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**Methodologies to Measure Market Competition – Note by Korea**

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More documents related to this discussion can be found at  
<https://www.oecd.org/daf/competition/methodologies-to-measure-market-competition.htm>

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### 1. Introduction

1. The purpose of competition policy is to facilitate market functions and promote competition. Therefore, competition authorities should understand the market structure before establishing and implementing policies. This is the reason why we conduct market studies which explain how competition works and identify what factors are anti-competitive.
2. The KFTC has been conducting market analyses to collect basic data for policymaking. This report describes the methodologies to assess market competition, and introduces cases that the KFTC applied them to specific markets.

### 2. Indicators to measure market competition

3. In order to gauge market competition, we can use the following indicators for market structure and performance.

**Table 1.**

Market structure	Market concentration	Concentration ratio(CRk), Herfindahl-Hirschman Index(HHI)
	Entry barrier	Regulations: Approval for business, Restriction on the scope of business, etc.
		Actual barriers: Advertising intensity, Capital intensity, Minimum efficient scale, Amount of secured input, Access to sales and distribution channels, etc.
Others	Market share variation-fluctuation index, Company ranking variation-fluctuation indicator, etc.	
Market performance	Price	Price level, Price fluctuation, etc.
	Profit	Ratio of operating income to sales, Price-cost margin, Tobin's q, etc.

4. The Herfindahl-Hirschman Index(HHI) is one of the most common measures of market concentration. The HHI is calculated by squaring the market share of each firm and then summing them. We can measure the market share in various ways, but usually uses annual revenues. As the market share is squared, the higher the market share is, the greater the weight is. Also, the greater the concentration by a few companies is, the higher the HHI is. The KFTC uses the HHI for pre-screening of merger reviews.<sup>1</sup>

5. Regulations or actual entry barriers can affect market competition. We can measure the degree of actual entry barriers by using advertising intensity and capital intensity. The advertising intensity is calculated by dividing total sales revenue by advertising costs. A low advertising intensity, in other words, higher advertising costs than sales revenue generated, means that actual barrier is high. The capital intensity is calculated by dividing total assets by number of regular employees. When the capital intensity is high, the actual barriers is usually high as companies need more capital when they enter the market.

<sup>1</sup> The KFTC's M&A guidelines consider a market with an HHI is less than 1,200 to be a low-concentrated market, an HHI is 1,200 or more and less than 2,500 to be a mid-concentrated market and an HHI is 2,500 or more to be a highly concentrated market.

However, we should consider it with the minimum capital required. Even if the capital intensity is high, if the minimum capital required is small, then we cannot conclude that potential competitors have difficulties entering the market.

6. We can also consider the market share variation-fluctuation index<sup>2</sup> and company ranking variation-fluctuation index<sup>3</sup> to understand the competition intensity. If a company's market share or ranking maintains for a long time, it means this market stays at a fixed status, implying that competition may not be sufficient.

7. Among indicators of market performance, price and profit are useful. If price or profit is higher than that of competitors, other industries or other countries, then it means the market in question may not be competitive enough. In particular, if the profit rate of a certain company is significantly high, the company may have used its market power. The profit rate can be measured using the ratio of operating income to sales. The higher it is, the lower the competition intensity is. The KFTC is using price and profit to judge which market should be monitored and design policy remedies for flawed markets.

### 3. KFTC's analysis on market competition: overall market

8. The KFTC has biennially analyzed the market structure of the mining and manufacturing industries, and estimated the competition intensity. The KFTC uses the data such as "the investigations on the mining and manufacturing industries" released by Statistics Korea, and calculates CR3 and HHI.

9. The market structure analysis conducted in 2019 was about 488 industries including the mining industry (11) and manufacturing industry (477) as of 2017<sup>4</sup>. The analysis shows that market competition has improved slightly from a year ago with a CR3 of 41.8% and an HHI of 1,288.

**Table 2. Concentration of the mining and manufacturing industries**

Indicator	2015	2016	2017	Year-on-year
CR3	44.1%	42.1%	41.8%	△0.3%p
HHI	1,464	1,320	1,288	△32

10. The KFTC classifies the industry with a CR1 is 50% or more or a CR3 is 75% or more for the recent 5 years as a "monopoly industry", and conducts more thorough investigations. Monopoly Industries as of 2017 were 46 including the semi-conductor, automobiles, LCD and mobile phone industries. Compared to the average, these industries

<sup>2</sup> The market share variation-fluctuation index is calculated as follows: (i: company, t: year, m: number of years subject to the analysis, n: number of participating companies, s: market share)

$$A = \frac{\sum_{t=2}^m \sum_{i=1}^n (s_i^t - s_i^{t-1})^2}{m-1}$$

<sup>3</sup> The company ranking variation-fluctuation index is calculated as follows: (i: company, t: year, m: number of years subject to the analysis, n: number of participating companies, N: ranking of market share)

$$B = \frac{\sum_{i=1}^n \left[ \sum_{t=1}^m N_{i,t} - m \left( \frac{n+1}{2} \right) \right]^2}{\sum_{i=1}^n \left\{ m N_{i,t=1} - m \left( \frac{n+1}{2} \right) \right\}^2}$$

<sup>4</sup> At the time of the analysis (Mar. 2019), the 2017 data was the most recent one.

had high value of shipment and a large proportion of domestic companies while their R&D ratio was low. This kind of investigation can explain the characteristics of a monopoly industry and the competitive harm. Also, we can reflect the results in policymaking to improve the market structure.

**Table 3. Major monopoly industries**

(Unit: %, billion won)

Industry	CR3	HHI	Total value of shipment	Average value of shipment	R&D ratio	Proportion of domestic companies	Ratio of international trade
Semi-conductor	99.2	6,033	91,835	3,401	7.8	70.6	28.8
Automobile	88.5	3,175	79,070	4,651	3.6	77.7	12.1
LCD	86.0	3,515	49,679	376	4.8	78.4	8.9
Mobile phone	88.5	3,869	31,840	209	9.9	73.8	16.7
Average of monopoly industries	92.0	5,155	7,580	324	2.6	78.9	14.0
Average of the mining & manufacturing industries	41.8	1,288	3,059	61	2.8	36.2	12.7

#### 4. KFTC's analysis on market competition: specific market

11. The KFTC has annually conducted market studies on 1 to 5 monopoly industries since 2008. First, we shortlist several industries based on the market structure analysis and reports from various economic research institutes. Then, we consider the market concentration, the importance of the national economy and the daily life comprehensively, and choose the market for studying.

**Table 4. Market studies**

Year	Industry	Year	Industry
2008	Air transport, Internet portal	2015	Aluminum hydroxide, School uniform
2009	Indemnity insurance, Movie, Petroleum, Pharmaceuticals, Gas	2016	Beer, Tug boats, Community energy system
2010	Liquor	2017	Railway, Mobile communications, Movie
2011	Cosmetics	2018	Air passenger transport, Warranty, Housing management system
2012	Online lecture, Digital music, Multichannel pay-TV	2019	Distribution of farm products, Broadcasting media, Payment system
2013	Advertising, Insurance	2020	Distribution of fishery products, ICT-based vocational training, Asphalt concrete bidding system
2014	Car rental, Gas		

#### 4.1. Case 1: Online music service market

12. The KFTC analyzed the online music service market, which is a part of the digital (mainly, online and mobile) music market.

13. To assess market competition in terms of market structure, the KFTC first measured the market concentration by using the CR3 and HHI<sup>5</sup>. We calculated the market share with the annual revenue and number of paid subscribers<sup>6</sup> respectively.<sup>7</sup> The result showed that, in 2011, the CR3 and HHI of the online music service market based on revenues were 62.8% and 2,249 respectively. Based on the number of paid subscribers, 65.14% and 2,291 in the same year. The CR3 at around 60% and HHI at over 2,000 mean that the market share of the largest firm in the market was especially larger than those of the second and third place competitors.

14. We measured the size of actual entry barrier as advertising intensity and capital intensity.<sup>8</sup> From 2007 to 2011, the advertising intensity of this market averaged 46.8, which was similar to the average of online-based industry (42.8). On the other hand, in the same period, the capital intensity of this market averaged about 440,000 USD, which was slightly higher than the online-based industry's (310,000 USD). However, given that there were over 50 firms in this market and many of them are small in size, we could assume that the minimum capital required was not large. As a result, the KFTC concluded the entry barrier was not high.

15. In order to analyze market competition with market performance, the KFTC used the ratio of operating income to sales. The result showed that, in 2011, the ratio was 12.09%, which was similar to those of other industries, such as the publication, broadcasting & telecommunications industry (9.2%), and the arts, entertainment & recreation industry (12.5%).

16. In conclusion, although the market concentration by the largest firm was high, the entry barrier and operating profit were not particularly higher than other markets. If so, how would the largest firm be able to maintain its huge market share? Companies in that market were providing similar products at similar prices. Also, due to the characteristics of the music service industry, other than prices, competition through improving service quality or increasing diversity was difficult. The KFTC concerned (1) the possibility of tacit price fixing between businesses, or (2) the effect of the bundling strategy (giving a discount on an online music service for subscribing to a particular telecommunications service) of the largest firm. Based on the analysis, the KFTC has been continuously monitoring possible anti-competitive behaviors in the online music service market.

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<sup>5</sup> When calculating the HHI, the KFTC counted only top 8 companies, which accounted for 85% of the whole market.

<sup>6</sup> As the annual number of page view includes free subscribers as well, using the number of page view was not appropriate to measure the share of non-free product market.

<sup>7</sup> While we can obtain data on the revenue and number of subscribers of major 8 music streaming service providers, it was impossible to secure data of all other 40 businesses, which made it difficult to estimate the whole size of the market. Therefore, the aggregate of fees the music service providers pay for sound sources, which was provided by the Korea Music Copyright Association, was used for the analysis. Specifically, the proportion of the fees paid by the top 8 businesses account for in the total fees was calculated. The KFTC assumed that the proportion the major 8 businesses account for when it comes to the revenue and number of subscribers would be equivalent to the proportion of the fees (85%).

<sup>8</sup> The online music distribution service did not require approval or authorization for business, and exclusive sales rights were not acknowledged in the market. Therefore, there existed no regulations that directly acted as entry barriers. In addition, it was concluded that there existed no actual entry barriers stemming from access to raw materials and sales distribution channels, and the minimum efficient scale.

## 4.2. Case 2: Online lecture market

17. The KFTC analyzed the online lecture market for high school students provided by private enterprises (not by public enterprises).

18. First of all, the KFTC analyzed market competition from the market structure perspective. We calculated the market share based on the revenue, number of unique visitors<sup>9</sup> and number of paid-up members. Afterwards, we used the CR1, CR3 and HHI to measure the market concentration. The result showed that, in 2011, the revenue-based CR1, CR3 and HHI of the online lecture market were 64.7%, 85.5%, and 4,467 respectively. Based on the number of visitors, CR1, CR3 and HHI were 31.9%, 65.3%, and 1,893. And, based on the number of paid-up members, CR1, CR3 and HHI were 36.1%, 82.3%, and 2,763. According to these numbers, the market is highly concentrated.

19. To measure the size of actual entry barrier<sup>10</sup>, we used the advertising intensity. From 2007 to 2011, the average advertising intensity was 10.5, which was lower than those of other industries, such as brick and mortar private educational institutes (24.9) and the online-based industry (42.8). As advertising costs were high relative to the sales revenue generated, it was analyzed that the entry barrier was high.

20. As mentioned earlier, we can estimate market competition by examining market performance indicators, such as prices<sup>11</sup> and profits. The analysis showed that the price level of the largest firm was, on average, 9% higher than those of the second to fifth competitors. Also, as of 2011, the ratio of operating income to sales for the largest firm was 31% while those for other firms<sup>12</sup> were between -21.2% and 14.6%. This clearly showed that the No.1 firm had some market power. However, it was difficult to assert that the largest firm had ‘significant’ market power or abused it. Because the high price of the largest firm may reflect the high-quality of service. Also, we couldn’t ignore competition threats such as growth of public enterprise (Korea Educational Broadcasting System) in adjacent markets.

21. Based on the aforementioned indicators for market structure and performance, it was difficult to conclude that the online lecture market was sufficiently competitive. This implied that the KFTC should monitor the possibility that the largest firm abuses its market power and restricts competition using its huge market share. In fact, the competition situation can get worse at any time due to bundling, demand tipping, exclusionary conduct, etc.

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<sup>9</sup> The number of unique visitors refer to the number of natural persons who visited a website in a specific period of time. Even if one person visits a site several times for a specific period of time, the visitor is counted as one.

<sup>10</sup> In order to provide online lecture services, the providers are just required to register on the superintendent of education. Therefore, there existed no actual entry barriers. For the analysis of actual entry barriers, capital intensity in addition to the advertising intensity could have been used, but due to limited data, it was not possible.

<sup>11</sup> As the price of online lectures varied depending on their forms, types, and qualities, it was difficult to compare each of them directly. In the analysis, price per minute as of Sep. 2012 were used.

<sup>12</sup> It included only business operators which published their revenue records.