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Introduction

One of the fastest growing areas in the economic sciences is broadly defined area of finance, with particular emphasis on the financial markets, financial institutions and risk management. Real world challenges stimulate the development of new theories and methods. A large part of the theoretical research concerns the analysis of the risk of not only economic entities, but also households.

The first Wrocław Conference in Finance WROFIN was held in Wrocław between 22nd and 24th of September 2015. The participants of the conference were the leading representatives of academia, practitioners at corporate finance, financial and insurance markets. The conference is a continuation of the two long-standing conferences: INVEST (Financial Investments and Insurance) and ZAFIN (Financial Management – Theory and Practice).

The Conference constitutes a vibrant forum for presenting scientific ideas and results of new research in the areas of investment theory, financial markets, banking, corporate finance, insurance and risk management. Much emphasis is put on practical issues within the fields of finance and insurance. The conference was organized by Finance Management Institute of the Wrocław University of Economics. Scientific Committee of the conference consisted of prof. Diarmuid Bradley, prof. dr hab. Jan Czekaj, prof. dr hab. Andrzej Gospodarowicz, prof. dr hab. Krzysztof Jajuga, prof. dr hab. Adam Kopiński, prof. dr. Hermann Locarek-Junge, prof. dr hab. Monika Marcinkowska, prof. dr hab. Paweł Miłobędzki, prof. dr hab. Jan Monkiewicz, prof. dr Lucjan T. Orłowski, prof. dr hab. Stanisław Owsiak, prof. dr hab. Wanda Ronka-Chmielowiec, prof. dr hab. Jerzy Różański, prof. dr hab. Andrzej Sławiński, dr hab. Tomasz Słoński, prof. Karsten Staehr, prof. dr hab. Jerzy Węclawski, prof. dr hab. Małgorzata Zaleska and prof. dr hab. Dariusz Zarzecki. The Committee on Financial Sciences of Polish Academy of Sciences held the patronage of content and the Rector of the University of Economics in Wrocław, Prof. Andrzej Gospodarowicz, held the honorary patronage.

The conference was attended by about 120 persons representing the academic, financial and insurance sector, including several people from abroad. During the conference 45 papers on finance and insurance, all in English, were presented. There were also 26 posters.

This publication contains 27 articles. They are listed in alphabetical order. The editors of the book on behalf of the authors and themselves express their deep gratitude to the reviewers of articles – Professors: Jacek Batóg, Joanna Bruzda, Katarzyna Byrka-Kita, Jerzy Dzieża, Teresa Famulska, Piotr Fiszeder, Jerzy Gajdka, Marek Gruszczyński, Magdalena Jerzemowska, Jarosław Kubiak, Tadeusz Kufel, Jacek Li-

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Wanda Ronka-Chmielowiec, Krzysztof Jajuga

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**FACTORS AFFECTING THE POSSESSION
OF AN INSURANCE IN FARMS
OF MIDDLE POMERANIA –
EMPIRICAL VERIFICATION**

**CZYNNIKI WPŁYWAJĄCE NA POSIADANIE
OCHRONY UBEZPIECZENIOWEJ
W GOSPODARSTWACH ROLNYCH
POMORZA ŚRODKOWEGO –
WERYFIKACJA EMPIRYCZNA**

DOI: 10.15611/pn.2016.428.13

JEL Classification: D12, G22, O13, Q12

Abstract: Insurance is a risk management strategy used to limit losses in economic activity, including agriculture. Agricultural insurances are a special kind of insurance for farm owners. They are aimed at financial security of the consequences of planned losses of income. The article presents the results of research on factors determining the possession of voluntary insurance in the farms of Middle Pomerania. The analysis was conducted using data obtained from owners or managers of farms in the region of Middle Pomerania in 2012 which covered 256 entities. In order to solve the posited research problem, multidimensional correspondence analysis and Ward's method were used. The results show that particular factors characterizing farms and the characteristics of their users are in varying degree associated with having insurance protection.

Keywords: insurance, agricultural activities, farms, multidimensional correspondence analysis.

Streszczenie: Ubezpieczenie jest strategią zarządzania ryzykiem wykorzystywaną w celu ograniczania strat w działalności gospodarczej, w tym również rolniczej. Ubezpieczenia rolne stanowią szczególny rodzaj ubezpieczeń skierowany do właścicieli gospodarstw rolnych. Mają one na celu zabezpieczenie finansowe przed konsekwencjami utraty planowanych dochodów. W artykule przedstawiono wyniki badań dotyczące czynników determinujących posiadanie dobrowolnych ubezpieczeń w gospodarstwach rolnych Pomorza Środkowego. Analiza przeprowadzona została z wykorzystaniem danych pozyskanych od właścicieli lub zarządzających gospodarstwami rolnymi z regionu Pomorza Środkowego w 2012 roku i objęła 256 podmiotów. W celu realizacji podjętego problemu badawczego wykorzystano

wielowymiarową analizę korespondencji oraz metodę Warda. Wyniki badań wskazują, iż poszczególne czynniki charakteryzujące gospodarstwa rolne i cechy ich użytkowników były w różnym stopniu powiązane z posiadaniem ochrony ubezpieczeniowej.

Słowa kluczowe: ubezpieczenia, działalność rolnicza, gospodarstwa rolne, wielowymiarowa analiza korespondencji.

1. Introduction

Insurance is a risk management strategy used to limit losses in economic activity, including agriculture. It provides coverage for the future needs of the property [Łazowski 1998], protects the productive forces from damage, has a positive effect on the growth of the productive forces, ensures the protection of personal property, life and the ability to work, mobilizes cash, balances income and expenses, and increases the feeling of safety [Handschke 2001].

Agricultural insurance is a special kind of insurance for farm owners. It is aimed at financial security of the consequences of planned losses of income resulting from the disruption of agricultural activities caused by natural disasters or other events that lead to material damage. It is realized both in a compulsory and a voluntary form. There is also a type of agricultural insurance that is subsidized from the state budget.

In recent years, there were numerous studies of issues of agricultural insurance in Poland. They generally consist of two areas: the first concerns the current state of agricultural insurance in Poland (e.g.: [Stroiński 2006; Łozowski 2006; Nowak 2007; Łozowski, Obstawski 2009; Łyskawa 2009; Wicka, Wojciechowska-Lipka 2009; Łozowski 2009; Józeficka, Tetwejer 2009; Janowicz-Lomott, Łyskawa 2009; Kaczała, Łyskawa 2010; Sulewski 2011; Wicka 2011; Kołosowska, Walczak 2011; Pawłowska-Tyszko 2011; Lipińska 2012; Rojewski 2012]), and the second refers to the study of insurance in the context of risk management methods in agriculture (e.g.: [Adamowicz 2002; Handschke, Łyskawa 2008; Szymecka 2008; Ronka-Chmielowiec 2009; Sulewski 2009; Czyżewski, Stępień 2011; Stempel 2011; Wicka 2014; Dubiel 2014]). Most of them are fragmentary in nature.

There is little research incorporating the correlation between the properties of farms and the characteristics of their users and participation in a system of voluntary agricultural insurance. Therefore, it is worth to further analyze this issue. So far, studies on the prevalence of insurance of farms were carried out by IAFE-NRI (Institute of Agricultural and Food Economics – National Research Institute) in 2005 on a sample of about four thousand farms divided into five macro-regions. Their aim was to show the relationship between the properties of farms (especially the agrarian structure) and the characteristics of their users and their participation in the available forms of insurance.

The results of the study show that there is a relationship between the area of the holding, market activity, source of livelihood of the family and the age and

education of the farmer and the prevalence of mandatory and voluntary agricultural insurance [Sikorska 2008]. It is also worth mentioning the work edited by A. Wicka [2013], which outlines the use of commercial insurance with respect to the assets and production. International research on agricultural insurance generally focuses on research involving the properties of insurance schemes, insurance as a method of risk management in agriculture and issues related to the factors determining the propensity of farmers to insure.

2. The importance of insurance in agricultural activities

The spectrum of risks that affect agricultural activities is quite broad. According to many authors, the main problem in the current economic reality of agricultural producers appears to be the presence of market risk, which reflects the changes in the market prices of agricultural commodities and means of production, and of the production risk resulting from differences in the quantity and quality of manufactured goods [Rychlik, Kosieradzki 1981; Bielza et al. 2006; Henisz-Matuszczak, Czyżewski 2006; Sulewski 2009; Majewski, Sulewski 2011].

The most important element of production risk is natural risk (climate, weather), which denotes a condition in which there is a possibility of an occurrence of adverse deviation from the desired or expected/predicted weather conditions in a particular location in a specific unit of time [Vaughan 1997]. The effects of its occurrence have a direct effect on the volume of production and sales, while they indirectly affect the price of the product and profit margin [Edrich 2003], which ultimately affects the financial results of the holding [McIntyre, Windle 2004]. In the case of weather events, which are difficult to predict and control, self-insurance either does not guarantee real insurance of future needs due to the lack of sufficient financial resources, or is carried out at the expense of current needs and, more often, long-term investment needs [Sordyl 2007, p. 23].

An important role in ensuring more stable agricultural holdings, especially these particularly vulnerable to the occurrence of adverse weather conditions, is played by agricultural insurance.

Agricultural insurance is intended to protect against an unexpected financial loss, which reduces the loss of revenue resulting from a decline in productivity [Ronka-Chmielowiec 2009]. Compensation received under the insurance can ensure the resumption of production, rebuilding of the farm or at least the return to the previous economic situation [Ronka-Chmielowiec 2009], without having to sell assets, use savings, reduce spending or seek additional sources of financing. The transfer of risk to a specialized institution (the insurance company) reduces the uncertainty of business and increases the stability, not only of the revenue, but also of employment, prices and supply of agricultural products [Arena 2005], thus stimulating technological progress and the undertaking of economic initiatives [Das et al. 2003; Chand 2008].

In foreign literature it is often stressed that agricultural insurance contributes to the modernization of the agricultural sector and provides a tool for stimulating economic development [Nnadi et al. 2013]. The reason is that the lack of need to create reserves to ensure financial security increases free capital which can be allocated to investment activities [Hazell 1992; Swain 2014]. Having insurance coverage gives farmers the opportunity to engage in risky activities related to introducing modern production technologies and agricultural practices [Ahsan et al. 1982] and supports the realization of larger investments, requiring high financial outlays, to improve and increase agricultural production [Farayola et al. 2013], and thereby also to increase in expected income [Hazell 1992; The World Bank 2007]. Insurance, through ensuring the continuity of operations, allows for better planning and implementation of a project [Farayola et al. 2013]. Besides stimulating investment activities, it is also one of the ways to protect farmers' investing activities, and it plays an important role in improving the ability of farmers to take risks [Raju, Chand 2008].

When considering the importance of insurance in agricultural activities, it should also be noted that having insurance coverage provides better access to financial services [Hazell 1992; The World Bank 2003; The World Bank 2005]. Farmers who insure their farms have greater credibility and arouse greater confidence in credit institutions. Sometimes insurance is a condition for obtaining a loan or a credit, as a guarantee of repayment of liabilities [Farayola et al. 2013]. In addition, taking out insurance affects the amount of aid granted by the state for the losses due to adverse weather conditions in the form of preferential disaster loans [European Commission 2006].

3. Data sources and methodology

The aim of the study is to pinpoint the factors determining the ownership of voluntary insurance in the Middle Pomerania farms. The study was conducted using primary data derived from the results of a survey conducted among owners or managers of farms in the region of Middle Pomerania in 2012. The selection of units for testing was random, using the snowball method. After verification of the collected material, 256 subjects were involved in the study. Among them, 57.42% had voluntary agricultural insurance. In total, in the years 2004-2012, there were 1326 insurance contracts signed.

To fulfill the research objective, a correspondence analysis was used, which is a specialized method of data mining, which facilitates the presentation, primarily in graphic form, of the relationships between features and statistical units. The study proceeded in several stages [Stanimir 2005; Panek 2009; Machowska-Szewczyk, Sompolska-Rzechuła 2010]: (1) the identification of Burt table (2) creation of a matrix of observed relative frequencies, (3) determination of row (column) profiles as ratios of observed relative frequencies of a row (column) by the sum of the frequency of a given row (column), (4) the conversion of the matrix of

observed relative frequencies to the matrix of weighted deviations of profiles from the row's (column's) center, (5) decomposition of a matrix of weighted deviations of profiles from the row's (column's) center by singular values, (6) creation of a matrix containing the coordinates of the categories of features on all axes of actual relationships, (7) indication of a lower dimension of the space for the presentation of results, so that the distortion of an output configuration of points was as small as possible. The study used the classification of results of the correspondence analysis using Ward's method [Joe, Ward 1963].

Based on data contained in the questionnaire, the following variables were adopted:

- UBEZ – *the possession of voluntary agricultural insurance* (t – yes, n – no);
- ST – *the status of the farm* (t – commercial, n – subsistence);
- WIEK – *the age of farm's manager* (≤ 45 – lower than 45 years, > 45 – higher than 45 years [45 years – the average in the study group]);
- WYK – *farm manager's education level* (SW – secondary or higher, PZ – basic or vocational);
- ZATR – *the number of people employed on the farm on a permanent basis* (≤ 2 – at most 2 people, > 2 – more than two people; [2 – median]);
- NAST – *the successor to the farm* (T – yes, N – no);
- KIER – *the period of independent managing of the farm* (≤ 16 – no longer than 16 years, > 16 – more than 16 years; [16 years – average in the group]);
- ZAS – *land resources on a farm in hectares* (≤ 15 – no more than 15 hectares, > 15 – greater than 15 ha [15 hectares – median]);
- GLE – *the class of soils on the farm* (1–4 – dominance of 1–4 classes, other – dominance of other classes of soil);
- PROD – *the nature of production* (R – crop, Z – livestock, M – mixed);
- DOCH – *a source of income on the farm* (1 – from agricultural activities, 2 – from non-agricultural activities);
- SZK – *the occurrence of damage on the farm in the past* (T – yes, N – no);
- RYZ – *the level of exposure of the farm to weather risk¹* (≥ 2 – greater than 2, < 2 – less than two; [2 – median]).

4. Factors influencing the ownership of insurance in the Middle Pomerania farms

As a result of multiple correspondence analysis, it can be concluded that possession of voluntary agricultural insurance is most closely linked to such features as: *occurrence of damage to the farm* and *mixed* type of production (Figure 1). Therefore, voluntary agricultural insurance was the most widespread among the farms which

¹ Respondents could assess the exposure of farm to specific natural risks on a scale of 1 to 5, with 1 being low level, while 5 high degree of exposure.

experienced losses in the past as a result of adverse climatic events, and those which diversified the production while taking advantage of insurance. This means that the use of insurance and diversification of production gives farmers greater protection against loss or reduction of income from agricultural production. Insurance reduces the financial losses resulting from the occurrence of certain random events, while product diversification allows the distribution of risk to different manufacturing processes and adapt to changing conditions, e.g. market, technological and climate conditions.

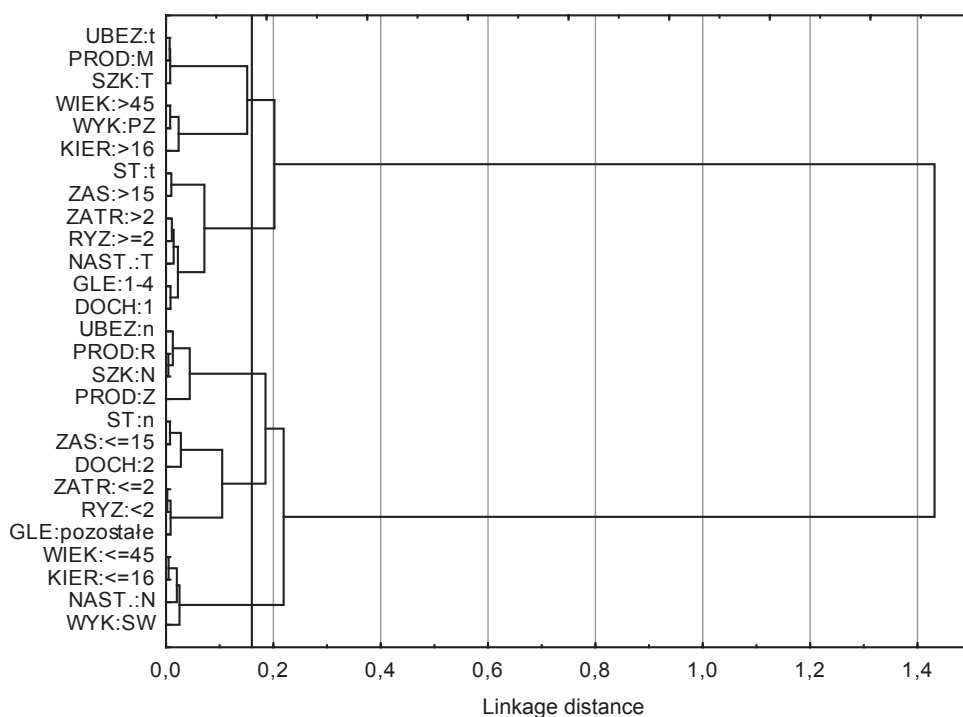


Figure 1. Diagram of the distribution of categories of features using Ward's method

Source: Author's own study.

Having a voluntary agricultural insurance was also strongly associated with age, education and professional activity of the farmer. Farms which purchased the insurance were managed by farmers over 45 years old, with extensive professional experience (farmers managing the farm for over 16 years), with basic schooling or vocational training. It can be assumed that these farmers have a lower propensity to take risks and are characterized by a greater awareness of the dangers which can occur in the farm's area, and on the basis of this knowledge and experience they decide to buy insurance.

A group of features can also be isolated that are characterized by a very weak relationship with the category *having voluntary agricultural insurance*. This group includes the following variables: the commercial status of the farm, area greater than 15 ha, soils of class 1-4, the number of people permanently employed greater than 2, income from agriculture, the level of exposure of the farm to the occurrence of specific natural risk greater than 2 and having a successor.

From this follows that voluntary insurance in the Middle Pomerania farms was used in market-oriented, larger-area farms, where the only source of income was from agricultural activities – in contrast to smaller farms, with a low scale production, which may contribute to lower income from agricultural activities, hence the need to supplement their income from other sources. It can therefore be surmised that for this group of farmers taking out insurance is not profitable, or they lack the funds to buy it. It should be noted that farmers with smaller-area farms, due to the small scale of production, can take action to make a change in production or in resources used before or during the production season, which reduces the risk of production, and thereby reduces the demand for insurance.

It is also worth noting that farms with very good or good soils, those which were strongly exposed to the occurrence of adverse weather conditions and in which there was a successor ready to take over the farm also took advantage of buying an insurance.

5. Conclusions

Research using multiple correspondence analysis in order to indicate determinants affecting the spread of voluntary agricultural insurance among farmers of Middle Pomerania showed that the factor strongly associated with having insurance protection is sustaining damage in the past. In this case, buying of insurance is affected by the awareness of the damage which can occur due to unforeseen and difficult to control natural hazards. What's more, farmers with more professional experience are characterized by greater awareness.

The analysis showed that the insured farms were run by farmers over 45 years old, with more than 16 years of experience of working on a farm. The second strongly linked factor is product diversification. This could mean that a combination of the two methods of limiting the risk of agricultural activity is an opportunity to give farmers greater certainty and stability of operations.

Other factors, such as the status of the holding, area, soil quality, the number of people permanently employed on the farm, source of income, level of exposure of the farm to the occurrence of certain risks and having successors are also associated with having insurance coverage, but the association is weak.

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