants, which, in turn, reduces the value of information given by the earnings. Additionally, they explain that highly levered companies tend to manipulate earnings given the exposure to interest rate volatility which negatively impacts stock returns.

2.5 Financial Fair Play

The introduction of the UEFA Financial Fair Play (FFP) rules in 2010 has changed the financial landscape to which football clubs operate in. The primary objective of these is to improve the financial health (through economic and financial flexibility) of clubs with the hope to preserve and enable them to ensure the long-term viability and sustainability of European Club Championships (UEFA, 2018a). There are two main criteria which clubs must conform to in order to adhere to the FFP rules which are listed below:

1. No overdue payables
2. Breakeven requirements which requires clubs to be able to balance their expenditure with their revenue. Under this stipulation, clubs shall not exceed more than €5 million above their means. The first assessment of these rules was introduced in May 2014. From this start date, there has been a phasing process, in which the limits have been reduced gradually which are as follows
    a. €45m for assessment periods 2013/14 and 2014/15
    b. €30m for assessment periods 2015/16, 2016/17 and 2017/18

Though, according to Peeters and Szymanski (2014) they may be alternative implicit motives with these rules. His belief is that these financial rules are aimed to regulate and restrict the unfairness of power introduced by "sugar daddies" which affects the competitive balance within Europe, in addition to limiting competitive inequality by placing a cap on wage spending, as wage spending is a pivotal cost driver for firms success.

According to Acero et al. et al. (2017), prior to the introduction of FFP, both monitoring and shareholder expropriation were present. However, he found that an external monitoring mechanism on the club's financials was introduced following the announcement of FFP thereby leaving only shareholder expropriation effect to be present by assessing the relationship of financial performance on European clubs using both OLS regression and Fixed Effects Panel data methodology. Despite this finding, Peeters and Szymanski (2014) provided evidence in whether the breakeven stipulations actually caps clubs spending. They concluded that FFP rules have a positive impact in reducing payroll costs across all leagues as a result of FFP, while yet the revenue of clubs was largely undeterred due these rules. However, one has to be cautious in interpreting these results as by capping a clubs' spending on payroll may limit their on-field success due to not been able to attract top talent, which will invariable affect their commercial success and ultimately their revenue will decline. This is one of the major criticisms of FFP regime in that larger clubs will have larger revenue and therefore can spend more to spend on attracting top talent compared to weaker clubs. Though Peeters and Szymanski (2014) and Ghio et al. (2019) showed that FFP rules have led to a greater balance of costs efficiency of European clubs which reduced the competitive imbalance in Europe and will continue if stricter regimes are enforced onto clubs.

3. Hypothesis Development

The below section outlines the hypotheses which will be investigated in order to provide evidence with respect to the impact of the key KPIs on listed European football club stocks.

The rationale for identifying and investigating the main KPIs which influence the share price of listed Football clubs is that, as with other public companies, will aid management in maximising shareholder value. The best way to achieve this value growth is by identifying exactly what indicators drive share prices of a company, both positively and negatively. In that way, management will have the possibility to tailor strategies that will hone those specific indicators in a way that will ensure they meet their ultimate objective in maximising shareholder value.

Different industries have different KPIs which affect the share price and in turn the market value of firm at different magnitudes. This asserts the fact that this paper focuses on the KPIs of the football industry much more valuable. Despite the vast array of different indicators which can be grouped in five different categories; profitability, liquidity, leverage, management efficiency ratio and market values, this paper aims to investigate the influence of the different KPIs, the explanatory independent variables, on the MTB of listed European football clubs, the dependent variable, by investigating the following hypotheses. Please refer to Figure 1 for summaries of the hypotheses to be discussed.

Revenues do not take into consideration player transfers as the sole focus of this paper is to study the operations of the clubs, discussed in greater detail within section 4.4 - Research Design. As identified in the literature review, the main sources of revenues for football clubs are broadcasting, commercial and matchday (Pinnuck & Potter, 2006). When either of these sources generate an increment increase to gross revenue for a listed firm, it not only marginally increases the book value of the firm by increasing the operations of the firm through the Income Statement, it also sends a signal to the market that the future cash flows of the company will be larger. This generates a greater increase in the market capitalisation of the company which, in turns, helps in raising the MTB of a firm. Therefore, the first hypothesis is:

Null Hypothesis 1: Revenues of listed European Football Clubs are positively correlated with their MTBs

Figure 1

The below table summarises the main hypothesis for inspection of the paper. In the table, the key variable for assessment has be identified, with its expected relationship with MTB and a brief comment about rationalising it

Variable (*)	Expected Sign (**)	Comment
Revenues	+	Higher revenues should lead to higher market-to-book value due to increasing the increment of cash flows
Net Income Margin	+	Higher Net Income Margin leads to greater profitability which invariably increases shareholder value
Current Ratio	+/(-)	With a better current ratio, better liquidity and lower financial distress which should lead to a higher MTB
Debt-to-Assets	-	Lower Debt-to-Asset ratio reduces the possibility of default and underinvestment problems which should lead to a higher MTB
League Positions	-	Better league positions translate to a better brand value, higher player values and more revenues which should lead to a higher MTB
Champions League Participation	+	Champions league participation generates a stronger revenue sources, global reach and demand which should render a higher MTB

(*) Name of the independent variable
(**) Expected sign of the correlation between the independent variable analysed and the dependent variable

The first hypothesis states the importance of revenue. However, revenue is heavily influenced through the participation in the UEFA Champions League, one of the most important global club competitions. The pay-out from this competition substantially benefits football clubs by solely participating in this competition (Pawlowski et al. 2010). Investors will react favourably to the increase in revenues derived from competing in UEFA's flagship competition which has a knock-on effect on the club's valuation. To paint a picture of the importance of this competition, by participating in the group stage of the competition, clubs benefit from the revenue distribution schedules from UEFA (Peeters & Szymanski, 2014). To be more specific, qualifying for the group stages of this competition, clubs receive a fixed sum of €15.25 million excluding variable performance income, where clubs can earn €2.7 million per match won and €900 thousand per drawn match in the 2018/2019 Champions League[2]. The revenues generated by progressing deeper in the competition increases with the exact distributions specified in Figure 2.

To put the worth of this competition into a practical sense, the distribution of this competition accounted for 29% of Celtic's £101.6 million for the financial period 2017/2018 (Deloitte Sports Business Group, 2019). The revenue distribution total does not take into consideration all the sponsorship deals or matchday revenue stemming from the leading worldwide club competition. Sponsors flock clubs competing in the Champions League in order to be associated with them due to the global reach of this competition. Not participating in this league has drastic consequences for clubs even for the major clubs like Manchester United. If said club does not successfully qualify for the group stages of this competition in two consecutive seasons, their

[2] Source: UEFA. (2018b).

annual payment from their record kit-manufacture deal with Adidas of £75 million will reduce by 30%.

Null Hypothesis 2: Champions League Participation of listed European Football Clubs are positively correlated with their MTB

Figure 2

The below table outlines the performance income related to progressing further in the UEFA Champions League.

Qualified to	Revenue Distributed
16th Round	€9.5m per club
Quarter Finals	€10.5m per club
Semi-Finals	€10.5m per club
Final	€15m per club
Winner Bonus	€4

Source: UEFA, (2018b)

Increasing revenue organically does not necessarily translate into a profitable business due to the astronomical expenditures incurred by clubs lending itself to rationalising the hypothesising of Net Income Margin. When a company generates higher Income Margins, it shows that a company has a strong cost efficiency structure, transforming revenues into Net Income. This is more than critical in an industry that is plagued by clubs increasing their costs exponentially to achieve success resulting in large losses. These losses are mostly related with the high level of expenditures football clubs are forced to pay on player salaries, investments in grander stadia and acquiring inflated priced players (Wilson et al. 2013). The introduction of the FFP has on average improved the bottom-line figures across Europe, however more clubs on average are still producing operating loss margins (UEFA, 2018a). Player wages, the biggest contributor of costs for clubs, has been increasing relative to revenues leaving less room for other operating and financial costs to be covered by revenue (UEFA. 2017). This shows the difficulty clubs face being in the green with respect to their bottom-line figure. Consequently, a positive Net Income Margin will be perceived favourably by investors which view this metric as a strong indicator to buy a stock as it shows them a firm can operate within their means, producing earnings which will be transferred to them (Patell, 1976). Therefore, the third hypothesis is:

Null Hypothesis 3: Net Income Margins of listed European Football Clubs are positively correlated with their MTB

The next set of hypotheses focus on the leverage and liquidity of listed football clubs. When a company increase their debt incrementally in their balance sheet, a chain of events occur which directly affect the market capitalisation of a company. These events increase the probability of default of a company by increasing finance distress, rising interest expenses, reducing the available free cash flow (FCF) to pursue positive investment opportunities (Cai & Zhang, 2011). Clubs with a lack of available free cashflow follow Myers and Majluf (1984) Pecking Order Theory by increasing their debt loading. Clubs prefer to issue debt rather than equity in order to avoid outside investors rationally discounting the club's stock price due to the asymmetric information that exists between both parties about the operations of a club. However, increasing debt can result in a debt overhang problem if not managed appropriately, thus having a negative impact on the development of training facilities and acquisitions of ready-made and/or young and talented players. High debts levels resulted in the demise of the

Italian Seria A league at the turn of the decade with clubs "doing a Leeds"[3]. Italian clubs amassed a total debt of €2.6 million in the 2011/2012 season, representing a 9% CAGR from the 2006/2007 season, equating to a sixth of the total Italian GDP. Clubs attempted to reduce their wage bills and by selling star players to richer leagues in order to reduce their debt burden which ultimately destroyed the competitiveness and appeal of the league and clubs alike. These debt problems resulted in the fall from grace of AC Milan, the second most decorated club based on European Cups, who were once the most revered European team in the late 2000's to a team that is currently reeling in their past glory days due to the debt problems they face. This illustrates how high debt levels have a drastic negative impact on-the-field and on business capabilities as discussed above. In other words, clubs will directly be affecting their future growth due to the debt overhang problem associated with low liquidity. Moreover, leverage increases put a club in a position of weakness relative to their deep-pocket competitors who may exploit their weakness (Telser, 1996), by acquiring their star roster or coaches from the club at discounted prices. This is severely punished by the financial markets; as the probability of bankruptcy increases due to sizeable risk-shifting beyond a comfortable zone corresponds to an increase in cost of equity and ultimately the discount factor resulting in reflecting the riskiness of the company (Cai & Zhang, 2011). This will lead to lower discounted FCFs and thus a lower share price.

The riskiness of a club can also increase if its short-term liabilities increase, as it puts pressure on its capabilities to meet its financial obligations in the short term. These potential issues could drive the company into accruing more debt with restrictive financial convents. This could restrict the club in seeking their long-term targets and ultimately have a negative effect on their growth. These problems will send the wrong signal to the markets and, in turn, have an adverse impact on the club's stock price and market value. Thus, it is expected the current ratio of listed football clubs will decrease, and the MTB will follow. However, this is not to say the relationship will always behave in the above manner. When the current ratio of a company continues to increase beyond a certain point compared to the industry, this might negatively impact the market value of the firm as investors interpret a mismanagement of liquidity. Different industries have different acceptable industry ratios, with the average current ratio for pharmaceutical companies being 2:1 (Yadav, 2014). Therefore, current ratios exceeding a certain threshold will be frowned upon and as a result display a negative relationship with MTB. Based on the aforementioned comments with respect to liquidity and gearing, the following hypotheses have been developed:

Null Hypothesis 4: Debt-to-Asset of listed European Football Clubs are negatively correlated with their MTBs

Null Hypothesis 5: Current Ratios of listed European Football Clubs will follow a quadratic relationship by initially displaying a positive correlation with their MTB but then turns negative

The final relationship to be analysed is with respect to league positions and the MTB of listed European Football clubs. When a club is performing well and winning on the pitch, it invariably results in the club climbing up the table. Obtaining the number one spot is the prime purpose of any club's existence, and if the team at the end of the season maintains this position, it wins the domestic championship. During the process of a team winning matches and potentially winning the league, there are many diverging events that happen simultaneously that positively affect the club and its market capitalization. A valorisation of capital occurs as a result of good team

[3] "Doing a Leeds" is a football phrase synonymous with clubs possibly in dire straits as result of financial mismanagement

performance, presenting an opportunity for a club to capitalise on by substantially increasing their revenue through commercial and broadcasting deals, in addition to selling players that performed well for a significant mark-up (Pinnuck & Potter, 2006). In fact, there have been studies that state that a 1% increase in the relative number of points leads to a 0.26% increase in revenues within England (Peeters & Szymanski, 2014). League position is the linchpin for the entire business model of a club to succeed both currently and in the future. The sixth hypothesis is:

Null Hypothesis 6: Better League Positions of listed European Football Clubs are negatively correlated with their MTB

4. Methodology

This section discusses the principles, models and their respective limitations to which this research will be performed in, while also introducing an assessment of the critical variables for inspection to answer the research question. The final section concludes with the base regression model produced providing the foundation for the results of the paper.

The purpose of this research is to provide new evidence relating to identifying the KPIs and their impact on listed European Football club stock prices, measured using the MTB as proxy. The basis for the research and ultimately the goal of the methodology is to assess the magnitude and direction in which the selected KPIs affect the stock price. The literature review carried out in Section 2 – Literature Review provided a deep insight into the different techniques utilised by academia, with Ordinary Least Squares ("OLS") regression and panel data being most favoured when empirical research was conducted. These statistical measures were implemented by Wilson et al. (2013), Rohde and Breuer (2016), Acero et al. (2017) and Hegazy (2012). The empirical methodology of this paper follows these authors' approach in utilising a regression model. The purpose of the utilisation of this tool is to identify and properly analyse the relationships between the dependent variable expressed in the model, and the main independent explanatory variables, which are as follows:

- Revenue
- Net Income Margin
- Current Ratio
- Debt-to-Assets
- League Position
- Champions League Participation

4.1 Regression Limitations

Before discussing the research design of this paper within Section 4.4, limitations regarding the OLS regression and Panel data empirical methodologies will be brought to the reader's attention. Identifying the potential limitations of using the respective statistical techniques provide a greater understanding of them ensuring the model is robust and capable of delivering the goal of the research paper.

A multiple OLS regression attempts to discover the direction and magnitude between a dependent variable and the independent explanatory variables by fitting a linear equation to the data. This linear regression is exposed to several limitations which are listed below (based on Gauss-Markov OLS regression assumptions):

MLR.1: The linear regression model is linear for all parameters. In equation form, this can be written as:

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots \beta_k x_k + e$$

MLR.2: There is random sampling from a population
MLR.3: No perfect collinearity in the sample
MLR.4: The conditional mean (i.e. exogenous explanatory variable) should be zero which in algebraic form is:

$$E\ (u|x_1, \ldots . x_k) = E(u) = \ 0$$

MLR.5: There is homoscedasticity

$$Var\ (u|x_1, \ldots . x_k) = Var(u) = \ \sigma^2$$

MLR.3, no perfect collinearity is endemic in financial studies and as a result of this problem, further attention will be devoted to this by expanding on this issue and how it can be eradicated.

Endogeneity is present in a regression where the chosen independent variables correlates with the error term (e). Therefore, the aim of the regression model is that the independent variables should be mutually exclusive to each other. This issue has come to the fore in recent times with researchers using econometric techniques to attempt to reduce the possibility of the assumption not being "blue" [4](Roberts & Whited, 2013). There are three grounds for which this assumption may result in the OLS regression not being blue:

Measurement Error

Measurement error arises as a result of a chosen explanatory variable being unobservable resulting a proxy is used. The difference between the proxy and the parameter (i.e. the true value) is the measurement error, this being contained in the error term. This issue can arise in this dataset with Debt-to-Assets been used as a proxy for market leverage and/or estimation of operating revenues. This error can be correlated to other independent variables, thus violating MLR.3 assumption which in turn leads to an underspecified economic model (Aigner et al. 1984)

Omitted Variables

One of the most common issues in empirical corporate finance is the omittance of variables, these being a thorn to empirical papers through the reoccurring violation of MLR.5 (Roberts & Whited, 2013). Omitting variables will more often than not produce inconsistent and inaccurate estimates of all other beta coefficients of the independent variable. This issue is also a hindrance to this paper leading to the omission of Brand-Value, an indicator that is thought to be critical to a club's success due to the difficulty of sourcing data for all the sample clubs.

Simultaneity

Simultaneity occurs when an explanatory variable is linearly related to the dependent variable. In simple terms, x_{ij} causes MTB but MTB also causes x_{ij} (i.e. both variables are jointly determined). This has led to using the Debt-to-Assets as opposed to Market Leverage ratio as an explanatory variable since the components of the Market Leverage ratio is directly affected by the MTB of a club. The root of this problem is that the independent explanatory variable explains a significance variation in the dependent variable.

The effect of endogeneity can be reduced by increasing the number of variables within the multiple regression model. However, this approach must be taken with care, as with the addition of more variables inherently increase R^2, which is irrespective of whether these variables increase the explanatory power of the model. The greater the amount of variables included, more often than not results in a more informative model, but does not fully mend the problem that the error term (e) and the mean error in the independent variables are jointly related (Aigner

[4] Blue is an acronym for the "Best Linear Unbiased Estimator"

et al. 1984). The components of the error term consist of both quantitative and qualitative factors with the latter difficult to address in a statistical model. These unknown qualitative factors may be addressed by including proxies, however as explained above, a measurement error is more than likely to arise. Including more explanatory variables, while yet increasing the explanatory power of the model, may ruin the assessment of the key KPIs that are vital for corporate performance success in the football industry (Hegazy, 2012; Chan et al. 2002).

4.2 Panel Data

As stated above, omitted variables are one of the most common grounds of endogenous events occurring in the regression model. A pooled panel data analysis is carried out in order to try to mitigate this problem, thus ensuring more accurate and robust results. Panel data (longitudinal or cross-sectional time-series data) can be defined as repeated sampling over a time period with new observations obtained in each period. This research focuses on 23 cross-sectional panels, each correspond to a listed European football club. This spans over a time period of 10 seasons. Implementing a pooled panel data is more informative than a single cross-sectional or time-series varying regression model without experiencing adverse aggregation bias (Blundell & Mátyás, 1992). It does however add more complexity to the modelling specifications. Other associated advantages and disadvantages of utilising this statistical model are outlined as follows:

- Panel data can offer greater informative power for the effect of KPIs and the clubs' stock prices by pooling data rather than analysing individual inferences
- It can offer a better, but by no means complete and cost-efficient remedy to omitted variables, in turn mitigating the potential omitted variable bias creeping into the results
- The usage of panel data can alleviate the potential under-specification of the economic model as by clustering multiple observations for the clubs enabling a different alteration from deducible changes without the need of qualitative information. This is achieved by implementing a Fixed Effect Panel regression using xtreg on stata

Limitations

- If a random error exists for one football club, clustering football clubs exposes the model to non-randomness bias which may compound the endogeneity problem (Blundell & Mátyás, 1992) discussed above
- Panel data is at its optimum when a balanced panel data set is achieved with uniform time-periods across the cross-sectional panels. This may be difficult to achieve due to data collection issues which is to be the case for the database used in this paper

By conducting a Fixed Effects panel data model, this will potentially eliminate one of the two components of the error term (e) in a panel regression. An error term consists of a composite error of unobservable factors, including both time-invariant components and an idiosyncratic element over the time period. A decomposition of the error term can be written as:

$$e_{it} = U_i + V_{it}$$

where U_i represents the time-invariant component and V_{it} is the term that captures the residual. The U_i term is the relevant indicator which is of main concern for estimation purpose (Roberts & Whited, 2013). If the time-invariant component, U_i, is correlated with any one of the regressors, this is referred to a "Fixed Effect" and endogeneity exists. If the opposite occurs,

then the relationship is labelled as a "Random Effect" and endogeneity is of no concern. To determine which effect pertains, a Hausman Test will be carried out (which is discussed in Section 4.8 – Model Selection).

4.3 Sample Selection

Despite previous literature focusing on European club stocks, the dataset in this paper includes all listed European football clubs rather than football club stocks which are only listed on European Stock Exchanges. This is to gain a complete perspective of the public European football landscape and will give a better representation and remove any selection bias to the overall results.

Tottenham Hotspur (known as Spurs) were the first professional football club who conducted an Initial Public Offering (IPO) in 1983. Ever since, numerous clubs have listed and delisted and. Currently 22 European football clubs have been listed on European Stock Exchanges (Dimic et al. 2018). The sample for this paper comprises of 24 listed football clubs derived from assessing the components of the Stoxx Football Index and assessing articles resulting in the inclusion of Manchester United and Fudbalski Klub Teteks AD Tetovo, listed on the New York Stock Exchange (NYSE) and Macedonian Stock Exchange (MSE) respectively. The latter has been dropped from the dataset due to the clubs' stock price operating at a steady state during the time period for which information could be sourced regarding this club. Subsequently, inclusion would result in no meaningful inferences on assessing the impact of KPIs on stock price.

The sample comprises of 11 national football leagues, Denmark (Danish Superliga), England (Premier League), France (Ligue 1), Germany (Bundesliga), Italy (Seria A), Netherlands (Eredivise), Poland (Ekstraklasa), Portugal (Liga NOS), Scotland (Scottish Premiership), Sweden (Allsvenskan) and Turkey (Spototo SüperLig) for the 23 listed clubs. From Figure 3, it can be seen that there is a higher concentration of football clubs listed in Denmark, Italy, Portugal, and Turkey with these four countries contributing to two thirds of the overall sample.

Digging deeper into the sample set, it is interesting to note the skewness of club size, the majority being small- or mid-cap, and how it is correlated with both the football prestige and business model of these clubs. This is to the exception of Manchester United and Juventus, the only clubs with revenues exceeding €400 million (please refer to Figure 4). Due to the varied size, one could allocate clubs to different market positions, with the ranking of the above results consistent with the market positions outlined by Şener and Karapolatgil (2015). According to them, Manchester United is an industry leader due to their financial strength with Juventus and Borussia Dortmund being runner-up clubs. Therefore, all other clubs can be considered weak in terms of global presence, this being indicative of their revenues. It comes as no surprise from the sample that the clubs performing in the best leagues around in terms of commercial value are higher up in the revenue rankings.

Figure 3

The below table provides a list of the 23 European football clubs listed on a stock exchange. Including in this table are the countries which these clubs compete in, their respective tickets, dates they IPO d at and the names they are commonly referred to

Official Stock Name	Country	Ticker	Date Listed	Football Club Name
Aalborg Boldspilklub	Denmark	CPSE:AAB	14/09/1998	Aalborg
AFC Ajax	Netherlands	ENXTAM:AJAX	11/051998	Ajax
AGF	Denmark	CPSE:AGFB	20/05/1988	AGF
AIK Fotboll AB	Sweden	NGM:AIKB	31/07/2006	AIK Fotboll
AS Roma S.p.A	Italy	BIT:ASR	22/05/2000	AS Roma
Beşiktaş Futbol Yatirimlari Sanayi ve Ticaret A.S.	Turkey	IBSE:BJKAS	19/02/2002	Beşiktaş J.K.
Borussia Dortmund GmbH & Co. Kommanditgesellschaft auf Aktien	Germany	XTRA:BVB	30/10/2000	Borussia Dortmund
Brondyernes IF Fodbold A/S	Denmark	CPSE:BIF	05/04/1988	Brondy IF
Celtic PLC	Scotland	AIM:CCP	28/09/1995	Celtic
Fenerbahçe Futbol A.S.	Turkey	IBSE:FENER	17/09/2004	Fenerbahçe
Futebol Clube Do Porto - Futebol, S.A.D.	Portugal	ENXTLS:FCP	01/06/1998	FC Porto
Galatasaray. Sportif Sinai ve Ticari Yatirimlar AS	Turkey	IBSE:GSRAY	19/02/2002	Galatasaray S.K.
Juventus Football Club S.p.A.	Juventus	BIT:JUVE	19/12/2001	Juventus
Manchester United plc	England	NYSE:MANU	10/08/2012	Manchester United
Olympique Lyonnais Groupe SA	France	NXTPA:OLG	08/02/2007	Olympique Lyon
PARKEN Sport & Entertainment A/S	Denmark	CPSE:PARKEN	13/11/1997	FC Copenhagen*
Ruch Chorzów S.A.	Poland	WSE:RCW	31/12/2009	Ruch Chorzów
Silkeborg IF Invest A/S	Denmark	CPSE:SIF	07/10/1991	Silkeborg IF
Sport Lisboa e Benfica - Futebol, SAD	Portugal	ENXTLS:SLBEN	21/05/2007	S.L. Benfica
Sporting Clube de Braga	Portugal	ENXTLS:SCB	09/10/2006	S.C Braga
Sporting Clube de Portugal - Futebol, SAD	Portugal	ENXTLS:SCP	02/06/1998	Sporting Lisbon CP
S.S Lazio S.p.A.	Italy	BIT:SSL	06/05/1998	S.S. Lazio
Fudbalski Klub Teteks AD Tetovo	Macedonia	MK:TETE		FK Teteks
Trabzonspor Sportif Yatirim ve Futbol Isletmeciligi Ticaret A.S.	Turkey	IBSE:TSPOR	10/10/2006	Trabzonspor

* Parken Sport & Entertainment A/S is a Danish company which operates 5 different divisions, with FC København being one of their subsidaries

Figure 4

The below table presents a ranking of clubs based on the 2018 revenue which is denominated in revenue. The revenues of clubs which operate in a different reporting currency were translated using the average FX exchange rate relating to the respective reporting period. Accompanied with revenue are each club's predominate reporting frequency and the market capitalisation of the club as of the 1st April 2019 is reporting, once again in EUR, in order to provide comparable information. Current Market Capitalisation were translated using the exchange as of 1st April 2019.

Ranking*	Club	2018 Revenue (€'m)	Current Market Cap. as of 1st April 2019	Frequency of Reporting
1	Manchester United	713.63	3,274	Quarterly
2	Juventus	459.83	1,530	Semi-Annually
3	Borussia Dortmund	351.33	774	Quarterly
4	AS Roma	251.78	300	Semi-Annually
5	Olympique Lyon	217.68	172	Semi-Annually
6	Galatasaray S.K.	165.70	105	Quarterly
7	S.L. Benfica	160.05	84	Quarterly
8	Fenerbahçe	154.96	107	Quarterly
9	Ajax	146.08	312	Semi-Annually
10	FC Porto	141.85	16	Semi-Annually
11	S.S. Lazio	123.19	86	Semi-Annually
12	Beşiktaş J.K.	119.00	53	Quarterly
13	Sporting CP	81.75	51	Quarterly
14	Celtic	80.03	153	Semi-Annually
15	Trabzonspor	54.14	33	Quarterly
16	FC København	35.27	135	Quarterly
17	Brondy IF	24.170	31	Quarterly
18	AIK Fotboll	15.60	6	Quarterly
19	AGF	11.77	12	Semi-Annually
20	S.C Braga	9.90	2	Annually
21	Aalborg	9.33	5	Semi-Annually
22	Silkeborg IF	6.73	19	Semi-Annually
23	Ruch Chorzów	1.07	2	Quarterly

(*) Ranking is based on 2018 Revenue

The sample period runs through 10 seasons (i.e. 2009/2010 - 2018/2019 season) beginning in December 2009 and finishing in March 2019. As can be seen from Figure 3, all but one of the football clubs, Manchester United, have been listed prior to the sample period. The basis for selection of this sample period is due to the introduction of the FFP regulation from the European football governing body, UEFA. Despite implementation of the FFP commencing at the beginning of the 2011/2012 season, the rules were agreed upon in September 2009 by the UEFA Financial Control Panel (UEFA, 2018a). Selection of December 2009 as the start date is based on the view that clubs would have taken proactive precautionary actions as a result from this announcement from the outset and therefore began to adjust their business models to be in line with the FFP stipulations. A longer sample period beginning prior to December 2009 would not provide an accurate representation of the current impact of the KPIs to football clubs' stock prices, since football clubs would have engaged in different financial strategies. There were no restrictions on their overdue payables or ensuring they adhered to the "breakeven rule".

During the sample period, the clubs' quarterly, semi-annual and annual reports were used. Included data information was influenced by the frequency of each club publication their respective financial reports (either because of the stock exchange regulatory requirements or

because of their own discretion). Data collection and selection of such frequency was aided per the time-period information contained in Bloomberg, Capital IQ, Thomson Reuters and from each club's investor relations website. This approach has been adopted in order to increase the amount of data points in the analysis which will translate into more meaningful and representative results for the panel data study. As of March 2019, twelve clubs were producing quarterly reports, ten producing semi-annual and one publishing solely annual reports (Figure 4).

In conclusion, the sample comprises of 673 data points (n) for the 23 listed European football clubs between the periods of December 2009 to March 2019.

4.4 Research Design

This section has been based on what has been covered within Section 2 – Literature Review, some minor adjustments been made in order to further the research. The literature review carried out provided a wide array of financial indicators, both quantitative and qualitative, these being key to the football industry. The analysis is carried using panel data regression with particular focus on controlling for clubs size. Utilising a pooled OLS regression model assumes that the 23 football clubs in question are homogeneous, and that time effect does not affect these clubs. However, the football industry is heterogeneous (Şener & Karapolatgil, 2015) and supports the implementation of panel data as being the best specification for this research to proceed with.

The critical inferences derived are heavily dependent on the selected dependent and explanatory variables. The main dependent variable in the analysis will be the MTB, which is used as a proxy for a club's share price. This ratio assumes the share price reflects the total market value of equity; as the total assets by owning equity changes, a club's share price should change. Therefore, MTB becomes a relative measure of valuation. Another advantage of the MTB metric is that a club's share price is a generic nominal number which does not consider stock splits. For example, Manchester United plc. proceeded with a dual class share listing when it went public in August 2012 resulting in a stock split of 16,666,667, outstanding shares been evenly split between Class A and Class B. Usage of share price as the dependent variable would result in the omission of one share class, thus yielding an inaccurate and inconclusive analysis. Instead, using MTB considers the total valuation irrespective of a club's stock split. Consequently, provides an overall assessment of the impact of the KPIs on the club's stock price through market capitalisation.

The main explanatory variables are sourced from the articles written by Wilson et al. (2013), Rohde and Breuer (2016), Johnson and Soenen (2003) and Plumley et al. (2017) who describe quantitative variables fundamental to the performance within the football industry. The main independent explanatory variables have been selected based on the guidance provided by (Plumley et al. 2017) who determined eleven different indicators to assess the financial performance of football clubs. The approach of this paper aims to quantify their qualitative assessments of the indicators. However, all the eleven financial indicators are not assessed. The objective is to strike a balance between including a sufficient number of variables which will limit the measurement error (Aigner et al.,1984) which will not harm the assessment in the critical factors, delivering corporate financial success (Hegazy, 2012; Chan et al. 2002) in the football industry. The selected explanatory variables are as follows: Revenue, Net Income Margin, Current Ratio, Debt-to-Assets, League Position, Debt-to-Assets and Champions League participation. These variables can be classified into the common five different categories which are Profitability, Liquidity, Efficiency, Market Values and Leverage ratios.

Though data has been provided for all the 23 listed football clubs, adjustments have been made to some of the explanatory variables in order to produce results which are comparable and consistent to each other, in addition to addressing the problem relating to omitted variables. All the financial data was sourced and assimilated from Bloomberg, Capital IQ, Datastream, Thomson Reuters, the and the clubs' respective financial reports. The calculation procedure for each variable is outlined below:

Revenue

Revenue for each club is based on core football operations. However, some listed stocks generate revenues through different sources including, but not limited to Investment Property, Catering Business (i.e. Brondy IF IF) and Fitness (i.e. Parken Sports and Entertainment). Revenue streams which do not focus on football operations are excluded from the revenue figure. For example, transfer receipts resulting from disposal of players are excluded from revenue (such as in the case of Borussia Dortmund, Juventus and S.S. Lazio). This is due to the fact that this paper takes the view of players in a club being equivalent to fixed assets. Transfers of these players are influenced by firms' characteristics, clubs' sporting history and their participation in the UEFA Champions League Mourao (2016) while obsecuring ones' view of the pure operations of football clubs.

Disposals of these assets, while yet occurring bi-annually (January ("Winter Transfer Window")[5] and July-August ("Summer Transfer Window")) are considered to be significant. Howbeit, listed football clubs are not primarily in existence for acquiring and disposing of players but rather maximizing shareholder wealth. This is consistent with the approach taken by Deloitte Sports Business Group (2019) and KMPG (n.d.) in their respective reports. The base units for the analysis is Euro millions. Clubs whose reporting currency are not denominated in Euro are translated using the average FX rate for a respective period.

Leverage

Based on prior literature, the main metric for assessment of leverage is the Market Leverage ratio. It provides a better measure of the firm's indebtedness compared to ratio in book value terms. However, inclusion of market leverage within the panel regression model would result in simultaneity creeping into the model. In order to avoid this relationship from occurring, a different metric shall be used to represent leverage. The Book Leverage was the main indicator for gearing according to Plumey et al. (2017). This alternative metric has not been utilised in this paper due to the equity component of this ratio been negative 207 times across the sample of 23 listed clubs. A negative equity produces an invalid number and therefore, the inclusion of this variable would result in 31% of the data points being excluded. This has resulted in the inclusion of Debt-to-Asset ratio as the main leverage metric. The rationale for selecting this metric is that it is intrinsically the same as the Market Leverage ratio as both metrics go beyond one due to being continuous variables. When Book leverage is invalid, this assumes that debt is greater than equity and therefore leverage is greater than 1. This option has been further vindicated by carrying out a simple linear regression between the Market Leverage and both the Book Leverage and Debt-to-Asset metrics. Results of this regression conclude the Debt-to-Asset gearing ratio is more correlated with Market Leverage with a correlation coefficient, p,

[5] The English Premier League clubs have ruled in favour of altering the Summer Transfer window period from July to September to May (after the final fixture has been played up until the beginning of the new season) to the Thursday before the start of the new season.

of 0.1895 between both variables compared to a p of 0.0918 when assessing Book Leverage (please refer to Appendix Table 1).

Usage of the Debt-to-Asset ratio results in leverage being measured using both in market and book value terms. The asset component of the formula is based on the Total Asset line item of the club at reporting date. Debt is assumed to be measured in market terms[6] and comprises of all interest-bearing liability, both short- and long-term. The primary interest-bearing liabilities included in the formula are Short-term Debt, Current Portion of Long-term Debt, Capital Leases obligations and Tax Payable. While the first 3 components of the debt figure are intuitive, the addition of tax payable into debt component is deemed necessary as it satisfies the criteria of debt. Tax payables is interest-bearing where the government has a claim on the firm's cashflows resulting in the possibility of the club been wound up if they cannot fulfil their tax obligations.

League Position

The League Position entered for each club is the position held in their respective league at the time of reporting period, gathered from the reputable online website transfermarkt.com. With the seasons coming to an end during the second quarter of a year, the final league standing for the club gets entered in this time period. This is contrary to the procedures of Ghio et al. (2019) and Plumley et al, (2017) who use league points as their basis of measurement of football success. The reason this paper goes against academic views is that a better league position translates to greater success both on- and off-the-field. Greater points result in a better league position and tend to improve revenue opportunities. Howbeit, this may not be the case in relative terms. A prime example is what occurred in the 2018/2019 English Premier League season where Liverpool FC would have been crowned English Premier champions over the past 20 seasons in all but 2 seasons with their 97 points tally but they finished second. Therefore, despite having significantly more points on the table compared to previous years, Liverpool FC did not end up in the coveted first position, instead finishing runner-up which shows that the number of points does not automatically equate to coming first.

Champions League

Champions League participation is critical to European clubs in fulfilling their business goals (Ghio et al. 2019). The increased revenue earned by clubs participating in the flagship European competition has increased due to the growing appeal of this competition. Commercial value of this competition is driven by global demand and media deals (Bullough et al. 2018). Assessment of this factor is to include it as a dummy variable in the base regression model with a "1" indicating the periods in which a club participated in the Champions League, thus generating revenue. For instance, if a club reached the Last 16 stage, it would have generated Champions League revenue from September through March as these are the periods which club will have competed in this competition, resulting in 1 been included in Q3, Q4 of t_y and Q1 of t_{y+1} where y denotes a year.

Current Ratio

The current ratio is calculated by dividing current liabilities by current assets.

[6] An assumption has been made that debt line-items contained in the club's financial reports and in the analytical software tools utilised for this paper are equivalent to market values.

Net Income Margin

The choice of using this ratio as the base profitability ratio is to assess the earnings of the club (i.e. Revenue/Net Income) with investors placing significant emphasis on the bottom-line figure and EPS, stemming from this figure.

The inclusion of independent variable in a single model has been assessed in order to ensure MLR.3 assumption is not violated. The correlation coefficient matrix (please refer to Appendix Table 1) indicates no pairwise correlation pertains between the explanatory variables with no absolute significant relationship shown in the matrix[7].

4.5 Descriptive Statistics

The descriptive statistics were carried out for each numeric variable with the summary statistics provided in Figure 5.

Figure 5 - Descriptive Statistics

The following table presents the descriptive statistics for the selected explanatory variables. The variables which are described below exclude the League Positions and the participation of these clubs in the Champions League for the 23 clubs. Market leverage, while yet not analysed in the base regression due to reverse causality, has been included below for supplement information. The total standard deviation for each variable has been decomposed into "Between" and "Within". "Between" indicates the difference between the standard deviation for each panel compared to the average standards from the 23 panels. "Within" indicates the deviation from each individual's average.

Variables		Revenue (€'m)	Net Income Margin	Current Ratio	Market Leverage	Debt-to-Assets
Measures of Central Tendency	Mean	34.64972	-25.3380	0.7493	183.3817	42.8801
	Median	20.88	-10.9748	0.5293	58.7313	39.4075
	1st Quartile	6.56	-46.4209	0.3134	16.2933	15.3925
	3rd Quartile	43.2	8.9052	0.8468	182.6484	58.5076
	Kurtosis	13.2370	25.8257	45.2032	129.9387	5.6895
	Skewness	2.7400	-1.7461	5.4530	9.3130	1.3567
Standard Deviation	Total	42.7861	96.1071	0.9011	429.5652	36.0083
	Between	37.0615	26.6873	0.4407	468.8906	26.9343
	Within	24.5140	92.5109	0.7908	292.1994	23.7044

The 23 listed clubs in the sample are predominately occupying the number one spot or competing for the championship and/or Champions League qualification spots within their respective domestic leagues (please refer to Appendix Graph 1). However, being top in January does not necessarily translate into success: ultimately a club is judged based on their final standing. Therefore, the inference about the frequency of positions throughout the 10 seasons can be misleading. If only club standings at the end of the domestic season[8] is focused on the second quarter for the 11 divisions the clubs are competing in, the distribution curve remains,

[7] The rule of thumb for the acceptable threshold to indicate a pairwise correlation is in excess of a correlation coefficient of 0.70 or 0.80.

[8] The end of the domestic league occurs within the second quarter for each club in the sample. Henceforth, when discussing the final league standings for the clubs, it is discussed up until the end of the 2017/2018 season as the 2018/2019 seasons for all the clubs have been completed nor has financial reports been published.

reinforcing that the clubs in the sample are amongst the best performers in their division (please refer to Graph 2). This result does not necessarily mean that the best positions are shared amongst all the listed clubs, despite 15 out the 23 clubs been crowned champions in their respective domestic leagues throughout the sample (with S.C Braga, AIK, Trabzonspor, S.S Lazio, Sporting Lisbon CP, Olympique Lyon, Ruch Chorzów and AS Roma never winning the league during the sample period). Within the 11 leagues, there exists a separation between the elite clubs and the rest, with the divergence increasing as a result of the financial might of the best clubs' leaving the remaining clubs behind. Prime examples include the monopoly in existence specifically in the Scottish Premiership and Italian Seria A, where Celtic and Juventus "own" these divisions[9], the duopoly of Benfica S.L. and FC Porto in the Portuguese league[10], Ligue Nos, and the oligopoly of the "Top 3" (i.e. Beşiktaş J.K., Fenerbahçe and Galatasaray S.K.) in the Turkish Spototo SüperLig[11].

The trend of the league position for the listed European clubs is outside the remit of this research due to the fact this paper is assessing the impact of the KPIs as a whole rather than taking a silo-approach for each individual club. League positions fluctuate sporadically and are hard to interpret, especially when looking at one period in isolation as a plethora of factors contribute to the meaning of position which are outside the control of teams despite them trying their best to ensure they can secure their positions. What can be deciphered from these trends (please refer to Appendix Graph 3) is that clubs can be put into different categories with the majority of the clubs in the sample competing for domestic titles or for Champions League spots, leaving only a handful of clubs vying for mid-table postion such as Rich Chorzów.

Revenue

Despite league position being a significant factor of success, this does not necessarily indicate that clubs have been successful from a business perspective. By inspecting the revenue trend (please refer to Appendix Graph 4), there is a clear growing pattern in overall revenues for all listed European football clubs analysed, with revenue increasing by a CAGR of 29.33% between the periods 2010-2018 demonstrating increasing appeal of football worldwide and the strength the listed clubs in capitalising on this demand.

However, these developments have not been dispersed equally to all the football clubs studied in the sample set, with clubs pertaining to the so-called Big 5 Leagues (Rohde & Breuer, 2016) accruing the majority of share revenue over the rest. They are many reasons for this difference but two of them have stood out over the rest. The first one relates to the UEFA Champions League. As previously explained, this competition represents a powerful revenue source for those clubs that partake in it. This competition has increased its revenue distributions by 62.29%, from €1.257 billion in the 2015-2018 cycle to 2.040 billion for the 2018/2019 edition showing the considerable influence of this competition for European football clubs (UEFA, 2015; UEFA, 2018b). For instance, Manchester United enjoyed an increase of £28.5 million in

[9] Both Celtic and Juventus have remained reigning champions for the last 7 consecutive seasons in their respective leagues. At time of writing of this thesis both clubs have been recently reinstated as champions in their respective leagues for the 2018/2019 campaign.

[10] Benfica S.L. and FC Porto having shared the title over the 9 complete seasons across the sample period, with Benfica winning it on 5 occasions with FC Porto winning the remaining.

[11] The "Top 3" Turkish clubs have been victorious in their league in the last 8 seasons. These 3 clubs due to the division of their superiority, will be aware of the actions of others which will affect their decision-making. This is evident with each of these teams signing players that have just passed their prime at a deep discount compared to previous market values simultaneously, such as Fenerbache signing Robin Van Persie and Martin Skrtel, Beşiktaş J.K. signing Pepe and Ricardo Querisma and Galatasaray recruiting the likes of Dider Drogba and Lukas Podolski.

Champions League revenue, or 37.9%, in the 3 months ended 31 December 2018 compared to the same period of the previous year (Manchester United Plc, 2019).

The other reason why major clubs have seen drastic hikes in revenues is through sponsorship deals. Sponsorships are labelled as the most important commercial revenue source for European Football clubs, and moreover, the amounts are strictly related with the performance, size and global recognition of each given European Football club (Pinnuck & Potter, 2006). A perfect example of this is the renegotiation of the contract between Juventus S.p.A and Adidas in December 2018 where the sports brand agreed to pay €408 million to Juventus S.p.A until 2027 (or €45.33 million a year), representing a substantial 94.97% increase per annum considering their last deal signed from season 2015/16 season was worth €139.5 million total (or €23.25 million a year) (Juventus S.p.A. 2019). This value is much greater than the €25 million (i.e. €16 million fixed payment with potential €9 million royalty payments dependent on league performance and qualification for the Champions League) S.S Lazio secured with Macron for 5-years until 2022 (S. S. Lazio, 2017). This difference is even greater for smaller clubs and is attributable to the global demand that major clubs have due to constantly winning, creating an image that sponsors desire to market on.

Net Income Margin

They are many factors in play affecting the transformation of revenue into Net Income. These include player salaries and transfer contracts and dealings creating significant strain on clubs and their profitability. The mean Net Income Margin for the 23 listed clubs over the period is -25.33%, which infers that on average, clubs are in the red, however this result is heavily influenced by outliers in the sample from Brondy IF, Fenerbahçe, Galatasaray S.K. S.K, Ruch Chorzów and Sporting Lisbon CP. Using the median to remove the impact of the outliers still yields a negative result of -10.97% which the leptokurtic[12] histogram distribution clearing depicts this observation (please refer to Appendix Graph 5). Assessing the median and the histogram with the Inter-quartile range (IQR) of -46.24% to 8.91% shows that the clustering of the results is around zero which validates that clubs reported more losses than profits[13]. These results are consistent with the intuition that the football industry is loss-making and is plagued by management running clubs under the "Trophy Asset" model where focusing on winning and engaging in financial strategies devoid of economic rationale (Wilson et al. 2013). This trade-off has been long discussed amongst football economists who suggest that the more one spends, specifically in player transfers, the more you win. However, a deeper analysis of the Net Income Margin for each individual club (please refer Appendix Graph 6) shows that not all clubs are on average loss-making. As can be seen from this graph, only 7 clubs produce on average a positive Net Income Margin, those being, AIK, Ajax, Borussia Dortmund, Celtic, FC Copenhagen, S.S Lazio and Manchester United.

Current Ratio

The current ratio for all the listed European football clubs in question can be seen to have relatively low stable ratio (please refer to Graph 7). Three out of the four Turkish clubs (i.e. Fenerbahçe, Galatasaray S.K. and Trabzonspor) all have had high current ratios at the beginning

[12] Leptokurtic occurs when the kurtosis of a distribution is greater than 3. The peak of distribution will be higher and narrow than a mesokurtic. The outliers present in a leptokurtic distribution expand across the x-axis of a histogram which results in the characteristics of leptokurtic distribution.
[13] Only 250 observations yield a Net Income Margin greater than zero

which decreased to peer level in the third quarter with the decreasing occurring for Fenerbahçe and Trabzonspor decrease in 2011 and Galatasaray S.K.'s shift occurring in the preceding year. The only clubs which have increased their current ratio to significant levels are Aalborg, whose ratio[14] has risen from 0.36 to operating around the standard theoretical range of 2, and Ajax whose ratio has nearly doubled to 1.54[15] since the beginning of the sample period. The low stable current ratio is confirmed by the heavily positive skewed distribution of the ratio with 539 (80%) observations clustered between the range of 0 to 1 (please refer to Graph 8). The theoretical current ratio is expected to be around 2[16], thus the low ratio indicates that clubs are constantly in short-term liquidity problems, that is common to the industry.

To determine if clubs potentially face the possibility of being in financial distress, an analysis of clubs' gearing ratios must be assessed to provide an overall picture in conjunction with the results reported for current ratio. As stated previously in Section 4.4 – Research Design, descriptive analysis will be carried out on the Market Leverage of the firms and the explanatory variable which substitutes this ratio, Debt-to-Assets. The market leverage for the 23 listed clubs displays a leptokurtic distribution and is heavily positive skewed with 75% of the observations clustered within the range between 0 – 182.64% (please refer to Appendix Graph 9). The range of the results is indicative of a low standard deviation between the clubs. However, the overall standard deviation between clubs in the panel and the 673 observations presented in Figure 5 are heavily influenced by the absurdly high leverage operated by the 4 Portuguese clubs; S.C Braga, Benfica S.L. FC Porto, and Sporting Lisbon CP with Aalborg, Silkenborg IF and Trabzonspor making a small feature. Therefore, the standard deviation presented in Figure 5 provides no meaningful information due to these clubs. All these clubs are small-cap therefore they have small equities values and consequently it is of no surprise that debt levels are excessively high given that debt tends to be assessed more frequently by these group of stocks.

One would question how these clubs can consistently operate with such leverage. One explanation for this is that these clubs are renowned selling clubs which gain most of their income through the selling of home-grown talent that have been developed through their academy or by purchasing youth players and making a substantial profit when they sell them on. Put in another way, clubs leverage player trading to optimise their books. A prime example of this is Benefica S.L whose world-renowned, Caixa Futebol Campus has produced the likes of Renato Sanches, André Gomes and Bernardo Silva who have been transferred for €35 million, €20 million and €15.75 million respectively. This excludes the players they have purchased, fostered and sold at hefty transfer prices, such as goalkeeper Ederson for €40 million to Manchester City. Taking a closer inspection at their transfer activity over the past 10 years, Benfica S.L has generated a minimum of €50 million in 9 of those years and have the title of making the most money from transfers since 2010/2011. This is a similar approach taken by FC Porto who are infamous for the profits on disposing players at significant mark-up such as James Rodriguez transfer to AS Monaco for €45 million and most recently centre-back, Éder Militão transfer to Los Blancos (i.e. Real Madrid C.F.) for €50 million. At the time of writing this paper, heavy speculation exists about 19-year old Beneficia S.L midfielder starlet, Joao Felix who to be sold between €80-100 million with all the elite European teams including Manchester City, Manchester United and Juventus keeping close tabs on him. If this transfer went through, Benfica S.L. would recuperate €80 million resulting in their market leverage ratio

[14] The current ratio for Aalborg at the beginning of the sample period of December 2009 was 0.36. Since June 2014, this ratio has risen dramatically with the club operating with an average current ratio of 2.45 from thereon.
[15] Ajax's current ratio as of December 2018 was 1.54 which has increased from 0.88 as of December 2009.
[16] Different industries have different acceptable levels of current ratio

decreasing from 320% to 172%[17] provided all funds were used to paydown debt. Therefore, clubs which are implementing defensive strategies are notorious in engaging in this business model of selling players. This is a volatile strategy as it requires clubs to have a conveyor belt of talent to be primed and ready for disposal which is of no guarantee.

Larger clubs don't have the same pressure in offloading players as "selling" clubs, as typically they have secured constant significant revenue sources through broadcasting and sponsorship deals. As one would expect, not all clubs have used their increased revenue to reduce their debt loading relative to their equity value. It can be seen that 9 out of the 23 clubs have decided to eliminate debt in their accounts since December 2009 (please refer to Appendix Graph 10). This is a testament to the implementation of the FFP regulations enforced by UEFA, with these clubs fearing punishments from the governing body such as barring these clubs from participating in UEFA competitions. Though not all clubs have taken the same approach such as the Turkish and Italian clubs all having increased their Market Leverage post the introduction of FFP, with the Turkish clubs increasing their leverage from single digits to the high 200% range. The Italian clubs have done the same but not to the same magnitude. The surge in leverage ratio is attributable taking greater volume of debt to fund new stadia[18], upgrade facilities and finance player acquisitions. FC Porto is the club which has increased their Market Leverage the most during the sample period in that they began with a leverage ratio of 169% to which has reaching to 772% as of the end of the 2018 fiscal year, the same level as their bitter Portuguese rivals, Benfica S.L. This increased leverage places more scrutiny of their transfer trading activity since FC Porto does not have the same might compared to the leading counterparts in commercial terms.

This analysis of the market leverage is pivotal in the understanding of the mechanisms with respect to the financial burden companies are willing to assume and how they can continue to operate with high leverage. However, the base regression contains Debt-to-Assets and not market leverage which is used as the gearing indicator for a club. This financial ratio shares similar distribution characteristics in that it is positively skewed but not to the same degree (please refer to Appendix Graph 11). This is as expected since the Book Value of Total Assets tends to be lower than the market capitalisation for a firm, thus reducing the effect of the severely high leverage in the results. The reported statistics shown in Figure 5, that the mean of the sample is considerably lower than the mean of the market leverage of 42.88%. This is attributable to the impact of the outliers being less dramatic, with the outliers for Debt-to-Assets been dominated by Top 3 Turkish clubs and not by the Portuguese clubs as what happened with Market Leverage. These statistical inferences are as expected since small cap stocks have lower market capitalisation and typically will have asset values greater than this. By carrying out panel data summary statistics, it can be seen that the variation in Debt-to-Assets across the panel sample of 23 clubs is nearly equal to that observed in the ratio over time. Thus, if one were to pick a random observation, the differences in the metric is expected to be nearly equal to the difference for the same club in 2 randomly selected years. This deduction stipulates that on average, clubs' debt is shifting in line with its Total Assets or vice versa. It is worth to noting the trend of this ratio follows that of market leverage in that the same clubs which increased their market leverage over the sample period also suffered increased Debt-to-Asset Ratio with the exception of FC Porto (please refer to Appendix Graph 12).

[17] This percentage was calculated based on the 31st December 2018 figures where Benfica had amassed €173.4 million worth of debt with a market capitalisation of €54.42 million.
[18] Juventus and Olymique Lyonnais both took out debt to fund the building of their new stadium in 2011 and 2014 respectively

4.6 Robustness of Variables

As a result of carrying out a panel regression for this research paper with a set of independent variables, an analysis of whether these variables follow a random-walk or a parametric pattern necessitates. A random walk or a unit-root[19] is a stochastic trend in a time series which is unpredictable in nature. The panel data requires an inspection of whether a random walk exists because material problems can result in the regression, as unit roots can cause spurious regressions and errant behaviour within the model. These issues can result in an irrational inflated r-squared even if the MTB and independent variables are uncorrelated or result in the t-values not following a t-distribution. A number of tests have been devised to determine whether this behaviour persists in the panel dataset including the Levin-Lin-Chu (2002), Harris and Tzavalis (1999), Im-Persaran-Shin Test (2003) and Fisher-type (Choi, 2001). Not all of these statistical tests can be applied to the database as the data does not confirm to the requirements of some of the models due to the panel data being unbalanced and containing gaps[20] in the time-series.

The Levin-Lin-Chu test places a straitjacket on the test and assumes homogeneity in that all the 23 clubs within the panel data must be balanced and have uniform time periods. The Im-Pearson-shin loosens the straps of the straitjacket imposed by Levin-Lin-Chu as this test combines the test statistics of the unit root analysis which does not need to be balanced, however there must be no gaps in the time-period across the panels. Therefore, the Fisher-type test is the best option for unit-root testing for the dataset as it whips off the straitjacket for unit-root hypothesis testing by performing a non-parametric testing. The Fisher-type test is a practical implication of the Maddala and Wu (1999) paper in that it combines the unit-root statistical inferences for n unit tests performed across the n cross sections. Therefore, what the Fisher-type test does is perform a unit root test for each club individually and accumulates the p-values generated in each one of these tests to provide a diagnosis of whether the panel data contains unit-root or not. The Fisher-type can be thought as of a combination of cherry picking from both the Levin-Li-Chu and Im-Persaran-Shin Test. The rationale behind this selection is that within the 23 listed clubs, there exists an unbalanced database due Manchester United been listed during the sample period, and also because of the fact that gaps exist in the time period across the panels due to the frequency of reporting not being identical. Therefore, this test enables all panels to be tested regardless of whether the panels are balanced or contains gaps. The Fisher-type performs an Augmented Dickey-Fuller for each panel to answer the following hypotheses:

$$H_0 = Variable\ (X_j)\ across\ the\ panel\ series\ experience\ random\ walk$$
$$H_1 = Variable\ (X_j)\ is\ stationary\ in\ at\ least\ one\ panel\ series$$

One would expect that the alternative hypothesis is lenient as only one of the 23 panels need to display a stationary pattern. Conducting the Fisher-type test with a lag period of 1 through stata rejected the null hypothesis for all the explanatory variables in the model; Revenue, Net Income Margin, Current Ratio, Debt-to-Assets with the test generating p-values below the 1% statistical significance level (please refer Figure 6). In conclusion, all the explanatory variables are non-

[19] They are many names given to random walk including unit root, difference stationary process or a random walk with drift

[20] A balanced panel dataset implies that n units have the exact same amount of observations. Data containing gaps means the time period across the n sample is inconsistent and does not follow the same logical pattern as each other.

stochastic resulting in no adjustments need to be made to them within the model. However, when the lag period for revenue was adjusted for 2 in order to account for potential seasonality, the null hypothesis was accepted with a p-value of 0.0723 indicating that random walk is present within the sample set. Consequently, to remove and stabilise the randomness of the revenue pattern, a natural logarithm transformation of the variable was utilised. This transformation has resulted in the acceptance of the alternative hypothesis with p-values less than 0.05 indicating that the transformation has corrected the random-walk of the variable.

Figure 6 – Unit-Root Test

The below table lists out the results that was produced from carrying out the Fisher-type test (Choi, 2001). The table lists out the Chi-squared ("goodness of fit") statistic, its respective degrees of freedom, the number of lags implemented and the probability that the observed distribution is random.

Unit-Root Test Summary				
Variables	**Coefficients**			
	Chi-Squared Statistic	**Degrees of Freedom**	**Lags**	**Prob. > Chi-Squared**
Revenue	108.0831	34	1	0.0000
	46.6856	34	2	0.0723
Log (Revenue)	128.1374	34	1	0.0000
	60.5528	34	2	0.0034
Net Income Margin	256.7485	34	1	0.0000
	219.9650	34	2	0.0000
Current Ratio	68.5871	34	1	0.0004
Debt-to-Assets	100.8518	34	1	0.0000

It is worth to noting that this paper could have performed either the Levin-Lin-Chu or the Im-Persaran-Shin Test (2003) if the database was augmented to include the omitted information in the missing time periods by creating the time periods and filling them with the metric averages or by assuming the six-month result occurred in the first three months of that period. This approach would however introduce potential measurement errors in the database and drastically impair the results which was deemed was too volatile.

4.7 Base Regression Model

Incorporating all the above information results in the determination of the base regression model to assess the affect of the KPIs on listed European football clubs stock price. Further segmented regressions stemming from this base model will be conducted to ensure pure inferences will be obtained to the research question. The base panel regression model is defined below:

$$MTB = \beta_0 + \beta_1 \log(Revenue) + \beta_2(Net\ Income\ Margin) + \beta_3(Currentratio) + \beta_4 \log(Debt - to - Assets) + \beta_5 \log(Leagueposition) + \beta_6(CL) + e$$

The (CL) is a dummy variable included to represent whether a club has participated in the Champions League within a defined period and aims to capture the effects concerning this competition. An aside to the base regression is the application of a natural logarithm function to the Debt-to-Assets and League Position variables. With the inclusion of a log function, the relationship between the dependent variable, MTB, and the two independent variables will display diminishing marginal returns. The implementation means that the gains of clubs resulting from improving their league standing will not be linear. Put in a different context, the difference of effect from a club moving up the table from tenth to ninth does not have the same

impact as when the club moves from second to the top of the table. An alternative approach could have been with the inclusion of a quadratic equation term. However, a key difference between a log function and a quadratic term, is that the effect of an independent variable on the dependent variable never becomes negative. In other words, the slope of the explanatory variable incrementally gets closer to zero but never reaches a state where the slope is zero and most definitely never becomes zero (Wooldridge, 2015). Furthermore, due to the heavy skewness of the distribution of both of these variables, a natural log transformation converts skewed data to approximately conform to a normal distribution and/or reduce the skewness[21].

4.8 Model Selection

The final step to be conducted is to ascertain which panel data regression model will be utilised, either the Fixed Effects or Random Effects to yield better results. This results in carrying out a Hausman Test[22] to make the necessary judgement. The Hausman Test is a practical application of the econometric model misspecification of the Hausman (1978) test. The hypotheses for this test are as follows:

$$H_0 = Random\ Effect\ is\ the\ appropriate\ model$$
$$H_1 = Fixed\ Effect\ is\ the\ appropriate\ model$$

The Hausman test has indicated that the alternative hypothesis (i.e. Fixed Effect model) is the best specification for the base regression after providing a p-value of 0.0001, well below the standard statistical significance of 5% (please refer to Appendix Table 2). The above result complements the findings with respect to whether the explanatory variables follow a unit-root or a stationary path in Section 4.6 – Robustness of Variables.

Conducting a Fixed Effect transformation, one is aiming to the remove the time-invariant factor by subtracting the mean over the time period for each variable, thus the demeaning transformation eliminates the U_i, with only the idiosyncratic factor, V_{it} remaining. Applying fixed effects to the model will eradicate the endogeneity problem in its entirety if panel data is available, endogeneity is time-constant and regressors are time-consistent which is not the case since the dataset in this paper does not satisfy these requirements. Therefore, partial endogenous effect is likely to be contained within the model.

[21] The log transformation of the League Position has reduced the skewness from 1.4748 to 0.1113. The same result occurred for the log transformation of Debt-to-Assets with its skewness reducing to -0.0288 from 1.3567

[22] The Hausman Test is also referred to the "Model Misspecification", "Durban-Wu-Hausman (DWH)" or "Augmented Regression test for Endogeneity" test

5. Results

The following section provides overall results to which the hypotheses stated in Section 3 – Hypothesis Development will be either accepted or rejected. The initial hypotheses states that an increase in Revenue, Net Income Margin and Champions League participation will result in a higher MTB for a club, with the Debt-to-Assets been negatively correlated with MTB. The remaining variable, Current Ratio is expected to follow a n-shaped quadratic function, with an increase in this ratio initially increasing MTB, but then reversing as a result of ineffective working capital management.

5.1 Base Fixed-Effect Panel Regression

From the base regression model (please refer to Figure 7) which clusters clubs into 23 groups, it is determined that 6.85% of the deviation in the MTB is explained by the 6 independent explanatory variables. The interclass correlation between the clubs is 50.82% meaning the 50.82% is associated with the variance across the panels. Within the base regression model, four out of the six variables in the model are statistically significant. However, an interesting observation is the statistical significance of the negative relationship between the $\log(Revenue)$ and MTB. This contradicts economic theory in that if revenue increases by 100 basis points, the MTB will change downwards by 0.464. Ultimately, increasing revenue has a damaging effect on a club's share price according to the model. However from the base regression model, both the $\log(Debt - to - Assets)$ and $currentratio$ variables follow the desired trend which this paper hypothesised and are statistically significant under the 5% p-value threshold. The same can be said about $\log(league\ position)$ and the Champions League dummy variable but both variables are not significant. According to the regression, the error term e, is correlated with the regressors indicated by a correlation coefficient of -0.387. This violates MLR.3 assumption in that the error term should not be correlated with the regressors.

Despite the conclusions determined from the base regression model, the impact of $\log(revenue)$ and the correlation of the error term with the independent variables,
diagnostics tests for heteroskedasticity, cross-sectional dependence (CD) and serial correlation were carried out to check the validation and provide a robust regression model.

5.2 Diagnostic Tests

The model has the potential to breach MLR.5 homoscedasticity. Concerning MLR.5, homoskedasticity is expected not to be maintained since the MTB and in turn different clubs' share prices are influenced at different magnitudes to external factors (e.g. brand value, expectation, history etc.), factors not captured in the model. This ultimately deviates the dependent variable significantly, thus resulting in a cone-shaped (or funnel) formation. For example, a 50% increase in revenue for a Silkenborg IF will have a greater impact on their share price compared to that of industry front-runner. To confirm whether the presence of heteroskedasticity exists,

Figure 7

The below table provides results from the base regression model using the standard Fixed-Effects model with no robustness checks been provided. The control group is the 23 listed European Football Clubs. The Champions League variable is a dummy variable indicating the impact of participation of the club in this club competition. In this table, there has been no robustness

	Base Regression **MTB**
Log(Revenue)	-0.464***
	(-5.28)
Net Income Margin	0.0604
	(1.36)
Current Ratio	0.523***
	(10.48)
Log(Debt-to-Assets)	-0.336*
	(-2.29)
Log(League Position)	-0.0462
	(-0.44)
Champions League	0.118
	(1.04)
Constant	2.121***
	(8.17)
N	673
R^2	0.228

Z statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

this paper performs a Modified-Wald statistic to take into account for groupwise heteroskedasticity in the error term of the Fixed-Effect regression model. A standard Breush-Pagan test for homoscedasticity cannot be performed as the error process may be homoscedastic across the cross-sectional clubs, but its variance may differ across units: a condition known as groupwise heteroskedasticity. The null hypothesis for the modified Wald Test is the assumption of homoscedasticity, with the alternative hypothesis assuming heteroskedasticity. This test[23] yielded a strong rejection of the null hypothesis with a p-value of 0.0000 (please refer to Appendix Table 3) resulting in concluding that heteroskedasticity exists in the base regression model.

Cross-sectional dependence (or contemporaneous correlation") across the 23 listed clubs needs to be tested because the errors within the base regression model may arise due to common exogenous events discussed in Section 4.1 – Regression Limitation, which are unobserved, ultimately becoming a component of residual. Despite the sample comprising of all the listed European football clubs, the effect cannot be mitigated in its entirety. Contemporaneous correlation can arise due to ubiquitous shocks including, but not limiting effects from regulation changes and integration of different clubs, implying strong interdependences between clubs.

[23] To carry out this test in stata, the command "xttest3" was utilised after the base regression model.

An example of this is the potential adverse effect on matchday revenue when the European economy deteriorated in 2012 affecting discretionary consumer spending power. To analyse this effect, the Pearson Cross-sectional dependence test was carried out to exam whether the error term across the clubs are correlated. The null hypothesis for this test is that the residuals are not correlated, with the alternative hypothesis articulating that the residuals display a relationship. The p-value of 0.0408 from the Pasaran CD test[24] provides evidence that cross-sectional dependence correlations pertains between the 23 listed football clubs (please refer to Appendix Table 4). This lends itself to a strong rejection of the null hypothesis that the residuals are not correlated.

Serial correlation (or "autocorrelation") is the final diagnostic test to be applied to the base regression model. Serial correlation occurs in a panel data regression when the error term for one period is correlated with the error term to a subsequent period. This connection can lead to a chain-reaction residing within the results. For example, one club's Debt-to-Assets ratio may be overestimated, leading the influence to the next period resulting in grave problems such an exaggeration of the beta coefficients and the respective significance levels. The "Lagram-Multiplier" test is commonly implemented to test for serial correlation with a lag period of one following the principles prosed by Wooldridge (2010). The null hypothesis of this test: no first-order serial correlation is strongly rejected with the test producing a statistically significant p-value of 0.0217 (please refer to Appendix Table 5), which is below the 5% alpha threshold.

From the three diagnostic tests, it is found that the base regression model suffers from the three effects which were analysed resulting in the need to adjust the base regression in order to take account of the prevalence of these effects. Stata provides several applications to provide robust standard error estimates for linear panel models with the Feasible Generalised Least Square (FGLS) (or Weighted Least Square (WLS)) estimator the best model to modify the initial fixed effect panel regression model. This model can produce biased results, however if the initial OLS of heteroskedasticity and autocorrelation represents an accurate approximation of the true unknown of these effects, which is assumed to be the case in this model, the FGLS model is unbiased and consistent. Furthermore, due to the nature of the dataset (being unbalanced, containing time period gaps and that T is greater than N), the model is restricted to utilising the FGLS as it can force results due to non-uniformity. This cannot be done with the PCSE model.

Conducting a FGLS regression has changed the assessment of the statically significance based on z-scores instead of using the t-statistics. Analysing the FGLS model, all of the explanatory variables except for $\log(Debt - to - Assets)$ are not statically significant under the standard alpha threshold. The reduction in the amount of statistically significant variables in the regression model, after carrying out the diagnostic tests, could be explained by the fact that a period effect is embedded in the model that is not taken account for. This rational is supported with the scepticism associated in using the Fisher-type (Choi, 2001) hypothesis in that only one panel is needed to display a non-stochastic pattern in order to reject the null hypothesis of assuming random-walk in the variable. By adding a quarter period effect into the base FGLS regression model, the significance of the variables has changed drastically in addition to improving the robustness of the model by reducing the probability of chi-squared from 0.0413 to 0.0000. This confirms the model is fully robust and true inferences can be made.

[24] The "xtcsd, pesaran abs" command is utilised to carry out Pasaran Cross-sectional dependence test on stata

5.3 FGLS Regression Results

Revenue

The $\log(Revenue)$ while not statically significant at the standard significance level of 0.05 (5%), is below that of the highest threshold of significance level of 0.10 (please refer to Figure 8). As a result, it is believed this relationship suffices in providing inferences since this increasing in the epicentre for clubs. If this line-item grows, the expected cash flows of a company grows thus enhancing the present value of those cash flows, and the market capitalisation of football clubs (dependent on the cost structure of the firm). As revenue increases by one basis point, the MTB will increase by 0.0002 which is not of practical significance. This indicates that something greater is in effect rather than the economic rational of investors.

Due to the statistical irrelevance of the results, a more accurate representation of the relationship between the stock price and company's revenue necessitates. A detailed revenue breakdown was conducted consistent to the breakdown presented within the reports from Deloitte Sports Business Group (2019) and KPMG (n.d.), and from Pinnuck and Potter (2006) article. Operating revenue has been subdivided into three categories, which are listed and defined below:

- Broadcasting: Includes revenue from the participation of domestic leagues and European club championships including the media revenue which can be obtained from television rights (both from national and regional broadcasters to the clubs' own official channel)
- Commercial: Includes sponsorship and merchandising revenue
- Matchday: This revenue is primarily derived through gate receipts (through ticket and corporate hospitality) and revenue from any operations resulting from hosting matches

With respect to the sample of revenue, several clubs have omitted data points in their revenue breakdown (i.e. Aalborg, Benfica, Fenerbahçe, Galatasaray S.K., AS Roma, Sporting Lisbon CP, Silkenborg A/S and Trabzonspor). For these clubs, assumptions have been made for each quarter based on averages for the quarter for which financial data was available for the company. For example, if Q3 2018 data was omitted, the average for this period would be calculated by averaging all of Q3 revenue breakdown figures for that quarter and assume this to be the proxy percentage for the omitted period. This method was carried out for all other clubs and periods for which they were no data points available. This method will expose the model to potential measurement error as discussed in Section 4.1 – Regression Limitation. Howbeit, the usage of such method enables statistically more robust results than without it compared to the omitted variable bias. No revenue breakdown from football operations was provided for Copenhagen FC and S.C. S.C Braga and therefore have been omitted from calculation purposes.

This breakdown produces meaningful revenue statistics, the original task for all the above adjustments (please refer to Figure 8). Applying the time-period to the FGLS regression with revenue breakdown has reduced the observations from 673 to 627 as a result of S.C Braga and FC Copenhagen not disclosing any revenue breakdown in their financials to reference from.

Both $\log(Commercial)$ and $\log(Matchday)$ generate strongly statistical significances with p-values of 0.014 and 0.0002 respectively. The positive correlation between MTB and the 2

respective revenue components indicate that MTB improves as these 2 revenue variables grow. If commercial revenue doubles, this will result in the MTB to improve by 0.0425. This can be

Figure 8

The below tables are a continuation from the base regression model presented in Table 1 with the effects described from the diagnostics tests (i.e. Heteroskedasticity, Cross-sectional dependence and serial correlation) taken into consideration. The third column expands from the initial FGLS regression in that period effects are considered due to the significance and direction of the Log(Revenue) variable and the fact that revenue in nominal terms followed a random walk pattern. The final column presents a breakdown of operating revenue into Broadcasting, Commercial and Matchday. As with the initial base regression, the champion league variable is a dummy variable.

	Base Regression	FGLS Regression	FGLS Regression with Period Effects	Revenue Breakdown - FGLS Regression with Period Effects
	MTB	MTB	MTB	MTB
Log(Revenue)	-0.464***	-0.0213	0.0286	
	(-5.28)	(-1.58)	(1.88)	
Net Income Margin	0.0604	-0.0116	-0.0196*	-0.0214*
	(1.36)	(-1.53)	(-1.99)	(-2.15)
Current Ratio	0.523***	0.0208	0.0327	0.0422
	(10.48)	(0.83)	(1.40)	(1.93)
Log(Debt-to-Assets)	-0.336*	-0.0551*	-0.0856**	-0.110**
	(-2.29)	(-2.06)	(-2.78)	(-3.25)
Log(League Position)	-0.0462	0.0128	0.000749	0.00408
	(-0.44)	(0.71)	(0.04)	(0.18)
Champions League	0.118	0.00535	0.0194	0.0268
	(1.04)	(0.37)	(1.05)	(1.32)
Log(Broadcasting)				-0.0257*
				(-1.97)
Log(Commercial)				0.0425*
				(2.45)
Log(Matchday)				0.0410**
				(3.16)
Constant	2.121***	0.827***	2.058***	2.060***
	(8.17)	(13.76)	(3.79)	(3.83)
N	673	673	673	627
R^2	0.228			

Z statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

explained as the markets are rewarding clubs for realising their true commercial value. With football becoming ever more popular throughout the world, this presents wealth opportunities for companies to exploit with commercial revenue showing how management capture this bubble. Commercial revenue in affect becomes a factor in which management can differentiate themselves from their peers. Investors reward clubs in capitalising on their brand value with

greater commercial streams of revenue. A greater global appeal should translate into greater revenues and when this is realised, results in larger expected cashflows with investors reacting favourably to the event. The $\log(Commercial)$ has the strongest impact on the MTB compared to any other variable and this could be explained in that relative to all other variables, commercial revenue is the true differentiating factor across clubs.

The same effect of commercial revenue occurs with regards to matchday revenue, but the effect is marginally weaker with the MTB of listed European football clubs increasing by 0.0410; this has a larger statistical significance in that its p-value is less than 0.01. It is believed that this statistical relation has a "ceiling" as it is expected that investors will be aware of the limiting factor of matchday revenue as stadia have finite capacity; eventually a club extracting as much value through this revenue source will result in an adverse impact from this variable on a club's share price. However, the significance of this variable is striking with investors seemingly viewing matchday view as an indicator for club popularity. Greater popularity results in a greater demand to view the club game which infers to how a club is perceived. In other words, matchday revenue broken down more granularly (i.e. average attendance per match) can be perceived as a value driver for the overall club similar to how the airline industry focuses on the average passengers per flight to assess demand.

Despite $\log(Commercial)$ and $\log(Matchday)$ displaying positive relationship with a club's share price, broadcasting revenue displays a contrasting negative relationship with the MTB, with a 0.0002 decrease of the dependent variable for every 1% increase in broadcasting revenue. This explanatory variable did not behave as first anticipated but it is on the tether to not being statistically significant. An explanation for this relationship could be due to the "Uncertainty of Outcome" economic theory which hypothesises that the biggest rewards accrue to clubs where there is a highly competitive rivalry amongst them. This theory is quintessential to the sports industry especially in football and has implications on both on- and off-the-field performances, specifically to matchday and television rights (Plumley et al, 2017; Forrest and Simmons, 2002). As discussed in Section 4.5 - Descriptive Statistics, most of the clubs are predominately featuring at the top of their respective division. Given that broadcasting revenues are based on the distributions of domestic leagues and European Championships, there is a risk that sports fan worldwide do not value uncompetitive leagues which have a undesirable impact on broadcasting revenue. In addition, the dominance of these clubs at the top of their division result in investors suffering from the "Expectations Treadmill" (Koller et al. 2015) in which they expect a club's performance to continue at the same rate. Investors and shareholders expect these clubs to consistently perform at the top level where if they do not maintain this level shareholders will not reward them but penalise them for dropping their standards. The Expectations Treadmill is the dynamic behind the adage that a good club and a good investment may not be the same. This would be consistent to the findings by Benkraiem et al. (2009) and Dimic et al. (2018), who stated investors absorb losses quicker than wins due to expectation. Therefore, investors during the sample period may have over-anticipated the expected increase in broadcasting revenue, thus penalising the club as a consequence for the realisation not occurring. The above is a prime example of an externality affecting a club where they not have any control or power in how overall broadcasting revenue is to be distributed. Put differently, nothing could prevent the organisers of these competitions from substantially reducing the revenues dispersed to them.

Tis effect does not seem to be embedded in the commercial and matchday revenue sources. Even if there is a lack of or no competitive rivalry for a club, these clubs will still generate substantial revenue due to the existence of financialization where all parties associated with the football industry are more than not worried about maximising the bottom-line (Van der Zwan,

2014; Zhang and Andrew, 2014). Linking this theory with the football industry, it can be justified that even if broadcasting rights may be impacted stemming from low competitive rivalry, these clubs can source their revenue through alternative means mainly through sponsorship, as these clubs will tend to have a larger fanbase and worldwide coverage surrounding them, making them a prime target for sponsorship and other commercial deals.

Overall the impact from the $\log(Commercial)$ and $\log(Matchday)$ outweigh the negative effect of $\log(Broadcasting)$ variable on the MTB which enables the acceptance of the first hypothesis in that revenue drives the share price and MTB of a club.

5.4 Interaction Terms

Champions League

The inclusion of this single dummy variable allows a simple comparison means test, where the hypotheses are:

$$H_0\colon \mu_{cl} = \mu_{notcl}$$
$$H_1\colon H_0\colon \mu_{cl} \neq \mu_{notcl}$$

where μ_{cl} is the population average of the MTB for clubs participating in the Champions League and μ_{notcl} is the population average of the MTB for clubs not taking part in this competition. The Z-statistics and statistical significance are directly reported in the regression output where under MLR.1 to MLR.5, this paper can use the usual z-statistic as approximately valid. The z_{cl} equals 1.32 which is a strong acceptance of the null hypothesis that clubs participating in the Champions league have a similar MTB, which is contradictory to the Bullough (2018) theory in that revenues of clubs are heavily influenced through the participation in the UEFA Champions League (please refer to Figure 8).

From the above regressions, both $\log(League\ Position)$ and the Champions League dummy variable are not significant based on the z-scores. This goes against academic literature and industry reports which places weight on these factors regarding a club's success in terms of business. The original models assume a linear relationship between these regressors and the dependent variable. In Figure 9, interaction terms both at level and mean-adjusted have been included into the base time-period FGLS regression with no revenue breakdown, as presented in Figure 8. These variables will affect revenue as a whole rather than just an individual element. Application of interaction terms will induce non-linearity within the regression.

Inclusion of the interaction term of the integer champions league variable and the mean-adjusted $\log(Revenue)$, has produced a statistical significance just shy of the alpha statistical significance level of 0.05 with a z-score of 1.97, to increasing the beta coefficient of $\log(Revenue)$ from 0.0286 to 0.0527 at a statistical significance below the 1% threshold. The null hypothesis of the interaction term, $H_0\colon \beta_{(cl)*(\mu\log(revenue))} = 0,$ is the same as saying the partial effects are constant and should not be test with the alternative hypothesis accepting its inclusion as resulting of the partial effects been non-significant. The p-value is lower than the statistical level of significance, meaning that this paper can reject the null hypothesis and assume the interaction is significant. In other words, the effect of $\log(Revenue)$, is dependent on the participation in the Champions League which affirms the escalating importance of this competition on the finances of European football clubs and academic literature. Holding all variables constant, the participation in Champions League increases the impact of doubling the revenue on MTB by increasing this value ratio by 0.0527 to 0.0562. the estimated partial effect

of Revenue if the clubs participates in the Champions League, the MTB is 1.8935. This finding reinforces the discussion provided in the Descriptive Statistics asserting the second hypothesis in that the Champions League has a positive influence on the MTB and therefore the share price of a club.

The significance level of the interaction was not as expected and a possible explanation for it could be that investors have already taken into account the improvement in revenues at the moment of the participation in the Champions League. A perfect representation of this is the case of Ajax, who after beating Real Madrid in the quarter finals stock price boosted by 7,82% to a record high of €15.35 on the Euronext Amsterdam stock exchange (Cordovilla, 2019). Therefore, to provide more conclusive and significance results, further research should be conducted on this variable, with event study analysis the best approach to be taken.

League Position

From Figure 9, it can be deciphered that $\log(Leagueposition)$ does not have statistical nor economic significance either with a stand-alone or a mean-adjusted interaction terms with $\log(Revenue)$. Either approach to including an interaction term yields the exact same regression results, illustrating that the variation in both variables are the same. Consequently, no meaningful conclusions can be drawn based on these results, ultimately leading to the rejection of the sixth hypothesis in that league position should have a negative correlation with the MTB. Despite this conclusion, it is worth acknowledging that in order to retrieve the benefits from the Champions League, a club must first qualify for the competition which is dependent on their league position. Therefore implicitly, since the Champions League is statistically significant to the share price of a listed club, then the league position also has to be implicitly significant due to qualification process of the Champions League. The league position may not have influenced the regression model for many reasons including the similar fact to the Champions League in that investors have taken into account the effects of league standings directly after a match is played, with share price adjustments already having been incorporated. In addition, a club's share price may not be materially affected by a single period league position as the history of past success outweighs this effect. For example, Manchester United holds the record of winning the most English Premier League titles (13 times) since the league inception in 1992. However, since Sir Alex Ferguson retired in 2013 the club has not performed to previously high levels. Due to the historical success, the club enjoys record deals with brands including Cheverlot and Adidas, as their brand value is still intact despite not maintaining prior standards on-the-field. This highlights the impact of a legacy being built over time and the $\log(Leagueposition)$ does not measure this since its looks at league position in isolation.

5.5 Net Income Margin

Having talked about revenues, it is necessary to discuss listed European football clubs' capabilities in converting revenues into actual profit and the magnitude of this transformation on its share price. According to the adjusted panel regression model (Figure 10), the Net Income Margin of a club displays a negative correlation with the dependent variable which rejects the third hypothesis in that there should be a positive correlation between this variable and the MTB. The assessment between these two variables creates a statistically significant negative relationship with a club's MTB, expected to increase by 0.002 for every 1 unit decrease of a club's profit margin. This inference does not follow stock market where investors value the Earnings-per-Share (EPS) which the Net Income figure affects.

A possible explanation for this extrapolation is by assessing the covariance between the 2 components in the MTB (i.e. Market Capitalisation and Book Value of Assets). The denominator is Book Value of Assets comprising of Retained Earnings, defined as an accumulation of historical profits. As Net Income decreases, this has a knock-on effect in reducing Retained Earnings which will adversely impact the Book Value of Assets. However, according to the beta coefficient of the Net Income Margin, despite the denominator decreasing, the market value of the club increases. This relationship signifies the importance investors place on the performance of football clubs between the white lines which is achieved by vast investments in transfer activity and player wages. These two

Figure 9

The below tables display the regression results with the inclusion of the potential interaction terms identified in the FGLS regression model. Any interactive term that has μ indicates that a mean-adjusted interaction regression was carried out, where the mean value for the respective variable was deducted from each observation of x_{ij}.

	Mean-adjusted Interaction FGLS Regression	Revenue and League Position	Revenue and League Position (mean-adjusted)
	MTB	MTB	MTB
Log(Revenue)	0.0527**	0.0324*	0.0354*
	(3.24)	(1.96)	(2.42)
Net Income Margin	-0.0249*	-0.0203*	-0.0203*
	(-2.25)	(-2.08)	(-2.08)
Current Ratio	0.0669**	0.0379	0.0379
	(2.94)	(1.63)	(1.63)
Log(Debt-to-Assets)	-0.110**	-0.0824*	-0.0824*
	(-3.00)	(-2.54)	(-2.54)
Log(League Position)	0.00150	-0.0095	-0.00235
	(0.07)	(-0.29)	(-0.11)
Champions League	-0.0435		
	(-1.24)		
(CL)*(μLog(Revenue)	0.04699*		
	(1.97)		
(μLog(leagueposition)*(μLog(Revenue)			0.00268
			(0.31)
Log(League Position)*(Log(Revenue)		0.00268	
		(0.31)	
Log(Debt-to-Assets)*Currentratio			
Constant	1.891***	2.057***	2.048***
	(3.47)	(3.77)	(3.76)
N	673	673	673

Z statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

cost factors are cited as fundamental to the achievement of performance for most clubs. These investments drive the club to unprofitability which the investors as of now are not reacting negatively to, as it is the motor of a club. This therefore exacerbates the relationship illustrated in the regression model (please refer to column 4 in Figure 8) and can elude to the statistical significance of the revenue variables in the FGLS regression model. It is expected that he negative relationship between the Net Income Margin and MTB will reverse in the future with more clubs focusing on operating with profitability since the introduction of the FFP rules. Once this transition of clubs operating with losses to profits comes to fruition, and it is shown that success can be achieve by maintaining economic rationale, investors will start to reward clubs with significant valuation premiums. But as of now, this ideal business model has not been maintained. Once a club achieves this, it will become a market front-runner.

Figure 10

The below tables expand on the FGLS Regression model with the interaction of the mean-adjusted log(Revenue) and the Champions League dummy variable by replacing the Net Income Margin with a purer measure of operating profitability, EBITDA margin. The basis for this test is to determine whether EBITDA margin displays a positive relationship with MTB by eliminating the subjectivity flaws associated with Net Income Margin.

	Mean-adjusted Interaction FGLS Regression	EBITDA Margin FGLS regression (with interaction term)
	MTB	MTB
Log(Revenue)	0.0527**	0.0521**
	(3.24)	(3.28)
Champions League	-0.0435	-0.0407
	(-1.24)	(-1.18)
(CL)*(μLog(Revenue)	0.0470*	0.0463*
	(1.97)	(1.96)
Net Income Margin	-0.0249*	
	(-2.25)	
Current Ratio	0.0669**	0.0629**
	(2.94)	(2.78)
Log(Debt-to-Assets)	-0.110**	-0.109**
	(-3.00)	(-2.98)
Log(League Position)	0.00150	0.00303
	(0.07)	(0.13)
EBITDA Margin		-0.0198
		(-1.66)
Constant	1.891***	1.899***
	(3.47)	(3.50)
N	673	673

Z statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

With Net Income Margin displaying a statistically significant negative relationship to share price, it was considered to replace this margin with a truer measure of operating profitability; being the EBITDA[25] margin. Net Income is heavily influenced by accounting subjectivity and non-cash items to which the inclusion of EBITDA will eradicate as this line-item looks at pure operating profitability of clubs. This line-item is much more important for FCF derivation of a club. The inclusion of this term instead of the Net Income Margin produces a similar conclusion as its counterpart in that it displays a negative relationship with MTB (please refer to Figure 10). However, EBITDA margin is not statically significant which is as expected as investors do not place as much emphasis on this financial metric. As a result, the same inferences mentioned about the Net Income Margin above can be applied to the EBITDA margin, with accounting manipulations and non-cash items not impairing investors' perception of the value of a club.

5.6 Current Ratio

As stated above, the current ratio and Debt-to-Asset metrics provide statistically significant results in the base FGLS regression model (Figure 8). Despite this finding, this paper has to delve further into these two variables to inspect whether they follow a quadratic function. These working capital and gearing ratios are known for rewarding companies if they move in a favourable direction, but penalises companies after a certain point, with the current ratio punishing for inefficient working capital management and Debt-to-Asset for being in financial distress. Implementing a quadratic current ratio term for current ratio (currentratio^2) into the adjusted model returns a negative beta coefficient of 0.0074 onto this term (please refer to Figure 11). The inclusion of this term indicates that the current ratio continues increasing beyond a certain point. To test the rationale for including this term, an assessment of its p-value was measured against the hypotheses of a quadratic term. The hypothesises for this test are as follows:

$$H_0\colon\ \beta_{currentratio^2} = 0$$
$$H_1\colon\ \beta_{currentratio^2} \neq 0$$

The addition of this quadratic term is not statistically significant highlighted by a p-value 0.023 (please refer to Figure X). As a result, the variable follows a quadratic function. As $\beta_{currentratio} > 0$ and $\beta_{currentratio^2} < 0$, the function follows a "n-shaped" with the curve pivoting at a current ratio of 4.087[26]. From this observation, the fourth hypothesis in that the current ratio displaying a quadratic function is accepted. The addition of the quadratic variable reduces the statistical significance of the interaction term between the Champions League and mean-adjusted revenue contained in the model. Even though the addition of the quadratic term reduced the statistical significance level of the interaction term below 10% from a previous low of 5%, the model is considered to be robust due to the significance of the interaction highlighted by the fact that $\log(Revenue)$ is statistically significant below 1%, a significance not viewed without this interaction term.

An increase of the current ratio from 1 to 2 would result in 0.1343 incremental increase in the MTB. The turning-point of 4.087 is greater than standard theoretical current ratio of 2 to 1. This result signifies the importance of listed European football clubs in having enough working capital to meet their financial obligations but not increasing exponentially as this will result in cash resting in their account and not been utilised for value creation purposes. Therefore, this

[25] EBITDA denotes Earnings before Interest, Tax, Depreciation and Amortization

[26] The turning point (x*) is calculated using the formula $x^* = \left|\frac{\beta_j}{2\beta_{j2}}\right|$

coincides with the findings of Johnson and Soenen (2003) in that successful companies need a buffer to not create barriers for day-to-day operations hindering their pursuance of their strategy and brand-value. This is pivotal in industry characterised by achieving short-term goals (i.e. Champions League qualification and winning trophies etc.).

Figure 11

The below tables providence statistical evidence with respect to the current- and acid-test ratio (i.e. liquidity ratios) and whether they follow a quadratic nature using the FGLS Period Effect Regression with Interaction Term as the base regression. The acid-test ratio is calculated similarly to the current ratio but with the exclusion of cash and cash equivalents in the current asset's element of the formula.

	FGLS Period Effect Regression with Interaction Term	Current Ratio Quadratic FGLS Period Effect Regression	Acid Test Ratio FGLS Period Effect Regression	Acid Test Ratio Quadratic FGLS Period Effect Regression
	MTB	MTB	MTB	MTB
Log(Revenue)	0.0527**	0.0575**	0.0456**	0.0568**
	(3.24)	(3.26)	(2.87)	(3.15)
Champions League	-0.0435	-0.0406	-0.0278	-0.0261
	(-1.24)	(-1.20)	(-0.88)	(-0.80)
(CL)*(μLog(Revenue))	0.0470*	0.0406	0.0386	0.0345
	(1.97)	(1.69)	(1.74)	(1.47)
Net Income Margin	-0.0249*	-0.0310**	-0.0194	-0.0222
	(-2.25)	(-2.63)	(-1.88)	(-1.92)
Current Ratio	0.0669**	0.212***		
	(2.94)	(4.86)		
Log(League Position)	0.00150	0.0143	0.00539	0.0163
	(0.07)	(0.57)	(0.26)	(0.67)
Log(Debt-to-Assets)	-0.110**	-0.115**	-0.101**	-0.104**
	(-3.00)	(-3.10)	(-3.03)	(-2.86)
Current Ratio sqd.		-0.0259*		
		(-2.28)		
Acid-test Ratio			-0.00724	-0.00258
			(-0.27)	(-0.05)
Acid-Test Ratio sqd.				0.00348
				(0.28)
Constant	1.891***	2.032***	2.275***	2.249***
	(3.47)	(3.48)	(4.10)	(3.77)
N	673	673	673	673

Z statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The current ratio includes a cash and cash equivalents component, often lending itself in the assessment of the overall debt of the company. An indication of true assessment of a club's

liquidity is achieved by investigating the acid-test ratio as it eliminates the most liquid form of current asset: cash. The acid-test ratio expands on from the quick ratio by omitting cash and cash equivalents within the current assets' component of the formula. Following the same approach as the assessment of current ratio, the model produces unforeseen results in context of economic theory in that acid-test ratio is considered insignificant in the assessment of a club's share price. The beta coefficient of this liquidity measure is -0.007 (please refer to column 3 of Figure 11), indicating that the ratio is virtually flat. This is confirmed by the severely low z-score producing a statistical insignificant variable. To ensure that this finding is accurate and robust, the potential quadratic nature of the variable is tested on the same basis as was performed with the current ratio. The acid-test ratio does not a produce a highly positively correlated function with the MTB, in addition to not following a quadratic function (please refer column 4 in Figure 11). Therefore, this financial indicator is considered to be irrelevant in the eyes of the market justified by its statistical irrelevance and virtually flat relationship with the MTB, as illustrated by its low beta coefficient.

This result shows how cash in the lifeblood of a club's liquidity. The football industry is fast paced, filled with short-lived investment opportunities where a club can only capitalise within 2 periods of the calendar year during the transfer market. This problem has unique attributes to the football industry, in that a club feels the effects from the underinvestment problem more severely than industries characterised by less-restrictive deadlines to do business. This confirms that clubs with lots of investment opportunities ought to maintain financial flexibility. If a club misses the opportunity of improving their squad in one transfer window, they are left idle until the next transfer period, which can severely impact a club's performance on-the-field. Cash gives the club flexibility in order to exploit potential transfers if they see best fit. Not to mention, cash has a transaction cost motive for clubs since they highly levered on average, as seen in Section 4.5 – Descriptive Statistics. Having financial slack enables clubs operating under high leverage to avoid large transaction costs associated with external financing. If a club has solvency problems, they might resolve this by engaging in fire sales of valuable players which are vital for the on-pitch performance just to be able to meet their short-term obligations which has been seen in several clubs worldwide with, for example, Malaga S.C. In addition, the FFP rules established by UEFA, clubs with low liquidity are potentially in a position of breaching the "no overdue payables" stipulation. A perfect representation which shows the significance of this result is what has happened in Turkey with the big three clubs; Beşiktaş J.K., Fenerbahçe and Galatasaray S.K., all failing to adhere to FFP rules. Galatasaray S.K. was punished the harshest in March 2016, been handed a fine of €6 million and being prohibited to compete in UEFA competitions. These sanctions eliminated the club from Deloitte Sports Business Group (2019) Money Football leader board as it reduced revenue by €53.94 million[27] following the sanctions. The club has not reached the same revenue levels experienced in the 2015/2016 season since the breach was announced, however are currently on track to restore revenues to historical levels due to the sanctions being lifted. This highlights how breaching FFP rules have an adverse impact on the revenue-generating capabilities of a club, found to be statistically significant, and therefore damage the stock price in an inverted way.

5.7 Debt-to-Assets

With short-term liquidity being important for the performance of listed European clubs, it is of no surprise that the leverage of a club measured using the $\log(Debt - to - Assets)$ has been

[27] Galatasaray revenue for the 2015/2016 season was calculated as €158.36. The breach of the FFP to club was announced on the 2nd March 2016 with not been allowed to compete in UEFA competitions. The revenue for the decreased to €104.42

statistically significant below the standard alpha statistical significance in all of the aforementioned regression models. This, therefore, highlights how vital leverage is for a football club. In each of the above regressions, the Debt-to-Assets has been negatively correlated with the dependent variable, implying that share price of a club increases as leverage decreases. In Figure 12, the MTB of a club increases by 1.15% following a 1 basis point decrease of Debt-to-Assets ratio.

Figure 12

The below tables show the regression results with implementing the quadratic log(Debt-to-Assets) variable. The base regression for this analysis is the regression following the inclusion of the interaction term between Champions League Participation and the mean-adjusted log(revenue), and the quadratic relationship experienced by the current ratio

	Current Ratio Quadratic FGLS Period Effect Regression	Current Ratio Quadratic FGLS Period Effect Regression (with quadratic log(Debt-to-Assets))
	MTB	MTB
Log(Revenue)	0.0575**	0.0607***
	(3.26)	(3.45)
Champions League	-0.0406	-0.0420
	(-1.20)	(-1.22)
(CL)*(μLog(Revenue)	0.0406	0.0403
	(1.69)	(1.67)
Net Income Margin	-0.0310**	-0.0302*
	(-2.63)	(-2.58)
Current Ratio	0.212***	0.215***
	(4.86)	(4.96)
Current Ratio sqd.	-0.0259*	-0.0262*
	(-2.28)	(-2.29)
Log(League Position)	0.0143	0.00397
	(0.57)	(0.16)
Log(Debt-to-Assets)	-0.115**	-0.186***
	(-3.10)	(-3.45)
Log(Debt-to-Assets) sqd.		0.0615
		(1.77)
Constant	2.032***	2.031***
	(3.48)	(3.48)
N	673	673

Z statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

This result assumes a linear relationship, and in a similar approach for inspection of whether the current ratio followed a quadratic form, was applied to the Debt-to-Assets due to the theoretical perspectives from the Trade-Off Theory. Based on the results yielded in Figure 12, the inclusion of the Debt-to-Assets quadratic variable is not of relevance with this variable producing a non-statically significant z-score of 1.77. Furthermore, the nature of the curve implies a "U-shaped" curve, where the market rewards increasing leverage to an indefinite level and punishes a club for decreasing its leverage after a certain threshold, contradicting the Trade-off Theory.

This conclusion reinforces the interpretation of the market leverage in section 4.5 – Descriptive Statistics in that clubs are, on average, too-leverage respective to the Trade-Off theory. Additionally, the football industry is a loss-making industry, therefore clubs are on average not in a position to realise the potential tax benefits of holding onto debt within their accounts (Graham, 2001). Moreover, the FFP regulation is an oversight board carrying out the monitoring efforts which are commonly associated with financial institutions issuing debt. As the monitoring is completed by an external third party regardless of whether a club takes out or not, the value of monitoring and curtailing of management expenditure by assuming debt decreases. Since both benefits components of leverage are reduced, investors do not see any logic in issuing more debt as all the clubs are effectively is increasing their probability of default and engaging in dangerous risk shifting with little value expected to be delivered to shareholders. As a whole, the only value clubs can achieve through leverage is by reducing it and not allowing the potential debt overhang problem to affect the performance and development of football clubs. This is what happened when the Turkish Banking Association (TTB) on the 7th January 2019 announced that they agreed to restructure the TL10 billion debt amassed by the "Top 4" clubs in the Turkish League; Beşiktaş J.K., Fenerbahçe, Galatasaray S.K. and Trabzonspor. Following the announcement of this deal with the debt-ridden clubs, each clubs' share soared 5.7%, 4.1%, 7.4% and 1.3% respectively. This recent event supports the above finding in that the market rewards highly levered clubs reducing their debt burden as a result of building up debt to fund players acquisitions, building new stadia and/or training facilities for grass-root development.

As explained in numerous sections, financial distress hinders the possibility to pursue profitable investments, either by player acquisitions or through improving facilities to foster the development of home-grown talent which investors find reason enough to discount the expected cash flows of the company taking into consideration this factor. However, it is worth pointing out that the benefits of the Trade-Off theory are still applicable in the football industry, despite the above results saying otherwise, as not all listed European clubs are debt-ridden. Ajax, Borussia Dortmund and the Scandinavian clubs all have relatively low leverage and thus have the room to manoeuvre to increase their leverage where they can benefit from the interest-tax shield.

6. Conclusion

Football affects the masses. Whether that is through fans supporting their team, to clubs helping the disadvantaged or making people rich, football affects somebody in some shape or form. The European football industry, while yet mature, has been growing at a CAGR of 7.2% (Franck, 2018), a growth rate indicative of large demand which has no sign of slowing down in the near future. The purpose of this thesis was to investigate the impact of KPIs for listed European football clubs, an area of research not yet delved into by previous academia, in addition to attempt rationalising the illogical nature of the stock price behaviour of listed clubs in not following economic rationale compared to other industries.

To investigate the research question, 23 listed clubs across were studied over the period beginning December 2009 to March 2019 by developing a regression defining the market-to-book (MTB) ratio as proxy for share price to be the dependent variable and Revenue, Net Income Margin, Current Ratio, Debt-to-Assets, League Position and Champions League participation as the main independent explanatory variables. Initially, a panel regression was performed. However, due to exogenous effects contaminating the model, it was then decided to perform a FGLS period effect regression to analyse the dataset.

With respect to Revenue, it is observed that there was not a statistically significant positive correlation between revenue as a whole and the share price of a firm. However, when the Champions League dummy variable was interacted with this term, this changed Revenue to become the most significant variable that affects the share price of a listed club, highlighting the impact of participation in the Champions League on Revenue for clubs, regardless of their size. Investigating league position in isolation had an immaterial impact on the MTB of a club, highlighting the importance of long-term results in helping football clubs generate larger revenue. However, due to the importance of the Champions League on this club's line-item, it is determined that league position implicitly affects the share price of a firm.

The key revenue sources were the commercial and matchday. This is believed so due to the fact that commercial revenue is the main differentiating factor for clubs to assess how they can convert brand-value into revenue, with matchday revenue deemed to be an important value-driver metric; the better a team performs, the greater the gate receipts will be which in turn indicates its popularity to the stock market. Surprisingly, broadcasting revenues did not behave as expected as there was a negative statistically significant relationship with the MTB. A possible source of explanation is that external factors outside management control a large extent affecting Broadcasting revenue, in addition to the possibility that most clubs may suffer from the Expectations Treadmill due to 15 out of the 23 clubs been crowned champions during the sample period. The positive relationship of revenue to the MTB metric was not shared by the Net Income Margin. The negative relationship goes against investors' standard practice that maximising the bottom-line is the aim of the game. It suggests that clubs increasing their market capitalisation focus more on beating teams on the pitch rather than through their accounts. This shows how the Trophy Asset model of winning at all costs is consuming management and investors' financial rationality in terms of profitability.

The relationship between the current ratio and the MTB follows that of standard financial theory, in that the market rewards clubs for obtaining a large short-term buffer, but penalises it after exceeding 4.087 level, this being greater than standard theoretical ratio of two to one. The excessively high ratio illustrates how vital the market looks upon potential fear of breaching FFP rules which would damage the club if not being able to participate in UEFA European competitions, specifically the Champions League. The insignificance of the acid-test ratio

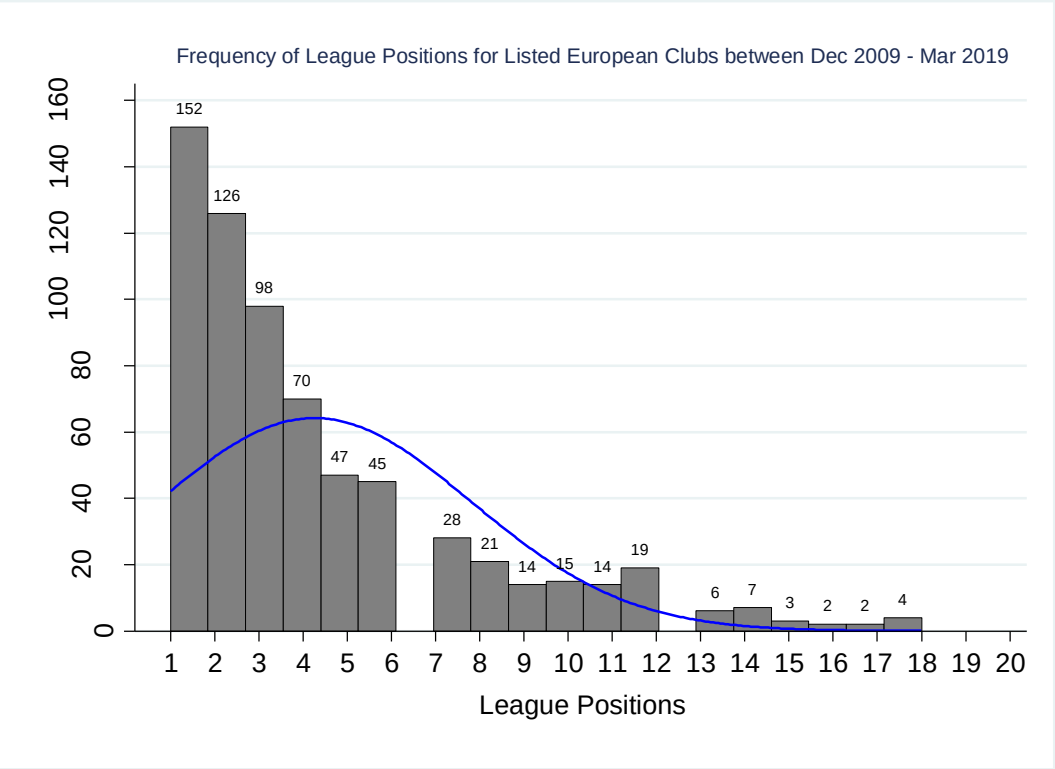
highlights how vital cash is for football clubs across Europe, enabling clubs to have "gun powder" to pursue acquisitions of players in the short-run, develop young up-and-coming talent for the long-run and not breach any FFP rules. Moreover, the negative correlation displayed between Debt-to-Assets and the MTB of listed European football clubs, which makes sense as it not only reinforces the fear associated with the debt overhang problem if the club is under financial distress but also because the market deems the industry to be over-levered. In other words, clubs on average cannot benefit from taking leverage through the curtailment of management spending, or benefiting from the interest tax shield. This situation leads these investors to give a premium for those clubs that maintain efficient cash management and a leverage. Reducing leverage for clubs allows them not to be forced into selling their star players keep themselves afloat, which has been seen specifically in Portugal, where both Benfica S.L. and FC Porto would have formidable teams if they didn't sell their prize assets to "Deep Pocket" clubs.

Given that the results from the League Position and Champions League variables were unexpectedly not individually statistically significant, it is proposed that further research should be made to shine a light on these area by possibly carrying out an event study analysis. To conclude, it is also proposed that research efforts be made through analysing more independent variables such as brand-value that were not previously included due to the difficulty in obtaining information for all of the 23 listed European clubs in the sample.

7. Appendices

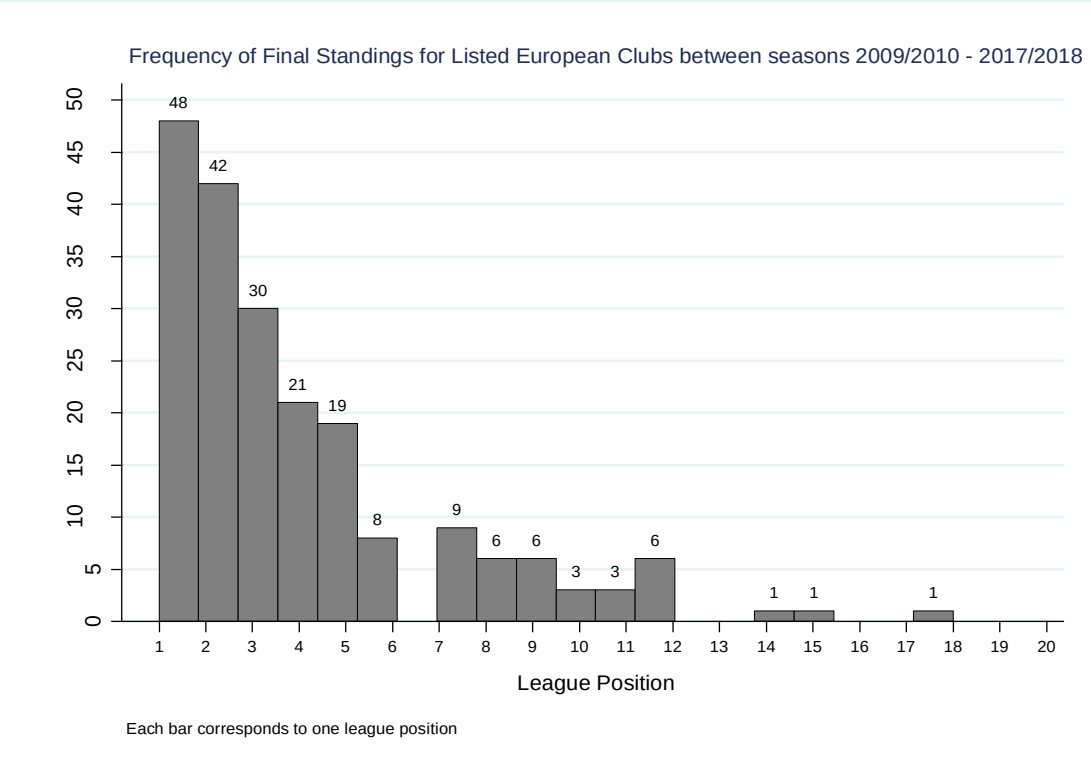
Graph 1 – League Position

The histogram displays the frequency of the league positions for all clubs during the sample period. Each bar corresponds to one league position (i.e. the first bar indicates the frequency the 23 clubs held 1st position throughout the reported periods). Even though all 11 national divisions don't have 20 league positions up for grabs, this paper groups them all together as this graph aims to show where the clubs have been predominately positioned during the 10 seasons in the results. The blue line is the distribution curve of the frequency of the league positions.



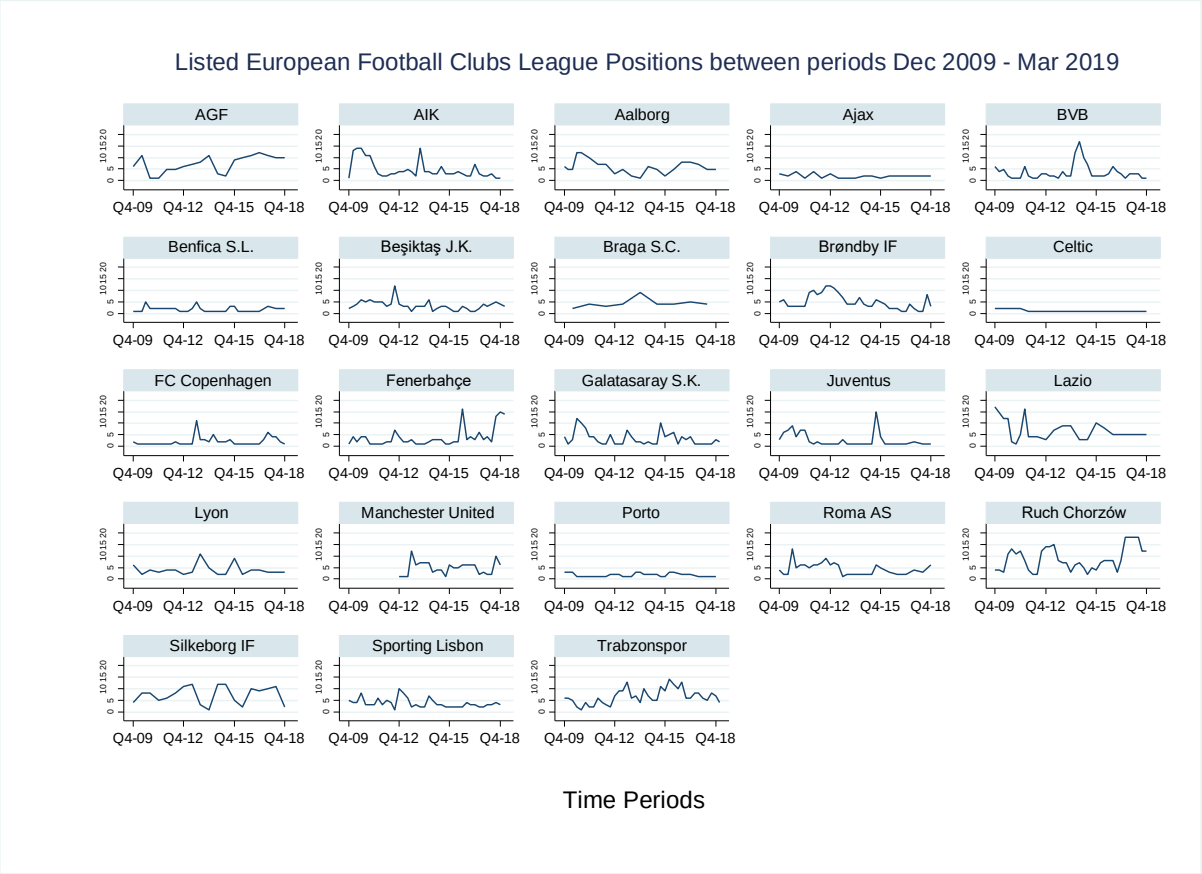
Graph 2 – League Position at the end of the Second Quarter

Graph X is a microscopic view of the findings in Graph X. The objective of this graph is to show the frequency of the final league standing positions for all the clubs. The final league standings for all clubs take place in the second quarter of reporting as all of the 11 different national domestic leagues come to conclusion during the beginning of Summer. The sample period for this graph only looks at 9 complete seasons, since the 2018/2019 season has not yet been finalised nor have the clubs produced their respective reports for Q2 2019. As per Graph X, each bar corresponds to one league ranking.



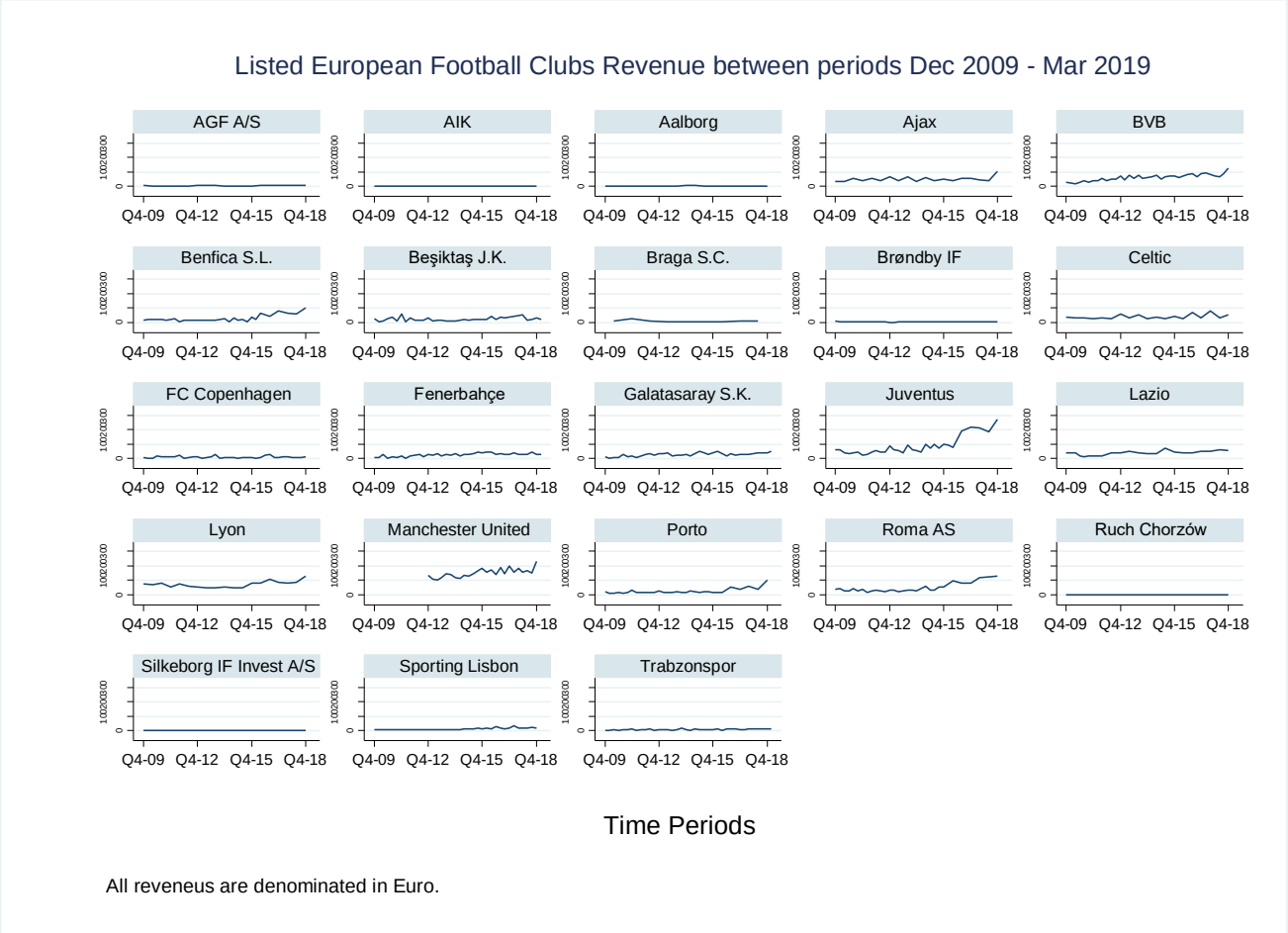
Graph 3 – Trend of League Position

The graph illustrates the league positions change for each club over the sample period. The positions were taken at the time when each respective club reported their respective accounts. For example, league positions were taken for all clubs; standard quarter annually breakdown (i.e. 31st March, 30th June, 30th September and 31st December) with the exception of the Turkish clubs whose reporting periods end one month prior to the other clubs. However, to maintain consistency, comparability and conformity it was assumed that the 31st May is Q2 for the purpose of this research.



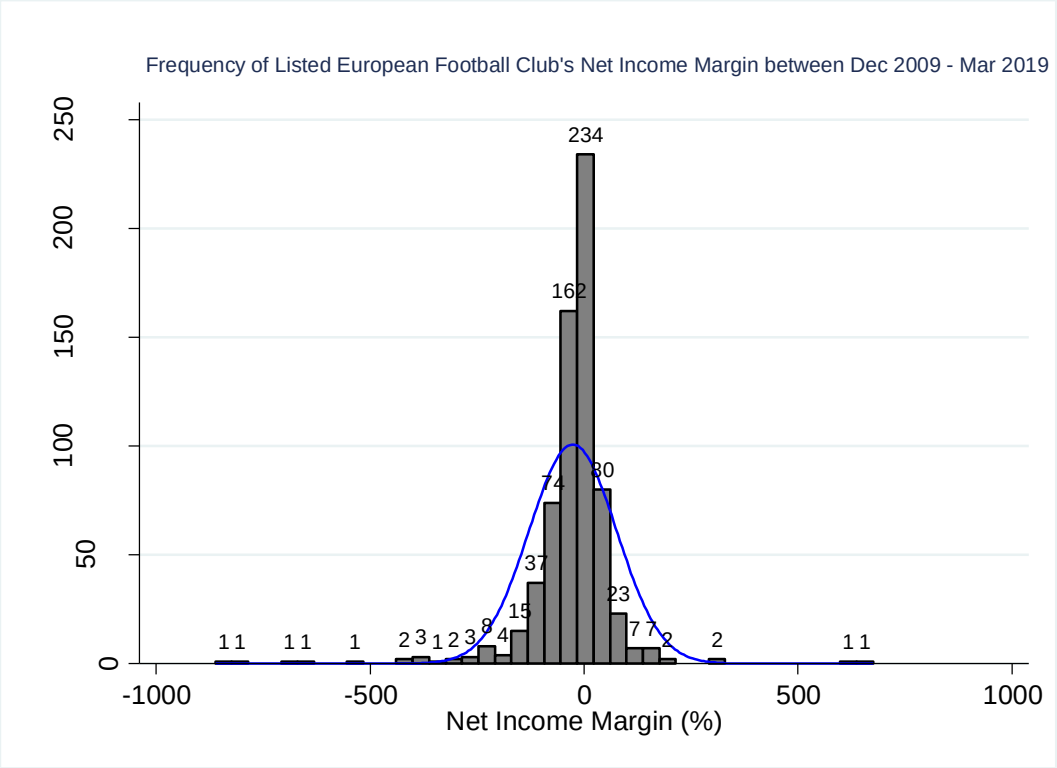
Graph 4 - Revenue

The bellow graph illustrates the revenue movement for all the 23 listed European football clubs in the sample between the periods December 2009 to March 2019. All the revenues are denominated in Euro. Football clubs whose reporting currency is not denominated in Euro has been converted based on the Average monthly FX rate to EUR. These clubs are situated in Denmark, Poland, Sweden, Turkey and UK). Consequently, the revenues presented below may not be exact amount at the time earned as converting revenue using an average FX smoothens out any fluctuations. All the reported revenues are based on a uniform time period. However, some clubs changed their reporting frequency (i.e. Juventus, Benfica, Lazio, FC Porto, Roma) from quarterly to producing reports bi-annually, henceforth their respective revenues experience a dramatic increase stemming from the change of reporting frequency. The changing in reporting requirement occurred in June 2016 for the Italian clubs and FC Porto where the alteration occurred for Lazio in June 2012. The change for Lazio was a forced decision for the benefit of the research as no information was published for quarter ends of March and September 2012 onwards. Thus, in order to reduce the inaccurate information, it was decided to report their financial results semi-annually from 2012 onwards. The official period of change for Lazio was similar to the other clubs previously stated.



Graph 5 – Net Income Margin Histogram

The purpose of this histogram is to highlight the distribution of the Net Income Margin for the 673 observations. The histogram comprises of 40 bars (“bins”) and each bin equates to an increment increase of 38.44%. The blue line is the distribution of all these findings which provides an overall assessment of how the Net Income Margins are distributed.

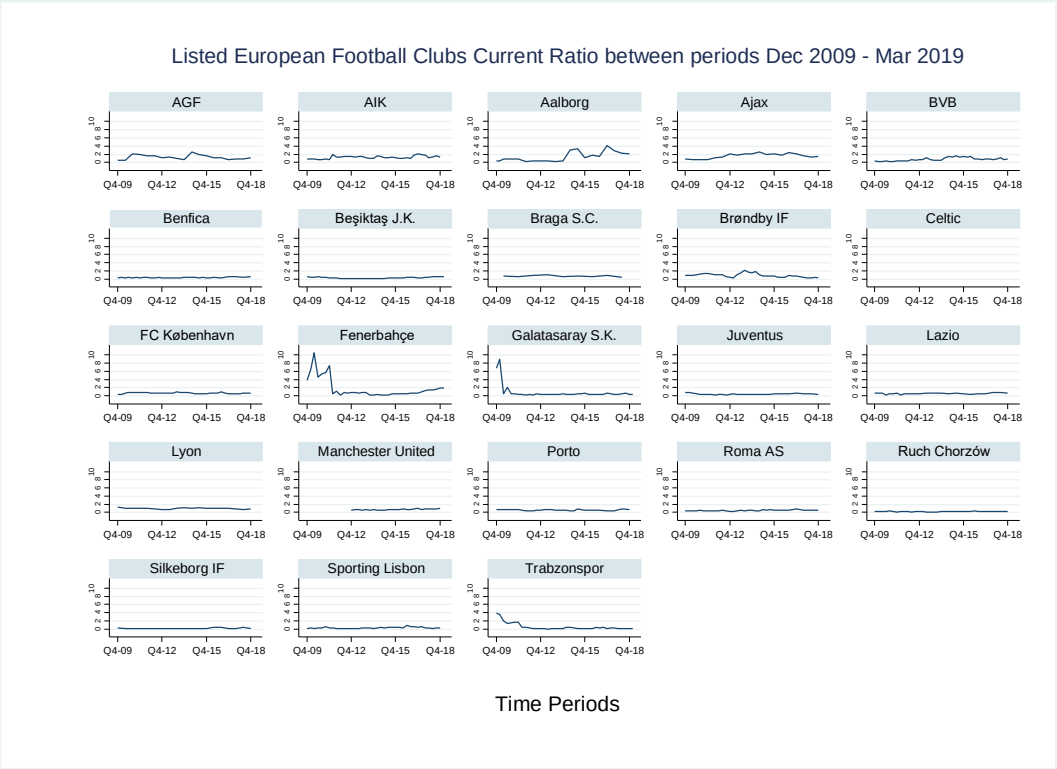


Graph 6 – Histogram for each sample club

This graph is a microscopic breakdown of the histogram presented in Graph 5. The graph therefore comprises the breakdown of the overall distribution for the Net Income Margin with the breakdown being the 23 clubs been the clustering. Each graph has a black vertical reference line which occurs at 0%, with this line indicating the threshold at which each club generates a positive Net Income Margin.

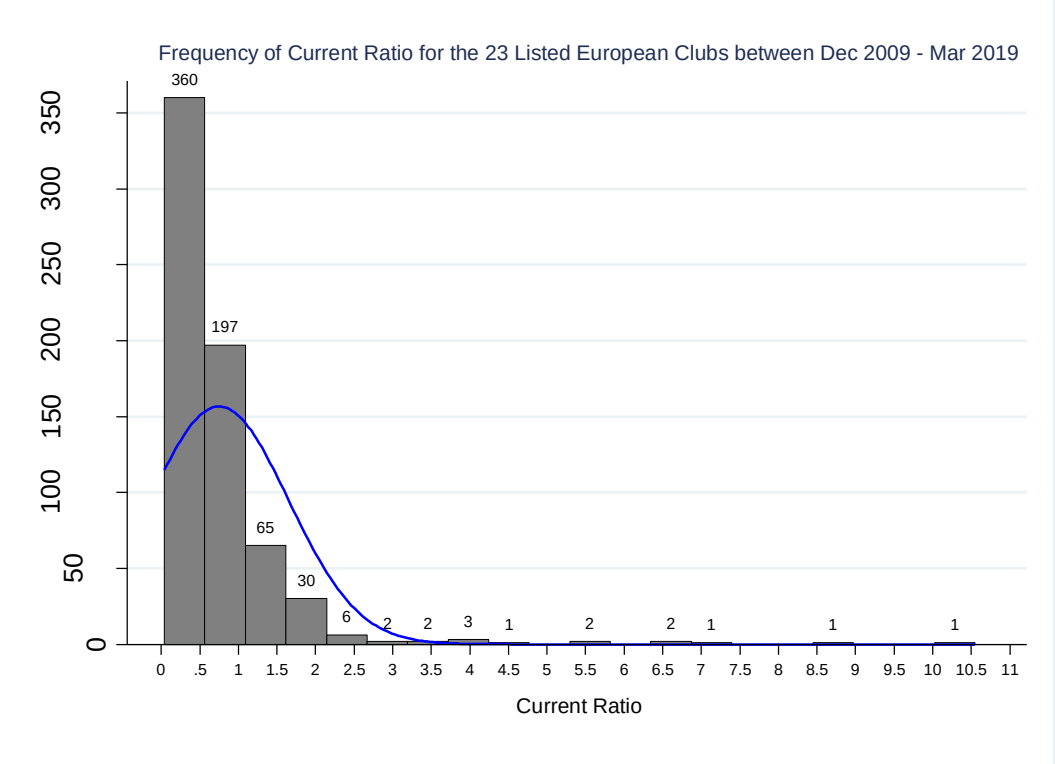
Graph 7 – Current Ratio Trend for each Sample Club

The below graphs indicate the trend of the current ratio for each of the 23 listed football clubs within the sample across the sample period. Since current ratio is a function of a club's current assets and short-term liabilities, which both are Balance Sheet figures, and therefore an accumulation of past periods, the line in each respective graph indicates the movement of this liquidity ratio throughout the 10 years.



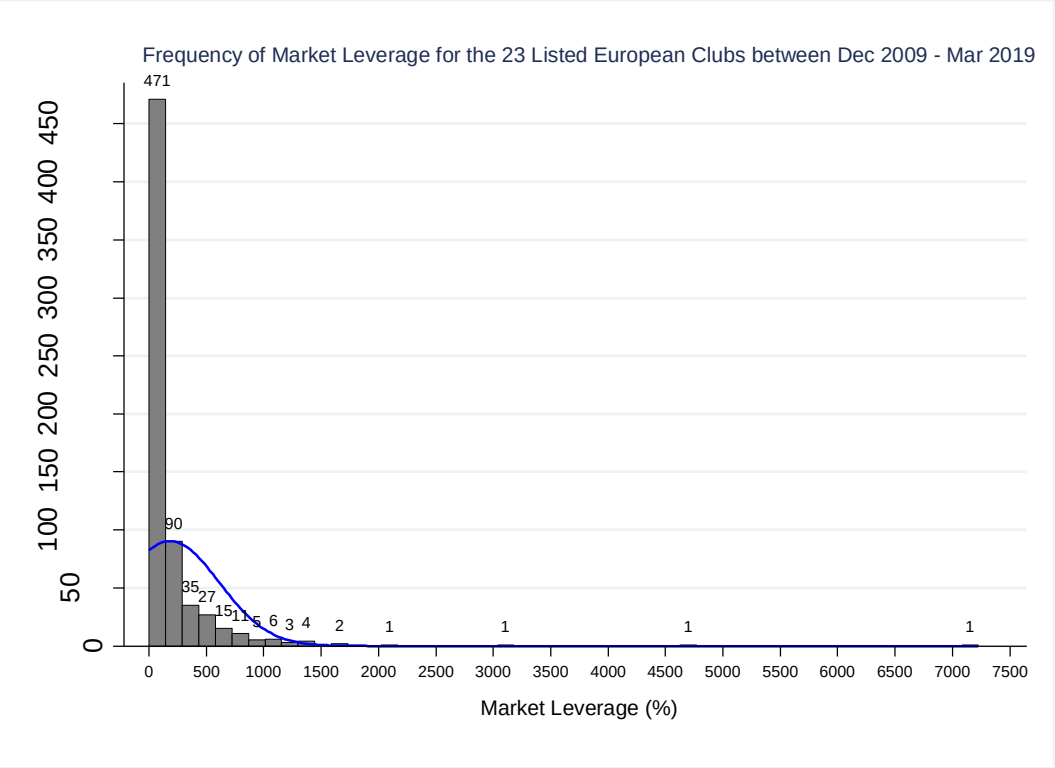
Graph 8 – Current Ratio Histogram

The Histogram presents the frequency of the current ratio for the 23 listed European football clubs during the sample period. Each bar represents an incremental increase in the current ratio of 0.5. The blue line within the graph represents the distribution curve of these frequencies.



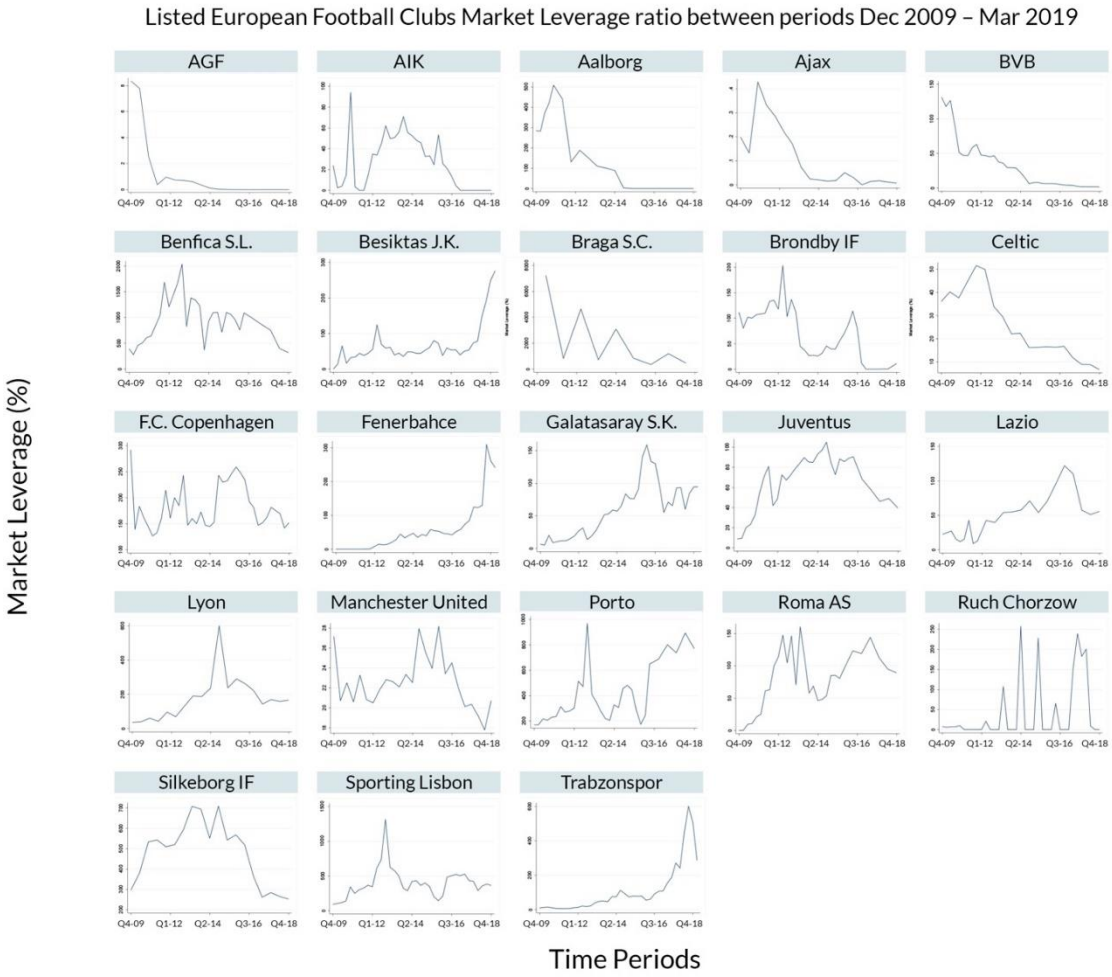
Graph 9 – Market Leverage Histogram

The graph paints the distribution of the frequency of Market Leverage within different brackets over the sample period. Each bar represents an incremental unit increase in this metric of 145%. The blue line subsumed within this histogram displays the distribution of frequencies of the market leverage ratio. The results are heavily skewed due to the presence of significant outlier pertained in the sample.



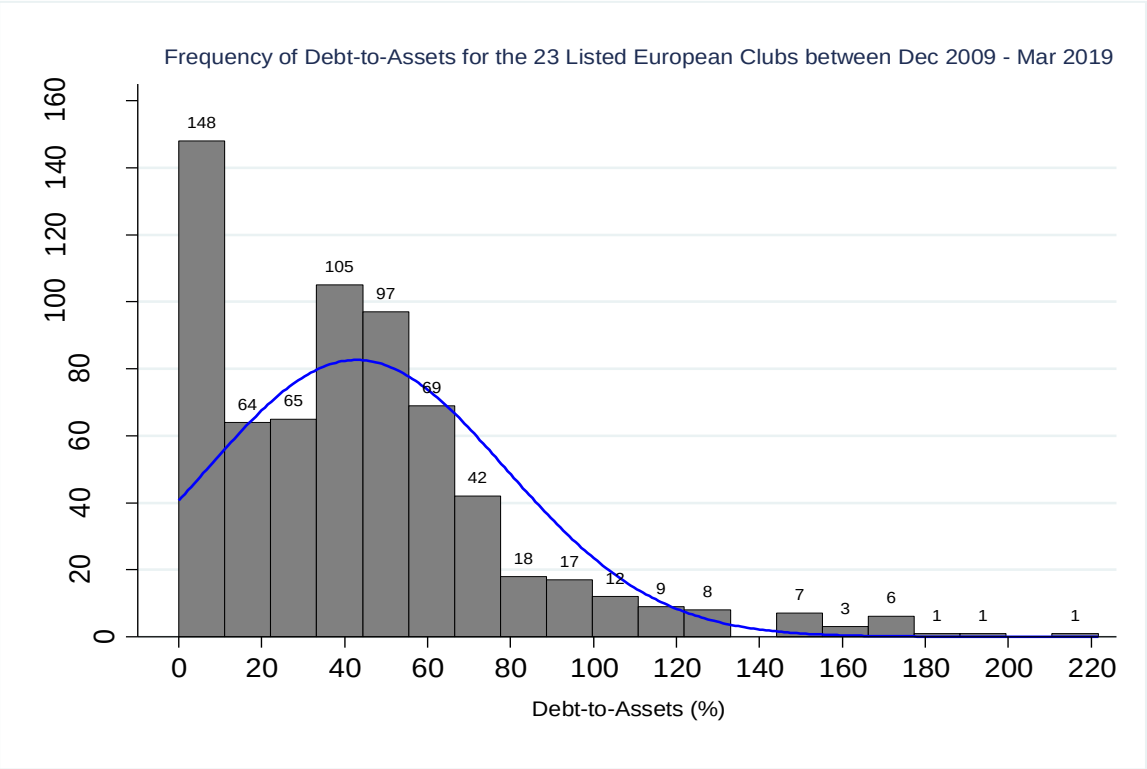
Graph 10 – Market Leverage for each Sample Club

The below graphs illustrate the trend of the market leverage for each of the 23 listed clubs in the sample during the time period.



Graph 11 – Debt-to-Assets Histogram

The frequency of the Debt-to-Assets over the sample period is presented below in a histogram format. The formulation of this gearing ratio is devised from the Statement of Financial Position figures as discussed in the methodology section. Usage of the Debt-to-Asset ratio results in leverage being measured using both market and book value terms. The asset component of the formula is calculated based on the Total Asset line item of the club at its respective reporting date. Debt is assumed to be measured in market terms[28] and comprises of all interest-bearing liability, both short- and long-term. The primary interest-bearing liabilities included in the formula are short-term debt, current portion of long-term debt due, Capital Leases obligations and Tax Payable Each bar represents an incremental unit increase in this gearing of 11%. The blue line contained in this histogram displays the distribution of frequencies of this financial metric.



[28] An assumption has been made that debt line-items contained in the club's financial reports and in the analytical software tools utilised for this paper are equivalent to market values.

Graph 12 – Trend of Debt-to-Assets for each Sample Club

The graph below tracks the progression of the proxy for market leverage, Debt-to-Assets over the periods beginning at the end of the fiscal year 2009 to the end of the first quarter in 2019 for each of the 23 listed football clubs.

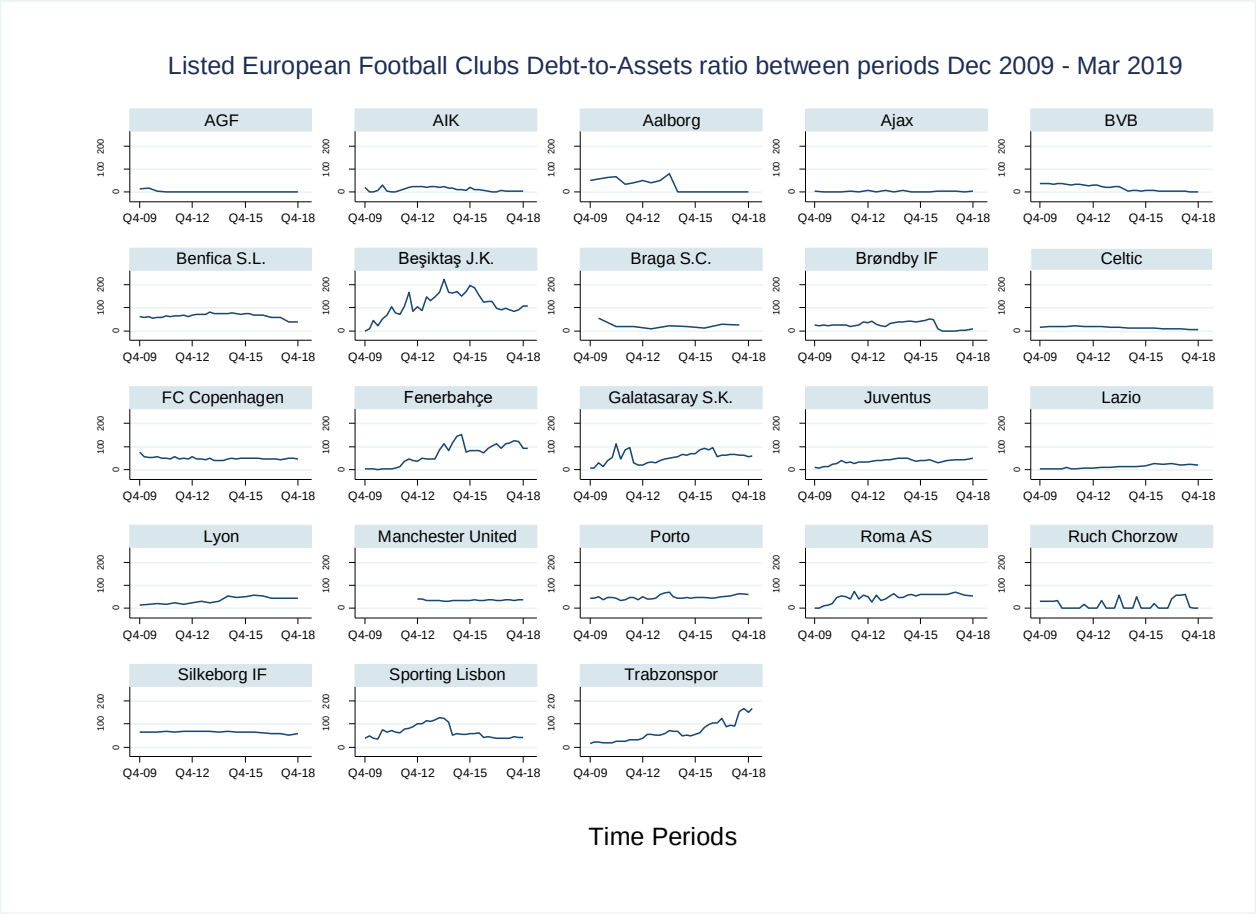


Table 1 – Correlation Coefficients

The below table shows the matrix between the financial indicators which have been taken as the explanatory variables. Financial leverage ratios Market Leverage and Book Leverage have been included in the matrix in order to show the relationship between these ratios and the ultimate ratio being used in the regression Debt-to-Assets.

	Revenue (€'m)	Net Income Margin	Market Leverage	Book Leverage	Debt-to-Assets	Current Ratio
Revenue (€'m)	1.0000					
Net Income Margin	0.1616	1.0000				
Market Leverage	-0.1099	0.0200	1.0000			
Book Leverage	-0.0191	0.0450	0.0918	1.0000		
Debt-to-Assets	-0.0618	-0.1466	0.1895	0.0185	1.0000	
Current Ratio	-0.0134	0.1545	-0.1193	-0.0338	-0.3472	1.000

Table 2 – Hausman's Test

This table presents the statistical findings from Hausman's Test where both a Fixed Effects and Random Effects model was produced in order to find the difference between the coefficients for both models. This model produces a chi-squared statistic that is the basis whether the base panel regression should be implemented with Fixed Effects or Random Effects

Test Summary			
Variables	**Coefficients**		
	Fixed-Effects	**Random Effects**	**Difference**
Ln(Revenue)	-0.4000	-0.2627	-0.1373
Net Income Margin	0.0364	0.0160	0.0204
Current Ratio	0.5161	0.5519	-0.0358
Debt-to-Assets	-0.1966	-0.0387	-0.1579
Log(Leagueposition)	-0.2512	-0.2400	-0.0112
	Chi-Squared Statistic	**Degrees of Freedom**	**Prob. > Chi-Squared**
	25.79	5	0.0001

Table 3 – Heteroskedasticity

The Modified Wald test for groupwise heteroskedasticity in a Fixed-Effect regression model results are presented. The test indicates whether heteroskedasticity is present. The null hypothesis is homoscedasticity between the panels. In other words, homoscedasticity equals constant variance between the panels. The table includes statistical figures about the Chi-squared, degrees of freedom and the measure of probability of greater than Chi-Squared. The code in stata is xttest3

Test Summary	Chi-Squared Statistic	Degrees of Freedom	Prob. > Chi-Squared
	85025.84	23	0.0000

Table 4 – Cross-Sectional Dependence

The presence of Cross-Sectional Dependence (or contemporaneous correlation) is determined by carrying out Pasaran's Cross-Sectional Dependence test. This test determines whether the error terms are correlated across panels. The null hypothesis states that residuals are not correlated with the alternative hypothesis providing a counterargument to the null hypothesis.

Test Summary	Pasaran's CD Test	Probability	Absolute Mean Value of the off-diagonal elements
	2.046	0.0408	0.274

Table 5 – Serial Correlation/Autocorrelation

Serial correlation is verified by conducting a Wooldridge Test for autocorrelation in panel data. The null hypothesis of this test states that no first-order autocorrelation persists in the panel data. The alternative hypothesis is that first-order autocorrelation exists. A limitation of the Wooldridge test is that the test can only be carried out with a first order (i.e. a lag period of 1 or AR (1)). Though this limitation is not an issue as the results of Fisher-type test provides evidence that no unit-roots exist under this lag period. The test issues F-statistic and a p-value.

Test Summary	
F (1, 16)	6.468
Prob > F	0.0217

8. References

Acero, I., Serrano, R., & Dimitropoulos, P. (2017). Ownership structure and financial performance in European football, *Corporate Governance: The international journal of business in society*, vol. 17, no. 3, pp. 511-523.

Aigner, D. J., Hsiao, C., Kapteyn, A., & Wansbeek, T. (1984). Latent variable models in econometrics, *Handbook of econometrics*, vol. 2, pp. 1321-1393.

Almeida, H., & Philippon, T. (2008). Estimating risk-adjusted costs of financial distress, *Journal of Applied Corporate Finance*, vol. 20, no. 4, pp. 105-109.

Andonov-Acev, D., Buckovska, A., Blagojevic, Z., & Kraljevski, V. (2008, June). Enterprise performance monitoring, In ITI 2008-30th International Conference on Information Technology Interfaces, pp. 185-190. Available Online: https://ieeexplore-ieee-org.ludwig.lub.lu.se/document/4588405 [Accessed 27 May 2019]

Bebchuk, L. A., & Fried, J. M. (2003). Executive compensation as an agency problem, *Journal of economic perspectives*, vol. 17, no. 3, pp. 71-92.

Bell, A. R., Brooks, C., Matthews, D., & Sutcliffe, C. (2012). Over the moon or sick as a parrot? The effects of football results on a club's share price, *Applied Economics*, vol. 44, no. 26, pp. 3435-3452.

Benkraiem, R., Louhichi, W., & Marques, P. (2009). Market reaction to sporting results: The case of European listed football clubs, *Management Decision*, vol. 47, no. 1, pp. 100-109.

Berument, M. H., Ceylan, N. B., & Ogut-Eker, G. (2009). Soccer, stock returns and fanaticism: Evidence from Turkey, *The social science journal*, vol. 46, no. 3, pp. 594-600.

Birkhäuser, S., Kaserer, C., & Urban, D. (2019). Did UEFA's financial fair play harm competition in European football leagues?, *Review of Managerial Science*, vol. 13, no. 1, pp. 113-145.

Blouin, J., Core, J. E., & Guay, W. (2010). Have the tax benefits of debt been overestimated?, *Journal of Financial Economics*, vol. 98, no. 2, pp. 195-213.

Blundell, R., & Mátyás, L. (1992). Panel data analysis: An introductory overview, *Structural Change and Economic Dynamics*, vol. 3, no. 2, pp. 291-299.

Bullough, S. (2018). UEFA champions league revenues, performance and participation 2003–2004 to 2016–2017, *Managing Sport and Leisure*, vol. 23, no. 1-2, pp. 139-156.

Butler, B. N., & Aicher, T. J. (2015). Demonstrations and displacement: social impact and the 2014 FIFA World Cup, *Journal of policy research in tourism, leisure and events*, vol. 7, no. 3, pp. 299-313.

Cai, J., & Zhang, Z. (2011). Leverage change, debt overhang, and stock prices, *Journal of Corporate Finance*, vol. 17, no. 3, pp. 391-402.

Carmichael, F., & Thomas, D. (1995). Production and efficiency in team sports: an investigation of rugby league football, *Applied Economics*, vol. 27, no. 9, pp. 859-869.

Chan, A. P., Scott, D., & Lam, E. W. (2002). Framework of success criteria for design/build projects, *Journal of management in engineering*, vol. 18, no. 3, pp. 120-128.

Choi, I. (2001). Unit root tests for panel data, *Journal of international money and Finance*, vol. 20, no. 2, pp. 249-272.

Cordovilla, Ivan. (2019). Ajax shares hit record high after eliminating Real Madrid, *El As, 6 March*, Available Online: https://en.as.com/en/2019/03/06/football/1551899025_640049.html [Accessed 27 May 2019].

Davydenko, S. (2005). When do firms default? A study of the default boundary, working paper, University of Toronto.

Deloitte Sports Business Group. (2019). Deloitte Football Money League 2019, Available Online: https://www2.deloitte.com/content/dam/Deloitte/uk/Documents/sports-business-group/deloitte-uk-deloitte-football-money-league-2019.pdf. [Accessed 27 May 2019].

Demydyuk, G. (2012). Optimal financial key performance indicators: evidence from the airline industry, *Accounting & Taxation*, vol. 3, no. 2, pp. 39-51.

Dimic, N., Neudl, M., Orlov, V., & Äijö, J. (2018). Investor sentiment, soccer games and stock returns, *Research in International Business and Finance*, vol. 43, pp. 90-98.

Duque, J., & Ferreira, N. A. (2005). Explaining share price performance of football clubs listed on the Euronext Lisbon, working paper, Universidade de Lisboa

Edmans, A., Garcia, D., & Norli, Ø. (2007). Sports sentiment and stock returns, *The Journal of Finance*, vol. 62, no. 4, pp. 1967-1998.

Ferreira, P., Loures, L., Nunes, J. R., & Dionísio, A. (2017). The behaviour of share returns of football clubs: An econophysics approach, *Physica A: Statistical Mechanics and its Applications*, vol. 472, pp. 136-144.

Floros, C. (2014). Football and stock returns: New evidence, *Procedia Economics and Finance*, vol. 14, pp. 201-209.

Franck, E. (2018). European Club Football after "Five Treatments" with Financial Fair Play—Time for an Assessment, *International Journal of Financial Studies*, vol. 6, no. 4, pp. 97.

Ghio, A., Ruberti, M., & Verona, R. (2019). Financial constraints on sport organizations' cost efficiency: the impact of financial fair play on Italian soccer clubs, *Applied Economics*, vol. 51, no. 24, pp. 2623-2638.

Graham, J R (2001), "Estimating the Tax Benefits of Debt", *Journal of Applied Corporate Finance*, vol. 14, no. 1, pp. 42-54.

Harris, R. D., & Tzavalis, E. (1999). Inference for unit roots in dynamic panels where the time dimension is fixed, *Journal of econometrics*, vol. 91, no. 2, pp. 201-226.

Hausman, J. A. (1978). Specification tests in econometrics, Econometrica: Journal of the econometric society, working paper, no. 185, Massachusetts Institute of Technology.

Hegazy, M. A. (2012). The development of key financial performance indicators for UK construction companies, *Accounting, Accountability & Performance*, vol. 17, no. 1/2, pp. 49-77.

Hodgson, A., & Stevenson-Clarke, P. (2000). Accounting variables and stock returns: The impact of leverage, *Pacific Accounting Review*, vol. 12, no. 2, pp. 37-64.

Hull, R. M. (1999). Leverage ratios, industry norms, and stock price reaction: An empirical investigation of stock-for-debt transactions, *Financial management*, vol. 28, no. 2, pp. 32-45.

Hummel, C. (2018). Do poor citizens benefit from mega-events? São Paulo's street vendors and the 2014 FIFA world cup, *Latin American Politics and Society*, vol. 60, no. 4, pp. 26-48.

Jensen, M. C. (1986). Agency costs of free cash flow, corporate finance, and takeovers, *The American economic review*, vol. 76, no. 2, pp. 323-329.

Johnson, R., & Soenen, L. (2003). Indicators of successful companies, *European Management Journal*, vol. 21, no. 3, pp. 364-369.

Juventus S.p.A. (2019). Half-yearly Financial Report at 31 December 2018, Available Online: https://www.juventus.com/media/native/investor-relations-docs/english/bilanci/1718/Relazione%20finanziaria%20semestrale%20al%2031%20dicembre%202018%20eng%20web.pdf [Accessed 27 May 2019]

KPMG. (n.d.). Available Online: https://www.footballbenchmark.com/methodology?fbclid=IwAR1KB_KRtfQmrVp8juulxSdHq6MgX1uPef3phUDxKQ76or7q_1On3ZGzm0o [Accessed 27 May 2019].

Kucukaltan, B., Irani, Z., & Aktas, E. (2016). A decision support model for identification and prioritization of key performance indicators in the logistics industry, *Computers in Human Behavior*, vol. 65, pp. 346-358.

Koller, T., Goedhart, M., & Wessels, D. (2015). Valuation: measuring and managing the value of companies, Hoboken, N.J. : Wiley, cop.

Levin, A., Lin, C. F., & Chu, C. S. J. (2002). Unit root tests in panel data: asymptotic and finite-sample properties, *Journal of econometrics*, vol. 108, no. 1, pp. 1-24.

Maddala, G. S., & Wu, S. (1999). A comparative study of unit root tests with panel data and a new simple test, *Oxford Bulletin of Economics and statistics*, vol. 61, no. S1, pp. 631-652.

Manchester United Plc. (2019). Manchester United Plc 4Q18 Earnings Release, Available Online: https://ir.manutd.com/financial-information/quarterly-reports/2018.aspx [Accessed 27 May 2019]

Mourao, P. R. (2016). "Soccer Transfers, Team Efficiency and the Sports Cycle in the Most Valued European Soccer Leagues–Have European Soccer Teams Been Efficient in Trading Players?", *Applied Economics*, vol. 48, no. 56, pp. 5513–5524.

Müller, M. (2017). How mega-events capture their hosts: event seizure and the World Cup 2018 in Russia, *Urban Geography*, vol. 38, no. 8, pp. 1113-1132.

Patell, J. M. (1976). Corporate forecasts of earnings per share and stock price behavior: Empirical test, *Journal of accounting research*, vol. 14, no. 2, pp. 246-276.

Pawlowski, T., Breuer, C., & Hovemann, A. (2010). Top clubs' performance and the competitive situation in European domestic football competitions, *Journal of sports economics*, vol. 11, no. 2, pp. 186-202.

Peeters, T., & Szymanski, S. (2014). Financial fair play in European football, *Economic Policy*, vol 29, no. 78, pp. 343-390.

Pilotte, E. (1992). Growth opportunities and the stock price response to new financing, *Journal of Business*, vol. 65, no. 3, pp. 371-394.

Pinnuck, M., & Potter, B. (2006). Impact of on-field football success on the off-field financial performance of AFL football clubs, *Accounting & Finance*, vol. 46, no. 3, pp. 499-517.

Plumley, D., Wilson, R., & Ramchandani, G. (2017). Towards a model for measuring holistic performance of professional Football clubs, *Soccer & Society*, vol. 18, no. 1, pp. 16-29.

Renneboog, L., & Vanbrabant, P. (2000). Share Price Reactions to Sporty Performances of Soccer Club Listed on the London Stock Exchange and the AIM, *CentER Discussion Papers*, vol 2000-19.

Roberts, M. R., & Whited, T. M. (2013). Endogeneity in empirical corporate finance, *In Handbook of the Economics of Finance*, vol. 2, pp. 493-572.

Rohde, M., & Breuer, C. (2016). Europe's elite football: Financial growth, sporting success, transfer investment, and private majority investors, *International Journal of Financial Studies*, vol. 4, no. 2, pp. 12.

S. S. Lazio. (2017). Press Release: Agreement Macron Lazio Marketing (In Italian), Available Online: http://www.sslazio.it/images/documents/investors/COMUNICATO_STAMPA_8_2_2017_accordo_macron_laziomktg.pdf [Accessed 27 May 2019]

Myers, S. C., & Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have, *Journal of Financial Economics*, vol. 13, no. 2, pp. 187-221.

Telser, L. G. (1996). Competition and the Core, *Journal of Political Economy*, vol. 104, no. 1, pp. 85-107.

UEFA. (2015). UEFA details club competitions distribution system, Available Online: https://www.uefa.com/insideuefa/stakeholders/clubs/news/newsid=2229945.html [Accessed 27 May 2019].

UEFA. (2018a). UEFA club licensing and financial fair play regulations edition 2018. Available Online: https://www.uefa.com/MultimediaFiles/Download/Tech/uefaorg/General/02/56/20/15/2562015_DOWNLOAD.pdf. [Accessed 27 May 2019].

UEFA. (2018b). How clubs' 2018/19 UEFA Champions League revenue will be shared, Available Online: https://www.uefa.com/uefachampionsleague/news/newsid=2562033.html [Accessed 27 May 2019].

UEFA. (2019). Club Licensing Benchmarking Report Financial Year 2017, Available Online: https://www.uefa.com/MultimediaFiles/Download/OfficialDocument/uefaorg/Clublicensing/02/59/40/27/2594027_DOWNLOAD.pdf?fbclid=IwAR3XbsHFeGDo8Ev2yNKDJcu3GJD5rj5KbZ-buye8OW2Ir4O2GnUb_p1AOQ4 [Accessed 27 May 2019].

Van der Zwan, N. (2014). Making sense of financialization, *Socio-economic review*, vol. 12, no. 1, pp. 99-129.

Wilson, R., Plumley, D., & Ramchandani, G. (2013). The relationship between ownership structure and club performance in the English Premier League, *Sport, Business and Management: An International Journal*, vol. 3, no. 1, pp. 19-36.

Wooldridge, J. M. (2010). Econometric analysis of cross section and panel data, London : MIT.

Wooldridge, J. M. (2015). Introductory econometrics: A modern approach, Boston: Cengage Learning.

Yadav, P. (2014). Liquidity Analysis of Selected Pharmaceutical Companies: A Comparative Study, *International Journal of Advance Research in Computer Science and Management Studies*, vol. 2, no. 8, pp. 271-274.

Zhang, Y., & Andrew, J. (2014). Financialisation and the conceptual framework, *Critical perspectives on accounting*, vol. 25, no. 1, pp. 17-26.

Şener, İ., & Karapolatgil, A. A. (2015). Rules of the game: Strategy in football industry, *Procedia-Social and Behavioral Sciences*, vol. 207, pp. 10-19.