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SOURCES AND DETERMINANTS OF CASH HOLDINGS IN THE AGRICULTURE OF CENTRAL AND EASTERN EUROPE COUNTRIES AND THE PERSPECTIVE OF THE FINANCIAL SECURITY OF POLISH FARMS

Ensuring business continuity requires maintaining financial liquidity and a certain level of cash holdings. This also applies to farms whose owners obtain funds from various sources, including foreign capital. For this reason, the study aimed to identify sources and determine cash resources in farms in Central and Eastern European countries that are in the EU. Additionally, based on detailed data from Polish farms, we assessed and compared the importance of cash holdings in farms characterised by a high level of financial security and those for which we identify the bankruptcy risk. Data for the research is from the Farm Accounting Data Network (FADN) database for 2013-2018 (for all the EU countries we consider). In the analysis touching upon bankruptcy risk in Polish farms, we used data from FADN-PL for 2010-2018. In the study, we used the panel method – weighted least squares method (WLS). We applied the dynamic approach to calculate the cash holdings. Inferences from our study indicate that budget support for farmers and sales value per farm are the main sources and determinants of cash holdings in farms in New Member State of the EU. It should be underlined that the influence of budget support on cash holdings in Polish farms was weaker than in other surveyed countries. Moreover, it was found that the level of indebtedness was also an important factor that impacted cash holdings. On Polish farms, the impact of the debt level on cash holdings was negative, and in other countries – positive.
The added value of work is identifying factors that affect cash holdings changes, so it is a dynamic approach to cash holdings.

Keywords: cash holdings, panel regression, farms, developing country EU
JEL codes: G30, D25

Introduction

The fundamental objective of every economic enterprise is its smooth running and development. To ensure an enterprise's financial security[1] and the possibility of continuous

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[1] Financial security is a narrower yet fundamental synonym of economic security. In the description of economic security by the World Economic Forum, most economic risk factors concern the financial sphere, e.g., chronic fiscal imbalance, extreme energy price fluctuations, and in agriculture: permanent financial imbalance, repetitive liquidity crises, a high level of income disproportions, uncontrollable inflation or deflation (Global Risks 2013 Eight Edytion, Word Eonomic Forum, Committed to Improving the State of The Word, World Economic Forum, Swizerland 2013). The financial security of an enterprise is a key element of the economic security system. Generally, the financial component constitutes the basic value of level and structure of an entity's financial potential to ensure the means for economic development (e.g., B.O. Tursunov: Aspect of Financial Security of

activity, it requires funds, so it "demands money". The source of such funds may differ (i.e., internal and external financial sources). According to Jensen's theory, firstly, our own internal or external sources are used up, and then foreign, external sources. The amount of cash held is shaped by the differing needs of an enterprise. In 1936, Keynes highlighted this aspect by defining financial liquidity. At the same time, Keynes identified transactional motives and precautionary and speculative purposes for holding cash. From the perspective of the basic running of a company, it seems that the first two motives are the most important to ensure a family's financial security (the household).

The problem of cash holdings is not a new notion. Yet, it is also worth indicating that matters concerning it have been considered from the perspective of entities functioning outside agriculture and focused on stock market companies as well as S&M enterprises. The issue of cash holdings in the agricultural sector was raised by Singh and Misra[2], but the authors focused their attention on Indian agribusiness entities, not farms. The issue of cash holdings in farms is interesting because, according to Aditya R. Khanal and Omobolaij Omobitan[3], farmers' access to capital is constrained in multiple ways and the financial performers of credit constrained small farmers was significantly lower than that of unconstrained small farmers – an adverse impact of constrained capacity to credit could lower in gross farm sales. In such conditions – restrictions on crediting – Polish farmers function in particular. A strong argument for undertaking this research is also the fact that we suggest a dynamic approach to cash holdings, which is not as widely discussed in the literature. This is why we believe that research in the scope of cash holdings contains research gaps which we would like to fill. Agriculture, which we fail to associate with the farming industry, is an area in which there are limitations to raising external financing (e.g., on the capital market). On the other hand, farmers receive budget support. We would also like to examine the extent to which state aid is an essential financial source for farms.

The research aims to define the sources as well as the determinants of cash holdings. The research concerned agriculture in Poland as well as Central and Eastern European countries belonging to the EU (called 'developing countries'[4]) and also farms divided into two groups: 1) those at risk financially and 2) those not at risk financially (secure).

Due to the fact that research concerns two aspects of cash holdings, two hypotheses have been made:

H_1: Budget support, the essence of which is to compensate farmers for lost income, is a determinant that positively affects cash resources in both Poland and Central and Eastern European countries despite variations in the level of this support.

H_2: Cash holdings in farms are positively affected by the value of sales in a situation where there is no deferred payment.

Industrial Enterprises Under Influence of Global Crisis, Asian Journal of Technology & Management Research 10, 01/2020, p. 116-122).

[2] K. Singh, M. Misra: Financial determinants of cash holdings levels: An analysis of Indian agricultural enterprises, Agricultural Economics-Czech, 65 (5)/2019, p. 240-248.

[3] A.R. Khanal, O. Omobitan: Rural Finance, Capital Constrained Small Farms, and Financial Performance: Findings from a Primary Survey, Journal of Agricultural and Applied Economics, 52, 2/2020, p. 288-307. https://doi.org/10.1017/aae.2019.45

[4] J. Franc-Dąbrowska: Crawling financialization in Central and Eastern Europe – on the example of Agriculture, Economia Agro-Alimentare 21, 3/2019, p. 1-19, https://doi.org/10.3280/ECAG2019-003006

H₃: Among the negatively impacting determinants of cash holdings in farms at risk of going concern are those of external foreign funds, regardless of the term of the loan.

Data and method

The data used in calculations was from (1) the database organised for collecting accounting data for Polish farms FADN.pl, and for (2) Central and Eastern European countries – the European FADN database. The study period covered 2010-2018 (for Polish farms); for developing countries, this period covered 2013-2018[5]. For developing countries, the year 2013 was selected as other countries have not accessed the EU since this year. The collected data facilitated the design of two balanced panels for Poland (A) and developing countries (D). This was the first stage of the study. In the second stage, two further unbalanced panels were distinguished (using Altman's[6] Z-score) for farms not at risk (B) and at risk (C). Farin et al.[7] applied a similar method of distinguishing panel data. Finally, the following groups were distinguished: Group (A), counting 40,536 Polish farms as part of the balanced panel, Group (B), encompassing 15,979 farms, Group (C), in which 5,052 farms were analysed as well as Group (D), constituting a panel describing the agriculture of 11 countries over six years and belonging to the EU (balanced panel).

    Research hypotheses – in accordance with the rules – were proven with the application of panel data. Panel data is useful in such research as such data enables the testing of hypotheses with the help of cross-sectional analyses[8]. To model the data, model panels were applied. In order to ensure the proper selection model, we used Breusch-Pagan's and Hausmann's test analyses. The test results are presented in Table 1.

Table 1. Breusch-Pagan and Hausman tests verifying research appropriability for distinguished panels

Details	Poland – panel (A)	Unthreatened farms – panel (B)	Farm at risk – panel (C)	Developing countries – panel (D)
Breusch-Pagan test (χ^2)	14230.1265	1652.3219	1462.3222	7.2372
p-value	2.35e-025	5.32e-014	4.68e-09	0.0007
Hausmann test (χ^2)	290.1211	170.3632	120.5854	75.9596
p-value	3.21e-012	2.36e-029	2.95e-017	2.4351e-014
Number of object in the panel	40,356	15,978	5,052	66

Source: own elaboration based on FADN data, with the application of Gretl; version 1.9.3.

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[5] The 11 countries of Central and Eastern Europe belonging to the EU, called developing countries, were: Poland, Slovakia, Slovenia, the Czech Republic, Croatia, Hungary, Bulgaria, Romania, Lithuania, Latvia and Estonia.

[6] The rationale behind the use of the Altman model was that it was developed for the purpose of diagnosing the risk of bankruptcy of companies operating in emerging markets, and therefore less developed than the US economy (see Pawłowski, M.: Modele dyskryminacyjnew ocenie ryzyka wpadłosci emitenta obligacji korporacyjnych. Polityki Europejskie, Finanse i Marketing, 19 (68)/2018, p. 211-222, https://doi.org/10.22630/PEFIM/2018.19.68.18). And the tested objects fit the model's assumptions.

[7] J. Farinha, C. Mateus, N. Soares: Cash holdings and earnings quality: evidence from the Main and Alternative UK markets, International Review of Financial Analysis 56/2018, p. 245.

[8] P.J. García-Teruel, P. Martínez-Solano: On the Determinants of SME Cash Holdings: Evidence from Spain. Journal of Business Finance & Accounting, 35(1), (2)/2008, p. 127-149, https://www.doi.org/10.1111/j.1468-5957.2007.02022.x

In the group of Polish farms (A), there was a high value of chi-square statistics, which indicates a high level of heteroscedasticity of variables and proves that a better solution would be to use a simple method (the weighted least squares method). This was also confirmed by the Hausman test, which indicates that it would be unfounded to apply the random effects model. In the case of the panel of developing countries (D) the statistic value of the chi-square test of Breusch-Pagan indicates the possibility of applying the estimation method with specified effects. Considering the aforementioned, we decided to apply the weighted least square method for all data panels to compare results later. The general shape of the model of weighted least square methods may be presented per the following formula:

$$w_i y_i = \beta 0 w_i + \beta_1 (w_1 x_{1i}) + \beta_2 (w_2 x_{2i}) + \ldots + \beta_k (w_k x_{ki}) + \varepsilon_i \quad \text{for} \quad i = 1, 2, 3 \ldots, n$$

The weights are indicated according to the formula[9]:

$$w = \frac{1}{\sqrt{\sigma_i^2}}, \text{ where } \sigma_i^2 = e^{\widehat{\ln(e_i^2)}}$$

The dependent variable in the model is the liquidity reserve defined as funds which farmers have at their disposal to implement all transactions connected with running a farm and shall be presented per the following formula:

$$\Delta \text{cash} = \text{cash}_{t-1} + \text{Cash Flow } (CF)_t$$

Referring to our considerations, in general, it is possible to present the regression equation in the following way:

$$\Delta \text{cash} = \beta 0_i + \beta_1 \ CF/TA + \beta_2 \text{ subsidies} + \beta_3 \text{ short-term debt } (S\text{-}TD) + \beta_4 \text{ long-term debt } (L\text{-}TD) + \beta_5 \text{ sales} + \beta_6 \ LIQ + \beta_7 \ LEV + \beta_8 \text{ debt maturity} + \varepsilon_i$$

Whereby:

        CF/TA = total cash flows/ total asset value (asset cash yield),
        LIQ = (Working capital – funds)/Total assets,
        LEV = Total debt/Own capital,
        Debt maturity – Short-term debt/Total debt.

This is not a standard process when analysing cash holdings as the static approach is most commonly applied, while reserves constitute liquidity reserve resources (i.e., funds and their equivalents[10]). It is not, however, the only way of doing it as, for example, Isshaq and Bopkin[11] measured liquidity 1n of funds and the securities market, while – for example

[9] B. Borkowski, H. Dudek, W. Szczesny: Ekonometria. Wybrane zagadnienia, Wydawnictwo Naukowe PWN, Warszawa 2003, p. 122.

[10] A. Ozkan, N. Ozkan: Corporate cash holdings: an empirical investigation of UK companies, Journal of Banking and Finance, 28 (9)/2004, p. 2103-2134; E. Levitas, M.A. McFadyen: Managing liquidity in research-intensive firms: signaling and cash flow effects of patents and alliance activities, Strategic Management Journal, 30/2009, p. 659-678; R. Bansal, V. Bansal: A Research Paper on Determinants of Corporate Liquidity in India, International Journal of Marketing and Technology, 2, 4/2012, p. 103-117.

[11] Z. Isshaq, G.A. Bokpin, J. Mensah Onymah: Corporate governance, ownership stucture, cash holdings, and firm value on the Ghana Stock Exchange, Journal of Risk Finance, 10, 5/2009, p. 488-499, https://doi.org/10.1108/15265940911001394

– Chen and Mahajan[12], or Chen and Yo[13], measured interest of liquid reserves to non-cash assets. The LIQ, LEV and debt maturity indexes were designed according to the suggestions of García-Teruel and Solano[14]. Their significance in cash holdings studies can be found in publications of such researchers as Cai et al.[15], as well as in studies by Angelovska and Valentinčič[16], but LIQ is calculated as net working capital minus cash divided by net assets.

The suggested solution is a non-standard procedure in defining cash holdings, but facilitates presenting the changes in the value of cash held in various periods. It results from this that, on farms (in Poland), nobody keeps a record nor distributes cash between farms (in Poland) and households. Our approach to cash holdings is similar to that of Muncef Guizani[17], who suggests a dynamic approach to carrying out research into cash holdings, taking the changes in the level of cash held in further years into consideration.

The independent variables are characterised by sources of financing (i.e., subsidies, sales, long-term and short-term loans, as well as the effectiveness of using property resources or their structure).

Literature Review

The problem of being able to run a company smoothly is not only a concern for those running farms, but also for all entrepreneurs. This is evidenced by Lian et al. and Al Amarneh, who claimed that enterprises would aim to accumulate the most liquid assets to ensure financial security, especially in times of economic slowdown or crisis[18]. Research carried out by the International Monetary Fund in companies belonging to G7 countries has shown that there is a growing tendency to accumulate financial assets. Similar observations were made by Trejo-Pech et al.[19]. The authors concluded that "many agribusiness firms held large amounts of cash relative to total assets recently" and that one reason for holding cash is to prepare for less robust operating periods. In conditions of economic lockdown, the subject of financial sources and cash holdings is ever more current and interesting from the financial security perspective of economic entities (the lack of a separate so-called "financial shield" for farms).

It can be assumed that financial security is attained when an entity disposes of

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[12] N. Chen, A. Mahajan: Effects of Macroeconomic Conditions on Corporate Liquidity – International Evidence, International Research Journal of Finance and Economics, 35/2010, p. 112-129.

[13] N. Chen, S. Yo: Government Deficits and Corporate Liquidity, Asian Economic and Financial Review, 2, 1/2012, p. 59-75.

[14] P.J. García-Teruel, P. Martínez-Solano: On the Determinants of SME Cash Holdings: Evidence from Spain. Journal of Business Finance & Accounting, 35(1), (2)/2008, p. 127-149, https://www.doi.org/10.1111/j.1468-5957.2007.02022.x

[15] W. Cai, Ch.C. Zeng, E. Lee, N. Ozkan, N.: Do business groups affect corporate cash holdings? Evidence from a transition economy, China Journal of Accounting Research 9/2016, p. 1-24.

[16] M. Angelovska, A. Valentinčič: Determinants of Cash Holdings in Private Firms: The Case Of The Slovenian SMES, Economic And Business Review, 22, 1/2020, p. 5-36.

[17] M. Guizani: The financial determinants of corporate cash holdings in an oil rich country: Evidence from Kingdom of Saudi Arabia, Borsa Istanbul Review, 17, 3/2017, p. 133-143.

[18] A. Al-Amarneh: Corporate cash holdings and financial crisis: evidence from Jordan, International Business Research, 8, 5/2015, p. 212-222; Y. Lian, M. Sepehri, M. Foley: Corporate cash holdings and financial crisis: an empirical study of Chinese companies, Eurasian Business Review, 1, 2/2011, p. 112-124.

[19] P.O. Trejo-Pech, M.A. Gunderson, T.G. Baker, A.W. Gray, M.D. Boehlje: Assessing Cash Holdings in Agribusiness, International Food and Agribusiness Management Association, 18, 4/2015, p. 85-105.

appropriate financial resources and has created a level of cash flow to timely cover expenses[20]. In agriculture, budget support is a key component connected with financial security/stability. Studies conducted by Kropp and Katchova[21] and Goodwin and Mishra[22] show that agricultural policy instruments are of importance when it comes to the financial security of farms. Research by Bereżnicka[23] indicates that the subsidies handed out to farmers to carry out operational activity positively impacted the financial stability of EU farms – which, in turn, strengthened financial security.

As Amess et al.[24] point out, in contemporary empirical analyses, the problem of endogeneity is a concern as it may lead to an incorrect evaluation of coefficients. One of the more difficult variables to estimate is, for example, the influence of various policies on funds held by an entity. It is also worth indicating that there are certain market imperfections, which means that there is an optimal level of cash counterbalancing costs and benefits and maximising a company's value. Additionally, it is necessary to consider a company's ability to generate cash and raise funds, which also influences decisions concerning the level of cash held[25].

The research results of Spanish SMEs between 1998-2012 confirm the existence of a target cash level that small enterprises attempt to attain. At the same time, in accordance with the precautionary motive of holding cash, SMEs with greater possibilities of growth adapt faster to the target level of cash to maintain financial flexibility and take advantage of profitable investment opportunities when they arise. Empirical evidence also shows that enterprises with financial limitations also adapt more quickly to the target cash level. Smaller enterprises and those with less internal financing (low cash flow level) are especially more likely to counterbalance the level of their own cash resources than bigger enterprises with easier access to external financing[26]. Similar findings indicating that SMEs maintain a target cash level and adapt more easily to it were validated for 307 UK SMEs between 2000 and 2009 by Al-Najjar[27].

Research on cash holdings in agricultural businesses was carried out by Singh and Misra[28], focusing mainly on the factors that shape them. The results of these findings show

[20] S. Dahiya, A. Saunders, A. Srinivasan: Financial distress and bank lending relationships, Journal of Finance 58/2003, p. 375-399.
[21] J.D. Kropp, A.L. Katchova: The effects of direct payments on liquidity and repayment capacity of beginning farmers, Agricultural Finance Review, 71, 3/2011, p. 347-365.
[22] B.K. Goodwin, A.K. Mishra: Are decoupled farm program payment really decoupled? An empirical evaluation, American Journal of Agricultural Economics, 88/2006, p. 73-89.
[23] J. Bereżnicka: Operational Subsidies and Financial Stability of Farms in the European Union, Wieś i Rolnictwo, 3, (180)/2018, p. 113-135.
[24] K. Amess, S. Banerji, A. Lampousis: Corporate cash holdings: Causes and consequences, International Review of Financial Analysis, 42/2015, p. 421-433.
[25] P.J. García-Teruel, P. Martínez-Solano: On the Determinants of SME Cash Holdings: Evidence from Spain. Journal of Business Finance & Accounting, 35(1), (2)/2008, p. 127-149, https://www.doi.org/10.1111/j.1468-5957.2007.02022.x
[26] C. Martínez-Sola, P.J. García-Teruel, P. Martínez-Solano, P.: Cash holdings in SMEs: speed of adjustment, growth and financing, Small Business Economics Journal, 51 (4)/2018, p. 823-842, https://www.doi.org/10.1007/s11187-018-9990-y
[27] B. Al-Najjar: The Effect of Governance Mechanisms on Small and Medium-Sized Enterprise Cash Holdings: Evidence from the United Kingdom, Journal of Small Business Management, 53,(2)/2015, p. 303-320. https://www.doi.org/10.1111/jsbm.12062
[28] K. Singh, M. Misra: Financial determinants of cash holdings levels: An analysis of Indian agricultural enterprises, Agricultural Economics-Czech, 65 (5)/2019, p. 240-248.

that the capital expenditure rate, cash flow to assets ratio and the dividend payout rate have a positive impact on cash holdings. However, factors that negatively impact such holdings were enterprise size and market-to-book value relation.

Research results and discussion

Table 2 presents a comparison of basic descriptive statistics of independent and dependent variables divided into two groups: Polish farms (A) and developing countries of the EU (D). They facilitate the indication of differences between examined financial categories.

Table 2. Descriptive statistics for variables considered in the panel research

Variable	PANEL							
	Poland* (A)				Developing countries (D)			
	average	min	max	SD	average	min	max	SD
Δcash [thous. EUR]	23.97	-156.73	337.18	117.24	82.22	5.94	359.39	100.34
CF/TA [%]	9.27	-13.39	98.98	6.76	12.13	5.09	20.60	4.19
Subsidies [thous. EUR]	10.24	0.00	113.67	46.93	30.23	1.20	158.19	42.49
S-T D [thous. EUR]	5.38	0.00	361.43	54.60	39.40	0.08	325.73	75.14
L-T D [thous. EUR]	17.67	0.00	1069.06	178.37	35.70	0.36	188.01	45.23
Sale [thous. EUR]	34.03	-0.72	706.01	190.84	100.58	8.84	484.87	134.47
LIQ [%]	9.85	0.00	71.70	5.67	7.90	3.67	13.03	2.35
LEV [%]	6.35	0.00	472.60	14.03	25.89	1.55	76.66	20.95
Debt maturity [%]	60.00	0.00	100.00	31.00	60.60	19.54	98.00	17.80

* absolute values are presented in EUR thous. While the average exchange rate assumed constitutes 4.194, calculated as the daily average exchange rates for the research period 2010-2018.

Source: own calculations based on the Polish database FADN as well as Eurostat, FADN Public Database (SO), https://agridata.ec.europa.eu/extensions/FADNPublicDatabase/FADNPublicDatabase.html (access: 15.10.2020); Archiwalne kursy walut – tabela kursowa. Bankier.pl, https://www.bankier.pl/narzedzia/archiwum-kursow-walutowych (access: 24.11.2020).

When comparing the data from Table 2, it is worth noting that Polish farms show significantly lower values and sizes of the examined variables. It has been stated that they vary greatly (high value of standard deviation). The biggest differences take place in the case of the short-term debt variable, and the most probable reason for this is that Polish farmers do not take advantage of trade credit and very rarely make use of working capital loans in comparison with their European counterparts (simultaneously this is evidence confirming risk aversion). Low levels of debt do not concern the whole collective, evidenced by very high levels of maximum debt exceeding the maximum debt value of European farms. There is a significant difference in long-term debt, and in Polish conditions, it is an amount 5-fold greater than in developing country farms. However, these comparisons confirm just how differentiated the researched collective is in this matter (standard deviation constituted 178.37). Another interesting matter concerns cash holding sources, i.e. sales and subsidies. The average values attained by Polish farms are almost 3-fold lower than those attained by the competition; however, there are some agricultural producers who have attained 2-fold higher sales compared to other farms of developing countries. What is worth noting is the change in the cash levels. In the whole period

researched, there was an average growth of cash by EUR 24,000 per farm, while in developing countries, this amount was 4-fold higher. These differences stem from the fact that negative cash flows were observed on Polish farms, a phenomenon that did not occur in other countries (D). The maximum values in both comparisons are similar to each other, though greater differentiation concerns Poland (higher value of standard deviation).

In the case of relative values, it is worth indicating that the panel Poland (A) is characterised by a lower level of financial leverage (resulting from a lower debt level) as well as the capacity of assets to make cash in comparison with the panel for farms of developing countries of the EU (D). It results from the fact that there are assets in agriculture of long-term nature, which, in the long run, are involved in the production process. A factor differentiating Polish farms from developing country farms was the effect of total negative cash flows in the former as a result of negative operational flows (*CF/TA* – 13.39). At the same time, it is worth noting that the maximum values of the total cash flows to assets ratio of Polish farms is several times higher than those for the panel of developing countries.

The interactions taking place between variables are presented in Table 3.

Table 3. Matrix of variable correlation for the Polish panel (A) (top part of the matrix) and other Central and Eastern European countries panel (D) (bottom part of the matrix)

Variable	Δ cash	CF/TA	Subsidies	L-T D	S-T D	Sale	LIQ	LEV	Debt maturity
Δcash	1.000	0.396	0.434	0.202	0.134	0.561	0.046	0.092	0.196
CF/TA	-0.003	1.000	0.093	-0.017	-0.150	0.265	0.122	0.032	-0.004
Subsidies	0.909	-0.087	1.000	0.423	0.597	0.293	0.043	0.239	0.179
L-T D	0.842	-0.124	0.834	1.000	0.632	0.482	-0.047	0.712	0.377
S-T D	0.919	-0.039	0.903	0.790	1.000	0.429	0.004	0.591	0.080
Sale	0.907	-0.077	0.996	0.840	0.910	1.000	-0.007	0.293	0.168
LIQ	0.335	0.370	0.383	0.325	0.311	0.398	1.000	-0.026	-0.065
LEV	0.663	0.122	0.598	0.769	0.649	0.617	0.618	1.000	0.318
Debt maturity	-0.516	-0.561	-0.501	-0.305	-0.558	-0.518	-0.616	-0.463	1.000

critical value (with a 2-sided 5% critical area) constitutes 0.242 for *n* = 66 (countries) and 0.097 for *n* = 40,536 (Poland)

The figures presented in Table 3 indicate completely different correlation relationships between variables in the other Central and Eastern European countries panel and Poland. The differences do not only concern the critical area but also the dependencies between the variables. Considering the associations of the Δcash variable, it is worth noticing that apart from the *CF/TA* variable, all other variables are strongly correlated. This mainly concerns the source of funds, regardless of whether they were subsidies or debts. There is a slightly weaker correlation in the case of liquid assets. It is worth highlighting that the debt maturity variable is negatively correlated with the dependent variable, though this correlation is not strong. In the case of the Poland panel, the source

of funds also indicates decisively greater correlation values than variables constituting asset structure, capital or cash yield. What is worth noting is the quite high – for the Poland panel – coefficient correlation of the variable *CF/TA* to Δcash. It is also interesting to note that debt maturity shows a positive correlation with the dependent variable (contrary to the Central and Eastern European countries panel). This is most probably a result of the debt structure. In Poland, there is a big difference between the value of long-term debt and short-term debt (in favour of the former); however, in the other Central and Eastern European countries panel, these values are on a similar level (see Table 2). Due to the fact that long-term debt financing dominates in Poland, maturity should positively impact the value of funds in subsequent payment periods.

Moving on from a whole country and developing countries level to a lower level (local – Polish), Table 4 presents the descriptive statistics of variables for defined groups incorporating financial security.

Table 4. Descriptive statistics for the panel Polish farms at risk and not at risk [thous. PLN, %]

Variable	Panel							
	unthreatened (b)				endangered (c)			
	average	min	max	*SD*	average	min	max	*SD*
Δcash	115.50	-451.83	1414.53	124.23	118.38	-657.34	1349.10	136.90
CF/TA	9.83	-6.83	90.41	6.83	9.80	-13.39	68.64	6.08
Subsidies	45.30	0.00	436.48	42.52	61.12	0.00	476.70	57.90
S-T D	10.59	0.00	194.14	10.97	54.02	0.00	1515.83	75.30
L-T D	8.04	0.00	145.00	13.88	185.90	0.00	4483.65	279.20
Sale	149.45	0.00	2173.20	187.40	211.67	0.00	2960.90	231.40
LIQ	10.31	0.00	58.02	5.34	9.91	0.00	62.30	5.31
LEV	1.45	0.00	88.86	1.74	15.63	2.50	472.60	18.50
Debt maturity	30.00	0.00	100.00	32.00	70.00	0.00	100.00	23.00

Source: Source: own calculations based on the Polish database FADN as well as Eurostat, FADN Public Database (SO), https://agridata.ec.europa.eu/extensions/FADNPublicDatabase/FADNPublicDatabase.html (access: 15.10.2020).

The change of source of funds in both panels (B) and (C) was similar. Their slightly greater growth on average per farm was found in the group of companies at risk, but even this group was internally more differentiated. The results in panels (B) and (C) were similar in the scope of asset cash yield as the share of circulating capital was similar. The differences concerned variables such as debt, sales and subsidies. Interestingly and what seems impossible was the fact that the farms which have higher sales and receive bigger subsidies constitute the panel of farms at risk. The reason for this situation was very high levels of debt, which translated into financial leverage. Knowing that they have the opportunity to gain greater support and better sales possibilities, the owners of these farms would put the farm in debt to take advantage of the opportunity to develop using, to a lesser extent, their own funds. Such activity is risky and may lead to a decrease or even total loss of financial security, but simultaneously may bring success in the shape of additional benefits stemming from the effect of financial leverage.

Table 5 presents the results of data panel estimation using the weighted least square

method for Polish farms (A), Polish farms not at risk (B), Polish farms at risk (C) and farms from developing countries from the EU (D).

Table 5. WLS estimation for the Δcash variable in panel groups

Variable	Panel			
	Poland (A)	Central and Eastern UE (D)	unthreatened (B)	endangered (C)
Const	-0.564*** (-2.705)	1.549 (0.131)	-14.296*** (-13.95)	-42.209*** (-73.15)
CF/TA	3.847*** (114.781)	1.143** (2.016)	5.867*** (158.9)	6.867*** (136.0)
Subsidies	0.574*** (92.64)	2.094*** (2.678)	0.591*** (105.4)	0.446*** (80.73)
S-T D	-0.239*** (-24.659)	0.890*** (5.707)	0.824*** (55.36)	-0.07*** (-8.728)
L-T D	-0.032*** (-11.46)	0.766*** (3.254)	1.214*** (68.39)	
Sale	0.294*** (134.3)	-0.668** (-2.475)	0.198*** (141.5)	0.216*** (119.96)
LIQ		1.672* (1.675)	-0.400 (-1.441)	0.439*** (11.94)
LEV		-0.462** (-2.038)	-10.546*** (-66.52)	-0.651*** (-30.23)
Debt maturity				3.003*** (86.38)
R_2 (skor R_2)	0.719 (0.719)	0.912 (0.900)	0.977 (0.977)	0.948 (0.948)
Test F	20,761.41	74.35	37,373.88	42,029.0

significance level *** for $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Source: Source: own calculations based on the Polish database FADN as well as Eurostat, FADN Public Database (SO), https://agridata.ec.europa.eu/extensions/FADNPublicDatabase/FADNPublicDatabase.html (access: 15.10.2020).

The conducted panel WLS estimates for Poland show that CF/TA, subsidies and sales positively impact cash changes. All these factors are of a monetary character, which is the probable reason for such an impact. While short-term debt seems to be an obvious variable, what is surprising is the negative impact of long-term debt. From many years of team experience in research on agricultural farms in Poland, it seems that, on the whole, farmers in Poland unwillingly took advantage of external sources of funds. The negative coefficient indicates a decreasing amount of cash due to paying back long-term debt on a larger scale than becoming indebted. Analogical dependencies were observed by Farinh et al.[31]. In comparison with the WLS model for developing countries, there are visible differences in the case of variables such as short-term and long-term debt, sales, LIQ and LEV. For the model of developing countries, differences indicate a different impact of variables on cash changes. Positive coefficients, when in debt, indicate that the farm takes

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[31] J. Farinha, C. Mateus, N. Soares: Cash holdings and earnings quality: evidence from the Main and Alternative UK markets, International Review of Financial Analysis 56/2018, p. 248.

advantage of external sources of funds. This is in line with the well-known research findings of Pastor and Gama, among others. When examining Portuguese SMEs, they claimed that bigger companies were in greater long-term debt and more susceptible to bank loans while simultaneously having lower levels of cash resources, in accordance with the forecasts of the theory of compromise and pecking order[32].

A negative coefficient of the sales variable shows that sales in developing countries took place with deferred payment dates. As a result, receivables became bigger but there was no positive change in cash. Chen et al.[33] obtained similar results. In the model for developing countries, there were additional variables, LIQ and LEV. The positive impact of the LIQ variable (a different dependency than in the research[34], which is impacted by the difference in the examined group of companies) indicates a lower share of working capital less liquid than cash in assets, which should enable the optimalisation of cash level. It is possible to find justification for this situation in the approach of Keynes regarding motives for holding money. The coefficient of the LEV variable indicates an unfavourable relation of foreign capital to own capital as a result of an increase in debt. It is worth highlighting that the source of cash changes in developing countries is – to a greater degree than in Poland – subsidies (the coefficient of the subsidy variable is 4-fold higher for model D). These results confirm the research conducted by Amess et al.[35], who, citing Jensen (1986), argue that financial leverage decreases the amount of cash under the control of managers.

The division of farms in Poland into groups at risk and not at risk revealed a difference in the comparison of variables, significantly impacting cash changes and the direction as well as the force of impact. The variables with a force and direction of impact similar in both of the analysed groups are *CF/TA*, subsidies and sales. This is in line with the model results for the examined group of Polish farms. Differences connected with the direction of impact on the dependent variable emerged in the short-term debt variable case. Farms from the group at risk pay off their short-term debts by reducing cash. It is worth noting that long-term debt is strongly a factor, positively impacting cash changes in farms that are not at risk. The obtained results signify a financial gap in this group of farms, which should be assessed as a positive phenomenon (also, in the production of rice in Nigeria, it was stated that the existence of a financial gap and improved access to loans may have a positive impact on the efficiency of agricultural production[36]. Confirmation of observations is a strong, negative impact on the dependent variable LEV in the group of

[32] C.C. Pastor, P.M. Gama: Determinant Factors of Cash Holdings: Evidence from Portuguese SMEs, International Journal of Business and Management, 8, 1/2013, p. 104-112.

[33] H. Chen, D. Yang, J.H. Zhang, H. Zhou: Internal controls, risk management, and cash holdings, Journal of Corporate Finance 64/2020, 101695, https://www.doi.org/10.1016/j.jcorpfin.2020.101695

[34] P.J. García-Teruel, P. Martínez-Solano: On the Determinants of SME Cash Holdings: Evidence from Spain. Journal of Business Finance & Accounting, 35(1), (2)/2008, p. 127-149, https://www.doi.org/10.1111/j.1468-5957.2007.02022.x

[35] K. Amess, S. Banerji, A. Lampousis: Corporate cash holdings: Causes and consequences, International Review of Financial Analysis, 42/2015, p. 421-433.

[36] T.O. Ojo, A.A. Ogundeji, S.C. Babu, T. Alimi: Estimating financing gaps in rice production in Southwestern Nigeria. Economic Structures, 9, 12/2020, p. 7, https://doi.org/10.1186/s40008-020-0190-y

farms not at risk (similar results were obtained by Cai et al.[37], Chen et al.[38]). In the group of farms at risk, there was another additional variable – debt maturity. This variable showed an additional impact on the dependent variable, which may be explained by the fact that farms at risk have a longer time to pay debts off (a bigger share of long-term debt, 70% on average – see Table 4), which means it has a smaller impact on cash changes.

Conclusions

The conducted research enables verification of the research hypotheses made. The first hypothesis, in which it was stated that "the cash holdings in Polish agriculture and developing countries of the EU is conditioned by budget support and sales", was confirmed positively. In addition, it was found that the *CF/TA* has a positive impact on cash changes in Poland. The second research hypothesis states that loans are one of the determinants of funds and was also positively confirmed, though short-term and long-term liabilities negatively impact the dependent variable. Therefore, it was stated that, in Polish agriculture, a payback of liabilities did take place – which explains the negative impact on these variables.

A different situation was observed in the model of developing countries, in which positive coefficients for debt were found. They indicate that these farms make use of external sources of financing. It was also found that the coefficient of the LEV variable indicates an unfavourable relation of foreign capital to own capital due to debt increase. This happened as the sources of cash changes in developing countries are, to a greater extent than in Poland – subsidies.

Taking the research conducted into consideration, it can be stated that funds – and, more specifically, cash holdings – serve as opportunities for the implementation of the basic objectives of each and every enterprise: secure existence and development. Somewhat other determinants shaped funds in agriculture in Poland and developing countries. Generally, in both groups, it is possible to state that the basic factors for maintaining cash reserves are of a monetary nature, facilitating financial security.

Limitations

The conducted research revealed the necessity of continuing analyses in the context of post-pandemic financial security – especially since agriculture benefits from budget support and subsidies that constitute a key factor of cash holdings, and these reserves have decreased post-Brexit. In the future, it is necessary to focus on the direction and types of activity in agriculture conducive to ensuring the financial security of farmers and their families.

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[37] W. Cai, Ch.C. Zeng, E. Lee, N. Ozkan, N.: Do business groups affect corporate cash holdings? Evidence from a transition economy, China Journal of Accounting Research 9/2016, p. 1-24.
[38] H. Chen, D. Yang, J.H. Zhang, H. Zhou: Internal controls, risk management, and cash holdings, Journal of Corporate Finance 64/2020, p. 101695. https://www.doi.org/10.1016/j.jcorpfin.2020.101695

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Źródła i determinanty rezerwy płynności w rolnictwie krajów Europy Środkowo-Wschodniej oraz z perspektywy bezpieczeństwa finansowego polskich gospodarstw rolnych

Streszczenie

Zapewnienie ciągłości działalności wymaga utrzymania płynności finansowej i określonego poziomu posiadania środków pieniężnych. Dotyczy to również gospodarstw, których właściciele pozyskują środki finansowe z różnych źródeł, w tym z kapitału obcego. Z tego względu celem opracowania była identyfikacja źródeł i określenie zasobów pieniężnych w gospodarstwach rolnych w krajach Europy Środkowo-Wschodniej. Dodatkowo, na podstawie szczegółowych danych z polskich gospodarstw, oceniono i porównano znaczenie zasobów pieniężnych w gospodarstwach charakteryzujących się wysokim poziomem bezpieczeństwa finansowego oraz tych, dla których identyfikujemy zagrożenie upadłością. Dane do badań pochodzą z bazy Farm Accounting Data Network (FADN) za lata 2013-

2018 (dla wszystkich rozpatrywanych przez nas krajów UE). W analizie dotyczącej zagrożenia upadłością w polskich gospodarstwach rolnych wykorzystaliśmy dane z FADN-PL za lata 2010-2018. W badaniu zastosowaliśmy metodę panelową – ważoną metodą najmniejszych kwadratów (WLS). Do obliczenia stanu posiadania środków pieniężnych zastosowaliśmy podejście dynamiczne. Wnioski z naszego badania wskazują, że wsparcie budżetowe dla rolników oraz wartość sprzedaży na gospodarstwo są głównymi źródłami i determinantami zasobów gotówki w gospodarstwach rolnych w krajach UE. Należy podkreślić, że wpływ wsparcia budżetowego na stan gotówki w polskich gospodarstwach był słabszy niż w innych badanych krajach. Ponadto stwierdzono, że istotnym czynnikiem wpływającym na stan posiadania gotówki był również poziom zadłużenia. W polskich gospodarstwach wpływ poziomu zadłużenia na stan posiadania gotówki był ujemny, a w innych krajach dodatni. Wartością dodaną pracy jest identyfikacja czynników, które wpływają na zmiany stanu posiadania gotówki, jest to więc dynamiczne podejście do posiadania gotówki.

Słowa kluczowe: rezerwa płynności, regresja panelowa, gospodarstwo, kraje UE
Kody JEL: G30, D25

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