

## The Evaluation of Škoda Auto a.s. Prosperity with the usage of the Modified Magic Quadrangle Method

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**Abstract:** The graphical method of magic quadrangle is the method used at a macroeconomics level to assess the national economy. This method is based on the assumption of achieving the four main goals of the economic policy which are defined as the GDP growth rate, balanced payments in current accounts, optimal inflation rate and optimal unemployment rate. When constructing the “Magic Quadrangle” appropriate for the level of a company as a macroeconomics subject on the supply side, the standard macroeconomics magnitudes were replaced, so that, the chosen indicators evaluate equally the four main areas mentioned above: the growth of earnings before taxes, the share of sales abroad from the total revenues, the revenues for the real volume unit of production and the demand for production in the number of workers. The graphical method of the magic quadrangle applied at a microeconomic level can work for the management of the company as a supportive indicator of its financial “health”. The key factor in applying this method is the option of suitable indicators for setting up their optimal (final) figures. Considering the variability of individual microeconomic subjects, it is necessary to have an individual approach to those mentioned above.

**Key words:** Magic quadrangle, financial “health” “Magic Quadrangle” appropriate for the level of a company Škoda Auto a. s., altman z-score, sales, option

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### INTRODUCTION

The study is based on the idea of modifying and applying graphical method of magic quadrangle at a microeconomic level. The application of the magic quadrangle is demonstrated at Škoda Auto a.s. between the years 2005-2014.

The magic quadrangle applied in macroeconomics is a very simple and clear way of using a graph to illustrate the basic objectives of an economic policy (Bokrosova, 2005).

The observed values of the 4 parameters are depicted on the semi-axes of the quadrangle. The magic quadrangles’ connecting points create irregular quadrangles which can be used to illustrate individual national economies. The irregular quadrangles can then be compared to the original basic diamond shape. The changes in shape of the quadrangle clearly indicate the degree of completion or in completion of the observed parameters from the four basic objectives (Kuric, 2014).

These methods have often been expanded with a number of other monitored aspects and in the past magic polygons have been used for experimental purposes, e.g., project GAČR402/99/0501. The World Economic Forum also uses octagons in accordance with the Lisbon strategy to evaluate the EU’s objectives for individual EU members.

This method was also described as the devil’s quadrangle and it is used for measuring the performance of workflow (Mansar and Reijers, 2007).

When constructing a magic quadrangle suitable for enterprise level as a microeconomic supply-side subject, the classical macroeconomic magnitudes were replaced so that the chosen indicators could similarly evaluate the above four basic areas. The Individual vertices of the magic quadrangle of Škoda Auto a.s. consist of the following four indicators: the growth rate of gross profit, the share of international sales in (%) of revenues in total, the revenue per unit of physical production volume and the intensity of production per number of workers.

For each year from the time series, two patterns are shown—an optimal pattern which was created in advance from the optimal values and a pattern created from the real values of the chosen indicators of Škoda Auto. The comparison of the two patterns areas shows how successful the company’s development on the market is. From a methodological point of view a method of synthesis is used in this study. Also included are the following: a causal, a systemic, a numerical and a graphical analysis an induction, a deduction and a comparison of selected indicators within/during the observed period.

### THE CONSTRUCTION OF THE MAGIC QUADRANGLE INDICATORS FOR COMPANIES

The selection of the four indicators which form the vertices of a company’s magic quadrangle, must conform to several criteria.

The first requirement is that the magic quadrangle used for macroeconomics must have the closest possible connection between the quadrangle's four areas in order to maintain approximately the same explanatory power at both macro-and micro-economic levels.

The second criterion is the availability of data from which it will be possible to calculate the value of individual indicators. From this point of view there will ideally be indicators whose specific values can be found in the financial statements in the annual reports of companies published every year.

The third and equally important criterion is to simplify the calculation of selected indicators. This clearly gives the quadrangle greater explanatory power. From this perspective, the use of absolute indicators is preferable. However, if the closest possible connection between the quadrangle's indicators at macro-and micro-levels is desired, then evaluative indicators must be used.

**Indicator of economic dynamics:** An example of an area of the economic dynamics at the macro-level is an indicator of real GDP growth. Macroeconomic output of a GDP type is the pure output, i.e., without intermediate goods. This indicator corresponding to the micro-level can be an added value, respectively a value added growth (Minor inaccuracies can arise when calculating the level of the added value which is stated in the financial statements mentioned above. Its level is not listed in constant prices of the preselected year. If however, emphasis will be placed on the availability of data, it is necessary to tolerate this inaccuracy. The amount of the added value will therefore be a "nominal" quantity and not "real one").

When analyzing the data of Skoda Auto an indicator of the value added growth was chosen, due to legislative changes in the Czech Republic which came into effect on the 1. 1. 2005. These changes relate to the obligations of issuers of securities which are traded on the public securities' market to account and to report according to the International Financial Reporting Standards (IFRS). As an issuer of bonds, Škoda Auto calculates its financial accounts according to IFRS which it has done since 2005. This means that the value added indicator is not published.

**Indicator of external balance:** An example of the external balance of the national economy is the balance of payments of the current account balance in % of GDP. The starting point for a construction of a corresponding indicator for the micro-level can be the amount of sales of the company abroad as an absolute indicator (Again, this is a simplification from the logical point of view there would be an indicator quantifying the difference between the export sales and purchase of materials, semi-finished

products from abroad. The priority, however in this case is a simplicity and a data availability which corresponds to an absolute indicator). However, there will be a more appropriate indicator of the amount of foreign sales in% related to the total volume of production or the level of revenues.

**Indicator of prices:** An example in the area of prices, currency and its exchange rate is the inflation rate in the national economy. The corresponding indicator for the micro-level can be the share of revenues per unit of physical volume of production, namely the number of vehicles sold. Also, this indicator shows the price increase in comparison with the previous period as well as the inflation rate (The problem associated with the usage of selected indicators are based on the fact that the period of 2005-2014 is not coherent in the sense that there is not always the same structure of the individual model car production. The result of these considerations is the fact that the price of each car as well as the revenue grow. They also grow thanks to the increasing quality, safety, comfort of driving and extra equipment etc. Without exerting these inaccuracies, however, it would not be possible to carry out the intended calculations and comparisons).

**Indicator of inner balance and resource utilization:** A representative of inner balance and utilization of domestic resources is the registered unemployment rate for the macro-level. The corresponding indicator to the micro-level can be the difficulty of production to the number of workers, namely the share of the number of workers to the number of vehicles, respectively the number of cars to the number of workers (The problem relates to the number of workers: it is advisable to choose as a starting point the total number of workers (including temporary personnel), the number of workers or only the number of production workers, etc. Due to the accessibility of data it is suitable to include the total number of employees into the selected indicator).

A basic logical assumption will be ensured with such indicators selected for individual peaks of the company magic quadrangle for the successful development of the national economy as a whole as well as for a successful company in the micro-scale the surface of the magic quadrangle formed by the real values will increase, respectively will become closer to the optimal magic quadrangle.

#### **CALCULATION OF THE MAGIC QUADRANGLE'S INDICATOR VALUES BY ŠKODA AUTO, A.S. FOR THE YEARS 2005-2014**

Values of the optimal magic quadrangle are based on the real values of selected parameters for the company Škoda Auto, a.s. during 2005-2014 which were

Indicators	Values
U1-gross profit growth	57, 8 %
U2-sales abroad in (%) to the total revenues	90, 9 %
U3-revenues for 1 car	395, 2 CZK thousand
U4-the number of cars per 1 worker	29, 2 cars

Years	U1 (%)	U2 (%)	U3 (CZK thousand)	U4 (No. of cars)
2005	29.4	86.0	360.6	19.0
2006	18.6	86.5	341.9	20.8
2007	36.4	87.6	338.7	22.5
2008	-23.8	87.3	303.1	23.8
2009	-35.6	87.5	316.4	20.9
2010	57.8	89.3	348.9	24.7
2011	28.4	90.5	342.4	27.0
2012	19.7	90.8	348.1	26.3
2013	-5.0	90.6	368.8	25.2
2014	30.2	90.9	395.2	29.2

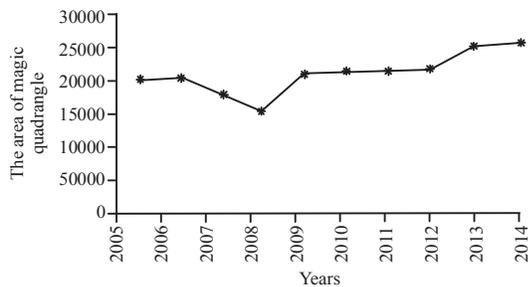


Fig. 1: The area of magic quadrangle

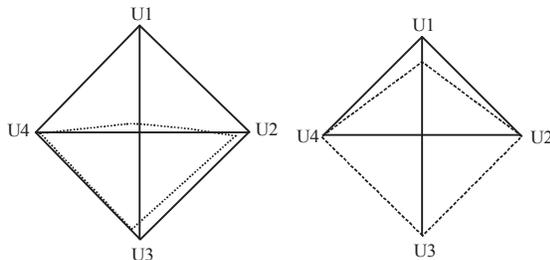


Fig. 2: Magic quadrangle of Škoda Auto in comparison with the reference quadrangle for the years 2009 and 2014

calculated from the data published in the company's annual reports. A methodology for the determining of reference values of individual indicators is based on Dvořáková.

Table 1 shows the optimum values of all four parameters which are essential for the construction of the optimal-reference-magic quadrangle of Škoda Auto.

The real values of these four parameters for the years 2005-2014 are shown in Table 2 and the area development of the magic quadrangle in the individual years is shown in Fig.1.

Figure 1 shows that the magic quadrangle reached the smallest area in 2009. The greatest decline of these indicators was observed in U1 indicators which characterizes the gross profit growth, so in the area of economic dynamics (Fig. 2). The cause of decline was

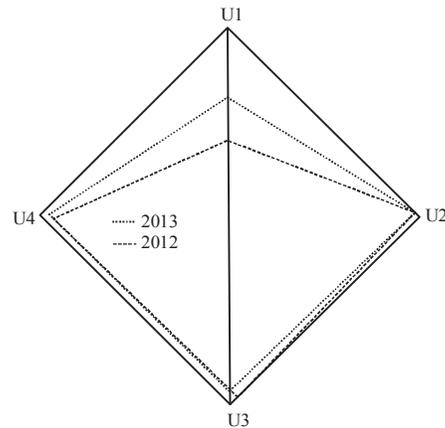


Fig. 3: The magic quadrangle of Škoda Auto in comparison with the reference quadrangle for 2012 and 2013

mainly due to the effects of the global crisis which had already hit the automotive industry by the second half of 2008; the quadrangle area designed for Škoda Auto reported a slump in 2008. The year 2009 can be evaluated as the least successful for the company Škoda Auto, not only based on the comparison of the magical quadrangle's areas. The result can be supported by using other methods of evaluation of the financial health of the company for example, creditworthy and bankruptcy models, e.g., the value of Altman Z-score (Altman and Hotchkiss, 2010) for 2009 was 3.0, thus approaching the border so called "Gray zone" (The upper limit of the so-called. "Gray zone" at the Altman Z-score (Altman and Hotchkiss, 2010) is 2.9) and is the lowest from the analyzed years. Also, the index value IN05 is the lowest in 2009, reaches only 1.4 and is located in the so-called. "Gray zone" (The upper limit of the, so-called. "Gray zone" 9 in the index IN05 is 1.6. According to companies in the gray zone will have a 50% probability of bankruptcy. And they will produce the value out of 70).

On the contrary, the largest area occupies the magic quadrangle of Škoda Auto in 2014 (Fig. 2) when the company achieved the best results of indicators U2, U3 and U4 during the monitored period. The company reported the record results in the area of sold and produced vehicles, operating profits and turnover as well. Also, the use of the Index IN05 leads to the confirmation of that conclusion; IN05 index reaches 2014 value of 5.18, thus significantly exceeds the upper limit of the so-called. gray zone. The slump in 2013 (Fig. 3) was caused by a decline in the volume of production and sales and the related decline in earnings before taxes.

The smallest volatility in the monitored period the U2 indicator shows the evaluation of international sales and the U3 indicator describes the revenue per car while the indicator U2 shows long-term growing trend (Fig. 4).

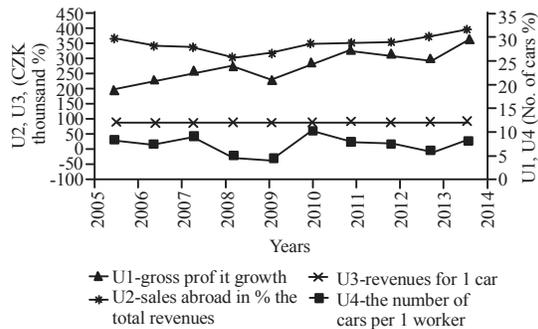


Fig. 4: Development of the magic quadrangle indicators of Škoda Auto in the years 2005-2014

The U1 indicator reached a record value (57.8%) in 2010 but the result was largely affected by a significant decline in gross profit in the previous two years in 2008 a gross profit recorded annual decline of 23.8% and in 2009 another annual decline of 35.6%.

### CONCLUSION

A comprehensive description of the functioning of the company is very difficult no model can capture the complexity of business processes. Therefore, the economic situation of a company is usually assessed by a complex of various indicators (Ross *et al.*, 2015).

The graphic method of the magic quadrangle applied on the microeconomic level allows a company management to analyze not only individual indicators and their development but also the overall impact of changes of all the indicators on the economic situation of a company.

In the example of Škoda Auto the application of this method was demonstrated provided that the results achieved were supported by the outputs of selected bankruptcy models.

The graphic method of the magic quadrangle certainly is not intended to replace a detailed financial analysis of the company but may well serve to a company management as a supporting identifier of the financial health of the company. A key factor in the suitability of this method is the choice of appropriate indicators and determination of the optimal (target) values. Due to the variations in different macroeconomic subjects, it is necessary to approach this individually.

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