

## **ENTROPIC ANALYSIS OF CONCENTRATIONS IN EUROPE'S HIGHEST BUDGET FOOTBALL LEAGUES**

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### **Abstract**

In this study, it is aimed to determine and compare the concentration (competition) level of football leagues (the English, Spanish, Italian, German, French and Turkish) with the highest market value and transfer budget in Europe. For this purpose, the Entropy Index (EI) is used as the concentration criterion in the study, which covered the 10-year period between 2008-2009 and 2018-2019 seasons. According to the results, the football leagues with the highest EI scores (the lowest concentration and the highest competition level) are the French, English, Italian, Spanish, German, Turkish football leagues respectively.

**Key Words:** European Football Leagues, Concentration, Competition, Entropy Index

## **AVRUPA'NIN EN YÜKSEK BÜTÇELİ FUTBOL LİGLERİNDEKİ YOĞUNLAŞMALARIN ENTROPİK ANALİZİ**

### **Öz**

Bu çalışmada Avrupa'da piyasa değeri ve transfer bütçesi en yüksek futbol liglerinin (İngiltere, İspanya, İtalya, Almanya, Fransa ve Türkiye) yoğunlaşma (rekabet) düzeyinin belirlenmesi ve karşılaştırılması amaçlanmıştır. Bu amaçla, 2008-2009 ile 2018-2019 sezonları arasındaki 10 yıllık dönemin ele alındığı çalışmada yoğunlaşma ölçütü olarak Entropi Endeksi (EI) kullanılmıştır. Elde edilen sonuçlara göre, EI skorları en yüksek (yoğunlaşma düzeyi en düşük ve rekabet düzeyi en yüksek) futbol ligleri sırasıyla Fransız, İngiliz, İtalyan, İspanyol, Alman, Türk futbol ligleridir.

**Anahtar Kelimeler:** Avrupa Futbol Ligleri, Yoğunlaşma, Rekabet, Entropi Endeksi

### **1. Introduction**

Sports with the highest industrial diversity and added value creation are basketball and volleyball, especially football. These three sports are popular sports that millions of people at all levels play or watch as spectators around the world. Although football is mainly a sports industry, the potential of basketball and volleyball is increasing every day.

Especially in the field of football, there is a system of competitions organized at national and international levels. Clubs compete against each other in these competitions. Achievements and failures in sports are tracked as statistical data. The competition process has been transformed into digitized criteria by giving different scores to the winning, drawn and defeated teams. Although the scoring system is different in each sport, a similar logic is driven (Kara, Pehlivan, Tiryaki, Bayhan, & Atsay, 2017).

In our age, football is not only a sport that is watched with pleasure, but also a sector that has huge material dimensions. It is obvious that football is the most popular and most popular sport in the world. In addition, today, football has become an industry that creates income and employment through its priori and backward connections, creating added value in very important dimensions. As a result, both national and club-based football competitions and rivalries of countries have become widely watched in the world. In this case, significant financial contributions are made to football clubs through advertising, broadcasting and sponsorship revenues. Football clubs have also made efforts to

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increase the level of competition on a national and global basis, providing them with more financial resources and moving to the front row in the race.

Table 1. Market Values and Transfer Spendings of the Six Football Leagues (2009-2018)

Leagues	Value (Million Euro)	009	010	011	012	013	014	015	016	017	018
English	Market Value	.090	.380	.290	.100	.190	.700	.630	.730	.380	.930
	Transfer Spending	.100	.650	.470	.220	.25	.75	.40	.99	.94	.56
Spanish	Market Value	.060	.730	.140	.640	.750	.620	.720	.700	.550	.250
	Transfer Spending	.55	.21	.13	.44	.50	.59	.98	.14	.03	.88
Italian	Market Value	.300	.110	.820	.800	.830	.420	.500	.790	.550	.300
	Transfer Spending	.56	.62	.03	.41	.63	.61	.19	.62	.43	.89
German	Market Value	.880	.580	.520	.400	.140	.890	.820	.810	.720	.460
	Transfer Spending	.17	.73	.73	.68	.05	.89	.19	.13	.46	.83
French	Market Value	.050	.740	.630	.520	.720	.580	.530	.590	.420	.240
	Transfer Spending	.39	.60	.64	.74	.14	.59	.47	.55	.70	.58
Turkish	Market Value	.040	.160	.200	.020	.060	.080	.88	.64	.29	.77
	Transfer Spending	.26	.7	.08	.5	.20	.19	.29	.14	.8	.2

Source: The data was obtained from <https://www.transfermarket.com.tr/>

The financial power of football teams in the world is growing, and European football clubs receive the highest share of this pie. This is undoubtedly an indication that the market value of European football clubs is higher. At the same time, it is clear that the transfer power and spending of the clubs in question, whose market value is higher, will also be higher. Table 1 shows the highest budget football leagues in Europe. Taken in terms of market value, the highest budget football leagues are the English, Spanish, Italian, German, French and Turkish football leagues respectively (<https://www.transfermarket.com.tr/>). As can be seen in Table 1, transfer expenditures in these leagues are also approximately shaped according to market values.

In this study, the competition situation between clubs in the highest budget football leagues in Europe is discussed in terms of intensification over the years (from 2009-2010 season to 2018-2019 season). The entropy index is also used as the concentration criterion. In this way, we will try to determine which football league is more competitive.

## 2. Data and Method

The study analyzes the level of competition in Europe with the highest budget and also the most popular football leagues (English, German, French, Italian, Spanish, Turkish). The study analyzes the 10-year period between 2008-2009 and the 2018-2019 season. In the analysis, the condensation method and the EI are used.

In the study, the points obtained by the football teams in question in that season are used in the analysis of the level of competition of the football leagues of the countries. These scores are obtained from the website Maçkolik (<https://www.mackolik.com/puan-durumu/>) and adapted by me for concentration analysis. The points obtained by the football teams in that season are used in the

analysis of the level of competition of the football leagues of the countries. These scores obtained are adapted by me for concentration analysis.

In the article, the EI scores of the countries' football leagues are shown individually. However, the charts used values set as 2009=100 along with index values. The aim here is to interpret the course of indices more accurately and easily according to the years.

The concept of entropy was originally developed as a measure of disorder in thermodynamics and statistical mechanics. The EI was put forward by Theil (1972), which represents the diversity or spread of a distribution (Theil, 1972). The EI, traditionally used in science, communications, business, finance and economics, indicates extreme expertise or concentration within a commodity (Samen, 2010). The EI is also a preferred measure of export diversification.

The EI is a weighted total concentration measure. These weights are the natural logarithms of the market shares of sellers and are inversely related to market shares. The minimum value of the index is zero, and this occurs in the case of a monopoly. Maximal values occur when the market shares of sellers are equal, and these maximal values are equal to the respective weights (Pisanie, 2013). In other words, the maximum value indicates the minimum concentration and the full (maximum) diversification (the shares obtained by the units are equal) (Palan, 2010). In the case of the probability of a discrete event, if the entropy is denoted by H, the formula is as follows:

$$H = - \sum s \cdot \ln s$$

Maximum entropy is reached when every probability of every discrete event is equal. If "n" is considered the number of events, it can be expressed as  $s = 1/n$ . If entropy is used as a measure of the degree of competitiveness; s is the proportional market value of the firm within the industry. The higher the entropy value, the higher the degree of competitiveness (Nawrockia & Carter, 2010).

The EI, which is mainly used in foreign trade, is also formulated as follows (Şimşek, Seymen, & Utkulu, 2010):

$$EI = \sum_{i=1}^m P_i \times \ln(1/P_i) \quad \text{with} \quad 0 < P_i < 1 \quad \text{and} \quad \sum_{i=1}^m P_i = 1$$

In the formula,  $P_i$  shows that the share of foreign trade of country i from the opposite country. The increased index value means that the spread rate also increases. In other words, an increased index value indicates that the level of integration between units is higher and that the level of integration is increasing in the near future (Erkan, 2014). A low index indicates that diversification is low, and a high index indicates that diversification is high (Laaser & Schrader, 2002). If a country trades at the same rate as all its trading partners, integration is excellent. In this case, the entropy index is also the highest (Seymen & Bilici, 2009).

If adapted to the subject, the EI indicates the level of points spread between football teams.  $P_i$  denotes the share that the football team i received from the total of points in the football league. The index is inversely proportional to the degree of diversification. The lower the index score,  $\ln(1/P_i)$  and all the scores are concentrated on a football team's line. In this case, the scores on other lines are equal to 0 (excellent concentration, zero diversification and competition) (Balavac, 2012).

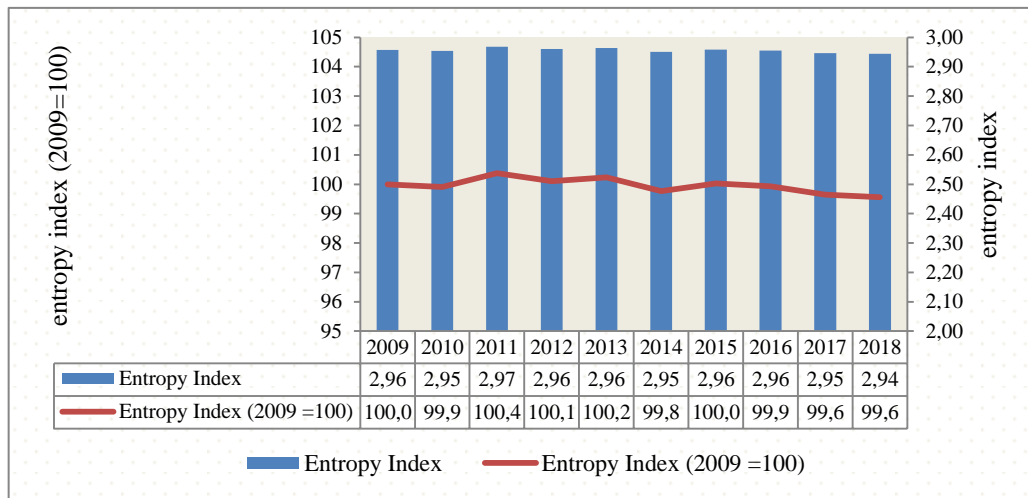
The higher the index indicates, the more evenly spread the scores, and the concentration level of the scores achieved by football teams is low. In other words, the level of competition between the football teams in the league in question is high. As a result, it is desirable for this index to be high in terms of competition. On the other hand, the upper limit of the index is equal to  $\ln(1/P_i)$ . In this case, all teams in the football league have equal points and a minimum (zero) concentration (Junior, Rezende, & Oliveira, 2013).

### 3. Entropy Index Analysis

As mentioned in the method section of the study, the higher the EI, the lower the concentration level. That is, football leagues with higher EI scores are more competitive than football leagues in other countries. In this case, the scores of the football teams in the competitive league in question converged relatively more together.

When the concentration values of the six highest budget football leagues in Europe are compared for the period 2009-2018, the highest EI scores (the lowest concentration) are observed in the French, English, Italian, Spanish, German and Turkish football leagues, respectively. The concentration view of the French Football League with the relatively highest EI scores is given in Chart 1. The relative height of EI scores in the French league reveals the relatively competitive structure of the league.

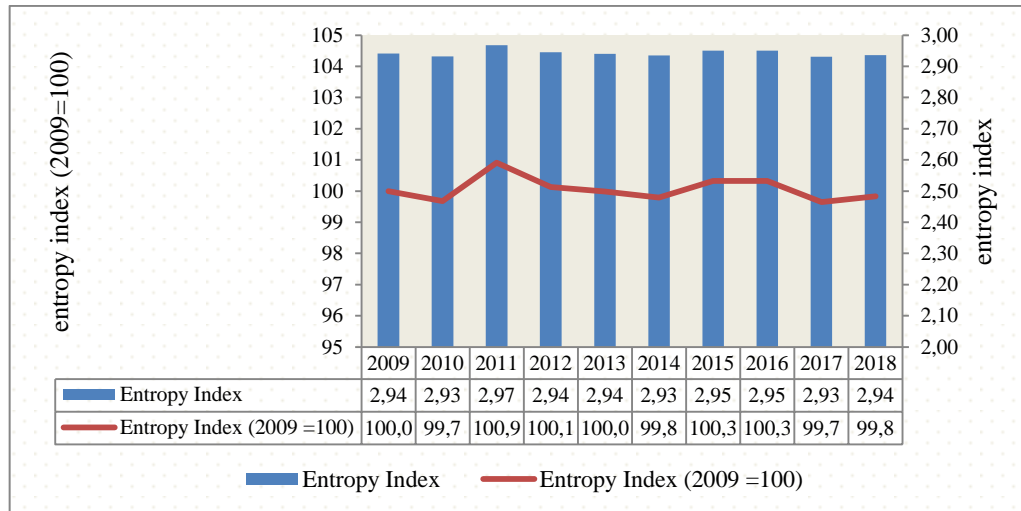
Chart 1. Entropy Index Values of the French Football League (2008-2009, 2018-2019)



**Source:** It was calculated and created by using data obtained from <https://www.mackolik.com/>

The season with the lowest concentration level in the French Football League is 2010-2011. In this season, the EI score reached its highest level (2.97). Although the concentration level in the French league is relatively low, the EI scores have been rising in recent years (Chart 1). This is a negative development in terms of the competitive structure of the league.

Chart 2. Entropy Index Values of the English Football League (2008-2009, 2018-2019)



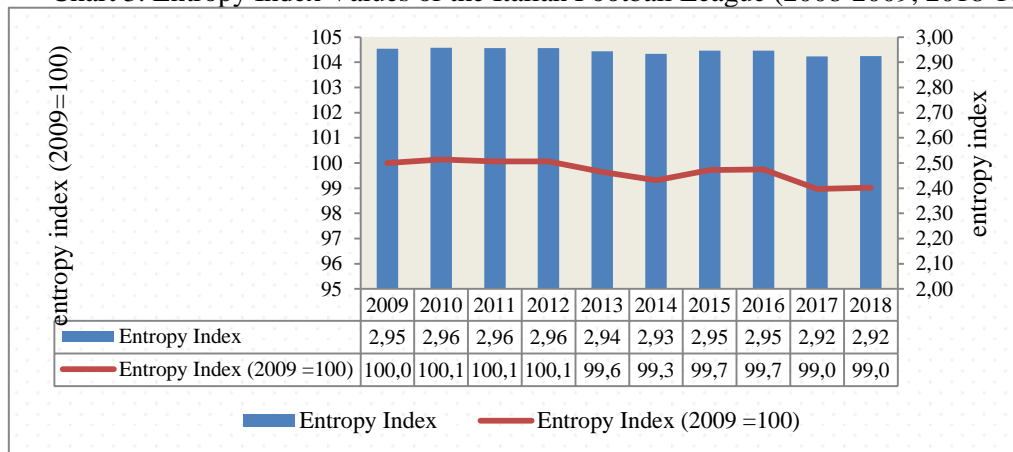
**Source:** It was calculated and created by using data obtained from <https://www.mackolik.com/>

The league with the highest EI scores (lowest concentration level) after the French league is the English league. The EI values in the English Football League are on an unstable course. Because the EI values, which were relatively lower in the first seasons, then rose and fell again (Chart 2).

The season with the lowest concentration level in the English Football League is 2010-2011. In this season, the EI score reached its highest level (2.97). However, in other seasons the index value has steadily declined.

Following the English Football League, the lowest level of concentration is the Italian Football League. The relative height of EI scores in the first four seasons in the league is remarkable. In recent years, however, the EI scores in the Italian Football League have been declining and concentration levels have been rising. As a matter of fact, the competitive structure in the league has been steadily deteriorating in recent years (Chart 3).

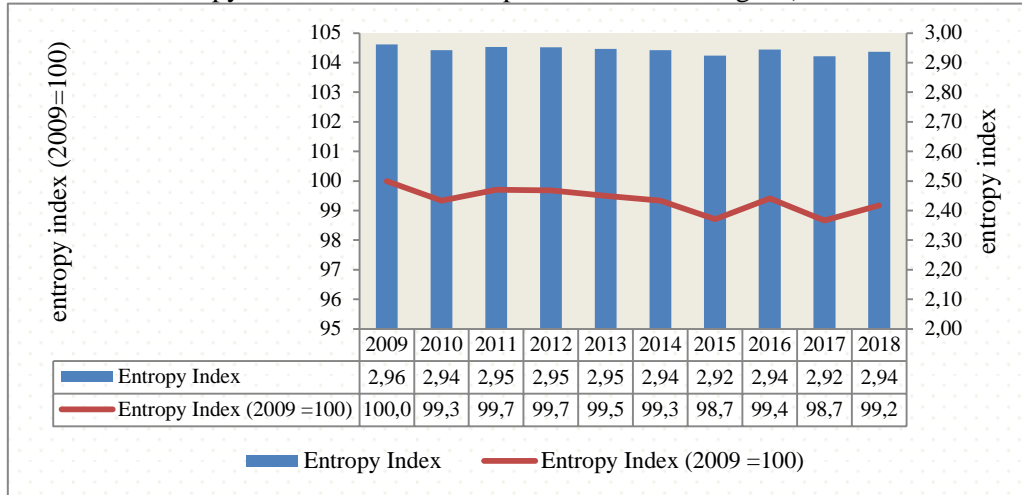
**Chart 3. Entropy Index Values of the Italian Football League (2008-2009, 2018-2019)**



**Source:** It was calculated and created by using data obtained from <https://www.mackolik.com/>

Following the Italian Football League, the lowest level of concentration is the Spanish league. The highest EI score in the Spanish Football League was in the 2008-2009 season. As it stands, this season is relatively competitive (Chart 4).

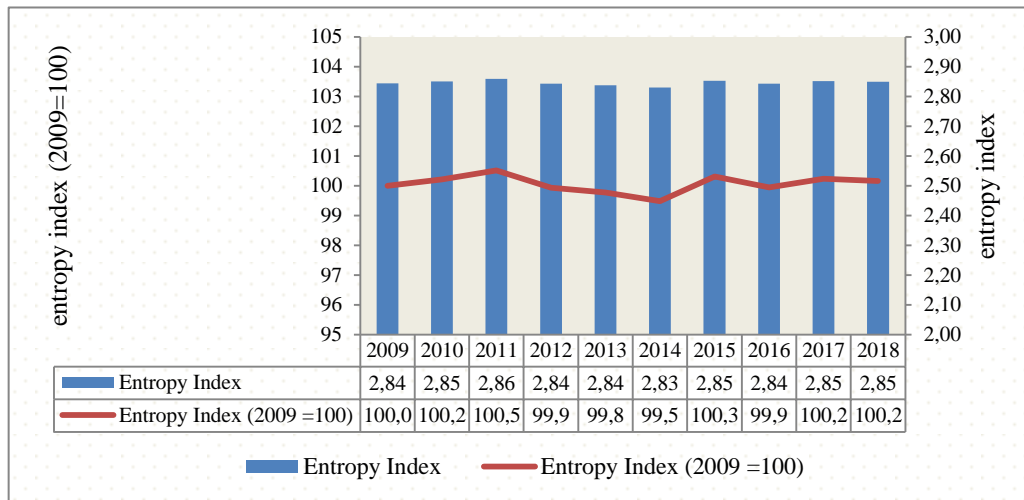
Chart 4. Entropy Index Values of the Spanish Football League (2008-2009, 2018-1019)



**Source:** It was calculated and created by using data obtained from <https://www.mackolik.com/>

In the Spanish Football League, the EI scores have decreased in recent years. This indicates that the concentration in the league has increased, the competitive level has decreased.

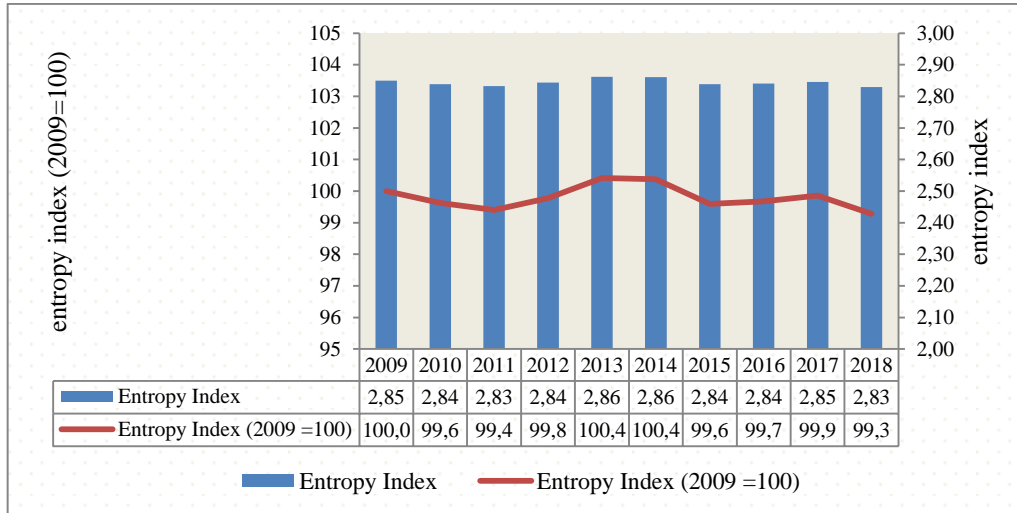
Chart 5. Entropy Index Values of the German Football League (2008-2009, 2018-1019)



**Source:** It was calculated and created by using data obtained from <https://www.mackolik.com/>

Among the six leagues with the highest budget, transfer spending and market value in Europe, the two leagues with the highest concentration level (the EI scores are the lowest) are the German and Turkish football leagues. Compared to other leagues, the EI scores in the German league are relatively low. The 2010-2011 season shows the highest level of competition in the league (Chart 5). However, the highest EI score in question was 2.7 in the French and English leagues. This indicates that the concentration in the German league is quite high.

Chart 6. Entropy Index Values of the Turkish Football League (2008-2009, 2018-1019)



**Source:** It was calculated and created by using data obtained from <https://www.mackolik.com/>

Among the six football leagues subject to the study, the league with the highest concentration level (lowest EI scores) is the Turkish Football League. The highest EI scores in the Turkish Football League were in the 2012-2013 and 2013-2014 seasons (2.86) (Chart 6). In other words, the level of competition is relatively high in the aforementioned seasons. The relatively high concentration in the Turkish Football League indicates the distance between the points that football teams have collected in a season. In this case, there can be no mention of serious competition between teams competing in such a football league.

#### 4. Conclusion

It is obvious that football is the most popular sport today, both in terms of the number of spectators, market value and transfer budget. Currently, the term industrial football is often used, and it has often begun to gain a place in the economic media, not only in the sports media. Football clubs, which constantly increase their returns even on national exchanges, are gradually increasing their importance in today's world through their back and forth connections and added value.

It would not be wrong to see football teams today as companies whose budgets have reached gigantic sizes at the same time. Because football teams now spend more transfers each time, make their management strategies more professional and become established. As a result, this leads to a further increase in the revenues of the clubs in question and gradually increases the competition between the clubs. Therefore, advertising and sponsor revenues of football clubs that lag behind in the race are declining, and these clubs score lower than other clubs.

This study aims to determine the concentration (competition) levels of football leagues with the highest budget and market value in Europe (England, Spain, Italy, Germany, France and Turkey). For this purpose, the EI from the concentration criteria is used and the country scores obtained by year are compared with each other.

In football leagues where the EI scores and competitive levels are relatively low and concentrations are high, clubs that struggle are also financially diverged from each other. In this case, the number of spectators, advertising and sponsorship revenues, market value and transfer budgets of some football clubs competing in the same league are very high, while those of some are quite low. Therefore, a few clubs have the highest share of the value added that occurs in a given season in the football league, and most other clubs have a very low share of the pie. As a result, football clubs with a low transfer budget and market value will not be able to compete and succeed in both the national and international arena.

## REFERENCES

- Balavac, M. (2012). *Determinants of export diversification at the export margins*. The European Trade Study Group (ETSG).
- Canada Statistics. Export Diversification: [www.statcan.gc.ca/daily-quotidien/171211/dq171211b-eng.pdf](http://www.statcan.gc.ca/daily-quotidien/171211/dq171211b-eng.pdf) Date accessed: (11.12.2017)
- Erkan, B. (2014). Product and Market Diversification in Turkey's Foreign Trade. *International Journal of Advances in Management and Economics*, 3(1), 1-15.
- Junior, L. M., Rezende, J. L., & Oliveira, A. D. (2013). Concentration of World Exports of Forest Products. *Ciência Florestal*, 23(4), 691-701.
- Kara, O., Pehlivan, M., Tiryaki, K., Bayhan, M. A., & Atsay, Ç. (2017). Türkiye Basketbol Liglerinin Rekabet Yapısı Ve Spor Endüstrisi İle İlişkisi . *İnsan Ve Toplum Bilimleri Araştırmaları Dergisi*, 6(6), 213-237.
- Laaser, C.-F., & Schrader, K. (2002). European Integration and Changing Trade Patterns: The Case of the Baltic States. *Kiel Institute of World Economics*, 1088, 1-51.
- Mackolik: <https://www.mackolik.com/puan-durumu/> Date accessed: (15.8.2019)
- Nawrockia, D., & Carter, W. (2010). 'Industry competitiveness using Herfindahl and entropy concentration indices with firm market capitalization data. *Applied Economics*, 42(22), 2855 — 2863.
- Palan, N. (2010). *Measurement of Specialization The Choice of Indices*. Vienna: FIW Working Paper, No. 62.
- Pisanie, J. d. (2013). *Concentration measures as an element in testing the structure-conduct-performance paradigm*. ERSA working paper 345.
- Samen, S. (2010). *A Primer on Export Diversification: Key Concepts, Theoretical Underpinnings And Empirical Evidence*. Washington DC: Growth and Crisis Unit World Bank Institute.
- Seymen, D., & Bilici, Ö. (2009). Has Customs Union Changed the Country Concentration of Trade Between Turkey and the European Union?'. *European Trade Study Group 10th Annual Conference*, (s. 1-14). Rome.
- Şimşek, N., Seymen, D., & Utkulu, U. (2010). Turkey's Competitiveness in the EU Market: a Comparison of Different Trade Measures. *Dokuz Eylül Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 12(2), 1-45.
- Theil, H. (1972). *Statistical Decomposition Analysis*. Amsterdam: North-Holland Publishing.
- Transfermarket: <https://www.transfermarket.com.tr/> Date accessed: (10.8.2019)