From economic standpoint competition concerns market structure and subsequent behaviour of buyers and sellers in a market. It is a way of production organisation and setting of prices. Economic role of competition is to encourage producers and owners of resources to offer their goods and services in a cheap way and skilfully done with the aim of consumer welfare maximalisation that means maximalisation of economy effectiveness.

However, the aim of firms themselves is to gain market power, i.e. intentional control over prices and other relevant factors e.g. quantity, discounts, that are decisive for business transactions. This market power can be obtained through competition restriction and that is a market imperfection which leads to ineffective allocation of sources and subsequent impair of industry output and economic welfare. Market imperfections allow sellers to decrease output of production deliberately with increasing prices to the detriment of consumers and society as a whole.

Quantitative methods are the instrument which helps to define the structure and behaviour of industry. Empirical analysis of economic issues becomes increasingly a basic characteristic of antitrust proceedings abroad especially when dealing with concentrations, abuse of a dominant position and agreements restricting competition.

The USA has got a long tradition of economic analysis stemming from the seventies when economists at the Department of Justice have got a greater influence as well as from the nature of the USA antitrust policy which requires lots of backing and facts finding evidence.

European antitrust law has started to pay attention to empirical evidence of economists only recently. European Commission Notice the Definition of the Relevant Market for the Purposes of Community Competition Law, 1997, defences quantitative techniques explicitly: "There are a number of quantitative tests that have specifically been designed for the purpose of delineating markets. These tests consist of various econometric
and statistical approaches: estimates of elasticity and cross-price elasticity for the demand of a product, tests based on similarity of price movements over time, the analysis of causality between price series and similarity of price levels and/or their convergence. The Commission takes into account the available quantitative evidence capable of withstanding rigorous scrutiny for the purposes of establishing patterns of substitution in the past"[1].

Econometric methods are suitable for rich data antitrust cases. An analyst has to know industry and behaviour of main actors in the market. He must appraise credibility and suitability of data before implementing empirical test [2]. Suitable method depends on quality of data, time and sources which are attainable. Results of econometric analysis should be compared with sources of evidence like documents, consumer reviews and marketing studies. If economic issues and a hypothesis are formulated clearly, if a model is well-defined and collected data are credible, then econometric methods are able to give the right answer and they represent a backing instrument when assessing the competition issue.

Analysis of concentrations, agreements restricting competition and abuse of a dominant position have the similar analytical proceeding consisting of the following steps:
1. identification of participants of proceedings, preliminary analysis of their activities – the subject of entrepreneurial activity, property and personnel linkage, definition of relevant jurisdiction,
2. definition of influenced markets from the product, geography and time point of view, assessment of position of firms in the relevant markets,
3. assessment of impacts on competition in the relevant markets in connection with behaviour restricting competition or proposed concentration
4. assessment of possible overall economic advantages.

Quantification can be involved in each of these steps whereby in every country quantitative techniques can differ. However, they are the only instrument for assessment of structures and behaviour of industry. Quantitative techniques are used especially for
- Market definition
- Market structure analysis
- Empirical analysis of competitive behaviour of firms, e.g. predatory pricing
- Assessment of effects of a concentration.
Market definition is the most important task when analysing economic competition. Statement on competition implications depends on size and form of relevant market. To define a relevant market means to characterise circumstances for market power performance. Key element is extent of supply and demand substitution. Primary means for a product market delineation is the evaluation of demand substitution – the extent to which buyers would easy substitute among alternative products or sources of supplies is characterised. When evaluating reactions of consumers one can stem from price and cross-price elasticity of demand. Interchangeability of supply, i.e. reactions of customers represent the secondary mean for definition of market boundaries. Level of substitutability of products, necessary for location of products in the same market, is high. Market has to be well-defined because a narrow definition of market takes into account insubstantial issues and too wide definition can conceal the very competition problems.

Very well known test is the test of hypothetical monopolist or cartel, called the SSNIP test in the USA (Small but Significant, Non-transitory Increase in Price). The test identifies the smallest number of products or producers, where the hypothetical monopolist or cartel which controls supply of all the relevant products, could increase profits by instituting a small but appreciable permanent increase in price over the competitive level. Also European Commission notice on market definition [1] makes reference to this approach as well as the U.K. new Competition Law [3].

Price trends analysis, demand test and system of demand equations are the quantitative tests used for market definition. In general, tests based on price trends should be used carefully as they do not enable to evaluate whether prices could be increased by market participants in profiting way. However, for the reason of not having data other models are not used and therefore markets are defined on the grounds of price tests [4].

Degree of market concentration was considered one of the main structural characteristics for a long time and market structure analysis has become the key indicator of actual and potential market power.
Traditional competition analysis stems from Bain’s paradigm on relationship among market structure, behaviour and market performance. Under this theory a market structure (number of sellers, feasibility of entry) predicts to the great extent the degree of market participants behaviour (pricing policy, advertisement) and a market performance in the form of effectiveness, technical progress is the result of the market behaviour.

Nowadays, there does not exist unambiguous opinion on the paradigm. Under some economists there does not exist evidence proving hypothesis that structure predetermines performance. Industries are very different and at the same time so complex that a simple generalisation is not possible. Therefore, the most preferred approach nowadays is case-by-case approach, i.e. individual assessment of the every case [5].

Concentration indices

Index used within econometric analysis of competition is called a concentration index. This index sets up a rate of individual firm to the total production of industry or within defined group of firms.

$$\alpha_i = \frac{q_i}{Q} \quad \text{where } i = 1, ..., n \text{ and } \sum_{i=1}^{n} \alpha_i = 1$$  \[6\]

Concentration rate CR_m points on the position of the m highest shares of firms

$$CR_m = \sum_{i=1}^{m} \alpha_i \quad \text{ordering the firms so that } \alpha_1 \geq ... \geq \alpha_m \geq ... \geq \alpha_n$$  \[6\]

CR_m is defined as a percentage rate of total industry sales /or capacity, employment, physical output/ of the largest companies set up under market shares. In the USA CR_m is measured for the first four firms CR4 whereby production industries are published for 8, 20 50 firms [7].

The most popular instrument is the Herfindhal- Hirschman Index (HHI) which is equal to the sum of the squares of the market shares
Under the USA guidelines unconcentrated market has the HHI less than 1000, a moderately concentrated market has the HHI between 1000 and 1800 and the market is concentrated when HHI is higher than 10 000. Concentration which leads to the increase of HHI less than 100 points and HHI is between 1000 and 1800 is not usually investigated. If HHI is above 1800 and an increase in the HHI is more than 50 points then a concentration could invoke serious competition harm.

Even if HHI seems to be a rational way of concentration measurement none of theories and econometric evidences have proven that HHI is a sufficient instrument for definition of concentration effects [2]. Every serious case of concentration has to point not only on concentration degree under HHI but especially on concentration effects on behaviour of market participants, e.g. probability of a collusion.

The question which of the mentioned indexes is the best one has not been answered yet. In every case it is necessary to proceed in empirical way and characterise the most suitable index for the particular behavioural relations.

When assessing impacts on competition stemming from behaviour of a firm or proposed concentration prices are analysed. Even a simple price analysis can give enough information as under Hayek's statement all relevant economic information are involved in data on price of product [9]. Matters are analysed in many ways:

- Time series of prices are evaluated in conditions of structural changes
- Actual price trends can be compared with that what a competition model in the absence of an event would predict (for example bidding models) [4].

Assessment of overall economic advantages in connection with behaviour restricting competition is also called defence of efficiency. Economists define three types of efficiency which are problematic when doing empirical verification:
Allocative efficiency means that prices reflect costs in such a way that firms produce relatively more of what people want and are willing to pay for. The result is that sources within economy are allocated in the way that the output which is the most appreciated by customers is produced. Co-operation among independent firms in the market or concentrations which decrease number of firms in the market, do not usually support allocative efficiency.

Technical efficiency means that under given output production uses the most effective combination of inputs without breaks. Healthy competition supports technical efficiency. If concentration increases beyond a certain level, technical efficiency is reduced, there is a fall in productivity.

Dynamic efficiency means that there is an optimal trade-off between existing consumption and investment in innovation and technological progress. Competitive pressures in the market support innovation. Firm in the front of technological progress has a chance to acquire market power.

The role of economic competition is to improve allocative efficiency without restricting the remaining two efficiencies.

Antimonopoly Office of the Slovak Republic is responsible for the supervision of competition rules in our country. Activity of the Office is focused primarily on observation of the Act on Protection of the Economic Competition as amended [9]. Quantitative analysis in competition area has not become yet the instrument regularly used when assessing market structures. In sporadic way Herfindhal index HHI was used as a backing argument when assessing degree of concentration in the relevant market under a concentration. During 1996 a methodology for industry quantitative analysis was tested in co-operation with University of Economics and it was confirmed that it is necessary to provide single data collection and to work out a methodological apparatus in the next future. After the validity of the just prepared new competition law harmonised with the EU legislation the Office is to pay increased attention to creation of methodology for quantitative analysis of competitive environment, degree of industry concentration, market structure analysis and utilisation of econometric and optimalisation progress.
References

[1] COMMISSION NOTICE on the definition of the relevant market for the purposes of Community competition law, OJ C 372 on 9/12/1997

Ing. Dagmar Straková
Protimonopolný úrad SR
Drienová 24
826 03 Bratislava