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Broadcasting Revenue Distribution & Competitiveness : A Research Across 16 European Football Leagues

Vasco da Costa Santos de Vasconcelos Cameira

23906

Work project carried out under the supervision of:

Professor Francisco Queiró

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Abstract

This paper tackles the issue of the distribution of broadcasting revenue within 16 top European football leagues. Through statistical analysis, a relation with the internal competitiveness of each league is established, concluding that a more equal distribution of broadcasting income will lead to a more competitive league. The research focuses on a 11 season time-frame, from 2008/09 to 2018/19.

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Keywords

Football, Broadcasting Rights, Competitiveness

Introduction

Football is the world's favourite sport. Throughout the planet, millions of people follow the "beautiful game", cheering for and suffering with their teams. The magnitude of this sport is unparalleled, but it is heavily argued that it might have become too predictable.

In recent years, media is playing a growing role in this sport. In fact, broadcasting is the fastest growing revenue component in European football, one that has a major impact on football clubs' finances. The topic around the distribution of this revenue has been a central one, bringing federations, scholars and football fans to some crossroads around this debate.

The research starts with a review on the literature around the topic of competitive balance in sports and, particularly, in football. The next step was to provide an overview of the European football market and, in greater detail, the evolution of the broadcasting landscape, distinguishing between the individual and collective systems. The topic of competitiveness was analyzed in greater detail, examining previous literature on the metrics used to assess it, and explaining the ones used in this paper's model. An integral part of this research was the analysis of clubs revenues derived from broadcasting. For this purpose, the distribution mechanisms of 16 European leagues were researched. These include: England, Spain, Germany, Italy, France, Turkey, Netherlands, Portugal, Belgium, Greece, Austria, Norway, Sweden, Poland, Scotland and Switzerland. Through the Gini Index, the equality of the broadcasting revenue distribution was assessed, season by season. With all the information and inputs at hand, a statistical model to assess the impact of the Broadcasting distribution on the leagues' competitiveness was created.

Ultimately, and in a original way, this paper provides statistical evidence supporting the collective selling mechanism of broadcasting rights, as it not only helps football clubs to remain financially healthy, but it also increases the leagues'competitiveness.

Literature Review

The concept of competitive balance has been widely debated and studied throughout the years. Vrooman (1996) believes there are three interrelated issues in the conceptualization of competitive balance: the dominance of larger-market clubs, the closeness of league competition within the season and the continuity of performance from season to season. Szymanski (2003) stresses out three claims on competitive balance: inequality of resources leads to unequal competition; fan interest declines when outcomes become less uncertain and specific redistribution mechanisms produce more outcome uncertainty.

In fact, the concept of result uncertainty plays a central role in many of the studies of sports economics over the past 50 years. Rottenberg (1956), whilst analyzing the American baseball market, understood that, in order to exist uncertainty of outcome, a more or less equal distribution of talent needs to be present. The Bosman ruling, a case brought by Jean-Marc Bosman in 1990 to the European Court of Justice and settled in 1995, declared that football players should have the right to seek employment in another club once their contract expired, without the previous club demanding financial compensation in return. Eventhough an initial reaction to the ruling was that smaller clubs were hit more severely, Antonioni & Cubin (2000) contradict this, stressing out that free transfers would unlikely take place (if a player is good enough to be signed by a larger club, they will not wait for the end of the contract as this might pose a risk of losing the player to a rival). The ruling somehow strenghtens Rottenberg's claims, since it also imposed no limit on the number of foreigners allowed in a club, leading to a more widespread distribution of players among european football clubs.

Neale (1964) elaborated on the concept of "League Standing Effect", the excitement that one feels with the constant change (or possibility of change) in league standings. Although this concept is somewhat related to competitive balance, it might prove to have an even stronger

effect: a game opposing two teams from the middle of the table (a quite balanced game in its nature) might not attract as much fans as a game between two of the last ranked teams by the end of season, since the latter has a much greater sporting stake in play (to avoid relegation). In other words, the league standing effect is much higher in the second example. The impact of this effect on fan attendance was furtherly explored by Andreff & Scelles (2015), with focus in Ligue 1.

Kringstad & Gerrard (2004,2005) distinguished between competitive balance and competitive intensity in their studies. The former is related to differences in quality of all teams within a league, whilst the latter concept focuses on the competition within a league but with regard to its overarching prize structure (the fight to avoid relegation or the qualification for UEFA championships). The competitive intensity concept was later explored by Scelles et al (2011) on a intra-league basis and by Durand et al (2011) on a intra-match basis. Fort & Maxcy (2003) distinguish between two lines when thinking about competitive balance. The first is the pure analysis of competitive balance (ACB) and studying what happened over time as a result of changes in business practices in Europe's main leagues. The second one analyzes the effect of competitive balance on fans, testing the longstanding uncertainty of outcome hypothesis (UOH).

It is also important to review literature from a more technical perspective, offering insights on the metrics that were used in the past to assess the competitive balance across European leagues. Ramchandani et al (2018) depart from the ACB line of thought to analyze the big five European leagues, over a timeframe of 22 seasons, in terms of level of concentration (within and between leagues) and level of dominance (in each league over time). For that purpose, the Herfindahl Index of Competitive Balance (HICB) was used as a measure of concentration, whereas the number of different teams to win the title or number of top 4 finishes achieved by a single team

were used as measures of dominance. Koning (2000) focused on the Dutch league, from 1970 to 2000, using metrics such as standard deviation of points as a competitive balance measure. Szymanski (2001) defined competitive balance as "the rational expectations of fans about who will be the winners", applying the coefficient of variance and the standard deviation of win percentages to analyze the Premier League, from 1978 to 1998. Michie & Oughton (2004) augmented the timeframe (1948 to 2004) to analyze the big five leagues, whilst also using the club concentration ratio (C5 index) and the Lorenz Seasonal Balance Curve (LSBC). Goosens (2006) included the Belgian, Danish, Greek, Portuguese, Dutch and Swedish first tier divisions, along with the big five, in the analysis. An original competitiveness indicator was created, the National Measure of Seasonal Imbalance (NAMSI), which sought to compare the standard deviation of winning percentages with the standard deviation under the worst possible competitive balance. Ramchandani (2012) examined the Scottish, Russian, Portuguese, Swiss and Dutch leagues in addition to the usual big five, using other dispersion and concentration measures, such as the inter-quartile range, the top-bottom quartile gap and concentration ratios. Ramchandani's methodology will also help to explain the model constructed in this research paper, further ahead. Montes et al (2014) undertook an in-depth analysis on the competetive balance of the Spanish league, from 1929 to 2012, by using, among some of the before mentioned measures, the Gini Index and Montecarlo test. Inan (2017) undertook a 30-year analysis of the Turkish league, seeking to find a trend of competitive balance in this country.

Also worthwhile mentioning is the research paper by François et al (2020), using some other explanatory variables for competitive balance in their models, such as temperature and the impact of Financial Fair Play.

Studies about competitiveness in football are vast and the opinions are multiple. It is a topic on the agenda of practically all football federations, and the discussion on inequality in resources amongst clubs has played a central role in the discussion for competitive balance. Simon

Kupper and Stefan Szymanski, in their book "Soccernomics", comment on this in an interesting light: "It is a curious thing that these complaints are relatively new, a product of the last twenty years or so. Contrary to public opinion, football was unbalanced in the past too, but before the 1990s fewer people complained". Inequality bothers the public, they believe, not because it is unprecendented, but because it is driven more by money than it used to be.

To understand these claims, a closer look needs to be given to the evolution of European football.

The European Football Market

Throughout this paper, reports from both Deloitte ("Annual Review of Football Finance") and UEFA ("The European Club Footballing Landscape") were used, since the 2008/09 season until 2018/19, to extract the annual figures. In the span of 11 seasons, the European football market has grown from around 15Bn € to 28.9Bn € (as illustrated in Figure 1), marking a 72% growth. The 'Big Five' (England, Spain, Germany, Italy and France) have been the main drivers of this growth, representing over 50% of the total revenue during the studied period. Their dominance in terms of market and brand value is inquestionable, but there are other leagues whose importance in the footballing landscape should not be overlooked. Bearing this in mind, 11 other leagues were included in the analysis: Turkey, Netherlands, Portugal, Belgium, Greece, Austria, Norway, Sweden, Poland, Scotland and Switzerland.

Professional leagues derive their revenues from three main revenue sources: Matchday, Commercial and Broadcasting. A fourth one, called 'Other', was also included in the analysis, and includes components such as UEFA prize-money, among other revenue streams. Using the before mentioned reports as guidelines, a first step to analyze the European football market would be to understand 1) the weight of each revenue source on the leagues revenue and 2) how the revenue mix has evolved as the seasons progress. A final table was built, with the

values for each league and for each season decomposed into the refered components. By taking the average for all the seasons, a clearer picture of the revenue mix is formed. The values are given in the below table:

Revenue Mix (2008/09 - 2018/19)				
	Broadcasting	Commercial	Matchday	Other
England	48%	26%	21%	5%
Spain	36%	28%	25%	11%
Germany	27%	44%	20%	9%
Italy	50%	26%	11%	12%
France	41%	25%	11%	23%
Turkey	40%	35%	12%	12%
Netherlands	12%	52%	25%	11%
Portugal	22%	42%	15%	20%
Belgium	19%	40%	23%	18%
Greece	20%	33%	21%	26%
Austria	8%	61%	16%	14%
Norway	13%	55%	21%	11%
Sweden	12%	51%	25%	12%
Poland	25%	48%	13%	14%
Scotland	14%	32%	40%	14%
Switzerland	4%	38%	35%	23%

Leagues such as the English or Italian rely more heavily on the Broadcasting component (both around 50%), whereas the Dutch or Austrian one are more dependent on Commercial revenue (54% and 64%, respectively). A common feature is that the bigger leagues have a much greater revenue percentage in the Broadcasting category than smaller ones. Switzerland, as an example, only derives around 5% of its revenues from Broadcasting. This is a somewhat obvious result, because bigger leagues have the capacity to close larger broadcasting deals, attracting a lot of investors in the process. Nevertheless, one has to acknowledge that the results don't reflect the true revenue figures of, particularly, smaller clubs. This fact is illustrated in UEFA's 2018 report. Whereas giants like Manchester United, FC Barcelona or Juventus only depend on 28%, 24% and 30% of broadcast revenue, respectively, in clubs like AFC Bournemouth, Brighton and Burnley, this value reaches 88%, 79% and 87%, respectively. In smaller leagues, this reality is much more severe, because the values obtained from broadcasting are nowhere near the ones

received in the Premier League. The current pandemic crisis the world is witnessing will pose a tremendous challenge to the entire football industry, but the survival of smaller clubs, already unable to cash-in revenue from matchday, is at stake.

The Broadcasting Landscape in Football

Roger Noll, in his research paper "Broadcasting and Team Sports" (2007), provides some fundamental insights on sports broadcasting market. The growth in the number of broadcasters, allied to the rise of commercial broadcasting, helps explaining the meteoric evolution of broadcasting rights sales. As television became more competitive, three phenomena, he argues, occurred: 1) there was a shift of sports rights from public to commercial television, 2) there was an increase in the fees for sports television rights and 3) there was a substantial increase in sports coverage. The results are in sight. Since Noll's observations, revenues from broadcasting activities have increased in both absolute and relative terms in the major leagues. In the majority of the leagues, these revenues are centralized, meaning that the overall atractiveness of the league will play a central role on the deal values for broadcasters.

The report "Hyperinflation in European Football" (2017) draws some important conclusions on the magnitude of the current broadcasting deals – and emphasizes that there is a "limit up to which broadcasters and sponsors can seize benefit (…) without hurting their own profitability". The current broadcasting deals for the big five leagues have reached astronomic values: in England €1.852 Bn (2020 to 2024), in France €1.172 Bn (2020-2024), in Germany €1.160 Bn (2017-2021), in Spain € 1.140 Bn (2019-2022) and in Italy € 0.973 Bn (2018-2021), all of these in per season values. With a saturation point in sight, the study also stresses out two possible outcomes: either the supply of money by broadcasters will slow down (a situation currently being witnessed due to the pandemic) or a continuosly increasing cost, which is being passed on to consumers, will severely hit demand. It is also important to consider that giant tech

companies are entering (and disrupting) the broadcasting industry, delivering sport content in new and innovative ways. Traditional broadcasters will have to rethink their strategies in order to remain competitive.

Pooling of Broadcasting Income or Individual System?

Currently, almost all European leagues have a collective (or pooling) system in place when it comes to the distribution of broadcasting revenues. These models, applied by the leagues, differ from country to country, and practically all of them have a component of the distribution that is linked to sport performance or capacity to generate revenue. There has been some debate around this topic in previous literature. Andreff & Bourg (2006) compared individual club ownership of TV rights and pooling by the league, in European football, arriving at the conclusion that there should even be a minimum enforcement of redistribution, without which the leagues will not be sustainable in the long run. Salaga et al (2014) also defend this position, stressing out the importance of a diversified revenue base. Cave & Crandall (2009) point out the importance of the impact of league-wide broadcasting right contracts on providing support to smaller clubs, but also warn that there are still huge imbalances in stadium gate and other forms of revenue. Szymanski (2001) goes one step further by saying that "performance based redistribution of broadcasting rights" would be a powerful tool to enhance competitiveness. This is currently the case in the majority of the leagues analyzed in this research paper. As an example, in Spain, 25% of the broadcasting revenue is allocated based on merit (clubs league position). This means that the final league standing can make a huge difference on clubs budgets for the next season: in 2018/19, Valencia (4th place) received around € 33M in merit fees, whilst Sevilla (6th place) € 21M.

However, there are also opposing views to the idea of collective selling. Peeters (2009) states that the choice for either individual or collective approach has no significant impact on the

league's competitive balance, whereas Noll (2007) believes that a few competition policies need to be in place in order for the sports broadcasting market to function properly.

Eventhough one might question if a more equal distribution of broadcasting revenues does make a league more competitive (and that is precisely the topic of this research paper), it is unquestionable that the collective approach has helped, at least to a certain point, to level the playing field in monetary terms. Some of the leagues analyzed have as distribution criteria, among others, game or season attendance. This is an example of a mechanism with the right incentives in place, as it encourages clubs to lower their ticket prices, hopefully stimulating demand on game days.

Higher governing bodies have recognized the importance of the collective system approach, with the European Commision's White Paper on Sports (2007) stating that it can be "important for the distribution of income and can be a tool to achieve greater solidarity within sports".

A closer look at the different distribution mechanisms, in each league, will be given further ahead in this paper.

Research Hypothesis

The main hypothesis of this research paper is that a more equal distribution of broadcasting money will lead to a more balanced and, hence, more competitive league. The methodology employed followed some important steps, which are interconnected in the end through the regression analysis. Firstly, a competitiveness indicator was created for each league, with the objective of understanding the trend throughout the sample period. The next step was to use the Gini index as an indicator of income inequality in terms of broadcasting revenue. Each league was analyzed separately for this purpose. Lastly, the main focus of this research paper: alongisde other chosen independent variables, to establish a relation between the Gini and the competitiviness of each league.

Competitiveness

It is a quite a challenging task to find one particular metric that defines competitiveness of a league. What exactly is competitiveness? One might argue that it is related to the intensity of the title race each season. Should that be the case, then Ligue 1 would be considered a quite predictable league, since PSG has won 8 of the last 9 championships. However, before Tamim bin Hamad Al Thani, ruler of Qatar, took over the club in 2011, the league had four different winners in the span of four years (Bordeaux, Marseille, Lille and Montpellier). The Swedish league is also an interesting case: over the studied period, Allvenskan had seven different champions (Kalmar, AIK, Malmo, Helsinborgs IF, IF Elfsborg, IFK Norrköpping and Djurgardens). Nevertheless, it is consensual that the teams in this country have almost nothing to say when it comes to European competitions. This brings the discussion to an important aspect of this research paper: the analysis seeks to understand the *internal* competitiveness of each league, and how the redistribution mechanisms of broadcasting revenue affect that same competitiveness. Therefore, six widely used indicators of competitive balance in previous research (as described in the literature review) were employed in the analysis in order to find some patterns in each one of the 16 leagues. Those indicators are described below:

Inter-Quartile Range (IQR): this is a measure of variability, achieved by dividing the data into quartiles. The idea is to find the difference between the third and first quartile, applied to each teams' final point score. The higher the IQR, the greater the dispersion between the clubs' overall relative performances, which means a lower competitive balance.

Herfindahl Index of Competitive Balance (HICB): The Herfindahl-Hirschman Index (HHI) is a measure of inequality among all firms in an industry. When applied to football, it looks at the inequalities (in points) among all the clubs in that same league. It is calculated as the sum of

the squared weight of each team´s points. Since the HHI is sensitive to the number of teams in the league, it is normalized to the HICB by adjusting to the number of clubs in each season. The higher the HICB, the greater the concentration and the lower the competitive balance.

Coefficient of Variance (CV): Another measure of statistical dispersion, calculated as the ratio between the standard deviation to the mean of a data set, the league points. The CV allows us to compare the degree of variation across data sets (e.g. season by season). The lower the CV, the closer the values are gathered around the mean and the higher the competitive balance.

Top Bottom Quartile Gap (TBQG): difference between cumulative points of clubs in top quartile and the ones in the bottom quartile. The lower the gap, the greater the competitiveness.

Top 25% Concentration Ratio (C25%): Represents the proportion of the output that the top 25% of firms represent. In the context of this research, it represents the proportion of total points that the top 25% of the teams in the league achieved. Naturally, the higher the value, the less competitive the league.

Top 50% Concentration Ratio (C50%): Similar to the previous variable, but it includes the top half of th final table. Just like the C25%, the higher the ratio, the greater the concentration and the less competitive the league.

The six indicators, also used by Ramchandani (2012), were carefully chosen in order to encapsulate the natural differences in quality and size among the leagues in the sample. Nevertheless, it is important to stress out, once again, that there are many other indicators that could be added to these six.

The next step was to calculate the indicators for all 16 leagues, throughout the 11 seasons. Using the Premier League as an example, the methodology employed was the following: for each indicator, a value from 1 to 11 was given depending on the score it obtained each season. As it was seen for all six indicators, the lower the value, the more competitive the league on that attribute. Hence, the year with the lower IQR would receive 11. The same process was repeated for each variable. In the end, a value would be obtained for that season. The higher this so called competitiveness index, the more competitive the league. This exercise was repeated for each one of the 16 leagues. The below table summarizes the results.

COMPETITIVENESS INDEX															
	England	Spain	Germany	Italy	France	Turkey	Netherlands	Portugal	Belgium	Greece	Austria	Norway	Sweden	Poland	Scotland	Switzerland
2008/09	54	52	52	58	52	49	55	60	55	42	42	64	57	33	65	36
2009/10	37	50	63	74	48	31	35	50	41	57	31	52	69	37	50	38
2010/11	71	65	72	67	75	41	66	66	35	66	54	65	72	66	32	57
2011/12	64	66	66	74	60	51	51	49	45	60	62	53	54	49	42	29
2012/13	49	51	51	49	60	68	58	54	40	59	42	60	53	58	72	65
2013/14	42	47	47	42	46	61	70	57	50	57	42	39	58	54	31	71
2014/15	60	35	35	58	55	38	48	45	48	59	52	29	66	75	56	65
2015/16	65	54	54	53	55	41	47	53	68	49	65	50	40	65	67	48
2016/17	36	38	38	36	37	45	53	60	56	54	61	69	48	51	25	45
2017/18	39	51	51	32	35	37	46	44	70	42	32	36	37	51	46	60
2018/19	39	68	68	41	34	66	61	56	59	36	49	40	32	46	37	44

The table should be analyzed column by column, as it gives a simple overview of the competitiveness evolution, league by league, during the 11 seasons. All of the six variables chosen have the same weight in this competitiveness index. In order to establish a possible trend for each league, a correlation analysis between the index and the season was conducted. The 2008/09 season received the value ‘1’ and then on a progressive basis until the value ’11’.

Below we can find the correlation results:

Correlation Table															
	England	Spain	Germany	Italy	France	Turkey	Netherlands	Portugal	Belgium	Greece	Austria	Norway	Sweden	Poland	Scotland	Switzerland
Correlation Coefficient	-0,3736	-0,1045	-0,2771	-0,7814	-0,6574	0,1736	0,0517	-0,2825	0,6756	-0,4785	0,1966	-0,4766	-0,78	0,3026	-0,2712	0,2859
p-value	p < 0.05	p < 0.05	p < 0.05	p < 0.05	p < 0.05	p < 0.05	p < 0.05	p < 0.05	p < 0.05	p < 0.05	p < 0.05	p < 0.05	p < 0.05	p < 0.05	p < 0.05	p < 0.05

As it can be observed, in 10 of the 16 leagues (including the Big Five) competitiveness, as defined in this paper through the six variables, has been decreasing. The results are merely indicative but given that the chosen variables are mainly focused on concentration and dispersion of points, this table does ring a few bells in terms of the gap that is present in European top leagues.

Gini Index – how well is Broadcasting income distributed?

The Gini Index is a widely used metric to measure inequality. Usually, it is used to analyze the distribution of wealth in a country, with its values ranging from 0 to 1. The closer the value is to 0, the greater the equality in the distribution. Conversely, the closer the value is to 1, the greater the inequality. In the context of this research, the Gini was used to measure the distribution of broadcasting money within each league. The advantage of using such a measure is that it not only allows to compare the distribution across all leagues, it also permits to look at the evolution of the broadcasting income within each league, across each season.

The results should be analyzed in parallel with distribution criteria of each league **(**Figure 2 & 3) in order to understand the possible inequalities that may arise.

Practically all leagues have a different mechanism to allocate the income, which makes the analysis more interesting. However, a component that is common to almost every league is the 'Equal' part, with its weight going from 65%, in Germany (this before the four-pillar system came into force, in 2017/18), to 30%, in Greece and Austria. 'Performance' or 'Merit' are the second most common components, which range from 18%, in Poland, to 70% in Germany's current system. This is a quite important component, working as a motivation booster for the clubs, as sporting performance and consistency will be highly rewarded. Lastly, some other forms of distribution are also included, which diverge from league to league. In England, like in France, some proportion is allocated based on the club's media profile, and how many times

the games are transmitted on TV. In Spain, the revenue generating capacity of clubs is taken into account, such as match day income. Germany takes into account the playing time German U21s. The same happens in Austria, with Austrian upcoming talents. Turkey rewards clubs that make it into the top six, as the league is usually dominated by a few, more powerful clubs (Galatasaray, Fenerbahçe, Besiktas, Trabzonspor and Istanbul Başakşehir). In Greece, a high proportion (around 40%) is allocated based on the commercial value of each club. Regarding the Dutch and Scottish leagues, the criterias are purely based on league position, meaning that the Gini will always be the same. As for the Norwegian league, the research conducted by Fløtnes (2011) provided the broadcasting values, by club, for the 2012/13 season. Due to lack of data on this league, those same proportions were assumed for the remaining years. The results are summarized in the table below:

GINI INDEX RESULTS																
	England	Spain	Germany	Italy	France	Turkey	Netherlands	Portugal	Belgium	Greece	Austria	Norway	Sweden	Poland	Scotland	Switzerland
2008/09	0,131	0,551	0,108	0,308	0,271	0,21	0,306	0,529	0,211	0,204	0,203	0,177	0,173	0,166	0,1092	0,3
2009/10	0,100	0,542	0,108	0,322	0,282	0,206	0,306	0,543	0,1543	0,199	0,185	0,177	0,163	0,166	0,1092	0,13
2010/11	0,082	0,565	0,108	0,259	0,273	0,215	0,306	0,537	0,178	0,194	0,253	0,177	0,173	0,171	0,1092	0,353
2011/12	0,082	0,62	0,108	0,25	0,285	0,209	0,306	0,538	0,159	0,219	0,369	0,177	0,191	0,185	0,1092	0,307
2012/13	0,076	0,508	0,108	0,246	0,341	0,213	0,306	0,573	0,165	0,2	0,284	0,177	0,159	0,186	0,1092	0,212
2013/14	0,086	0,677	0,108	0,274	0,335	0,24	0,306	0,575	0,144	0,193	0,195	0,177	0,165	0,224	0,1092	0,363
2014/15	0,083	0,365	0,108	0,296	0,372	0,227	0,306	0,5	0,165	0,187	0,337	0,177	0,173	0,194	0,1092	0,212
2015/16	0,078	0,193	0,108	0,267	0,241	0,196	0,306	0,613	0,176	0,21	0,243	0,177	0,176	0,123	0,1092	0,204
2016/17	0,092	0,196	0,108	0,261	0,237	0,189	0,306	0,585	0,167	0,204	0,355	0,177	0,179	0,143	0,1092	0,161
2017/18	0,089	0,191	0,121	0,285	0,367	0,227	0,306	0,598	0,163	0,203	0,213	0,177	0,258	0,3	0,1092	0,115
2018/19	0,086	0,194	0,133	0,28	0,364	0,172	0,306	0,708	0,163	0,201	0,224	0,177	0,205	0,262	0,1092	0,111

There are some interesting aspects to be found when looking at the table. Firstly, and as expected, the Premier League has the more equal distribution of broadcasting money. In the 2018/19 season, champions Manchester City earned only 1.56x more the TV money than relegated side Huddersfield Town. La Liga is also an interesting case. Until 2015/16, the individual selling system was in place in Spain, but the Royal Decree-Law 5/2015 marked the end of this system, as now the "amounts to which each participating club is entitled and the amounts they have paid" needed to be in line with the "obligations set out in Article 6.1" of the Royal Decree. In 2014/15, champions FC Barcelona earned around 10x more than relegated

side Cordoba. By 2016/17, that difference was reduced to 3x, between Real Madrid and Granada. As a consequence, the Gini Index fell sharply from around 0.5 to 0.2.

The 2017/18 season marked a change in the distribution criteria in the Bundesliga, with the four-pillar system coming into place. As a result, the Gini has risen. Another country that stands out in the table is Portugal. As it is stated in UEFA's 2017 report, "Portugal is now the only major league where clubs sell their rights individually", a factor that helps to explain the huge gap between the top three sides (SL Benfica, FC Porto and Sporting) and the other teams in terms of broadcasting revenue. Together, the three clubs represent around 75% of all the broadcasting income the league generates, mainly due to their profitable deals with large TV operators.

Regression Analysis

In order to test the main hypothesis of this research, six regressions were conducted in order to assess the relation between the distribution of broadcasting money and the competitiveness within each league. The six before mentioned indicators of competitiveness that were chosen for this research were used as dependent variables. Regarding the independent variables, along with the *Gini Index* ***(X1)*** of each league, three other variables were chosen:

Percentage of Broadcasting Rights **(*X2*)**: as previously explained, the weight of the Broadcasting revenue stream differs substantially from league to league. This is an important fact to take into account because a more equal distribution, characterized by a lower Gini, will have greater impact in leagues that earn a signifcant amount of money from this source (e.g. 50% in Italy vs 8% in Austria).

*Interaction Gini and BroPerc **(X3):*** this variable reflects the interaction between the distribution of broadcasting rights and each leagues' income from this revenue stream. It is an important variable to take into account, as it allocates the changes in the Gini proportionally to the leagues' weights. As an example, the Swedish league Gini jumped from 0.179, in 2016/17, to 0.258 in 2017/18. However, the league only derives approximately 12% of its revenue from Broadcasting, meaning that this significant jump in terms of inequality needs to be properly weighted.

*Logarithm of GDP **(X4):*** The inclusion of this variable in the model is important for two reasons: firstly, it is a precise indicator of the size of a country. Secondly, previous research, such as the one conducted by Klobucník et al (2019), has showed that sports performance (at the league level) is positively correlated with the annual GDP value.

Together with the previously mentioned variables, the six regressions used in this paper are the following:

Regression 1: $IQR = \alpha + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \varepsilon$

Regression 2: $HICB = \alpha + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \varepsilon$

Regression 3: $CV = \alpha + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \varepsilon$

Regression 4: $TBQG = \alpha + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \varepsilon$

Regression 5: $C25 = \alpha + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \varepsilon$

Regression 6: $C50 = \alpha + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \varepsilon$

The regressions need to be analyzed separately, although some common points will be drawn out. Eventhough not all regressions have the expected significance values, they offer important insights to the discussion about the distribution of Broadcasting revenue.

Source	SS	df	MS
Model	162.211728	4	40.5529319
Residual	1622.66941	171	9.48929477
Total	1784.88113	175	10.1993208

Number of obs	176
F(4, 171)	4.27
Prob > F	0.0025
R-squared	0.0909
Adj R-squared	0.0696
Root MSE	3.0805

Herfindahl	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Gini	12.52803	4.271601	2.93	0.004	4.096167	20.95989
Broadcast	8.940225	4.182725	2.14	0.034	.6838023	17.19665
Interaction	-28.96488	14.86032	-1.95	0.053	-58.29818	.3684139
GDP	-1.622501	.8012714	-2.02	0.044	-3.204158	-.040844
_cons	111.5045	2.207975	50.50	0.000	107.1461	115.8629

Regression 2 offers some interesting insights. By looking at the results, one can see that three variables are highly significant (displaying p-values below 0.05) to reflect the movements in the HICB index. The p-value of the Interaction variable lies at 0.053. Focusing the attention on the Gini Index (as it will be done in the other regressions), a coefficient of 12.528 reinforces the positive correlation between the Gini index and the HICB: as an example, a 0.1 increase in the Gini will lead to a 1.2258 increase in the HICB, in other words, a rise in the league's concentration. The X2 variable also has a positive correlation with the HICB, meaning that the greater the Broadcasting component in leagues' revenues, the more probable an increase in bigger clubs taking a lion share of the points. This is an important results, as is stresses out the still rather unbalanced revenue distribution mechanisms in the bigger leagues.

Source	SS	df	MS	Number of obs =	176
				F(4, 171) =	3.80
Model	.035726179	4	.008931545	Prob > F =	0.0055
Residual	.401770913	171	.002349538	R-squared =	0.0817
				Adj R-squared =	0.0602
Total	.437497092	175	.002499983	Root MSE =	.04847

Variance	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Gini	.1887295	.0672148	2.81	0.006	.0560519	.3214071
Broadcast	.1267415	.0658163	1.93	0.056	-.0031755	.2566586
Interaction	-.4204143	.2338312	-1.80	0.074	-.8819816	.041153
GDP	-.0210986	.0126082	-1.67	0.096	-.0459864	.0037892
_cons	.3266804	.0347431	9.40	0.000	.2580998	.395261

In *Regression 3*, and since the analysis is conducted using a 95% confidence interval, only the Gini is highly significant. Moreover, Gini and Broadcast, maintain the positive correlation, this time with the Coefficient of Variance (CV). The more unequal the distribution of TV money, the greater the dispersion of points. In other words, the balance in terms of competitiveness is lower.

Source	SS	df	MS	Number of obs =	176
				F(4, 171) =	49.77
Model	204220.503	4	51055.1258	Prob > F =	0.0000
Residual	175420.446	171	1025.85056	R-squared =	0.5379
				Adj R-squared =	0.5271
Total	379640.949	175	2169.37685	Root MSE =	32.029

Top_Bottom	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Gini	125.4513	44.41358	2.82	0.005	37.7818	213.1208
Broadcast	229.5481	43.4895	5.28	0.000	143.7027	315.3935
Interaction	-191.0146	154.5088	-1.24	0.218	-496.0048	113.9756
GDP	16.69782	8.331146	2.00	0.047	.2526904	33.14295
_cons	25.30679	22.95722	1.10	0.272	-20.00924	70.62282

Regression 4 seeks to understand some of the drivers of the Top Bottom Quartile gap. Is there a relationship to be established with the point difference of the teams competing for the title and the ones fighting not to be relegated? Once again, the Gini index proves to be highly significant ($p = 0.005$). This is an interesting, although expected result: there is still a great

discrepancy to be felt in the distribution of broadcasting money, and that translates into a wider gap between the top and bottom clubs.

Source	SS	df	MS		
Model	.004214518	4	.001053629		
Residual	.077678221	171	.000454259		
Total	.081892738	175	.000467959		

Number of obs	= 176
F(4, 171)	= 2.32
Prob > F	= 0.0590
R-squared	= 0.0515
Adj R-squared	= 0.0293
Root MSE	= .02131

Top50	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Gini	.0847214	.0295546	2.87	0.005	.0263825	.1430603
Broadcast	.0595271	.0289397	2.06	0.041	.0024021	.1166521
Interaction	-.2466713	.1028165	-2.40	0.018	-.4496243	-.0437183
GDP	-.0042663	.0055439	-0.77	0.443	-.0152096	.0066769
_cons	.6144432	.0152767	40.22	0.000	.5842881	.6445984

Regression 6, the last of the four significant ones, establishes the relation with the Top 50% Concentration Ratio (C50%), the proportion of points won by the clubs in the top half of the table. This ratio tends to grow as the distribution of broadcasting income is more unequal.

The majority of the chosen variables will be significantly impacted by the way that brodcasting revenue is distributed. By looking at the regression results, there are some common trends that need to be explained. Firstly, the coefficient for the X1 variable is always positive. This means that an increase in the Gini Index will always translate in a decrease in competitiveness (the dependent variables will increase). The same can be said about the X2 variable, which also has a positive coefficient in all regressions. All else being equal, the more a league depends on broadcasting revenue, the lower the competitiveness of that league. From a theoretical perspective, this actually makes sense because Broadcasting is the only revenue component upon which football clubs have practically no control, especially given the fact that the majority of the leagues have a collective system in place. Furthermore, the weight of the broadcasting component in a league's revenue usually does not change due to a larger (or smaller) amount

of TV revenue, but rather from a deterioration (or increase) in the share from other revenue streams, such as Matchday or Commercial. The broadcasting contracts usually span 3 to 5 years, meaning that the absolute value that a league receives each year does not change from season to season. A greater weight of the broadcasting component may be a sympthom of the league's bad performance, either through lower commercial revenue or less fans going to the stadium, hence the positive correlation with the dependent variables. The potential for inequality in this metric is greater. However, the interaction variable (X3) is very important to clarify this point. The coefficient is always negative, and the variable is only significant in Regression 5, although in Regression 2 it is practically significant at the 5% level. Even though this result may seem counter intuitive, a scenario analysis was conducted (using Regression 2 as an example) to clarify why the negative sign might be important. This analysis also might help the football associations of each country to assess the potential impact of a change in the distribution mechanism of broadcasting income (and, hence, result in a lower or higher Gini) on the league´s competitiveness. The below table summarizes the projected values for the HICB indicator for season 2019/20, accounting for all available scenarios:

	Scenarios								
	Gini increases			Gini decreases			Gini remains the same		
	X2 does not change	*X2 increases*	*X2 decreases*	*X2 does not change*	*X2 increases*	*X2 decreases*	*X2 does not change*	*X2 increases*	*X2 decreases*
England	110.344	110.644	110.283	110.428	110.772	110.359	110.386	110.708	110.321
Spain	110.215	110.397	110.185	110.208	110.425	110.172	110.212	110.411	110.179
Germany	109.138	109.434	109.096	108.978	109.395	108.918	109.058	109.414	109.007
Italy	109.990	109.993	109.983	110.034	110.048	109.991	110.012	110.020	109.987
France	110.147	110.028	110.266	109.785	109.782	109.788	109.875	109.843	109.908
Turkey	110.640	110.677	110.493	110.625	110.674	110.432	110.636	110.676	110.478
Netherlands	110.545	110.546	110.544	110.545	110.546	110.544	110.545	110.546	110.544
Portugal	113.203	112.902	113.504	112.649	112.446	112.851	112.812	112.580	113.043
Belgium	109.983	110.022	109.904	109.807	109.854	109.714	109.912	109.955	109.828
Greece	110.868	110.896	110.613	110.721	110.755	110.415	110.794	110.826	110.514
Austria	110.319	110.341	110.276	110.021	110.052	109.961	110.220	110.244	110.171
Norway	110.093	110.169	110.055	110.093	110.169	110.055	110.093	110.169	110.055
Sweden	110.298	110.338	110.278	109.664	109.745	109.624	109.981	110.041	109.951
Poland	111.427	111.397	111.456	110.369	110.397	110.341	110.633	110.647	110.620
Scotland	109.664	109.722	109.491	109.664	109.722	109.491	109.664	109.722	109.491
Switzerland	108.888	109.051	108.834	108.293	108.508	108.221	108.789	108.960	108.731

The HICB projections were made using estimates for the potential future value of X1 and X2, which had to be calibrated to the reality of each league. It would not make sense to assume that, from 2018/19 to 2019/20, the Gini would rise by 0.05 in all leagues. The table in Figure 4

summarizes the increases or decreases in both X1 and X2, for each league. The values are based on the growth rates for both captions over the last 4 years. Nine possible scenarios can arise from season to season. The values in green represent the "correct" values, at least from a conceptual point of view, when compared to the 2018/19 HICB values (Figure 5). As an example, if the Gini rises, but X2 remains the same, it makes sense for HICB to increase, as the league becomes potentially more unequal. If both the Gini and X2 rise, then HICB will also rise, as now there is a more unequal distribution of broadcasting revenue and the broadcasting revenue share is becoming larger in that league. The same thought process was applied to the other scenarios. The values in white represent the "incorrect" values, although the scenario where the Gini remains the same and X2 does not change is the current one. However, some of these values can be justified: if the Gini increases and X2 decreases, although the expected result would be for the HICB to fall, it can be argued that the impact of the increase in the Gini is greater then the decrease in X2. The overall net effect is an increase in HICB.

Regression 1 and 5 are the two cases in which the results are not statistically significant, particularly the Gini Index, the most important variable of the model in the context of this research. The results, shown in Figure 6 and 7, show that inequality in the broadcasting revenue distribution does not play a key role explaining the Inter Quartile Range and the 25% Concentration Ratio. These results also display the difficulty of arriving at a consensual definition of competitiveness: although highly significant in four of the six regressions, the Gini Index is just a water drop in an ocean of possible variables that influence a football league's competitiveness. However, if there is one thing that can be extracted from this research is that a more equitative distribution mechanism of broadcasting income will help, at least to some extent, to mitigate too much concentration of points in a smaller number of teams within a league.

Conclusions

This research sought, in a innovative way, to provide some statistical evidence of the relation between broadcasting distribution and the internal competitiveness of 16 European top leagues. In the context of modern football, the large media deals will continue to play a key role on leagues' profitability, and the centralized method is proven here to be the most effective one in terms of competitive balance. There is a natural (and inevitable) financial disparity between the big clubs in each league and the rest of the table, a gap that is accentuated by commercial contracts and match day revenue. Therefore, sharing of broadcasting revenue should not be a possibility: it is an indispensable form to keep the leagues competitive. It is also worthwhile mentioning the different distribution mechanisms in each league, which only emphasizes the idea that there is no right (or fixed) way to solve this issue. The leagues' governing bodies need to take a hollistic approach to this topic, and try to understand which model will adapt best to its own league. A more equal distribution may also work as an effective driver for other revenues streams, such as Matchday. Although football leagues' may tend to look at their internal competitiveness directly in comparison to other countries, the first step must be a "self-reflection", and understanding if everything is being done, from a distributional perspective, to make the league more competitive and balanced. If even after this the league remains very predictable, the games quite "boring" and the concentration of points on top clubs persist, then some other measures might be studied. However, this research has shown that a more equal distribution of broadcasting revenue will have a direct (and positive) impact on the leagues' competitiveness.

Limitations and Future Research

This research gave some initial evidence on the measurement of Broadcasting revenue, through the Gini index, and its true impact on the leagues competitiveness. It is, perhaps, a mechanism that can be implemented by the leagues in order to monitor the decisions it makes around this topic. This last section will focus on two important points: the limitations of this research paper and some suggestions for future research.

The first (and obvious) limitation is the sample size: 16 leagues were used but, more critically, the research focused on a time-frame of 11 seasons, from 2008/09 to 2018/19. Ideally, it should include data since the start of the Broadcasting contracts (around 1990). Secondly, and as stated previously, only six measures of competitiveness were included. This value should be extended, hopefully capturing a wider number of measures from the competititveness spectrum. Two good examples are the more dynamic measures suggested by Eckard (2003), who sought to decompose the variance of the winning percentages into time varying and cumulative parts. Another interesting approach, which was also considered to be included in the context of this research, was the study conducted by Buzzacchi, Szymanski and Valletti (2003), who developed a measure with the objective of estimating the number of teams entering the top X ranks of a league over T seasons. Not only would it be interesting to see the *number* of teams, but also if there is a pattern around *which* teams achieve the ranks (the greater the number of different teams, the more unpredictable the league). Lastly, the inclusion of the so called Fixed Effects would also be important. Certain variables could bias the outcome variable, meaning that, by removing these effects, the true effect of the explanatory variables on the independent variables could be assessed. For the purpose of this research, this analysis was also conducted, fixing both the seasons and the countries variable. However, the results were not significant due to two reasons: 1) the data set was too short and 2) there were not many significant changes

of broadcasting distribution mechanisms within each league. Nevertheless, two examples of this analysis are attached in the Annex (Figures 8 & 9).

The majority of the analyzed leagues have a centralized distribution mechanism in place, meaning that the league itself has a last word on the allocation of the broadcasting money. However, it was quite challenging to find the Broadcasting figures for some championships, not only in smaller leagues, but even in larger ones, such as Serie A. This means that some projections had to be made, and eventhough they are rooted on reasonable assumptions, the true values might diverge. In order to achieve a more robust analysis, transparency in the reporting process to external stakeholders is vital. It shouldn't be that difficult for someone to find data on this topic. Future research on this topic will also need to incorporate the Covid situation, since it has fundamentally, and in the words of Jaume Roures (co-founder of Mediapro), "changed the equation".

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Annex

Figure 1

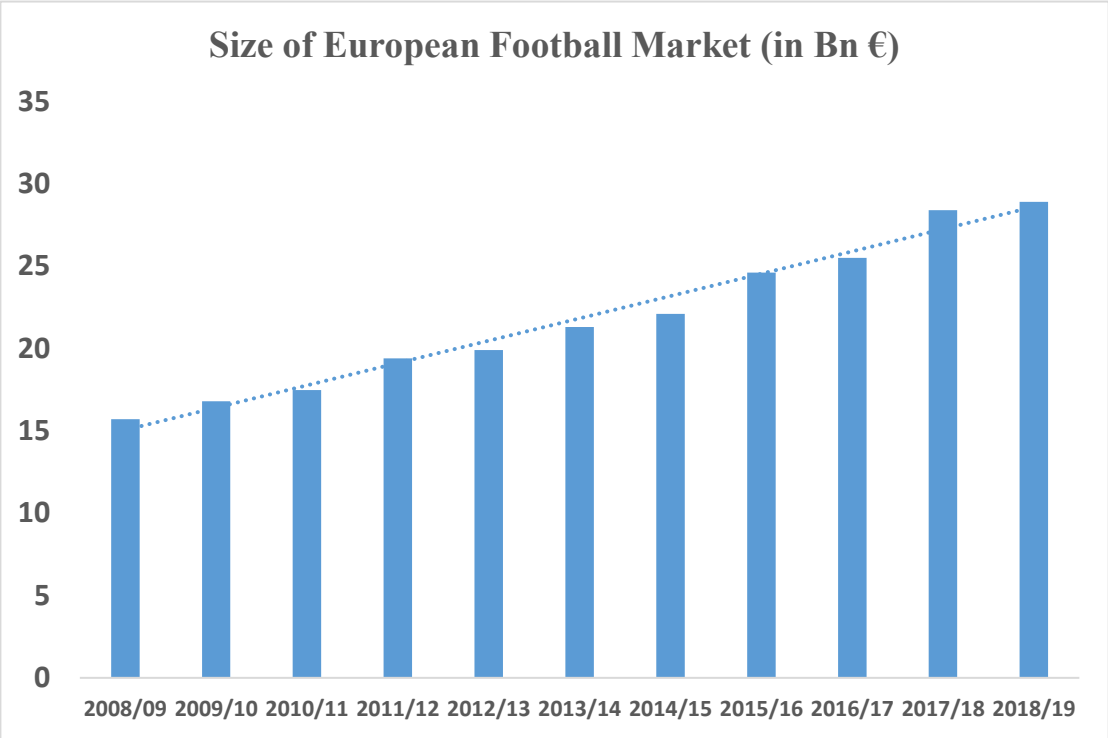

Figure 2: Distribution criteria of TV revenue, by league

	Distribution Mechanism	Methodology Employed/Sources
England	**50%** Equally **25%** Facility fees (TV transmissions) **25%** Merit fees (league finish)	Premier League Annual Figures "Central Payments to Clubs"
Spain	until 2015/16: individual selling (2015/16 onwards) **50%** Equally **25%** Merit (last 5 year ranking) **25%** Resource (income generating capacity: 1/3 average match day income, 2/3 Nr TV viewers)	Individual Selling: Annual Reports of clubs + Statista Collective Selling: La Liga Reports
Germany	2008/09 - 2016/17: **65%** equally split, **35%** based on league position 2017/18 onwards: 4 Pillar System **70%** 5-Year League Performance Ranking; **23%** 5-Year Ranking for Both Divisions **5%** 20-Year Ranking for both divisions; **2%** Playing Time Germany's U21	Fernsehgelder.de
Italy	**40%** Equally Shared **25%** Supporter Index **5%** Town Population **5%** Last Season **15%** Last 5 seasons **10%** Historical Performance	infodata.ilsole24ore
France	**50%** Equally (**30%** fixed, **20%** according to club licenses) **30%** league standing (**25%** current season, **5%** previous five seasons) **20%** media profile	Ligue de Football Professionel - Individual Club Accounts
Turkey	**35%** Equally **45%** Performance Based **12%** Among Top Six **8%** Championship Number	Ektifbank reports on Super League Estimations assuming growth rates
Netherlands	Fixed Amount based on Final Table	Dutch Football Federation
Portugal	Individual Selling Mechanism	Annual Reports of SL Benfica, FC Porto, Sporting, Braga, Tondela and Belenenses Rest based on estimations

Figure 3

Belgium	G5 vs K11 clubs (around 50/50 between top 5 clubs and the rest)	Deloitte Reports on Jupiler League
Greece	**30%** equally shared **30%** sporting performance (league table) **40%** based on commercial value of each football club	Greek League Reports (Central Management Distribution System)
Austria	**30%** Equally **20%** Usage of Austrian players **30%** Sporting performance **20%** Game attendance	Bundesliga Report (18-19) Remaining years based on clubs Annual Reports
Norway		Values for season 2012-13 assumed for the other years
Sweden		Swedish League Annual Reports
Poland	**44%** Equally **20%** Historical ranking **18%** sporting performance (league placing) **14%** clubs in UEFA competitions **0.5%** Solidarity payments to bottom 8 **2.5%** youth development program **1%** parachute payments	Ekstraklasa League Reports
Scotland	**48%** Equally **52%** League Position	
Switzerland		Annual Reports of Swiss Clubs had to be analyzed

Figure 4: Increase/Decrease in X1 and X2, from 2018/19 to 2019/20

	Increase		*Decrease*	
	Gini	% Broadcasting	Gini	% Broadcasting
England	0.015	0.05	0.015	0.01
Spain	0.01	0.06	0.01	0.01
Germany	0.03	0.07	0.03	0.01
Italy	0.02	0.01	0.02	0.03
France	0.15	0.02	0.05	0.02
Turkey	0.01	0.01	0.03	0.04
Netherlands	0	0.01	0	0.01
Portugal	0.12	0.02	0.05	0.02
Belgium	0.01	0.01	0.015	0.02
Greece	0.01	0.01	0.01	0.09
Austria	0.01	0.01	0.02	0.02
Norway	0	0.02	0	0.01
Sweden	0.035	0.02	0.035	0.01
Poland	0.15	0.01	0.05	0.01
Scotland	0	0.01	0	0.03
Switzerland	0.01	0.03	0.05	0.01

Figure 5: HICB values, season 2018/19

	Gini (X1)	% Broadcast (X2)	Interaction (X3)	logGDP (X4)	HICB
England	0.086	0.53	0.046	0.583	**110.386**
Spain	0.194	0.42	0.081	0.279	**110.212**
Germany	0.133	0.34	0.045	0.723	**109.058**
Italy	0.28	0.47	0.132	0.446	**110.012**
France	0.364	0.37	0.135	0.572	**109.875**
Turkey	0.172	0.42	0.072	0.014	**110.636**
Netherlands	0.306	0.15	0.046	0.087	**110.545**
Portugal	0.708	0.32	0.227	-0.491	**112.812**
Belgium	0.163	0.19	0.031	-0.139	**109.912**
Greece	0.201	0.18	0.036	-0.535	**110.794**
Austria	0.224	0.09	0.020	-0.215	**110.22**
Norway	0.177	0.17	0.030	-0.236	**110.093**
Sweden	0.205	0.12	0.025	-0.129	**109.981**
Poland	0.262	0.25	0.066	-0.105	**110.633**
Scotland	0.109	0.1	0.011	-0.537	**109.664**
Switzerland	0.111	0.09	0.010	-0.025	**108.789**

Figure 6: Regression 1

Source	SS	df	MS		
Model	443.462734	4	110.865684		
Residual	5051.33272	171	29.5399574		
Total	5494.79545	175	31.3988312		

Number of obs	=	176		
F(4, 171)	=	3.75		
Prob > F	=	0.0059		
R-squared	=	0.0807		
Adj R-squared	=	0.0592		
Root MSE	=	5.4351		

Iq_range	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Gini	7.720821	7.536656	1.02	0.307	-7.15604	22.59768
Broadcast	10.76056	7.379845	1.46	0.147	-3.806771	25.32788
Interaction	-31.19242	26.219	-1.19	0.236	-82.947	20.56216
GDP	2.74077	1.413734	1.94	0.054	-.0498469	5.531387
_cons	7.312861	3.89567	1.88	0.062	-.3769338	15.00266

Figure 7: Regression 5

Source	SS	df	MS	Number of obs =	176
				F(4, 171) =	11.04
Model	.031007129	4	.007751782	Prob > F =	0.0000
Residual	.120020899	171	.000701877	R-squared =	0.2053
				Adj R-squared =	0.1867
Total	.151028028	175	.000863017	Root MSE =	.02649

Top25	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Gini	.0425656	.036737	1.16	0.248	-.0299509	.1150821
Broadcast	.1324013	.0359727	3.68	0.000	.0613936	.2034089
Interaction	-.0903744	.1278032	-0.71	0.480	-.3426494	.1619006
GDP	-.0315812	.0068912	-4.58	0.000	-.0451839	-.0179784
_cons	.3978622	.0189892	20.95	0.000	.3603787	.4353457

Figure 8

Fixed-effects (within) regression — Number of obs = 176
Group variable: id — Number of groups = 16

R-sq: within = 0.1676 — Obs per group: min = 11
between = 0.0297 — avg = 11.0
overall = 0.0291 — max = 11

F(14,146) = 2.10
corr(u_i, Xb) = -0.8987 — Prob > F = 0.0149

Herfindahl	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Gini	-3.995019	6.410912	-0.62	0.534	-16.6652	8.675158
Broadcast	-10.2219	7.737015	-1.32	0.189	-25.51292	5.069113
Interaction	13.42418	19.04325	0.70	0.482	-24.21186	51.06022
GDP	-10.52227	5.626932	-1.87	0.063	-21.64304	.5984875

Figure 9

```
Fixed-effects (within) regression               Number of obs      =       176
Group variable: id                              Number of groups   =        16

R-sq:  within  = 0.0258                         Obs per group: min =        11
       between = 0.0274                                        avg =      11.0
       overall = 0.0135                                        max =        11

                                                F(4,156)           =      1.03
corr(u_i, Xb)  = -0.8638                        Prob > F           =    0.3913
```

Herfindahl	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Gini	-6.385982	6.5669	-0.97	0.332	-19.3575	6.585535
Broadcast	-6.585134	7.93096	-0.83	0.408	-22.25106	9.080792
Interaction	19.51016	19.6983	0.99	0.323	-19.39965	58.41998
GDP	-9.07432	5.045306	-1.80	0.074	-19.04025	.8916092
_cons	138.3862	14.89183	9.29	0.000	108.9705	167.8018
sigma_u	4.0874807					
sigma_e	2.6076682					
rho	.71073261	(fraction of variance due to u_i)				