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Methodologies for Conducting Market Studies – Note from Turkey

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> _This document reproduces a written contribution from Turkey submitted for Item 2 of the 125th meeting of the OECD Working Party No. 3 on Co-operation and Enforcement on 20 June 2017._
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> _More documents related to this discussion can be found at www.oecd.org/daf/competition/market-study-methodologies-for-competition-authorities.htm_

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Turkey

1. As a part of its advocacy efforts, Turkish Competition Authority (TCA) conducts market studies/sectoral inquiries and has legal powers to request information and use external consults during this market studies. Since its inception, TCA has conducted a total of 12 market studies in the "Television Broadcasting - 2017", "Cement - 2016", "Cinema Services - 2016", "Electricity (Wholesale and Retail) Sector - 2015", "Motor Vehicles - 2014", "Pharmaceutical - 2013", "Natural Gas - 2012", "Fast Moving Consumer Goods - 2012", "Meat - 2011", "Driving Schools - 2010", "Bank Cards - 2009", and "Road Fuel - 2008" markets[1].

2. TCA also has an internal "Directive" on how the sector/market reports should be prepared in order to streamline the market studies conducted in different sectors by the corresponding Supervision and Enforcement Department.

3. We now would like to give brief information about some of the most important market studies/sector inquiries that TCA has conducted and more thoroughly explain the "Cement" market study since it requires a special attention for its use of econometric methods and data analysis.

1. Television Broadcasting Sector within the context of Convergence and Digitalization Inquiry

4. In its meeting on 9 October 2013, Turkish Competition Board decided to prepare a report in the broadcasting sector in order to understand how convergence and technological innovation was affecting this sector and what kind of problems did consumers and actors in this market face. While preparing the report the rapporteurs have held meetings with various media service providers, pay TV platforms, infrastructure and platform providers, analyzed the literature and other Turkish and foreign authorities'/regulators' decisions and made use of the reports prepared by public and private entities. The study also used data, collected by the TCA, in order to better explain this market's characteristics.

2. Cinema Services Sector Report

5. Cinema Services Sector Report was prepared, similar to a post-merger analysis report, in order to understand the fundamental principles governing this sector and analyze the market conditions after the decisions taken by the Turkish Competition Board, especially the merger decision No: 11-57/1473-539, date 17 November 2011 about the acquisition of AFM by Mars. This report also looked at the decisions taken in US and EU and included market researches prepared by other agencies and TCA.

6. In order to determine how the market was shaped by the Mars-AFM decision, rapporteurs held meetings with the undertakings operating in different levels of the sector, prepared a web-based questionnaire and asked total box office revenue and other price related data from the related undertakings. The results, especially the HHI ratios before

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[1] You can find all of the market studies conducted by the TCA through this link:

http://www.rekabet.gov.tr/tr-TR/Sektor-Raporlari-Listesi

and after the merger decision, were then compared with the estimates prepared for the initial merger report.

3. Electricity (Wholesale and Retail) Sector Inquiry

7.   The Electricity (wholesale and Retail) Sector Inquiry was prepared in order to understand what could be done to have a more competitive market during and after the end of the liberalization process in this sector. The report analyzed the previous views and decisions taken by the Turkish authorities for this sector, looked at how the structure of the retail and wholesale market evolved throughout the years and came up with some suggestions to increase the competition during and after the end of the liberalization process.

4. Motor Vehicles Sector Inquiry

8.   In its meeting on 26 May 2011, Turkish Competition Board decided to carry out a sector inquiry on the motor vehicles sector in order to see the effects of the "Block Exemptıon Communıqué on Vertıcal Agreements in the Motor Vehicles Sector" which came into effect in 2006. In order to carry out this inquiry, the rapporteurs held meetings with many public and private bodies, sent surveys to suppliers, distributors, authorized services and unauthorized services and asked how the market was functioning between 2002 -2011 and the effects of the previous Communiqué. The survey found out that the sales of motor vehicles showed competitive structure whereas the after sales market was not found to be competitive enough. However, the previous Communiqué was found to be pro-competitive as the after sales market showed worse results in terms of competition before the previous Communiqué was published. Therefore, it was concluded that the Communiqué was effective in increasing the competitiveness in the after sales market of motor vehicles.

5. Cement Sector Inquiry

9.   In its meeting on 8 May 2014, Turkish Competition Board decided to conduct a sector inquiry in Cement sector. The reasons to conduct a market study in this sector, as stated in the final report, can be summarized by the below facts:

- Cement is a major input in infrastructure as well as superstructure projects.
- Cement sector has become an important part of the Turkish economy.
- There has been a lot of investigations and preliminary investigations carried out by TCA in this sector since TCA's inception in 1997.
- Cement sector can be characterized as an oligopolistic sector because of high investment (almost USD 100 Million (United States Dollars)) and transportation costs (an area of 200-300 km radius of the production facility is generally regarded as the feasible sale zone) and existence of legal entry barriers (every cement production facility has to be approved by a number of public entities).
- Cement can generally be considered as a homogeneous product but different cement products can be produced according to different needs.
- In this regard, production differentiation is possible and can occur according to different buyer types and buyers' location.

10.   The analysis used undertakings' sale prices between January 2009 – August 2014 which amounted to over 5 800 000 observation points. Each observation point contained the below data:

- Name of the producer (20 total).
- Recipient (buyer).
- Recipient's tax identification number (a total of 6 900 different buyers).
- Type of the recipient (11 in total) according to the factors like:
  - Whether the buyer is a distributor or not.
  - Whether the buyer belongs to the same group of firms with the seller or not.
- Date of sale (day/month/year and consists of 2 100 different dates).
- What type of the cement product is sold (32 in total).
- The city that the product is sold from (a total of 58 provinces).
- Quantity sold.
- Price, value added tax and the transportation cost.
- The city and county that the product is sold to (all of 81 provinces).

11.   Apart from the data, the cost figures requested from the undertakings were finalized after holding meetings with the undertakings and included only clinker (main input that is used to produce cement), energy and labor costs (when only these inputs are taken into account, 85% of the total costs were directly related to the production of clinker, 15% was energy costs and 5% was labor costs and these percentages more or less stayed the same between 2009-2014).

12.   The general findings of the report can be summarized as,

- Cement supply and demand show seasonality.
- The cement sector grew more than the whole economy and the price of cement increased (except for 2013) more than the inflation rate between 2009 and 2014.
- Each city's cement market structure is different from each other and did not change between 2009 and 2014.
- 25 % of the cement is sold to only three cities and 50 % of the cement is sold to other 13 cities.
- 20 % of the production is done in three cities and 50 % of the production is done in other 10 cities.
- On the average, 57% of the production was consumed within the city that it was produced.
- The production facilities sold 53 % of their cement production within the city that they operated.
- Between the years 2009 – 2014, at least two different producer sold its product to almost all of the provinces; and
- On the average four to five different producers sold its products to the majority of the provinces.
- Looking at the days that the producers sold their production to a province, it was found that on the average only one producer sold its product to a province in a given date and there has never been a day that more than six different producers sold their products to a city in the same day.
- Only 1 firm was found to be selling its products to more than 50 provinces.
- Almost 10-12 undertakings were found to be selling their products to more than 20 provinces.
- Only one firm had the lead in terms of production in 79 out of 81 provinces; and

- When the geographic market is defined as "all of Turkey" HHI ratios of the undertakings were low but when the geographic market is defined more narrowly like each city, the HHI ratios were found to be very high.
- Cement prices did not fall when the concentration ratio decreased.
- Sale price cement to public undertakings was higher than the sale prices of the cement product to the private undertakings.

6. Price-Cost-Demand Analysis

13.   The report made use of "*Autoregressive Distributed Lag Model*" (ADLM) in order to analyze the cost and average price of cement over the years.

- The model for ADLM used was:

$$Y_t = \alpha_0 + \sum_{p=1}^{T} \alpha_{t-p} Y_{t-p} + \sum_{P=0}^{T} \beta_{t-p} X_{t-p} + \epsilon_t$$

Where (t) is current date, (p) is the number of past variable added to the model, (Y) is price, (X) is costs.

14.   However, in order to apply ADLM to time series, time series needs to have certain statistical characteristics (such as no-autocorrelation) and in order to eliminate problems related to the price and cost structure of the data, a modified version of the test was applied. In other terms, "*Cointegration and Error Correction Model*" (CECM) were used in this case and first differences of price and were taken in order to eliminate unit root within the dataset. For price, the change in price in the previous period was used as an explanatory variable, and for cost both the change in the current period and the change in the 2 periods before were used as explanatory variables. Also, the price and the cost data's logarithm was taken and the coefficients were interpreted this way.

- The model for CECM used was;

$$\Delta Y_t = \alpha_0 + \gamma HT_{t-1} + \sum_{p=1}^{T} \alpha_{t-p} \Delta Y_{t-p} + \sum_{P=0}^{T} \beta_{t-p} \Delta X_{t-p} + \epsilon_t$$

Where, Δ is difference in variables, and HT is the error correction term which is calculated using the following equation

$$HT_t = Yt - \rho_0 - \rho_1 X_t$$

15.   The analysis method can be summarized as the following:

- For the price and costs series which demonstrated stability, a "cointegration" test was performed.

- If the data series passed the "cointegration" test, then the series was analyzed using CECM method after taking its difference in time with help of Engle-Granger method.
- CECM method used for estimation was:

$$\Delta \text{Price}_t = \gamma HT_{t-1} + \alpha_1 \Delta \text{Price}_{t-1} + \alpha_2 \Delta \text{Cost}_t + \alpha_3 \Delta \text{Cost}_{t-1} + \alpha_4 \Delta \text{Cost}_{t-2} + \epsilon_t$$

- If the data set couldn't pass Engle-Granger test then ADML was used to explain the model after taking its difference in time.
- The model used for price in ADML method was:

$$\Delta \text{Price}_t = \alpha_1 \Delta \text{Price}_{t-1} + \alpha_2 \Delta \text{Cost}_t + \alpha_3 \Delta \text{Cost}_{t-1} + \alpha_4 \Delta \text{Cost}_{t-2} + \epsilon_t$$

- The results of this analysis for cities can be summarized as:
  - There was a correlation between price and cost only in 13 of the 72 cities analyzed (not all of the cities were analyzed because of lack of data).
  - Past price changes did not affect the changes in price in every city.
  - When the past price change was found to be affecting the changes in current prices, it was found that the past price increases/decreases generally increased/decreased the current prices.
  - No sound relationship between costs and prices was observed.
  - Similar results was also observed when the test was carried out for the production facilities.
- Similar results were found when the data series obtained for the cement factories were analysed.
- As a result, it was concluded that the changes in price was mostly affected by the changes in the previous periods' prices and not the costs.
- This showed that when the production costs decreased it did not lead to a decrease in price over time and when this happened the prices tend to increase instead of decrease.

7. Price and Demand Analysis

16.   In this section, how much the average cement price in a city is affected by the cement demand and whether there was a relationship between these two variables in the long run was analyzed with the help of the number of "construction permits" issued, which is published by the Turkish Statistical Institute. The number of construction permits was used as a proxy to determine the near future demand.

17.   The general model used in this analysis was:

$$\Delta \text{Price}_{c,t} = \mu HT_{t-1} + \alpha_0 \Delta \text{Price}_{c,-1} + \beta_0 \Delta \text{Demand}_{c,t} + \sum_{s=1}^{s} \beta_s \Delta \text{Demand}_{t-s} + \varepsilon_{c,t}$$

Where;

- Δ is used to show the change of the variable relative to its previous term.
- In the estimation, logarithmic values of the variables were taken into account.

- "c" means city c and t means month (so $\Delta\text{Price}_{c,t-1}$ means the natural logarithm of the change of the average prices in city c in month t).
- HT_{t-1} is the error correction term which is calculated by the regression between the price and the construction permits with a lag.
- "s" is used to show lag.
- μ is the speed at which price and construction permit's short run deviation from each other returns back to its long run relation.

18.   Since construction does not start at the time construction permit is obtained, the effect of demand over price was modelled using four months of lag (s= 1, 2, 3 and 4).

19.   Since there was no long term relation was observed between the all other cities, the below ADLM model was used:

$$\Delta\text{Price}_{c,\,t} = \alpha_0\,\Delta\text{Price}_{c,-1} + \beta_0\,\Delta\text{Demand}_{c,t} + \sum\nolimits_{s=1}^{s}\beta_s\Delta\text{Demand}_{t-s} + \varepsilon_{c,t}$$

The results were:

- Except for two cities, no long term stability relation was found between any cities.
- When analyzed for short term effects, researchers couldn't find any effect of demand on price in 51 out of 61 cities in terms of current or lagged values.

8. Analysis of the Joint Pricing Behavior

20.   In this section of the report, the researchers conducted a simulation, which was based on a merger simulation, in order to find out whether the pricing decisions were collusive or not. In the analysis the prices, which would maximize the cement producers profit if they were to hypothetically collude, were calculated and in another situation it was assumed that cement producers were behaving in a manner identified in microeconomic theory (Bertrand model). After calculating these prices, the observed average annual prices of the cement producers were compared with the findings of the simulation in order to see which scenario was close to the actual prices. In the last part of this section, the difference between the observed prices and the prices of the best simulation which explained the observed prices was calculated in order to see how much the prices found by the simulation explained the actual behavior of the cement producers.

21.   The statistics for this analysis is calculated by the following formula:

$$\text{Distance statistics for the scenario \#} = \sum\nolimits_{I=1}^{N}(p_i\,\text{observed} - p_i\,\text{scenario \#})^2$$

22.   The findings of this section can be summarized as follows:

- The performance of the simulations which are closest to the actual prices were divided into three different categories: less than 5%, between 5-10% and between 10-15 %.
- 65 observation (16 %) was closer than 5%, 110 observations (27 %) was close between 5% - 10%, 102 observations (25 %) was close between 10% - 15% and 128 observations were close more than 15 %.
- Out of the 404 observation plot, the difference between the price found in the simulation and the observed price was less than 15% in 277 of them.

- In 234 of the 277 observation plots, prices which are the result of the collusive behavior were 15% or less close to the observed prices; and therefore
- Partial or full collusive behavior produced more results close to the observed prices than non-collusive behaviour.

9. Effectiveness and Competition Analysis

23.   In this part of the report, "*Data Envelope Analysis*" (DEA) was used in order to calculate the efficiency score of the cement firms. The formula used for DEA was;

$$\max \emptyset_k = \sum_{r=1}^{s} u_r y_{rk}$$

Under the constraints:

$$\sum_{i=1}^{m} v_i x_{ik} = 1$$

$$\sum_{r=1}^{s} u_r y_{rj} - \sum_{i=1}^{m} v_i x_{ij} \leq 0, j = 1, \ldots, n$$

$$u_r, v_i \geq 0; r = 1, \ldots, s; i = 1, \ldots, m$$

Where:

- $\emptyset_k$ = Effectiveness score of the k decision unit (DU) which was evaluated by DEA
- j = number of the compared DU
- y_{rj} = output produced by DUj
- x_{ij} = input used by DUj
- i = number of input used by DUs
- r = number of output produced by DUs
- u_r = weight of output r calculated by DEA
- v_i = weight of input i calculated by DEA

24.   The units which have one as the effectiveness score were considered to be %100 effective and an effectiveness score less than one showed ineffectiveness.

25.   The average effectiveness score of the cement producers between 2010-2014 was found to be 0.70, which showed that the cement industry was operating at 70% effectiveness, and thus the sector has the potential to improve its effectiveness by producing more and/or reducing its input.