The financial effects of FFP in the Premier League and a possible salary cap alternative

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Abstract

As the amounts of financing in the football industry increases, football governing bodies such as UEFA are left to regulate the market. How effective has its introduction of continental licensing requirements – the so-called FFP regulations – been in making football clubs more viable from a financial point of view? The aim of this paper is to analyze the effects of FFP rules on the solvability of football clubs and whether an alternative salary cap salary could prove more effective. A statistical analysis approach is used, drawing on the previous models on football club solvability and FFP consequences. The paper finds a viable alternative to UEFA's regulation in the introduction of a league-wide salary cap, having the desired effect of increasing the financial health of football clubs. These findings can provide a starting point for research into the possibility of a salary cap in European continental and national competitions, as well as offer an alternative direction for financial policy making in football. National football federations, international football governing bodies and national league organizations will find this research provides an insight into the effects of existing and future football accounting policies.

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1.Introduction

In the past decade, the football industry as escalated to new highs. The transfer market breaks player sale records almost every summer, with Neymar Jr.'s most recent transfer for 222 million euro to Paris Saint-Germain Football Club coming to mind (Transfermarkt, 2017). Not only are the prices paid for players and their respective wages incredibly high, income has also soared under new television broadcasting deals and sponsorship contracts. The English Premier League alone manage to rake in 2.46 billion pounds, distributed amongst its participating clubs. Finishing twentieth in the Premier League as a club this season, with direct relegation as a consequence, would have netted you 96 million pounds (Premier League, 2019).

These exorbitant revenues have also attracted foreign investments in the form of wealthy owners. Multi -million and -billionaires are more than happy to finance football clubs, with the hopes of glory and silverware. In their quest to obtain sporting success, many owners choose to aid their clubs in buying better players. They do so by papering over the cracks left by budgetary deficits, filling up the gaps with their private wealth. Whether the deficit is generated by the purchase of players, payment of wages or the development of stadia and facilities, the rich owners are ready to spend. A most recent example is the success of Manchester City Football Club in winning the Premier League for the second time in a row, a first in the club's history and a direct result of foreign investment (BBC, 2019).

With this influx of foreign investment also seen in other European football leagues such as the French Ligue 1 and Italian Serie A, the Union of European Football Associations (UEFA) has developed a framework for increasing the financial health of clubs. This framework came in the form of a seasonal licensing agreement, required for all clubs looking to participate in European continental competitions. After being announced in September of 2009, Financial Fair Play (FFP) regulations were formally introduced by UEFA in the 2011/2012 football season (BBC, 2019). FFP aims to improve the solvency of football clubs by increasing the amount of periodic debt servicing by football clubs.

The second aim of FFP is to curb excessive spending by limiting the expenses for purchasing players to a club's income. This would further dissuade clubs from taking on unnecessary debt to finance purchases in the transfer market. By solving these issues, UEFA hoped to decrease the occurrence of financial problems in football clubs and promote financially sustainable development.

1.1 Research Problem & Motivation

FFP aims to achieve financial health for football clubs by imposing a strict break-even rule for clubs to adhere to. As of the 2011/2012 football season, football clubs wishing to obtain a European license have to ensure that their expenses do not overshadow their revenues by certain predetermined amounts. Assessments are made over a rolling three-year period, giving clubs enough time to compensate losses with profits. As an example, for the 2014/2015 season, the previous three seasons 2011/2012, 2012/2013 and 2013/2014 were taken in order to decide on FFP rulings. During this period clubs were only allowed a maximum three season total loss of 45 million euro; in case their owners could compensate it. However, the aim was to gradually scale back the loss allowance, until a max loss of 5 million euro a year was reached. This would result in at most losses of 15 million euro over the course of three seasons (UEFA Club Licensing & FFP, 2018).

In order to observe the effectiveness of FFP, this paper aims to look at the financial results of football clubs. However, while the effect of FFP on sporting achievement is an important aspect of football clubs, I wish to focus on the effect of FFP on club solvency. The break-even cap of FFP is meant to decrease club dependency on large investments each season. By creating a relative hard cap of wages (Staudohar, 1998), UEFA allows clubs to scale down expenses and even generate profits, which can then be used to service debt. However, have these FFP regulations truly been followed and have they really resulted in an increased ability of football clubs to pay back their debts? Has FFP caused football clubs to decrease their dependence on debt to finance seasonal operations? In 2009, a majority of clubs in European divisions reported a

financial loss for the previous year (ESPN, 2011), has this changed at all after the introduction of FFP in the 2011/2012 season? Does a hard absolute salary cap, like in American sport leagues, improve solvency instead?

1.2 Research Objectives

FFP was introduced by UEFA to halt the trend of growing player wages and to improve the financial health of football clubs in Europe (Peeters & Szymanski, 2014). With this in mind, this paper asks the following research question:

What has the effect of FFP been on the financial viability of football clubs, and would a hard salary cap be more effective at increasing financial viability?

In order to answer this research question, the following sub-questions will be required. These will help ascertain the variables required for the methodology as well as defining what a correct application of FFP should look like. First, it is necessary to know what financial FFP requirements must be upheld to achieve licensing:

What financial FFP requirements must be followed to obtain licensing?

Next, the focus will shift on defining what indicators can be used to determine the financial viability of a football club. This will be useful to ascertain variables to be tested later on.

How can the financial viability of a football club be defined?

Once a set of measurable variables has been chosen, the following step can be taken in determining the effectiveness of FFP:

What effect has the introduction of FFP had on the financial viability of football clubs?

Lastly, the financial viability of football clubs should be compared before and after the introduction of an alternative measure, namely a salary cap.

What effect would the introduction of a salary cap have on the financial viability of football clubs?

1.3 Research Methodology

In order to accurately measure the effects of FFP, I will take the financial reports of football clubs from the 2007/2008 season until the 2013/2014 season. Hereby, I will capture the pre-FFP implementation values of the three seasons from 2008 till 2011 and of the post-FFP implementation metrics of the seasons up to and until 2014. The financial data required for my analysis can be found in the annual reports of football clubs, published yearly. This includes the parameters required to calculate the solvency ratio, wage totals and profit or losses generated each year. Further, the FFP regulations are publicly available and can be found on UEFA's website. These reports contain all FFP requirements and rules, including the maximum loss allowance per every three year period. In cases where official financial data of football clubs is unobtainable from annual reports, due to lack of continued public availability, other credible sources will have to be used.

In the research on the solvency of football clubs, conducted by Szymanski in 2012, the wage-turnover ratio appeared to be an important factor in the deterioration of the balance sheet. This indicator could reliably predict the loading up of the club with external debt. When a team fails in either on-field performances or in the generation of the expected level of revenue, the wage turnover ratio will rise, and clubs will turn to borrowing. This in turn affects various indicators such as the total liabilities to assets ratio, net debt to revenue and revenue to total liabilities (Szymanski, 2012). This relationship has proven to be a reliable measure of the probability of insolvency for a football club. This is why a similar regression will be applied to the data in this paper, analyzing the relationship between the wage turnover ratio and various balance sheet

ratios both before and after the introduction of FFP. Using Peeters and Szymanski's research on vertical restraints in soccer, a selection of certain indicators can be made (Peeters & Szymanski, 2012). As Peeters and Szymanski explain, the vertical restraints imposed by UEFA in the form of FFP create downward pressure on the wages of football players. This in turn allows for clubs to increase their profitability and decrease their wage bill. Therefore, the following three indicators will also be looked at: three-year average profitability of football clubs, three-year average wage-revenue ratio and the growth rate of the three-year average total wage bill. A period of three year is chosen in order to take into account the procedure of UEFA for enforcing FFP, that requires an observation period of three years. This will allow clubs enough time to adjust to the new licensing requirements and increase the reliability of the findings in this paper.

2. Theoretical Framework

2.1 Continental Club Licensing: Solvency and the Break-Even Rule

All professional-level football clubs that are eligible and willing to participate either the current or next football season in European competitions organized by UEFA, must comply with the licensing requirements (UEFA, 2018). These licensing requirements were first introduced in 2004 and implemented in order to create a minimum requirement for the management of football clubs throughout Europe. Over time, they have slowly evolved into a five-pillar system consisting of sporting, infrastructure, personnel, legal and financial aspects of club football (UEFA, 2019). Most recently, the financial aspect of the licensing regulations has seen an overhaul. With the introduction of Financial Fair Play regulations in 2010, clubs now had to adhere to strict limits on their expenditures and financing sources. The purchasing of football player registrations, payment of wages and other football-related expenses were allowed to be financed only from revenues generated by football-related activity. This excluded the large investment by owners and the pursuit of debt financing. The aims of FFP were to both decrease the amount of overdue borrowing and leveraging of clubs' finances, and the large injections of capital by owners of football clubs (UEFA, 2019). As shown by Peeters and Szymanski (2012, 2014), these measures can be seen as industry-wide vertical restraints implemented by the governing body of UEFA. However, while the intentions of FFP's break-even rule may have been to limit non-football related capital injections into football clubs, it has had the effect of decreasing wages and increasing profitability of football clubs. Peeters and Szymanski compare these effects to the salary caps introduced in North-American sport competitions, except without the effect of increasing league competitiveness.

The other aim of FFP is to increase the financial viability of football clubs. This is done in order to protect football clubs 'following a large number of cases of mismanagement that have even, in some cases, unfortunately led clubs to ruin' (UEFA, 2019). While the mismanagement of finances in football clubs is certainly not new (Dimitropoulos, 2010),

FFP also aims to protect creditors who lend to football clubs. Insolvencies in English football, for example, have become more frequent but with smaller total debt involved (Szymanski, 2012). Szymanski, in his study of insolvencies in English football, has also found a strong relationship between the wage/turnover ratio and various ratios involving balance sheet items such as total liabilities, total assets and revenues. A clear negative effect was found of the wage/turnover ratio, lagged over three previous seasons, and the current-season state of a football club's balance sheet. Furthermore, Szymanski's and Peeters's research on vertical restraints in football (2012) show that total wage bill and thereby profitability are good indicators of the effects of FFP. These vertical restraints also seem familiar to the effect of salary caps on profitability of sporting franchises and the income generated for their owners (Staudohar, 1998).

2.2 Hypothesis Development

In order to analyze the effects of FFP on financial viability, a two-leveled approach is taken. First, the testing in significance of change in three variables that can provide a good indication into the financial viability of football clubs: profitability, wage-revenue ratio and total wage bill. These variables will be averaged over the participating football clubs and over a three-year period. Due to previous research by Peeters and Szymanski on vertical restraints (2012), this paper predicts that FFP regulations will have a decreasing effect on total wages.

Hypothesis 1a: The introduction of FFP regulations has significantly decreased the three-year average total wage bill of football clubs.

A decrease in the average wage bill will then also affect the profitability of football clubs, which this paper predicts will increase.

Hypothesis 1b: The introduction of FFP regulations has significantly increased the three-year average profitability of football clubs.

With the profitability increasing and wages falling, a third change is predicted.

Hypothesis 1c: The introduction of FFP regulations has significantly decreased the three-year average wage/revenue ratios of football clubs.

By decreasing the total wage bill, while having minimal effects on the revenues of football clubs, the wage/revenue ratios should decrease accordingly. Once these three hypotheses have been answered, a more in-depth approach can be taken. According to Szymanski's (2012) research on the solvability of football clubs, three regressions were found to be explanative of solvability. These regressions include lagged variables for the wage/revenue ratio in order to account for the effect of consistent financial distress on the balance sheet. The regressions imply a relationship between the increase in the wage/revenue ratio and a deterioration of balance sheet items (Szymanski, 2012). With the introduction of FFP however, these relationships should be weakened because of the decrease in total wage bills for football clubs and the decrease in the use of debt to finance football activities, such as the wages of players. Because of these two intended effects of FFP, a weakening in the regressions is predicted after the introduction of FFP. This can be stated as follows:

Hypothesis 2a: The introduction of FFP decreases the lagged effect of the wage/revenue ratio on the Total Liabilities/ Total Assets ratio.

Hypothesis 2b: The introduction of FFP decreases the lagged effect of the wage/revenue ratio on the Net Debt/ Revenue ratio.

Hypothesis 2c: The introduction of FFP decreases the lagged effect of the wage/revenue ratio on the Revenue/ Total Liabilities ratio.

According to the comparison of Peeters and Szymanski (2012) the downward pressures on player wages, as a consequence of vertical restraints, can be seen as similar to that of salary caps in Northern American sports leagues. Certainly, the financial

repercussions of decreased total wage bills seems similar (Staudohar, 1998). This is why a third set of hypotheses can be formulated, pertaining to the effect of a salary cap instead of FFP regulations. A salary cap is predicted to lead to a decrease in total wages.

Hypothesis 3a: The introduction of a salary cap would have significantly decreased the three-year average total wage bill of football clubs.

As follows, this is predicted to also have an effect on profitability. Because a salary cap does not affect revenue negatively, while decreasing expenses, profitability is predicted to increase.

Hypothesis 3b: The introduction of a salary cap would have significantly increased the three-year average profitability of football clubs.

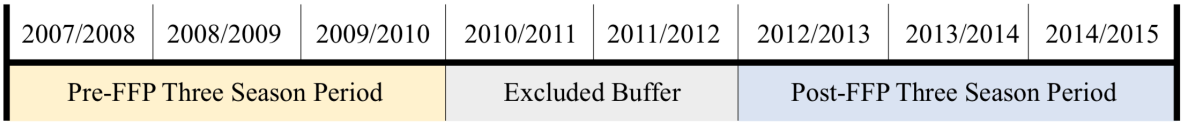
With the above two predictions in mind, this paper further predicts the wage/revenue ratio to decrease, as the total wages stay pinned or shift slowly while revenues are left unaffected.

Hypothesis 3c: The introduction of a salary cap would have significantly decreased the three-year average wage/revenue ratios of football clubs.

3. Data

For the testing of hypotheses, two datasets were created; one pertaining to the analysis of the FFP regulations and another for the analysis of a salary cap. Both datasets were constructed from the same original values. However, the second dataset used for a hypothetical salary cap has been modified accordingly.

In testing the effects of FFP on football clubs, a reliable and robust time window was required. This is why a period of eight football seasons was chosen, spanning from the 2007/2008 English Premier League season to the 2014/2015 Premier League season. This was done in order to allow for the effects of FFP, introduced in 2011, to fully incorporate itself in the result. For this purpose, three years seasons before 2010/2011 and three seasons after 2011/2012 were taken. This also decreased the possibility of including skewed data, due to the possible leakage of the FFP release date in the 2010/2011 season. This eventually lets us run test reliably in two three-year periods, the exact number of seasons included in UEFA's review period of FFP guidelines. A three year period, with another year as buffer, should be enough for a club to re-align itself according to licensing requirements.



Each football club in the sample published their annual report at the end of the football season, usually in May of every year. Here there is a distinction in reporting date, being either the 31st of May or the 30th of June. Both these dates allow for an entire English Premier League season to be included in the annual report. This means that there is no bias influencing the relationship between league position on the final matchday and subsequent revenues generated. Financial reports thus cover the most recently ended

season. As an example, the annual report of Chelsea Football Club Limited for the year 2008 will cover the 2007/2008 season.

The choice for the English Premier League (EPL) was made due to the large availability of data. Clubs in the highest division of English football are required to publish annual reports with the Companies House, the United Kingdom's register of companies. All football clubs in the EPL operate as Limited Liability Companies (LLC), with all assets of the club being assigned to the registered firm. The U.K. Companies House website (Companies House Register, 2019) has an easily searchable register, that then lists all annual publishings per company. Such completeness in data is rarely found in other football leagues throughout Europe. These annual reports are furthermore also audited by registered accountancy and consultancy companies, reinforcing the reliability of the collected data. Sourcing financial data from the annual reports of football clubs proved simple and straight-forward due to the standardization of annual report format.

Once the EPL was chosen, it was important to only include football clubs with a viable chance of obtaining European football, thus requiring a UEFA club license. For this reason, football clubs that had relegated and not participated in the EPL, between the 2007/2008 and 2014/2015 seasons, were excluded as data sources. This narrowed the selection down to only nine constant Premier League contestants; Arsenal, Aston Villa, Chelsea, Everton, Liverpool, Manchester City, Manchester United, Sunderland and Tottenham Hotspur. Because of their uninterrupted presence at the highest level in the English football pyramid, their chances of finishing in the top five standings was deemed highest over the period observed.

All financial information was provided and sourced in Great British Pounds (£) and in thousandths ('000). The variables that were directly provided by the clubs include *Total Revenue, Net Income, Fixed Assets, Current Assets, Short-Term Debt, Long-Term Debt* and *Total Wages*. With this data, all other required variables, such as ratios and totals, were calculated. The following main variables were then also included in the analysis: *an FFP dummy, Total Wage/Revenue Ratio for the years 2008, 2009, 2010, 2012, 2013*

and 2014, Total Liabilities/Total Assets Ratio for the years 2011 and 2015, Net Debt/Revenue Ratio for 2011 and 2015 and Revenue/Total Liabilities Ratio for 2011 and 2015 (see Table 1 of Appendix B). The second part of the dataset was also collected by the same means and from the same source. However, this partition was a modified replica of the first, with the data for *Net Income, Current Assets* and *Total Wages* being modified to test the third hypothesis (see Table 2 of Appendix B).

The salary cap chosen was done based on the model employed by the North-American Football League, which can be found in Article 12 of the NFL Collective Bargaining Agreement (NFL, 2011). Here it is stated that the league chooses the salary cap as a percentage of total league revenues, with percentages hovering around 47 to 50 percent. When looking at the average Total Wage/Revenue ratio for the collected data, a strict salary cap of 50% could be derived.

Year	Average Total Wage/Revenue Ratio	Percentage
2008	.4901287	49.0%
2009	.5391637	53.9%
2010	.5700572	57.0%
2013	.5841963	58.4%
2014	.4867995	48.7%
2015	.5217889	52.2%

By modifying the Total Wages of football clubs for the years 2013 to 2015, a mean comparison to years 2008 to 2010 can be performed. This modification consisted of only changing the Total Wage value to the wage cap in the case that the latter was crossed. After, the Net Income and Current Assets would be increased by the amount saved in Total Wages, thus saving the club funds and changing profitability. In total, only four clubs required a modification in variables in all three years, with Tottenham Hotspurs, Everton, Aston Villa and Sunderland being the exceptions.

Club Name	Increase in Net income 2013	Increase in Net income 2014	Increase in Net income 2015
Manchester United	46088	39852	33166
Manchester City	121767	72189	59585
Chelsea	56871	48532	68292
Arsenal	49904	36090	56634
Tottenham	0	0	0
Liverpool	33158	20350	36521
Everton	0	0	0
Aston Villa	0	0	0
Sunderland	0	0	0

The data collected also has some limitations, most important of which being its size. When looking at the entire dataset, a total of 54 observations can be included in the test relating to hypothesis 1. This in itself is a rather small sample compared to the historic annual results in English and European football, but even more so when requiring continuity of football clubs throughout eight seasons. The situation gets worse when continuing to the data used for the regressions generated to answer hypotheses 2abc, as these include just nine observations per three year period, per regression.

4. Methodology

Once all the data had been collected, a series of statistical tests were executed. These were required in order to accept or reject the hypotheses. For all these tests, a significance level of 5% was used.

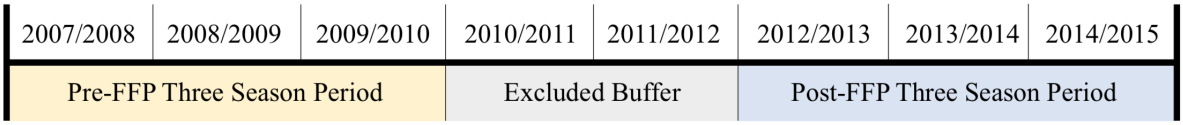
One of the focal points of this thesis, is the effect of FFP regulations on the financials of football clubs. This was test using the first and second hypotheses, of which the former should give a macro-level insight and the latter an insight to effects on solvability. The first three (sub)hypotheses goes as follows:

Hypothesis 1a: The introduction of FFP regulations has significantly decreased the three-year average total wage bill of football clubs.

Hypothesis 1b: The introduction of FFP regulations has significantly increased the three-year average profitability of football clubs.

Hypothesis 1c: The introduction of FFP regulations has significantly decreased the three-year average wage/revenue ratios of football clubs.

All three cases involve the comparison of mean values for three separate variables. These variables are Total Wages, Net Income and Total Wages/Revenue. All three have been chosen on the basis of the aspired goals stated in UEFA's FFP licensing documentation. In order to test a significant shift in the means of these variables, a three-year period prior to and after the introduction of FFP, was chosen. The first period ranges from the 2007/2008 season (2008 financial reporting year) till the 2009/2010 season (2010 financial reporting year) and is denoted by the dummy variable *postFFP = 0.* The second period used in this comparison in that between the 2012/2013 and 2014/2015 season (2013 and 2015 financial reporting year, respectively) and is denoted by the dummy variable *postFFP = 1*.



Once these two periods were established in the dataset, the *wage_rev_ratio* variable was created in order to test hypothesis 1c (see Output 1 of Appendix C). Next, the variances of both data pools (differentiated by the postFFP variable) were compared using an F-test for variances in order to determine whether a(n) (un)pooled variances T-test was to be used. After the poolability of variances had been established, the accompanying T-test of difference in means were executed for each of the three variables (see Outputs 2 through 7 of Appendix C).

The second part of FFP-related tests was that concerning the effect of UEFA's regulations on the solvability of clubs. The following hypotheses were set up:

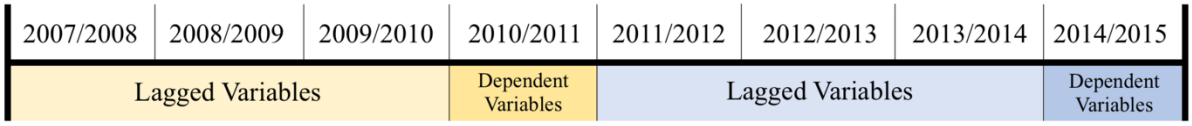
Hypothesis 2a: The introduction of FFP decreases the lagged effect of the wage/revenue ratio on the Total Liabilities/ Total Assets ratio.

Hypothesis 2b: The introduction of FFP decreases the lagged effect of the wage/revenue ratio on the Net Debt/ Revenue ratio.

Hypothesis 2c: The introduction of FFP decreases the lagged effect of the wage/revenue ratio on the Revenue/ Total Liabilities ratio.

These can be tested by using Szymanski's (2012) regressions for measuring the solvability of football clubs. These were applied to a dataset consisting of all years from the 2007/2008 season till the 2014/2015 season. The lagged variables of Total Wages/Revenue ratios were however, excluded from the buffer zone. Thereby, the three-year period was enacted similar to the observation periods used by UEFA. For the regressions, the dependent variables were from the financial reporting years

2011 and 2015 with the lagged variables being sourced from the three years prior, respectively.



The regressions used are as follows:

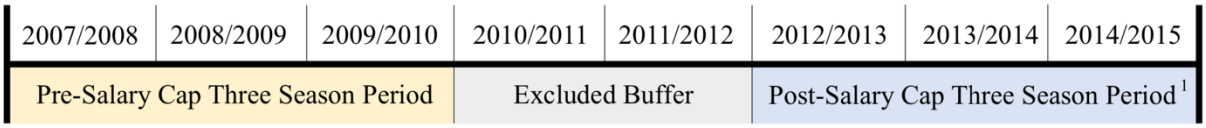
$$R1: \text{Total liabilities/ total assets}_t = \alpha_t + \beta_1 * \text{Wage/revenue}_{t-1} + \beta_2 * \text{Wage/revenue}_{t-2} + \beta_3 * \text{Wage/revenue}_{t-3} + \varepsilon_t$$

$$R2: \text{Net Debt/ revenue}_t = \alpha_t + \beta_1 * \text{Wage/revenue}_{t-1} + \beta_2 * \text{Wage/revenue}_{t-2} + \beta_3 * \text{Wage/revenue}_{t-3} + \varepsilon_t$$

$$R3: \text{Revenue/ total liabilities}_t = \alpha_t + \beta_1 * \text{Wage/revenue}_{t-1} + \beta_2 * \text{Wage/revenue}_{t-2} + \beta_3 * \text{Wage/revenue}_{t-3} + \varepsilon_t$$

All three were run twice in order to obtain results from both periods (see Outputs 8 through 13 of Appendix C). This then allows for a comparison in the regressors between periods, which will show whether the Total Wages/Revenue ratio became worse at explaining the change in all three balance sheet ratios.

Lastly, for the testing of the third hypothesis, the same method was used as in testing hypothesis 1. However, now the database was modified in order to reflect a salary cap implementation in the second period.



1: Includes modified data in accordance with salary cap (see Data section)

The two periods were now distinguished by a dummy variable representing the period before and after the introduction of a hypothetical salary cap (postCap = 0, postCap = 1). Once again, the poolability of variances for the data in both periods was tested with the use of an F-test for variances. The appropriate T-tests of differences in means was then executed (see Outputs 14 through 19 of Appendix C).

5. Results

This section will show whether the hypotheses introduced earlier can be rejected or not, on the basis of statistical test executed in STATA. All three hypotheses were tested using the 95% significance level.

5.1 Hypotheses 1abc

The first hypothesis focused on the FFP aspect of this research paper, namely the effect of FFP on the financial statements of football clubs. More specifically, the focus was on the financial viability of football clubs. This was then tested using the following three sub-hypotheses:

Hypothesis 1a: The introduction of FFP regulations has significantly decreased the three-year average total wage bill of football clubs.

Hypothesis 1b: The introduction of FFP regulations has significantly increased the three-year average profitability of football clubs.

Hypothesis 1c: The introduction of FFP regulations has significantly decreased the three-year average wage/revenue ratios of football clubs.

In order to test each hypothesis, a T-test for difference in means was chosen. This would allow not only the possibility of a significant change to be noticed, but also its direction. Before the statistical test was executed the poolability of all three variables tested, this decided whether equal or unequal variances were to be used in comparing means (see Outputs 2 through 4 of Appendix C). As stated earlier, a dummy variable was used to differentiate between the pre- and post-FFP observations.

Variable	Pre-FFP Mean	Post-FFP Mean	Change	P-Value
Total Wages	71356	108286	36929	0.0035**
Net Income	-6814	-6500	314	0.4891
Total Wages/Revenue	.5331165	.5309283	-.0021883	0.4831

Hypothesis 1a requires a significant decrease in the mean value of Total Wages after the introduction of FFP compared to before. The three-year average total wage for the selected football clubs before the introduction of FFP was found to be £71,356,000, with the post-FFP average being £108,286,000. This increase of £36,929,000 was found to be statistically significant at the 95% level, with a p-value of 0.0035. **Therefore, there is enough evidence to reject hypothesis 1a.** When looking at the Net Income averages for both observation pools, an increase of only £314,000 is found. This moves the average profitability only slightly as losses decrease from -£6,814,000 to -£6,500,000. However, the p-value for this change is 0.4891 and this means that the increase in Net Income is not significant at the 95% level. The total wages/revenue ratio sees a decrease in three-year average values of -0.002, yet once again the p-value of 0.4831 deems this change insignificant at the 95% level. **There is enough evidence to reject both hypotheses 1b and 1c.** As a result, the changes in Net Income and Total Wages/Revenue were in the predicted direction but with a lack in significance, while Total Wages had a significant change in the direction opposite of that predicted.

5.2 Hypotheses 2abc

The second set of hypotheses also focused on the effects of FFP regulations on the financial viability of football clubs. However, now a set of regressions was used to test the changes in solvability and financial health. The following three sub-hypotheses were formed to test this:

Hypothesis 2a: The introduction of FFP decreases the lagged effect of the wage/revenue ratio on the Total Liabilities/ Total Assets ratio.

Hypothesis 2b: The introduction of FFP decreases the lagged effect of the wage/revenue ratio on the Net Debt/ Revenue ratio.

Hypothesis 2c: The introduction of FFP decreases the lagged effect of the wage/revenue ratio on the Revenue/ Total Liabilities ratio.

These three hypotheses were then tested using the regressions found in Szymanski's (2012) previous work on the solvability of football clubs. The regressions were run on two samples of panel data, containing financial values of football clubs from before and after the introduction of FFP regulations. All regressions were run twice, for the pre- and post-FFP samples, with the dependent variable in 2011 and 2015 respectively (see Outputs 8 through 13 of Appendix C).

YEAR	DEPENDENT VAR.	WAGE/REVENUE T-1	WAGE/REVENUE T-2	WAGE/REVENUE T-3	R^2
2011	Total Liabilities/ Total Assets	-3.691862 (0.688)	4.625547 (0.698)	-.4826653 (0.926)	0.0449
2015	Total Liabilities/ Total Assets	4.003636 (0.493)	-6.669766 (0.468)	1.322493 (0.843)	0.3214
2011	Net Debt/Revenue	2.106471 (0.887)	6.017965 (0.756)	-4.745489 (0.582)	0.4588
2015	Net Debt/Revenue	13.13424 (0.167)	-12.23407 (0.381)	1.378851 (0.890)	0.3469
2011	Revenue/Total Liabilities	-.2551582 (0.954)	-.8122701 (0.888)	.6672303 (0.794)	0.1314
2015	Revenue/Total Liabilities	-6.799534 (0.092)*	5.040434 (0.371)	1.444265 (0.721)	0.5504

When looking at the results of the first regression a noticeable increase is observed in the R^2 values of the regressions in 2011 and 2015. Next, the coefficients of the lagged variables for the Wage/Revenue ratio do not all change in the same direction, with two of them increasing and one for T-2 decreasing. This pattern is not only seen for the

Total Liabilities/ Total Assets dependent variable but also that of the Net Debt/Revenue ratio regression. However, these coefficients are all deemed insignificant at the 95% level, with p-values of 0.468 and higher for both pre- and post-FFP. **Therefore, there is enough evidence to reject hypothesis 2a.** The second regression displays the same pattern in change of coefficients, with the year T-2 (financial years 2009 and 2013 for Pre- and Post-FFP respectively) Wage/Revenue coefficient decreasing from sample to sample. Yet again, a decrease in R^2 is observed, although this provides little evidence of a significant change in explainability. All the coefficients for the lagged variables are once again deemed insignificant at the 95% level, with p-values at 0.167 or higher for both pre- and post-FFP regressions. **Therefore, there is enough evidence to reject hypothesis 2b.** Lastly, the third regression shows an increase in the coefficients of the T-2 and T-3 lagged variables. This would mean that the Wage/Revenue ratios from 2013 and 2012 would have had less of an effect on the Revenue/Total Liabilities ratio of 2015, compared to the Wage/Revenue ratios of 2009 and 2008. However, the coefficient of the T-1 Wage/Revenue ratio only decreases further. The R^2 value here increases in the post-FFP regression compared to the pre-FFP one. Furthermore, all coefficients are deemed insignificant at the 95% level with p-values of 0.092 or higher. **Therefore, there is enough evidence to reject hypothesis 2c.**

5.3 Hypotheses 3abc

The second part of the analysis was focused on the supposed effect of a salary cap on the financial viability of football clubs. The same methodology as for hypotheses 1abc was applied in order to test the effect of a salary cap. This resulted in the following hypotheses being formed:

Hypothesis 3a: The introduction of a salary cap would have significantly decreased the three-year average total wage bill of football clubs.

Hypothesis 3b: The introduction of a salary cap would have significantly increased the three-year average profitability of football clubs.

Hypothesis 3c: The introduction of a salary cap would have significantly decreased the three-year average wage/revenue ratios of football clubs.

Once again, a T-test for the differences in means was chosen. This time the two different observation samples were denoted by the post-Cap dummy variable, with the second sample group data being modified to fit the salary cap rule. As shown previously, only five clubs from the sample total of nine were affected by the hypothetical cap in wages (see Table 4 in Appendix B). Before the execution of a T-test, an appropriate test for poolability was conducted (see Outputs 14 through 16 of Appendix C).

Variable	Pre-Cap Mean	Post-Cap Mean	Change	P-Value
Total Wages	71356	79432	8076	0.2021
Net Income	-6814	22352	29165	0.0093**
Total Wages/Revenue	.5331165	.4215043	-.1116122	0.0147**

When looking at the change in three-year mean total wages, an increase of £8,076,000 can be observed. While this increase in total wages is smaller compared to the increase of £36,929,000 found in the results of testing hypothesis 1a, it still runs against the prediction of hypothesis 3a. Furthermore, the increase in means is insignificant at the 95% level, with a p-value of 0.2021. **Therefore, there is enough evidence to reject hypothesis 3a.** T-test results become more interesting when looking at the next two hypotheses. For the Net Income, an increase of £29,165,000 can be observed, bringing the average three-year profitability of football clubs up from a loss of -£6,814,000 to a profit of £22,352,000. This runs in line with the predicted change of hypothesis 3b. The change in means also is considered statistically significant at the 95% confidence level, with a p-value of 0.0093. **Therefore, there is not enough evidence to reject hypothesis 3b.** The three-year average Total Wages/Revenue is shown to decrease as a result of the introduction of a salary cap. This decrease of 0.002 is also considered significant at the 95% confidence interval, with a p-value of 0.0147. This also runs in accordance with the prediction of hypothesis 3c. **Therefore, there is not enough evidence to reject hypothesis 3c.** Below is an overview of the findings concerning the hypotheses.

Hypothesis 1a	*Rejected*
Hypothesis 1b	*Rejected on insignificance*
Hypothesis 1c	*Rejected on insignificance*
Hypothesis 2a	*Rejected*
Hypothesis 2b	*Rejected*
Hypothesis 2c	*Rejected*
Hypothesis 3a	*Rejected on insignificance*
Hypothesis 3b	*Not Rejected*
Hypothesis 3c	*Not Rejected*

6. Conclusion

6.1 Main Findings

This paper was aimed at observing the effects of FFP on the financial viability of football clubs. UEFA's regulations were created with the aim of decreasing the reckless spending of clubs on player wages and transfer fees. A second aim of FFP was to increase the servicing of existing clubs' debt and decrease the total liabilities of football clubs. It was reasoned that clubs would require less leveraged financing as a result of a decrease in wage expenses. Instead, football clubs were supposed to restrict their expenses to only their revenues. With this reasoning in mind, this paper also conducted research into whether the introduction of a salary cap would have a more desired effect. The following research question was formed:

What has the effect of FFP been on the financial viability of football clubs, and would a hard salary cap be more effective at increasing financial viability?

The three hypotheses were formulated in order to answer both parts of the research question. The first sub-hypotheses were all shown to be rejected, either on the basis of a significant change in the opposite direction or an insignificance in predicted changes. The hypotheses were created to analyze the changes in average total wage bill, club profitability and eventually the wage/revenue ratio. All three variables are related to one another, the decrease of average total wages, given that the revenues remain unaffected, will have a decreasing effect on the wage/revenue ratio. It can be concluded that due to the lack of significance in the findings, there has been no predicted decrease in total wages, increase in profitability and decrease in the wage/revenue ratio. This lack of evidence continues with the second set of sub-hypotheses, where the lack of significance in regression coefficients before and after FFP causes all three sub-hypotheses to be rejected. The three hypotheses each have a separate regression, based off of Szymanski's (2012) research, that analyze the effects of the wage/revenue ratio on solvability indicators on a club's balance sheet. While there are some notable

changes in the explainability of regressors, these movements are not statistically significant at the 95% level and cannot be attributed to FFP regulation. Therefore, this paper cannot conclude that the FFP measures have deleveraged football clubs' financing. The second part of the research focuses on the alternative of a salary cap, with the last set of hypotheses analyzing the potential effect of a wage cap on football clubs. These results are more conclusive, and the statistical tests only find grounds to reject one of the sub-hypotheses, with the other two being statistically significant and their predictions in line with the findings. It can thus be concluded that a potential salary cap implementation, at a level of 50% of average league revenue, would significantly increase average profitability and decrease the wage/revenue ratio.

6.2 Research Implication

The research conducted fails to create a clear conclusion on the effectivity of FFP on the viability of football clubs. Results from the statistical tests are inconclusive concerning the expected effects of FFP regulation. While there appear to be changes in line with their predicted direction, they fail to meet a required significance and thus cannot be used in explaining the research question. There are changes in all three key variables and regressions, but these are not significant enough to be attributed to the introduction of FFP rules.

However, when looking at the effects of a potential salary cap, there appears to be a clear relationship between the introduction of a maximum relative wage and the profitability of football clubs. Not only are clubs left with a larger net income, the total wage/revenue ratio, a historically accurate indicator of insolvency, appears to also decrease significantly. While this does paint a favorable picture of the salary cap regulations seen in North-American sports, it does not encompass all of its effects. In the context of European football there is also the consideration of leagues other than the Premier League who would, in this scenario, not have the same wage limitations. The free movement of labor between football leagues would decrease the effectiveness of a salary cap localized to only the English football pyramid. A salary cap on only the

football league of a single country would not be enough to drive down average player salaries and increase club profitability while not affecting sporting quality. Furthermore, the introduction of a salary cap would be executed gradually, with target salary values announced at least five Premier League seasons in advance, allowing clubs enough time to adjust their wage bills. Over this duration, football clubs would lose much needed talent due to the inability to match foreign wage offers. The supply of foreign talent would decrease, as would the motivation for homegrown players to stay in the Premier League for long.

This research is intended to be an extension of the already existing evaluation of FFP regulations, while at the same time offering a possible alternative. The research conducted is by no means fully conclusive and encourages further modifications in methodology and data collection. The implications for football's governing bodies would be to take a potential salary cap into consideration, while also reviewing the existing policy of FFP restrictions and their apparent ineffectiveness. A salary cap could potentially have the desired secondary effects of FFP, namely the decrease of reliability on debt financing of football clubs. While FFP does this indirectly via the restriction of salary expenses, a wage cap would have a more direct effect. UEFA should reconsider the strict requirements of limiting wage expenses to only footballing revenue, a policy that only favors pre-established footballing giants with exposure to many markets. Instead, a salary cap should be seen as a policy for 'leveling the playing field' in football finance, a part of the beautiful game that becomes more and more exposed to inflationary salaries and transfer sums.

6.3 Limitations and Further Research

As was previously mentioned in the earlier data section of this paper, the small sample size proved to be a problem in obtaining significant results. While all data was found for the required football clubs, this complete dataset only included nine football clubs over a time period of eight football seasons. This limitation was mainly imposed by the requirement of all participating football clubs to have complete financial data and

consistently perform at the highest level of English football. Furthermore, while a three-year period was used for the evaluation of the effects of FFP, a time period further in the future could be used to account for the release of clearer signals by UEFA. This paper uses the start of official FFP compliance evaluation by UEFA as the starting point of the post-FFP period. Future research could start their post-FFP evaluation period after the enforcement of punishments as a result of FFP abuses. This would have the clubs in contention for a European license follow the FFP rules more strictly, with potential punishments acting as clear signals from UEFA.

Having a larger dataset should be combined with the inclusion of more regression variables in future research, this could help account for omitted variable bias. However, the limitation in regressing the financial data of football clubs is that multicollinearity poses a real threat to the significance of results. Instead, variables related to sporting performance should be included to account for changes in financial position as a result of on-field results. The outcome of football matches, promotion and relegation, and the amount of goals scored for and against should all be included to help explain the increase in liabilities of a football club. After all, negative on-pitch performances could very well be tied to a decrease of footballing revenue, leading to a decrease in the wage/revenue ratio and a requirement for debt financing. Variables such as match-day attendances, merchandise sales and online exposure could also be factors that influence the revenue regenerated by football clubs. These should all be included in order to form a more accurate picture of the changes of balance-sheet items. Furthermore, a revision in the methodology for establishing the solvability and financial health of football clubs could result in more appropriate measure of financial viability. While this paper used variables such as total liabilities/total assets, net debt/revenue and revenue/total liabilities as dependent factors, other balance sheet items could prove to be more insightful. The issue of course is that solvability can only be measure indirectly through various indicators of leverage and ability to service debts.

The analysis of hypotheses 1abc and 3abc was done with the assumption that a decrease in total wage bill would only have a direct effect on the profit and loss

statement, with a potential secondary effect on balance sheet items such as liabilities. This included the assumption that football club revenue would be left unaffected as a result of decreases in wages, either due to the indirect effects of FFP or direct restrictions imposed under a salary cap. However, revenues are very much tied to commercial branding and on pitch performance, both of which rely on the acquisition of high-caliber football players. In order for a club to perform at the highest level of English football, ensuring its viability in UEFA's competition and following its telos of acquiring silverware, it must invest heavily in its footballing staff. Footballing revenue is tied to sporting success, and on-pitch wins result in larger match-day attendances, higher merchandise sales and more broadcasting revenue. All of this requires talented football players to attract cash flows, something that is not possible in case the club cannot match the demands of high salaries. A decrease in wages, as a result of FFP regulations, will have a minimal effect on revenue due to the continental nature of the policy. However, a salary cap limited only to the English Premier League would very much drive down revenues as an exodus op footballing talent would ensue, decreasing the competitiveness and marketability of English football. This effect on revenues was not taken into account in the research and is a clear limitation.

Further research should focus on finding more appropriate measures of solvability, including previously omitted variables in the regression for solvability and adjusting the analysis for changes in the footballing revenues of football clubs. The regression of variables in order to find effects on solvability should always include lagged variables, seeing as solvability could be the consequence of an uninterrupted series of negative years. Furthermore, the effect of salary-restricting policies of revenues would be difficult to measure and could best done in terms of changes in revenues as a result of increases or decreases in existing salary caps. Of course, then the challenge would be one of external applicability of results, from a closed-league North-American system with a salary cap, to the Premier League that has a different sensitivity to salary changes.

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Appendix A: Figures

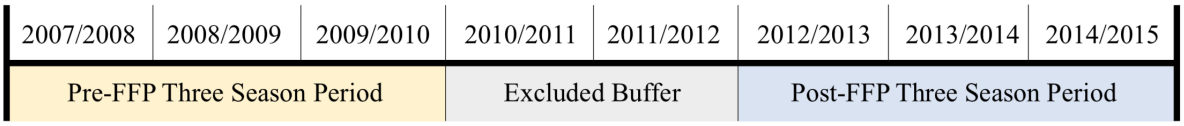


Figure 1: Overview of data collected per season and period

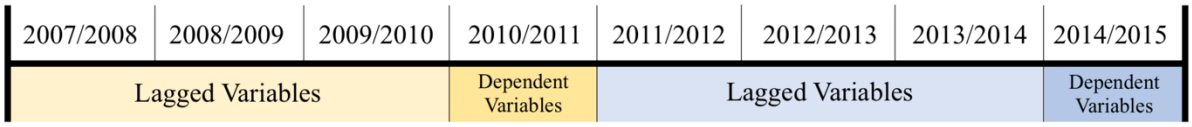
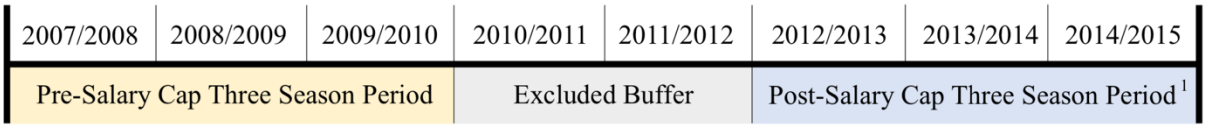


Figure 2: Overview of data collected per season and period (H2)



1: Includes modified data in accordance with salary cap (see Data section)

Figure 3: Overview of data collected per season and period (H3)

Appendix B: Tables

Variable Name	Label	Description	N	Mean	Std. Dev.	Min.	Max.
year	Year	Financial reporting year	54	2,012	2.655	2,008	2,015
revenue	Revenue	Yearly revenue	54	165,478	80,718	63,477	351,766
netIncome	Net Income	Yearly Club Profit/Loss	54	-6,657	41,440	-117,793	92,320
fixedAssets	Fixed Assets	Club's fixed assets	54	176,795	140,795	9,980	600,853
currentAssets	Current Assets	Club's cash and cash equivalents (liquid)	54	98,804	121,783	818	539,435
stDebt	Short-Term Debt	Amount due to creditors within one year	54	148,127	106,009	46,605	561,541
ltDebt	Long-Term Debt	Amount due to creditors after more than one year	54	122,062	205,039	0	821,622
totalWages	Total Wages	Total club wage bill	54	89,821	51,082	8,970	204,701
postFFP	Post FFP	Dummy variable, 0 = pre-FFP year, 1 = post-FFP year	54	0.500	0.505	0	1
wage_rev_ratio	Wage/Revenue Ratio	Wage/revenue ratio for all years	54	0.532	0.187	0.0850	0.946
wage_rev_ratio_2010	Wage/Revenue Ratio 2010	Wage/revenue ratio for 2010	9	0.570	0.233	0.111	0.946
wage_rev_ratio_2009	Wage/Revenue Ratio 2009	Wage/revenue ratio for 2009	9	0.539	0.213	0.107	0.847
wage_rev_ratio_2008	Wage/Revenue Ratio 2008	Wage/revenue ratio for 2008	9	0.490	0.164	0.128	0.758
wage_rev_ratio_2014	Wage/Revenue Ratio 2014	Wage/revenue ratio for 2014	9	0.487	0.159	0.0850	0.641
wage_rev_ratio_2013	Wage/Revenue Ratio 2013	Wage/revenue ratio for 2013	9	0.584	0.186	0.111	0.755
wage_rev_ratio_2012	Wage/Revenue Ratio 2012	Wage/revenue ratio for 2012	9	0.577	0.193	0.110	0.771
tliab_tass_ratio_2011	Wage/Revenue Ratio 2011	Wage/revenue ratio for 2011	9	1.381	0.787	0.538	2.814

tLiab_tAss_ratio_2015	Total Liabilities/ Total Assets	Total liabilities/total assets ratio for 2015	9	1.164	0.799	0.198	2.515
netdebt_2011	Net Debt 2011	Total debt less current assets for 2011	9	231,238	309,335	-92,924	778,123
netdebt_rev_ratio_2011	Net Debt/Revenue 2011	Net debt/revenue ratio for 2011	9	1.513	1.703	-0.471	4.866
netdebt_2015	Net Debt 2015	Total debt less current assets for 2015	9	178,994	326,013	-164,396	944,646
netDebt_rev_ratio_2015	Net Debt/Revenue 2015	Net debt/revenue ratio for 2015	9	0.978	1.221	-0.490	3.338
rev_tliab_ratio_2011	Revenue/Total Liabilities 2011	Revenue/total liabilities ratio for 2011	9	0.702	0.404	0.181	1.526
rev_tliab_ratio_2015	Revenue/Total Liabilities 2015	Revenue/total liabilities ratio for 2015	9	0.933	0.592	0.298	2.029

Table 1: Descriptive statistics of variables used for first two hypotheses

*(all monetary values reported in **£ '000**)*

Variable Name	Label	Description	N	Mean	Std. Dev.	Min	Max
year	Year	Financial reporting year	54	2,012	2.655	2,008	2,015
revenue	Revenue	Yearly revenue	54	165,478	80,718	63,477	351,766
netIncome	Net Income	Yearly Club Profit/Loss	54	7,769	46,135	-117,793	109,515
fAssets	Fixed Assets	Club's Fixed Assets	54	176,795	140,795	9,980	600,853
cAssets	Current Assets	Club's cash and cash equivalents (liquid)	54	113,230	135,922	818	596,096
stDebt	Short-Term Debt	Amount due to creditors within one year	54	148,127	106,009	46,605	561,541
ltDebt	Long-Term Debt	Amount due to creditors after more than one year	54	122,062	205,039	0	821,622

totalWages	Total Wages	Total club wage bill	54	75,394	35,180	8,970	144,007
wage_rev_ratio	Wage/Revenue Ratio	Wage/revenue ratio for all years	54	0.477	0.190	0.0850	0.946
postCap	Post Cap	Dummy variable, 0 = pre-Salary Cap year, 1 = post-Salary Cap year	54	0.500	0.505	0	1

Table 2: Descriptive statistics of variables used for third hypothesis

*(all monetary values reported in **£ '000)***

Year	Average Total Wage/Revenue Ratio	Percentage
2008	.4901287	49.0%
2009	.5391637	53.9%
2010	.5700572	57.0%
2013	.5841963	58.4%
2014	.4867995	48.7%
2015	.5217889	52.2%

Table 3: Average Total Wage/Revenue Ratio per Year

Club Name	Increase in Net income 2013	Increase in Net income 2014	Increase in Net income 2015
Manchester United	46088	39852	33166
Manchester City	121767	72189	59585
Chelsea	56871	48532	68292
Arsenal	49904	36090	56634
Tottenham	0	0	0
Liverpool	33158	20350	36521
Everton	0	0	0
Aston Villa	0	0	0
Sunderland	0	0	0

*Table 4: Total Wage Changes due to Salary Cap introduction (in **£ '000**)*

Variable	Pre-FFP Mean	Post-FFP Mean	Change	P-Value
Total Wages	71356	108286	36929	0.0035**
Net Income	-6814	-6500	314	0.4891
Total Wages/Revenue	.5331165	.5309283	-.0021883	0.4831

*Table 5: Hypothesis 1 results (**: significant at the 5% level)*

*(all monetary values reported in **£ '000**)*

Variable	Pre-Cap Mean	Post-Cap Mean	Change	P-Value
Total Wages	71356	79432	8076	0.2021
Net Income	-6814	22352	29165	0.0093**
Total Wages/Revenue	.5331165	.4215043	-.1116122	0.0147**

*Table 6: Hypothesis 3 results (**: significant at the 5% level)*

*(all monetary values reported in **£ '000)***

YEAR	DEPENDENT VAR.	WAGE/REVENUE T-1	WAGE/REVENUE T-2	WAGE/REVENUE T-3	R^2
2011	Total Liabilities/ Total Assets	-3.691862 (0.688)	4.625547 (0.698)	-.4826653 (0.926)	0.0449
2015	Total Liabilities/ Total Assets	4.003636 (0.493)	-6.669766 (0.468)	1.322493 (0.843)	0.3214
2011	Net Debt/Revenue	2.106471 (0.887)	6.017965 (0.756)	-4.745489 (0.582)	0.4588
2015	Net Debt/Revenue	13.13424 (0.167)	-12.23407 (0.381)	1.378851 (0.890)	0.3469
2011	Revenue/Total Liabilities	-.2551582 (0.954)	-.8122701 (0.888)	.6672303 (0.794)	0.1314
2015	Revenue/Total Liabilities	-6.799534 (0.092)*	5.040434 (0.371)	1.444265 (0.721)	0.5504

*Table 7: Hypothesis 2 results (**: significant at the 5% level *: significant at the 10% level)*

Appendix C: Statistical Outputs

```
by postFFP, sort : summarize netIncome totalWages wage_rev_ratio

-------------------------------------------------------------------------------
-> postFFP = 0

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
   netIncome |         27   -6813.815    45781.18    -117793      92320
  totalWages |         27    71356.44    38930.09       8970     144007
wage_rev_r~o |         27    .5331165    .2000931   .1065283   .9464934

-------------------------------------------------------------------------------
-> postFFP = 1

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
   netIncome |         27   -6500.259    37477.34     -79368      69666
  totalWages |         27    108285.5    55637.19       9051     204701
wage_rev_r~o |         27    .5309283    .1757539   .0849613   .7791954
```

Output 1: Descriptive Statistics of Pre- and Post-FFP variables

```
sdtest totalWages, by(postFFP)

Variance ratio test
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      27    71356.44    7492.099    38930.09    55956.21    86756.67
       1 |      27    108285.5    10707.38    55637.19    86276.18    130294.9
---------+--------------------------------------------------------------------
combined |      54    89820.98    6951.413    51082.25    75878.21    103763.8
------------------------------------------------------------------------------
    ratio = sd(0) / sd(1)                                         f =   0.4896
Ho: ratio = 1                                 degrees of freedom =   26, 26

    Ha: ratio < 1               Ha: ratio != 1                 Ha: ratio > 1
  Pr(F < f) = 0.0371         2*Pr(F < f) = 0.0743           Pr(F > f) = 0.9629
```

Output 2: Variance Ratio Test (F-Test) for totalWages

```
sdtest netIncome, by(postFFP)

Variance ratio test
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      27   -6813.815    8810.592    45781.18   -24924.25    11296.62
       1 |      27   -6500.259    7212.517    37477.34    -21325.8    8325.282
---------+--------------------------------------------------------------------
combined |      54   -6657.037    5639.207    41439.54   -17967.85     4653.78
------------------------------------------------------------------------------
    ratio = sd(0) / sd(1)                                         f =   1.4922
Ho: ratio = 1                                 degrees of freedom =   26, 26

    Ha: ratio < 1               Ha: ratio != 1                 Ha: ratio > 1
  Pr(F < f) = 0.8431         2*Pr(F > f) = 0.3137           Pr(F > f) = 0.1569
```

Output 3: Variance Ratio Test (F-Test) for netIncome

```
sdtest wage_rev_ratio, by(postFFP)

Variance ratio test
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      27    .5331165    .0385079    .2000931    .4539623    .6122708
       1 |      27    .5309283    .0338239    .1757539    .4614023    .6004542
---------+--------------------------------------------------------------------
combined |      54    .5320224    .0253843    .1865354     .481108    .5829368
------------------------------------------------------------------------------
    ratio = sd(0) / sd(1)                                         f =   1.2961
Ho: ratio = 1                                 degrees of freedom =   26, 26

    Ha: ratio < 1               Ha: ratio != 1                 Ha: ratio > 1
  Pr(F < f) = 0.7435         2*Pr(F > f) = 0.5130           Pr(F > f) = 0.2565
```

Output 4: Variance Ratio Test (F-Test) for wage_rev_ratio

```
ttest totalWages, by(postFFP) unequal

Two-sample t test with unequal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      27    71356.44    7492.099    38930.09    55956.21    86756.67
       1 |      27    108285.5    10707.38    55637.19    86276.18    130294.9
---------+--------------------------------------------------------------------
combined |      54    89820.98    6951.413    51082.25    75878.21    103763.8
---------+--------------------------------------------------------------------
    diff |           -36929.07    13068.27               -63225.95    -10632.2
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -2.8259
Ho: diff = 0                     Satterthwaite's degrees of freedom =  46.5364

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0035         Pr(|T| > |t|) = 0.0069          Pr(T > t) = 0.9965
```

Output 5: H1a (T-test for means of totalWages)

```
ttest netIncome, by(postFFP)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      27   -6813.815    8810.592    45781.18   -24924.25    11296.62
       1 |      27   -6500.259    7212.517    37477.34    -21325.8    8325.282
---------+--------------------------------------------------------------------
combined |      54   -6657.037    5639.207    41439.54   -17967.85     4653.78
---------+--------------------------------------------------------------------
    diff |           -313.5556    11386.26               -23161.76    22534.65
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -0.0275
Ho: diff = 0                                     degrees of freedom =       52

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.4891         Pr(|T| > |t|) = 0.9781          Pr(T > t) = 0.5109
```

Output 6: H1b (T-test for means of netIncome)

```
ttest wage_rev_ratio, by(postFFP)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      27    .5331165    .0385079    .2000931    .4539623    .6122708
       1 |      27    .5309283    .0338239    .1757539    .4614023    .6004542
---------+--------------------------------------------------------------------
combined |      54    .5320224    .0253843    .1865354     .481108    .5829368
---------+--------------------------------------------------------------------
    diff |            .0021883    .0512534               -.1006593    .1050358
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =   0.0427
Ho: diff = 0                                     degrees of freedom =       52

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.5169         Pr(|T| > |t|) = 0.9661          Pr(T > t) = 0.4831
```

Output 7: H1c (T-test for means of wage_rev_ratio)

```
regress tliab_tass_ratio_2011 wage_rev_ratio_2010 wage_rev_ratio_2009 wage_rev_
> ratio_2008

      Source |       SS           df       MS      Number of obs   =         9
-------------+----------------------------------   F(3, 5)         =      0.08
       Model |  .222762597         3  .074254199   Prob > F        =    0.9690
    Residual |  4.73408213         5  .946816427   R-squared       =    0.0449
-------------+----------------------------------   Adj R-squared   =   -0.5281
       Total |  4.95684473         8  .619605591   Root MSE        =    .97304

------------------------------------------------------------------------------
tliab_tas~2011 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------------+--------------------------------------------------------------
wage_rev_~2010 |  -3.691862   8.673272    -0.43   0.688    -25.98722    18.60349
wage_rev_~2009 |   4.625547   11.25141     0.41   0.698    -24.29712    33.54821
wage_rev_~2008 |  -.4826653   4.951944    -0.10   0.926    -13.21204    12.24671
         _cons |   1.227862   1.100071     1.12   0.315     -1.59996    4.055685
------------------------------------------------------------------------------
```

Output 8: Regression 1 Pre-FFP

```
regress netdebt_rev_ratio_2011 wage_rev_ratio_2010 wage_rev_ratio_2009 wage_rev
```

```
> _ratio_2008

      Source |       SS           df       MS      Number of obs   =         9
-------------+----------------------------------   F(3, 5)         =      1.41
       Model |  10.6484267         3  3.54947555   Prob > F        =    0.3423
    Residual |  12.5591479         5  2.51182958   R-squared       =    0.4588
-------------+----------------------------------   Adj R-squared   =    0.1341
       Total |  23.2075745         8  2.90094682   Root MSE        =    1.5849

------------------------------------------------------------------------------
netdebt_r~2011 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------------+--------------------------------------------------------------
wage_rev_~2010 |   2.106471   14.12684     0.15   0.887    -34.20774    38.42068
wage_rev_~2009 |   6.017965   18.32606     0.33   0.756    -41.09066    53.12659
wage_rev_~2008 |  -4.745489   8.065623    -0.59   0.582    -25.47883    15.98785
         _cons |  -.6066287   1.791773    -0.34   0.749    -5.212528     3.99927
------------------------------------------------------------------------------
```

Output 9: Regression 2 Pre-FFP

```
regress rev_tliab_ratio_2011 wage_rev_ratio_2010 wage_rev_ratio_2009 wage_rev_r
> atio_2008

      Source |       SS           df       MS      Number of obs   =         9
-------------+----------------------------------   F(3, 5)         =      0.25
       Model |  .171503926         3  .057167975   Prob > F        =    0.8569
    Residual |  1.13345678         5  .226691356   R-squared       =    0.1314
-------------+----------------------------------   Adj R-squared   =   -0.3897
       Total |  1.30496071         8  .163120088   Root MSE        =    .47612

------------------------------------------------------------------------------
rev_tliab~2011 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------------+--------------------------------------------------------------
wage_rev_~2010 |  -.2551582   4.243924    -0.06   0.954    -11.16451    10.65419
wage_rev_~2009 |  -.8122701   5.505432    -0.15   0.888    -14.96443    13.33989
wage_rev_~2008 |   .6672303   2.423038     0.28   0.794    -5.561388    6.895849
         _cons |   .9579359   .5382764     1.78   0.135    -.4257478    2.341619
------------------------------------------------------------------------------
```

Output 10: Regression 3 Pre-FFP

```
regress tLiab_tAss_ratio_2015 wage_rev_ratio_2014 wage_rev_ratio_2013 wage_rev_
```

```
> ratio_2012

      Source |       SS           df       MS      Number of obs   =         9
-------------+----------------------------------   F(3, 5)         =      0.79
       Model |  1.64172215         3  .547240717   Prob > F        =    0.5496
    Residual |  3.46676985         5   .69335397   R-squared       =    0.3214
-------------+----------------------------------   Adj R-squared   =   -0.0858
       Total |    5.108492         8    .6385615   Root MSE        =    .83268

------------------------------------------------------------------------------
tLiab_tAs~2015 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------------+--------------------------------------------------------------
wage_rev_~2014 |   4.003636   5.421029     0.74   0.493    -9.931562    17.93883
wage_rev_~2013 |  -6.669766   8.501552    -0.78   0.468     -28.5237    15.18417
wage_rev_~2012 |   1.322493   6.334848     0.21   0.843    -14.96175    17.60674
         _cons |   2.348211    .970457     2.42   0.060    -.1464278     4.84285
------------------------------------------------------------------------------
```

Output 11: Regression 1 Post-FFP

```
regress netDebt_rev_ratio_2015 wage_rev_ratio_2014 wage_rev_ratio_2013 wage_rev
> _ratio_2012

      Source |       SS           df       MS      Number of obs   =         9
-------------+----------------------------------   F(3, 5)         =      0.89
       Model |  4.14004906         3  1.38001635   Prob > F        =    0.5088
    Residual |  7.79435824         5  1.55887165   R-squared       =    0.3469
-------------+----------------------------------   Adj R-squared   =   -0.0450
       Total |  11.9344073         8  1.49180091   Root MSE        =    1.2485

------------------------------------------------------------------------------
netDebt_r~2015 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------------+--------------------------------------------------------------
wage_rev_~2014 |   13.13424   8.128481     1.62   0.167    -7.760684    34.02917
wage_rev_~2013 |  -12.23407   12.74753    -0.96   0.381    -45.00263    20.53448
wage_rev_~2012 |   1.378851   9.498693     0.15   0.890    -23.03832    25.79602
         _cons |    .934899   1.455137     0.64   0.549    -2.805651    4.675448
------------------------------------------------------------------------------
```

Output 12: Regression 2 Post-FFP

```
regress rev_tliab_ratio_2015 wage_rev_ratio_2014 wage_rev_ratio_2013 wage_rev_r
> atio_2012

      Source |       SS           df       MS      Number of obs   =         9
-------------+----------------------------------   F(3, 5)         =      2.04
       Model |   1.5450523         3  .515017433   Prob > F        =    0.2269
    Residual |  1.26189334         5  .252378668   R-squared       =    0.5504
-------------+----------------------------------   Adj R-squared   =    0.2807
       Total |  2.80694564         8  .350868205   Root MSE        =    .50237

------------------------------------------------------------------------------
rev_tliab~2015 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------------+--------------------------------------------------------------
wage_rev_~2014 |  -6.799534   3.270623    -2.08   0.092    -15.20694    1.607871
wage_rev_~2013 |   5.040434    5.12917     0.98   0.371    -8.144516    18.22538
wage_rev_~2012 |   1.444265    3.82195     0.38   0.721    -8.380371     11.2689
         _cons |   .4642477   .5854976     0.79   0.464    -1.040822    1.969317
------------------------------------------------------------------------------
```

Output 13: Regression 3 Post-FFP

```
sdtest totalWages, by(postCap)

Variance ratio test
------------------------------------------------------------------------------
Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
0 |      27    71356.44    7492.099    38930.09    55956.21    86756.67
1 |      27    79432.22    6004.365     31199.6    67090.07    91774.37
---------+--------------------------------------------------------------------
combined |      54    75394.33    4787.357    35179.75    65792.11    84996.56
------------------------------------------------------------------------------
ratio = sd(0) / sd(1)                                         f =   1.5569
Ho: ratio = 1                                 degrees of freedom =   26, 26

Ha: ratio < 1               Ha: ratio != 1                 Ha: ratio > 1
Pr(F < f) = 0.8672         2*Pr(F > f) = 0.2655           Pr(F > f) = 0.1328
```

Output 14: Variance Ratio Test (F-Test) for totalWages

```
sdtest netIncome, by(postCap)

Variance ratio test
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      27   -6813.815    8810.592    45781.18   -24924.25    11296.62
       1 |      27    22351.52     8167.69    42440.56    5562.591    39140.45
---------+--------------------------------------------------------------------
combined |      54    7768.852    6278.211    46135.24   -4823.644    20361.35
------------------------------------------------------------------------------
    ratio = sd(0) / sd(1)                                         f =   1.1636
Ho: ratio = 1                                 degrees of freedom =   26, 26

    Ha: ratio < 1               Ha: ratio != 1                 Ha: ratio > 1
  Pr(F < f) = 0.6489         2*Pr(F > f) = 0.7021           Pr(F > f) = 0.3511
```

Output 15: Variance Ratio Test (F-Test) for netIncome

```
sdtest wage_rev_ratio, by(postCap)

Variance ratio test
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      27    .5331165    .0385079    .2000931    .4539623    .6122708
       1 |      27    .4215043    .0316752    .1645892     .356395    .4866136
---------+--------------------------------------------------------------------
combined |      54    .4773104    .0258569    .1900085    .4254481    .5291728
------------------------------------------------------------------------------
    ratio = sd(0) / sd(1)                                         f =   1.4780
Ho: ratio = 1                                 degrees of freedom =   26, 26

    Ha: ratio < 1               Ha: ratio != 1                 Ha: ratio > 1
  Pr(F < f) = 0.8373         2*Pr(F > f) = 0.3254           Pr(F > f) = 0.1627
```

Output 16: Variance Ratio Test (F-Test) for wage_rev_ratio

```
ttest totalWages, by(postCap)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      27    71356.44    7492.099    38930.09    55956.21    86756.67
       1 |      27    79432.22    6004.365     31199.6    67090.07    91774.37
---------+--------------------------------------------------------------------
combined |      54    75394.33    4787.357    35179.75    65792.11    84996.56
---------+--------------------------------------------------------------------
    diff |           -8075.778    9601.247               -27342.09    11190.53
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -0.8411
Ho: diff = 0                                     degrees of freedom =       52

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.2021         Pr(|T| > |t|) = 0.4041          Pr(T > t) = 0.7979
```

Output 17: H3a (T-test for means of totalWages)

```
ttest netIncome, by(postCap)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      27   -6813.815    8810.592    45781.18   -24924.25    11296.62
       1 |      27    22351.52     8167.69    42440.56    5562.591    39140.45
---------+--------------------------------------------------------------------
combined |      54    7768.852    6278.211    46135.24   -4823.644    20361.35
---------+--------------------------------------------------------------------
    diff |           -29165.33    12014.06               -53273.31   -5057.354
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =  -2.4276
Ho: diff = 0                                     degrees of freedom =       52

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0093         Pr(|T| > |t|) = 0.0187          Pr(T > t) = 0.9907
```

Output 18: H3b (T-test for means of netIncome)

```
ttest wage_rev_ratio, by(postCap)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
       0 |      27    .5331165    .0385079    .2000931    .4539623    .6122708
       1 |      27    .4215043    .0316752    .1645892     .356395    .4866136
---------+--------------------------------------------------------------------
combined |      54    .4773104    .0258569    .1900085    .4254481    .5291728
---------+--------------------------------------------------------------------
    diff |            .1116122    .0498616                .0115576    .2116669
------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                      t =   2.2384
Ho: diff = 0                                     degrees of freedom =       52

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.9853         Pr(|T| > |t|) = 0.0295          Pr(T > t) = 0.0147
```

Output 19: H3c (T-test for means of wage_rev_ratio)