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**DEVELOPMENT AND PROSPECTS OF THE
DOMESTIC INSURANCE MARKET IN THE LIGHT OF
INSURANCE PENETRATION AND CONCENTRATION**

Doctoral (PhD) theses

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1. AIMS AND HYPOTHESES

The financial crisis of 2008 clearly showed that the exposure of individual investors to adverse effects is extremely high compared to institutional investors. In addition to the increase in life expectancy, the health status of the population, the situation of the pension system and time of the health insurance system, the value of expected services and their availability raise many questions nowadays.

Natural processes have undergone changes not seen before in the last 30 years. This is due to the increasing human presence, environmental transformation due to overpopulation, the extinction of species and ecosystems. In order to ensure our increasingly energy-intensive lives, emissions of polluting and greenhouse gases have already significantly increased the average temperature of our planet by about 1.1 degrees Celsius, and according to the reports of the IPCC, the international organization that studies the process, we can expect a further increase of one and a half degrees in the future even in the most favorable scenario. As a result, there has been an unprecedented increase in the number of extreme weather events and the extent of the damage they cause. On a daily basis, we receive news of forest fires in California and floods in Europe. While 175 people died in the July 2021 flood in Germany, an unprecedented drought greeted Europe in the summer of 2022. In Central Europe, snowy winters have disappeared, but in North America, increased snow in winter is an ongoing challenge.

The above processes underscore the importance of self-care, one of the most useful ways to do this for the economy is through insurance. I am convinced that exploring the situation in the insurance market, mapping future prospects, and its relationship between the parameters describing the market is essential for situational awareness and, if necessary, for cautious intervention,

The aim of my dissertation is to check and examine whether the direction and pace of the transformation of penetration and market concentration after the regime change is adequate, what are the experiences so far and what can be expected until 2030. In several respects, this correlation is being examined for variables, the results of which I consider important to influence market developments that may be unfavourable in a given case in a more nuanced way than before.

- I examine how the values of insurance penetration and market concentration have changed in the post-regime period to the present day,
- In addition, I investigate, based on the data sets available so far, *ceteris paribus* is expected to change in direction and how much change in the data is expected by 2030.
- I explore whether seasonal, trend and cyclical effects can be detected in the time series data of penetration and concentration values.
- I will then identify the existence, strength, and direction of possible links between key sectoral market characteristics, such as
 - insurance penetration and density,
 - insurance penetration and total number of contracts,
 - change of market concentration, penetration and cumulative premiums, the sector's profit before tax,

- the number of contracts, aggregate premiums and administrative, business and sectoral employees.

In the course of my research, I came up with 6 hypotheses, which are as follows:

Hypotheses

H1: The values of market concentration and penetration in Hungary, although gradually improving in recent decades, still do not reach the values considered desirable in the literature.

For the reasons indicated, I consider it very important that the values of penetration and market concentration in Hungary should also reach the values typical of developed Western European market economies, but I think that not enough time has probably passed since the collapse of the party-state system for the renewal of society and the market.

H2: Penetration in Hungary will start to rise slowly until 2030, but will not reach 50% of the value of current European data, but in the same time frame, a weakening rate of market concentration will decrease

Based on the literature data, it is likely that the time until 2030 will be too little for the data to be comparable to the European data, but I am confident that the direction of change will be positive.

H3: In terms of premium income and market concentration, a trend effect can be detected, but not a seasonal or cyclical effect.

The trend effect, the continuous change in one direction, is likely to be detectable over the entire period under review, but based on the nature of the insurance market, although a periodic rise in premium income is likely in certain segments, overall cyclicity within the year and beyond is unlikely to be established.

H4: There is a positive correlation between insurance penetration and changes in density, but the increase in insurance penetration and the number of insurance contracts in Hungary are not related.

Behind the positive change in insurance penetration, I assume that it is not an unfavourable change in GDP, but a real increase in the amount of money which society spends on insurance, and therefore its increase may be in a positive context with the average premium per capita.

Based on the unfavourable domestic data, I believe that the number of insurance contracts does not change much with the change in the value of penetration, because it is the result of premium adjustments and indexations within the existing contract portfolio.

H5: As concentration decreases, penetration and cumulative industry fee income increase, the sector's profit before tax increases.

Based on literature data, it can be assumed that fierce competition in the market with low concentration is acting in the direction of a decrease in insurance premiums and profitability. In addition, in the case of high market concentration, market participants may be less motivated to increase competition, and this situation is likely to favour the creation of irregular market agreements (e.g. price cartels) that

could result in extra profits. Furthermore, it is likely that, rather than penetration, other factors specific to the given market are primarily responsible for profitability: concentration, current financial, competition law or tax rules.

H6: There is no significant relationship between domestic insurance contracts, the change in the quantity of cumulative premium income and the change in employees in the administrative, business, and entire sectors.

The number of contracts is assumed to lose contact with the available human resources as the sector develops and the brokerage network grows. In addition, it is likely that the increase in fee income is not fundamentally related to the available human resources but is influenced by other factors (the strengthening of the brokerage network, the emergence of online sales, the economic environment).

2. OVERVIEW OF THE THEORETICAL BACKGROUND OF THE TOPIC

Based on the public data of the Association of Hungarian Insurers and the Central Statistical Office, I calculated the data for the life and non-life business myself and established the data for the life and non-life business.

Parameters under consideration

Insurance penetration

It is defined as the ratio of annual premium income to gross domestic product (GDP) for the same year, i.e. it shows what proportion of GDP is spent on insurance.

Penetration (penetration rate) indicates the level of development of the country's insurance sector. It is measured as a ratio of the fees undertaken in a given year to GDP.

Within the insurance sector, we distinguish between life insurance penetration, which takes into account only premiums from life insurance as a percentage of GDP, and non-life insurance penetration, which takes into account premiums other than life insurance, such as car insurance, health insurance.

Insurance density

It is defined as the rate of insurance premium per capita. Insurance density is calculated as the ratio of all insurance premiums to the total population of a particular country

Market concentration

In an economic approach, the most common definition of concentration is that it means compactness, concentrations in economic life.

Concentration rate, CR4, CR5

The easiest indicator to calculate and most used to measure market concentration is the concentration rate. The CR concentration ratio shows how some of the largest units in the population share the total value sum of the market share. In the insurance sector, company premiums written and the resulting market share shall be the starting point for the calculation.

Its value is the aggregate share of the number one company i with the largest market share (4 and 5 in my research).

Regarding CR4, a low concentration in Hungary, a value below 50%, in European comparison would be appropriate.

The Herfindahl-Hirschman Index, HHI

In economics, the Herfindahl-Hirschman index (HHI or Herfindahl index) is a common measure of market concentration.

The HHI index is calculated by squared and summing up the individual market share of companies, i.e. the Herfindahl-Hirschman index of a given economic sector is the square sum of the market shares of companies in the market.

Taking into account the data of the Hungarian literature, a value below 1000 would be desirable in Hungary for the HHI index.

3. SUBSTANCE AND METHOD

Statistical test methods

Decomposition procedure

The decomposition process is used to analyze time series data, with its help it can be broken down separately from the effects caused by the real trend, seasonality and cycles, as well as the random effect. The effect of cycles is the effect of cyclical change in the economy over several years, which is based on Kondratyev's theory of K waves. According to it, in addition to the 10-15-year economic cycles, there are also economic periods of 40-80 years and even 120-130 years. Seasonality is a change that is repeated within a year, which is associated with seasons or other phenomena that recur within a year.

The causes of the random effect cannot be defined in advance, it contains the effects that appear at a given time, in a specific time period.

Regression

In regression calculation or regression analysis, the relationship between two or more random variables is modeled. Based on the properties of the regression model, we

can distinguish between linear and nonlinear regression, and based on our data, we can perform time series, cross-sectional, and panel regression analysis.

Forecast

The procedures defined by the Forecasting/Time Series Modeler method, the models used in the investigation are ARIMA, Simple, Brown, Holt, and Winters additive, multiplicative models.

The ARIMA model makes findings based on historical values.

Elements:

- autoregression: based on autocorrelation, i.e., the phenomenon that can be built from previous data points, the future can be predicted ,
- integral: shows the trend by deriving the time series,
- training of moving averages: gives an estimate of the future based on the moving average of historical data.

The Simple model uses simple, exponential smoothing similar to the ARIMA model for time series that have no seasonality or trend. The *Brown* model provides analysis on the series of data to be studied by exponential matching, using a special case of exponential smoothing, that is, it performs smoothing twice in a row. The model assumes that a linear trend is observed in the time series. Seasonal effect cannot be justified, so the periodicity of fluctuations does not converge to a constant value. *Holt's* model is suitable for series in which a linear trend is observed and no seasonality is established. Applies flattening parameters that are not constrained by each other's values. Holt's model is more common than the Brown model, but larger series may take longer to calculate. Holt's exponential smoothing is most similar to an ARIMA model with zero autoregression series, two differentiation orders, and two moving averages. The Winters additive or multiplication model is suitable for predicting time series with linear trend and seasonality, using additive and multiplicative exponential smoothing.

Data based on the research

Penetration

I calculated the domestic annual penetration values from the given year's premium income and GDP data, the premium income data were calculated based on the annual publications (Yearbook of Hungarian Insurers) of the Association of Hungarian Insurers (MABISZ), and the source of the GDP data are public KSH (Hungarian Central Statistics Office) data series.

Density

Also the result of own calculations. The cumulative fee data required for the calculation of density were calculated based on the annual publications of MABISZ, the demographic data were downloaded from the KSH website.

Market concentration

I also calculated the market concentration values myself. Annual data such as the number, fee income and market share of market participants were provided by the annual MABISZ publications.

Incomes

The source of the annual fee income is the MABISZ annual reports, the quarterly data are calculated on the basis of cumulative reports.

Number of contracts

The number of insurance contracts was collected on the basis of the annual MABISZ prospectuses, grouped by life, non-life and total. Of these, I use the cumulative data set for analysis.

Number of employees in the sector

A set of data prepared on the basis of annual reports by MABISZ, which is available for all sectoral, administrative, business and other employees. In my research, I use data from entire sectoral, administrative and business workers.

Profit or loss before tax on the sector

Its source is also the MABISZ annual reports.

In all cases, the tests were performed using the IBM SPSS suite PAWS Statistics 18 Release 18.0.0.

Methodology for the study of hypotheses

When examining the **H1 hypothesis**, the database is based on secondary (MABISZ) data are the results of its own calculations, the methodology CR4 and HHI calculations.

In the case of the **H2 hypothesis**, the data are the results of own calculations (the source of the basic data is MABISZ and KSH), prediction, decomposition, and regression analysis after the calculation of the test Moorish concentration.

In the case of the **H3 hypothesis**, the data were produced as described for H2, with the calculated values of concentration and penetration in the model decomposition.

For *hypotheses H4, H5 and H6*, the method of data production is the same as described in the H2 and H1 hypotheses, the test methodology in all cases is regression analysis.

4. RESULTS OF RESEARCH

More than 30 years passed after the dissolution of the institutional system of state socialism, after the change of regime. Before that, the insurance industry operated as part of the state distribution system, its activities were not characterized by insurance professionalism.

The positive effects of the functioning of the ideal market in the mid-80s began to be recognized by the managers of the economy of that time, therefore, already in 1986, changes were made in the direction of reducing the hegemony of the ruling State Insurance Company. The real market opening took place after the regime change, which was given a significant boost by the accession to the EU in 2004.

In my present dissertation, I undertook to explore the most important changes in the insurance market over the past 30 years and to make forecasts using scientific methods for the most important market indicators and to identify correlations between certain parameters of the sectoral market.

In this context, I have put forward the hypotheses, the examination of which has revealed the following new and novel results:

T1: Market concentration values for a four-factor concentration rate from 2014, for the Herfindahl-Hirschman index from 2011, reached the desired values of 50 and 1000, and since then it has been possible to measure higher values for CR4 alone in 2018. In terms of penetration, apart from periods of stagnation from 1995 onwards, although there was a continuous increase until 2007, from there followed a decline of more than 10 years, and only from 2008 did we see a resurgence.

T2: Over a 10-year time horizon, penetration is not close to the target (current average value in 3 Western European countries), no significant improvement can be expected in this regard. The expected values of market concentration show significant variability.

T3: There is a clear upward trend in premium income and a clear downward trend in market concentration. A seasonal effect can be demonstrated in terms of both premium income and market concentration, but cyclical effects cannot be demonstrated.

T4: There is a weak, positive relationship between penetration and density, but there is no significant relationship between penetration and contract number.

T5: Pre-tax earnings have a strong positive correlation with fee income, a weaker positive relationship with concentration, and a weak positive relationship with penetration.

T6: There is a negative relationship between the number of contracts and the number of administrative staff, between premiums and the number of business employees, and between premium income and the total number of employees, indicating an improvement in the operational efficiency of economic operators in the sector.

5. CONCLUSIONS, PROPOSALS

In today's world, we have to deal with several critical problems. Resource shortages caused by overpopulation are a problem in an increasing part of the planet, and the provision of clean water or food poses insurmountable challenges for charities on several continents. The increase in emissions of pollutants and greenhouse gases is the reason why the anomalies involved in my thesis have appeared, become permanent.

The financial crisis has highlighted the enormous exposure of individual investors to the adverse effects of negative economic developments, and the financial result that can be achieved as individual investors is far below what is available to institutional investors in the market.

All these effects can also be observed at home. Whether we look at the frequency of extreme weather events or the extent of damage caused by an event, we have seen it at an accelerated pace in the last two decades.

New processes also started at the end of 2021, the beginning of 2022, with the end of the third and fourth waves of the pandemic: the recovery of consumption, the global economy has meant and is in high demand for energy carriers – the price of crude oil has tripled the previous ones – but also for several raw materials whose production capacity was previously reduced due to minimized demand. These effects generate significant inflation, which has led to a marked increase in interbank deposit and loan rates. The process was strengthened by the escalating Ukrainian-Russian conflict, which turned into an armed conflict on February 24, 2022, with the price of BRENT oil at a 7-year high at many times since then.

In my thesis, I highlighted the importance of the domestic insurance sector from several sides, the importance of self-care has increased significantly in the period following the change of regime. As one of the most effective ways to do this, I consider it of paramount importance to constantly examine the state of the Hungarian insurance market, to map the causes of phenomena, to analyze the relationships between the characteristics of the market, and to determine the expected changes. It was in this circle of thought that the present treatise was conceived.

The results of the research described in my thesis are as follows:

- I found that domestic market concentration has been below the desirable target set in the literature data for many years. This result is also surprising because, according to them, more than 30 years have been too little for a monopoly market governed by a totalitarian political system to naturally undergo such a transformation. My position is that among the motivations of the economic operators present on the domestic market, profitable operation and profits are often not of primary importance, in several cases they maintain the Hungarian presence by taking advantage of possible acquisition opportunities in the hope of future development, also taking into account the favorable geographical location of the country.

- As a result of my research, the future prospects for penetration are not favourable based on forecasts that can be determined by statistical methodologies, the current level is still likely until 2030.

- As a result of my analysis, I found that a clear trend can be identified in terms of quarterly fee income and market concentration, positive for fee income and negative for concentration. A high degree of seasonality was detected in both life and non-life sectors. These results can be the starting point for increasing the investment efficiency of the sector.

- My research shows that penetration has only a very small positive effect on density, i.e. there is a weak positive correlation between GDP and population numbers. However, it has no bearing on the number of contracts. These results are important for detecting market developments, mapping the directions of real development, and clarifying the possibilities of possible intervention.

- Based on my analysis, as sectoral fee income increases, the sector's pre-tax profit is growing rapidly, but less and less as market concentration and penetration increase. This result will be useful for the analysis of market developments, future prospects, either in terms of estimating market participants or in terms of possible changes in tax rules.

- Based on my research, I found that there is a negative relationship between the number of administrative employees and the number of contracts, as well as between the number of business employees and insurance premiums. I showed the same correlation between total number of employees and insurance premiums. This shows that the labor efficiency of the domestic sectoral market is improving: fewer employees are needed to perform tasks as time goes on. In addition, with the strengthening of online and brokerage sales channels, the number of business employees is also decreasing with increasing fee income and contract numbers.

The development of the sectoral market, penetration and the strengthening of density are of great importance, for the growth of which it would be desirable to intervene in the market in this direction. These may include ensuring the diversification of the health insurance system, separation from the state social security system, and prudent provision of options for individual insurance solutions. Similar consequences could be the rethinking of the role of the insurance industry in the case of pension insurance, and the rethinking of the changes that started earlier and then rebounded. In addition, certain subsidies, tax refunds and/or partial takeovers in order to increase the willingness to insure would also have an impact on penetration and density growth,

but these non-natural market instruments are only temporary and can only be partially effective.

I consider it very important to diversify supply so that domestic demand can find the elements available for self-care. Within a modality group, several coverage groups would need to appear on the market separately, in which case the segments of the demand side with different solvency would also find the solutions that are most suitable for us. The result would be that the most price-sensitive part of demand would not be excluded from this form of self-care, which would be a great achievement since it would be most needed in the most capital-poor areas. This would also have a positive impact on the value of penetration as the number of contracts increases.

After the elections have resulted in the previous administration being given a very large two-thirds mandate again, the continuity of the previous forms of agricultural support can be maintained. However, it is necessary to take more serious work to eliminate the harmful effects of climate change by spreading new crops whose drought tolerance and heat demand are higher than current varieties. Premiums for agricultural insurance could also be used as a tool to encourage this. This is also a burning issue because, due to the Ukrainian-Russian conflict, the volume of grain exports from these two countries has fallen drastically, and at the moment we cannot even estimate when there will be peace in the region.

6. PUBLICATIONS RELATED TO THE TOPIC OF THE THESIS

1. Bringye, Bernadett; Zsolt Eke; László Pataki:
The impact of climate change on the penetration of the insurance sector (The impact of climate change on the penetration of the insurance sector) (2022, forthcoming)
2. Zsolt Eke:
The domestic insurance market in terms of numbers: premium income, contract number and employees
In: Obádovich, Csilla; Richard Resperger; Zsuzsanna Széles (ed.) Pandemic – Sustainable Farming – Environmental Awareness: Conference Volume (Peer-reviewed studies)
Sopron, Hungary: Sopron University Publishing House (2022) 485 p. pp. 359-365., 7 p.
3. Zsolt Eke:
Car insurance during crises
logistrends and best practices Vol. VII: No. 1 pp. 43-48. Paper: 10.21405, 6 p. (2021)
4. Zsolt Eke:
The development of personal insurance during periods of crisis
In: Tamás Kovács; Károly Soka (ed.) XV. Sopron Financial Days "Sustainable economy – sustainable finance" professional and scientific conference on finance, taxation and accounting: Conference volume
Sopron, Hungary: Foundation for Higher Education in Sopron (2021) 359 p. pp. 106-115. Paper: ISBN 978-615-80230-7-8, 10 p.
5. Zsolt Eke:
The situation of the domestic insurance industry through market concentration: Where are we, Where are we going?
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Gödöllő, Hungary: Szent István University (2018) 119 p. pp. 87-87., 1 p.
6. Zsolt Eke:
The change in the domestic insurance market after the change of regime – where are we now? Change in the national insurance market at the time of the change of regime
In: Resperger, Richard; Tamás Czeglédy (ed.) Geopolitical strategies in Central Europe = Geopolitical strategies in Central Europe: [international scientific conference, Sopron, 9 November 2017]: Study: volume volume, Sopron, 9 November 2017: Publications
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7. Zsolt Eke; László Pataki:
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9. Zsolt Eke:
The change of the domestic insurance market from the period of regime change to the present day
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Sopron, Hungary: University of West Hungary Publishing House (2016) 1,070 p. pp. 11-22., 12 p.
10. Zsolt Eke:
Change in the domestic insurance market at the time of the change of regime = Change in the national insurance market at the time of the change of regime
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11. Zsolt Eke; Michael Fiddler; Laszlo Pataki; Zsuzsanna Széles:
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12. Zsolt Eke:
Controlling approach to penetration of the insurance market
CONTROL INFO 2 : 1 pp. 23-27., 5 p. (2014)
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13. Zsolt Eke:
Market control, control market
CONTROLLER INFO 2 : 4 pp. 42-45., 4 p. (2014)

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14. Zsolt Eke; László Pataki:

The reasons for the divergence of the domestic and Western European insurance markets two decades after the change of regime

In: Judit Balázs; Csaba Székely (ed.) Changing environment - Innovative strategies: an international scientific conference on the occasion of the Celebration of the Hungarian Science

Sopron, Hungary: University of West Hungary, Faculty of Economics (2011) pp. 775-793., 9 p.

Other publications

15. Bringye, Bernadett; Zsolt Eke; László Pataki:

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Bulletin:33297649 Conference Volume Scientific