A STUDY OF „UNDERTAKINGS IN DIFFICULTY" IN THE HUNGARIAN SME SECTOR INCLUDING EXPLANATORY VARIABLES[1]

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ABSTRACT

The objective of this study is to examine compliance with the definition of „undertaking in difficulty" as identified in EU competitive law in the Hungarian small and medium-sized enterprises sector. The 2019 data of the enterprises were used in the analysis. During the research, „undertakings in difficulty" as per the legal provisions were taken from a sample of about 31,000 companies. The „undertakings in difficulty" were then analysed by geographical area, industry and size. The explanatory variables were identified according to the literature. Classification tree and binary logistic regression were used to reveal the reasons why difficulties had arisen. The models built are highly reliable in predicting the emergence of difficult situations. The key outcome of the research is it has established a set of variables that can describe the emergence of difficult situations.

JEL codes: G28, G33, G38

Keywords: difficulty, capital structure, business analysis, prediction

1 INTRODUCTION

Pursuant to EU regulations, state aid is subject to certain criteria. Companies incurring major loss of capital or under insolvency proceedings are deemed *„undertakings in difficulty"* (NH). They are excluded from a certain group of aid, so economic decision makers must have information about their characteristic features. In this study, the situation of the Hungarian SME sector is surveyed including undertakings in difficulty and special features of their difficulties in the last year preceding the Corona virus pandemic.

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In the first part, the relevant legal environment is described followed by a review of the literature on the topic. The methodology is presented in part three. The variables and methods required for the study are derived from widespread models in economic studies to test the legal provisions with reference to companies. The findings are presented in part four. They include the number, regional distribution, structure by company size and industry structure of the businesses affected. Multivariate statistical methods were used to describe the process of entering into difficulty. The paper is closed by the lessons learned, some recommendations and a list of references.

2   THE LEGAL ENVIRONMENT

„*Difficulty*" in the operation of a business is a legal concept identified in Article 3 (5) of Commission Regulation (EU) No 1388/2014 with reference to small and medium-sized enterprises (hereinafter: SMEs); 37/2011. (III. 22.) Government Decree regulates its application in Hungary. Pursuant to the regulation, a company is deemed an „undertaking in difficulty", if it is unable to prevent loss accumulation through its own efforts. Accordingly, such enterprises cannot be granted state aid or EU co-financed support because of the principle of co-financing.

The set of criteria applies to economic enterprises of both limited or unlimited liability; in addition, it differentiates by company size. In this study, the focus is on SMEs. It should be noted that Section 3, XXXIV of 2004 law about small and medium-sized enterprises, supporting their development is the governing law for regulating the SME sector.

Considering the adverse effects of the Corona virus pandemic, any enterprise that had not been in difficulty prior to 31 December 2019 is eligible for air/support according to the European Commission (EC, 2020).

The regulation lists a number of criteria both qualitative and quantitative in nature (*Table 1*).

Table 1
Criteria of „difficulty"

Quantitative criteria
Over 50 percent of share capital or subscribed capital has been lost due to accumulated losses (limited liability and unlimited liability companies)
AND 25 percent of subscribed capital was lost over the past 12 months

Qualitative criteria
Insolvency proceedings have been launched by creditors as per the EU regulation
Insolvency proceedings can be launched pursuant to the law of the Member State

Other criteria
Company losses increase, turnover is reduced, stocks/inventories increase, excess capacity rises, orders significantly decline, payments decline, debts increase, depreciation of net asset value declines or net asset value has been depreciated in full.

Source: own design based on Section 6, 37/2011. (III. 22.) Government Decree

The criteria are well defined. However, other non-quantified criteria also characterise company operations. They are included in other, defined criteria, but this study does not cover them, as its scope is limited to the analysis of quantitative and qualitative criteria.

„Difficulty" has many consequences, as such enterprises cannot be granted state aid or EU co-financed support; see in detail in *Nyikos* (2018). The concept of state aid is defined in Article 107 (1), The Treaty on the Functioning of the European Union (TFEU). „Save as otherwise provided in the Treaties, any aid granted by a Member State or through State resources in any form whatsoever which distorts or threatens to distort competition by favouring certain undertakings or the production of certain goods shall, in so far as it affects trade between Member States, be incompatible with the internal market."

On the other hand, there are forms of state aid that are compatible with the internal market. They are listed in Article 107, (2) and (3) of Treaty on the Functioning of the European Union (TFEU). As a general rule, state support must be reported to the Commission which – in collaboration with the Member States – monitors Member States' support programmes. Pursuant to Article 107, Section (3), e) of TFEU, „such other categories of aid as may be specified by decision of the Council on a proposal from the Commission".[3]

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3   https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:12016E107&from=EN.

With respect to low significance state aid, block exemption was introduced in the EU in 2000 for SMEs and for training support. Pursuant to Commission Regulation 1407/2013/EU (de minimis regulation), the gross value of small amounts of aid granted to one and the same company cannot exceed EUR 200,000 in any three tax-years, or EUR 100,000 for enterprises engaged in commercial road transport (for more details, see *Losoncz*, 2019). The eligibility for support is controlled by the State Aid Monitoring Office.

3   A REVIEW OF RELEVANT LITERATURE

The core idea of the study is based on a paper by *Nagy* (2020). It is a comprehensive description of EU support and state aid to SMEs. It discusses EU support in the corporate sector by industry, company size, and region by analysing the data of a KPMG study on the absorption of EU support in Hungary in 2017.

„Difficulty" has mostly been studied from a legal aspect in the literature. *Schmidt-Köttlers* and *Rademacher* (2011) studied the German, *Lupu* (2014) the Romanian, American, and French bankruptcy laws in comparison with EU practice. *Segura* and *Nerea* (2017) have warned that the relevant authorities must examine compliance with eligibility criteria when they grant support. On the other hand, support cannot be withdrawn if insolvency proceedings are launched against a company after support has been granted.

Szűcs (2020) analysed the legal environment of state aid to undertakings in difficulty with respect to amendments in the EU regulation.

Accumulated knowledge is required for an economic study of „difficulty". Since the regulation typically analyses the characteristics of capital structure, the rise of a difficulty deducted from capital structure theories seems to be obvious. Another group affected is related to liquidation proceedings, so the Hungarian literature on bankruptcy models may be helpful for the analysis.

Modigliani and *Miller's* theses (1958) on capital structure theories used to be pioneering. Three main groups of currently accepted capital structure theories are based on selection theory, hierarchy theory and agent theory (see *Brealey–Myers* (2005); *Weston–Copeland* (1995) for the first and *Szemán* (2008) and *Jenson* (1976) for the second and third).

Of the Hungarian literature, *Krénusz* (2007), *Gál* (2013) and *Szücs* (2018) are worth mentioning. They break down the factors affecting capital structure to exogenous (taxation, legal provisions, macroeconomic characteristics) and endogenous (company size, age, asset composition, liquidity, business risk, profitability, and effectiveness) factors. With respect to empirical research, in his study *Gál* (2013) has found a positive relationship between equity ratio, asset composition and com-

pany size as well as profitability and liquidity. Equity ratio is important from the aspect of this study, as the criteria of „difficulty” mostly relate to its components.

Company viability is important from the aspect of accounting because different accounting measures must be applied if the principle of going concern is violated (*Lentner*, 2014; 2022). Bankruptcy models are suitable to assess the principle of going concern.

Of bankruptcy models, *Altman*'s (1968) is a core work, which analysed the probability of bankruptcy using discriminant analysis (*Asghar*, 2011). Pioneers in the Hungarian literature are *Virág and Hajdu*, who studied the bankruptcy of Hungarian large corporates using discriminant analysis and logistic regression on a 1992 database (Virág–Hajdu, 1996; Hajdu–Virág, 2001). *Arutyunjan* (2002) studied the bankruptcy of agricultural companies using discriminant analysis. In his paper, *Kristóf* (2008) generated a bankruptcy model using four multi-variable statistical methods. *Pollák* and *Popper* (2021) estimated the probability of bankruptcy using a combination of a linear auto-regressive model and a transition matrix. A novelty in Hungary by Nyitrai (2016) has been to apply dynamic financial indicators for establishing his model. *Béres* (2017) has set up a bankruptcy prediction model for municipalities based on logistic regression, while *Molnár* (2021) has done the same for municipality-owned economic enterprises based on a similar methodology. *Baranyi* et al. (2018) assessed bankruptcy models for banks. *Pálinkó* and *Svóób* (2017) analysed the reasons leading to bankruptcy in their paper, in which they emphasised the importance of liquidity to avoid bankruptcy.

4   MATERIAL AND METHODOLOGY

I identified two research objectives at the beginning. The **first research objective** was the identification of the ratio and sectoral distribution of undertakings in difficulty (hereinafter: NH) in the Hungarian SME sector in 2019. I chose year 2019 for the professionally acceptable reason that, partly, it was the last closed-down year prior to the Corona virus pandemic, and on the other hand, effective EU and national regulations also regard it decisive for identifying an „undertaking in difficulty” in addition to the factors presented in the paragraph on the legal environment.

The **second research objective** was to reveal which factors may trigger the rise of „difficulty”, i.e., which factors describing an asset-financial-profitability situation have the most impact on the rise of „difficulty”.

Since my research was explanatory in nature, I could not offer an adequate hypothesis based on the literature. Following my researcher's intuition, however, I

suggest sectoral characteristics and company size may affect the rise of „difficulty" – I tested that in the chapter on findings. Another proposition of my research is that the rise of „difficulty" has reasons that can be predicted well.

I have developed my **research methodology** in line with legal provisions; it is presented in *Table 2*. I used two indicators (*Table 2*: Variable1 and Variable2) to establish „difficulty" relevant to SMEs. If both variables were below the legal threshold value, I considered the given company to be an „undertaking in difficulty" in line with the legal provisions. The variable, in that way, was a dummy; difficulty was marked „1" and proper operation was marked „0". (*Table 2*).

I selected the explanatory variables based on the ones analysed in theories of capital structure. In addition, I also tried to evaluate the impact of dynamic changes by measuring the changes of variables year on year. The change indicator in the name of variables measures the change from 2018 to 2019.

Table 2
Generation of variables studied

No and description of research objective	Target	Variable
1. Ratio of NH companies	Generate variable describing „difficulty" from variables in legal provisions	**Variable1** = Ratio of equity2019/subscribed capital2019 50% or lower **Output:** 1 or 0 **Variable 2** = CPTL2019/CPTL2018 negative and higher than 25% **Output:** 1 or 0 NH is 1 if both variables are 1; otherwise, it is 0
2. Reveal reason why NH has arisen	Identify influencing variables	• Effectiveness • Liquidity • Profitability • Dynamic

Source: own design based on research concept

The following variables were studied:

- ROA added value indicator 2019
- ROA added value indicator 2018
- Tangible assets turnover 2019
- Tangible assets turnover 2018
- Change in tangible assets turnover
- Change in turnover per capita

- Change in sales revenues
- Relative standard deviation of EBIT
- Liquidity indicator 2019
- Liquidity indicator 2018
- Change in liquidity indicator
- ROA2019,
- ROA2018,
- Change in ROA
- Fixed assets ratio 2018
- Fixed assets ratio 2019
- Cash 2018
- Cash 2019
- Base-10 logarithm of balance sheet total in 2019
- Dynamic liquidity 2018
- Dynamic liquidity 2019
- ROS2018
- ROS2019

Table 3
Research goals, hypotheses and statistical methodology applied

	Research goal	Hypothesis	Methodology applied
1.	Ratio of NH companies	Sectoral classification and company size affect NH	Chi square test
2.	Reveal reason NH has arisen	NH can be well described using the variables studied	Binary logistic regression, classification tree based on CHAID model

Source: own design based on research concept

For the **first hypothesis** I assumed the ratio of SMEs in difficulty is higher in certain industries and that the category of company size also has a significant impact on the rise of difficulty (NH). I used Chi square to assess the hypothesis in normality (*Table 3*).

For the **second hypothesis** I took major variables affecting capital structure applied in capital structure theories as the basis, and used binary logistic regression for the explanatory variables, since the variable of NH was a dummy (*Table 3*). Variables not directly related to capital structure had to be selected, i.e., the components of the liabilities side were not included in the components of the indicators. To analyse the cross-table, in order to test binary logistic regression and the CHAID model, 490 non-NH companies were selected by random sampling as a control group to 590 NH companies.

The data analysed come from the database of Bureau Van Dijk Amadeus; the following **limiting criteria** were applied to the companies:

- They had been operating for at least three (3) years.
- They were not under liquidation, voluntary liquidation, or bankruptcy proceedings.
- They had sales revenues of at least HUF twelve million (12,000,000).
- They employed at least five (5) people.
- They submitted annual reports in 2019.
- They were partnerships in the category of SMEs.

The three-year operation as a limiting criterion was included because of a regulation in effect when the manuscript was finalised, because bankruptcy proceedings alone generate a „difficulty" (NH) in that case. Those companies were excluded by applying the limiting criterion, so the criteria presented in *Table 2* could be tested. The rest of the criteria were used to prove the companies were genuinely operational, since a company is subject to VAT above HUF twelve million unless it is engaged in exempt activities. Employing five people allows a company to be listed in the national wages statistics. The SME category came from the research objective. The limiting criteria were used to test the companies' basic operability, i.e., they verified their real, genuine activity. I used limiting criteria so that I could analyse companies engaged in measurable economic activities. Based on the criteria, 31,255 undertakings were included in the sample. I processed the data using the data analysis software SPSS 27 and visualised them using MS Office.

5   FINDINGS

At the beginning of the study, I generated the dummy variable in SPSS to allow the analysis of „difficulty" (NH). In the first step, variables were calculated; if a variable reached the legal threshold, the relevant company was included in the NH category. *Table 4* illustrates the ratio of NH companies to the total sample.

Table 4
Distribution of NH companies in the sample

NH status	Distribution	%
Non-NH	30,665	98.1
NH	590	1.9
Total	31,255	100

Source: own design based on database Amadeus

A mere 1.9 percent of the companies studied were deemed „undertaking in difficulty" (NH). Its reason is that – as presented in the part on methodology – I took into account the two quantitative criteria cumulatively rather than alternatively. I did so because I used 2019 data in the analysis. With respect to the objectives discussed in the part on methodology, I also kept in mind the idea of studying the impact of the Corona virus pandemic via panel tests, however, it had not been possible before the manuscript was finalised.

The logical question arises, how the ratio of NH companies would change if the two variables were studied separately. One can see from the analysis of the data that 651 companies reach the NH threshold value based on *Variable1,* and 628 ones based on *Variable2. Therefore,* difficulty" can be identified objectively if both aspects are assessed at the same time. Neither of the two variables indicate „difficulty" (NH) for 61 undertakings in the case of *Variable1,* and 38 in the case of *Variable 2.* The ratio of „undertakings in difficulty" (NH) so identified is 10.3 and 6.4 percent, respectively. Therefore, one can conclude considering both variables jointly is a better description of „difficulty" from the aspect of analysis.

The relatively low ratio of NH companies in the sample can be considered to be really good. However, the findings may be what they are because the analysis was made on a limited sample where companies deemed viable were studied. In addition, the impact of the favourable economic environment in 2019 also played a part. I believe the picture is worse than that if the whole SME sector is studied.

An insignificant part of companies meeting the limited criteria are deemed „undertaking in difficulty" (NH), which also means 98 percent are suitable for receiving external sources including state aid or EU support, as they are not subject to administrative restrictions.[4] Next, I analysed NH companies in-depth broken down by regional distribution, size, and sections of the national economy.

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4 Nyikos [2018] pointed out that only companies under insolvency proceedings are excluded from certain de minimis support.

Table 5
Geographical distribution of NH companies in 2019

Entity	Status of entity	Number of NH companies	% Ratio of NH companies in sample	Number of partnerships in regional entity	% Ratio of partnerships in regional entity	% Ratio of NH companies in sample to total multitude
Budapest	capital region	240	40.7	212,094	40.7	0.11
Pest	county region	95	16.1	81,346	15.6	0.12
Central Hungary	supra-region	335	56.8	293,440	56.3	0.11
Fejér	county	15	2.5	15,948	3.1	0.09
Komárom-Esztergom	county	14	2.4	12,522	2.4	0.11
Veszprém	county	20	3.4	12,142	2.3	0.16
Central Transdanubia	region	49	8.3	40,612	7.8	0.12
Győr-Moson-Sopron	county	24	4.1	19,062	3.7	0.13
Vas	county	13	2.2	8,547	1.6	0.15
Zala	county	9	1.5	10,026	1.9	0.09
Western Transdanubia	region	46	7.8	37,635	7.2	0.12
Baranya	county	19	3.2	15,328	2.9	0.12
Somogy	county	14	2.4	9,955	1.9	0.14
Tolna	county	7	1.2	6,864	1.3	0.10
Southern Transdanubia	region	40	6.8	32,147	6.2	0.12
Transdanubia	supra-region	135	22.9	110,394	21.2	0.12
Borsod-Abaúj-Zemplén	county	19	3.2	18,342	3.5	0.10
Heves	county	19	3.2	9,108	1.7	0.21
Nógrád	county	2	0.3	4,339	0.8	0.05
Northern Hungary	region	40	6.8	31,789	6.1	0.13
Hajdú-Bihar	county	10	1.7	18,498	3.6	0.05
Jász-Nagykun-Szolnok	county	10	1.7	9,611	1.8	0.10
Szabolcs-Szatmár-Bereg	county	11	1.9	14,390	2.8	0.08
Northern Great Plain	region	31	5.3	42,499	8.2	0.07
Bács-Kiskun	county	27	4.6	19,379	3.7	0.14
Békés	county	12	2.0	8,023	1.5	0.15
Csongrád-Csanád	county	10	1.7	15,478	3.0	0.06
Southern Great Plain	region	49	8.3	42,880	8.2	0.11
Northern Hungary & Great Plain	supra-region	120	20.3	117,168	22.5	0.10
Country total	country	590	100.0	521,003	100.0	0.11

Source: own calculations based on data from Amadeus and Central Statistical Office (KSH)

As for distribution, the number and ratio of „undertakings in difficulty" (NH) is the highest in Budapest and Pest County, which could also be predicted from

the national statistical data of partnerships (*Table 5*). In other counties their ratio does not exceed 5 percent, but it is close in Bács-Kiskun County and Győr-Moson-Sopron County. Data analysis did not show correlation between the level of development of a county measured by GDP per capita and the ratio of NH companies. The number of operational partnerships does not indicate a higher number of NH companies, either.

In a regional breakdown, the ratio of NH companies is the highest in the Central Hungary region followed by the Southern Great Plain and Southern Transdanubia, while Western Transdanubia is a close third. Geographical location has no effect on the number of enterprises in difficulty.

There are no geographical attributes with respect to the two factors.

The comparison of the country distribution of partnerships operating in 2019 to the ratio of NH companies is telling. Comparing the data, one can see a slight difference in the ratio of NH companies as opposed to that of nation-wide partnerships. The difference is positive in all regions except for the Northern Great Plain where the ratio of NH companies is lower than the national average mostly because of the distorting effect of Hajdú-Bihar and Szabolcs-Szatmár-Bereg Counties. In county comparison, there is a higher than 1 positive difference in the ratio of NH companies as opposed to regional ratios. The ratio of NH companies exceeds the predicted value in Veszprém and Heves Counties. Aside from those differences, the distribution of NH companies does not deviate much from national ratios; no significant difference prevails as a result of outliers in the Central Hungary region.

2019 data allow the comparison of the number of NH companies to the distribution of partnerships broken down by regions. The ratio of NH companies was 0.11% in 2019. It must be accepted with reservations because of the limiting criteria applied for establishing the sample; it does not reflect the actual ratio. (To be noted: the ratio of companies broken down by regions was 1.9 per cent in the sample.) It is telling that the ratio of companies in Heves County differs significantly from the national average.

Table 6
Distribution by size

Size categories by number of FTEs	Distribution pc	%
Micro enterprise	253	42.9
Small enterprise	298	50.5
Medium-sized enterprise	39	6.6
Total	*590*	*100*
Size categories applied as per database Amadeus (compatible with SME law)	**Distribution pc**	**%**
Medium-sized company	252	42.7
Small company	338	57.3
Total	*590*	*100*

Source: own calculations based on Amadeus

The **database Amadeus** displays statistical data about company size for all three categories of SMEs. In addition, the enterprises in the sample were categorised by the number of FTEs, which is an accepted method in Hungary (*Table 6*). Most NH companies in the sample were small enterprises while the relative weight of micro enterprises was also high. It is significantly different from national figures: the 2018 figures of the Central Statistical Office (KSH) presented 93.8 percent micro-enterprises, 4.5 percent small and 0.7 percent medium-sized enterprises among SMEs. Both limitations were different from national figures. It is because the number of small and medium-sized enterprises was higher in the sample, as inclusion in the sample was subject to basic operating features. The limitation relating to FTE numbers and turnover has a hidden assumption of bigger-sized companies, but it is not a guarantee of profitable operation.

Table 7
Distribution of NH companies by national economic branches

Code	National economic branch	Number of NH companies	% ratio of NH companies	Number of companies operational in 2018	Ratio of companies operational in 2018
A	Agriculture, forestry, fishing	10	1.7	31,140	3.99
B	Mining, quarrying	1	0.2	391	0.05
C	**Manufacturing (processing) industry**	**98**	**16.6**	*51,743*	*6.64*
D	Electricity, gas, heat supply, air conditioning	3	0.5	1,042	0.13
E	Water supply, wastewater collection, treatment, waste management, decontamination	10	1.7	1,763	0.23
F	**Construction industry**	**37**	**6.3**	*78,168*	*10.02*
G	**Trade, vehicle repair**	**145**	**24.6**	*132,382*	*16.98*
H	**Transport, storage**	**42**	**7.1**	29,525	3.79
I	**Accommodation and catering**	**77**	**13.1**	30,232	3.88
J	Information, communication	17	2.9	*45,082*	*5.78*
K	Financial, insurance activity	3	0.5	22,471	2.88
L	Real estate transactions	13	2.2	35,075	4.50
M	**Professional, scientific, technical activity**	**52**	**8.8**	*132,714*	*17.02*
N	**Administrative and service support activities**	**33**	**5.6**	*44,763*	*5.74*
O	Public administration, defence, compulsory social insurance	0	0.0	142	0.02
P	Education	6	1.0	33,153	4.25
Q	Human health and social care	12	2.0	35,473	4.55
R	Art, entertainment, leisure	14	2.4	23,848	3.06
S	Other services	17	2.9	*50,642*	*6.49*
Total	National economy total	590	100.0	779,749	100.00

Source: own calculations based on data from Amadeus and Central Statistical Office (KSH)

Table 7 is a distribution of NH companies by national economic branches. **Bold** was used to indicate if the ratio was higher than 5 percent. The KSH figures of operational enterprises in 2018 were available for national comparison. *Italics* were used to indicate branches where the ratio of NH companies was higher than 5 percent.

The analysis of data shows that NH SMEs were typically present in trade and the manufacturing/processing industry. Their ratio was also high in tourism, catering, transport, and scientific activities. It was also higher than 5 percent in construction industry. It can be assumed that market entry barriers and business risk are higher in those branches, however, further research is required to identify them.

An explanation might be that resource requirement is typically higher in branches where the ratio of NH enterprises exceeds 5 percent. Market competition is also fierce there, which causes higher exposure to market trends for the companies.

Losoncz et al. (2020), and Losoncz (2020) pointed out certain areas of manufacturing industry as well as transport, storage, accommodation, and catering that are front-runners of international operations. The considerable relative weight of NH companies is clear in the most international, export-oriented branches. It should be noted the ratio of NH companies was high in tourism, catering and transport worst hit by the Corona virus pandemic even before the pandemic. The ratio is expected to have increased further in the period following 2019. *Szabó* and *Farkas* (2011) have found companies accurately assessed the depth of the sub-prime crisis starting in 2009 –which is supported by a survey made in 2020 by MNB (MNB, 2020*)*.

The ratio of NH companies in the processing industry, accommodation, catering and trade is higher than the national average. The ratio of NH companies in other branches is lower than the national average, which supports the difficulties drawn up.

The **first hypothesis** was tested using cross-board analysis and Chi square test based on size category by FTE number and national economy branch. The statistical conditions of the test were met.

Table 8
**Chi square test and Cramer V indicator results (n = 1080)**

NH*Company size (by FTE number)			
Indicator	Value	df	Sig. (2-side)
Pearson Chi square	27.402[a]	2	0.000
Cramer V indicator	0.159	n.a.	0.000
NH*National economy branch			
Indicator	Value	df	Sig. (2-side)
Pearson Chi square	497.930[a]	287	0.000
Cramer V indicator	0.679	n.a.	0.000

Source: own calculation from Amadeus database and SPSS output

The Chi square test has proved a correlation for both variables, but the Cramer V indicator measuring its strength significantly differs (*Table 8)*. Regarding statistical tests, the correlation between variables was expected due to the high number of items, however, its strength could not be foreseen. The results prove a higher-than-medium-strong relationship between national economy branch and status of NH, i.e., the nature of activities does have an impact on whether a company becomes NH. (To remember: 490 NH companies were included in the sample by random sampling, leading to 1080 items altogether.) Regarding size category by FTE number, the relationship is weak according to the Cramer V indicator.

I studied the **second hypothesis** using two methods. One is the classification tree tested according to the CHAID model (*Figure 1*). Using the method, the influencing power of variables indicate the accuracy of classification.

Figure 1
Classification tree of NH status
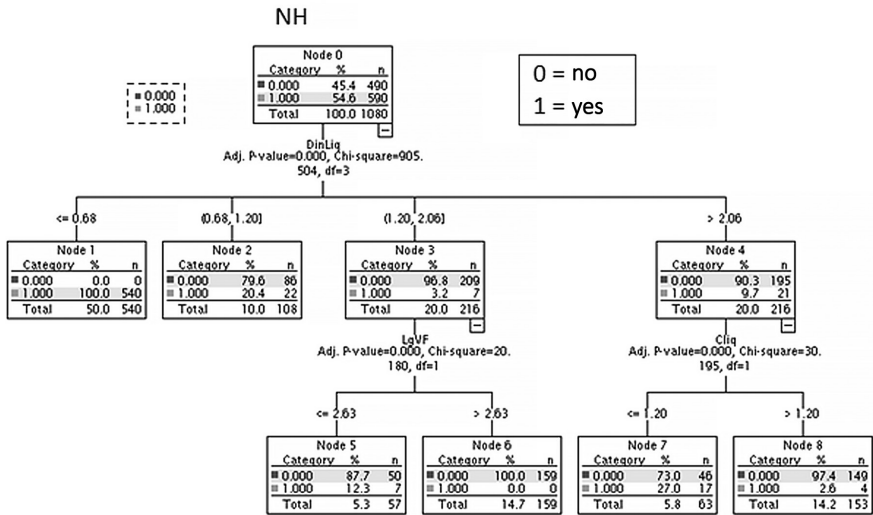
Source: SPSS output

Figure 1 illustrates the „branches" generated through classification, of which 8 have been „grown" by the calculations. The 2019 value (code: Dinliq) of dynamic liquidity had the highest influencing power identified as the ratio of operating profit and short-term liabilities, as per the proposal of *Bíró* et al. (2016). As in the decision tree, dynamic liquidity 2019 is lower than 0.68, so it influences NH status with an accuracy of 91.5 percent. If the value is higher, the classification is no longer accurate for 50 companies. If the value is higher than 0.68, 100% of the non-NH companies in the control group were accurately classified. The figure shows that including further variables did not have a major impact on accuracy. Thus, one can draw the conclusion the value of dynamic liquidation in the year preceding the research had a major impact on the NH status. It is because if operating profit cannot properly cover short-term liabilities, it will have a direct impact on both profitability and the components of equity causing asset loss for the company.

Table 9
Summary of model accuracy

NH	Prediction		
	No	Yes	Hit
No	490	0	100.00%
Yes	50	540	91.50%
Model accuracy			95.40%
Matching			4.6%
Standard error			0.006

Source: own calculation from SPSS output

Table 9 reiterates the accuracy of classification, because it classifies NH companies by their 2019 values of dynamic liquidity with accuracy of 91.5%, while the non-NH ones in the control group with 100%. The accuracy of the model was 95.4%; matching is the difference between it and total accuracy. Standard error can be considered low.

In addition to the classification tree, I also assessed the factors affecting NH with another method, called binary regression (*Table 10*). At the initial stage, if no enterprises were considered NH, the accuracy of the estimation would be (590/1080), i.e., 54.5 percent. It differs from 50 percent because the control group comprised 490 non-NH companies. The programme performs a constant test based on the Wald statistics, which is significant, i.e., there is a constant in the initial phase. I applied the „enter" procedure for the logistic regression, during which all variables assessed were included. I only displayed in *Table 10* the variables that exert individual impact on the dependent variable by significance level. However, it will not show the combined effect. The Chi square test of Omnibus was significant, which means the variables included in the test also had a combined effect on the dependent variable. The explanatory power of the independent variables in the model was examined using the Cox and Snell and the Nagelkerke R^2 indicator. The value of the latter indicates the explanatory power of the model is strong. Based on the significance level of the Hosmer-Lemeshow test value, I decided to accept the zero hypothesis. Eventually, the equation included the change of turnover in proportion to tangible assets, the 2019 value of cash liquidity, the 2019 value of base-10 logarithm of the balance sheet total, and the 2019 value of dynamic liquidity. Model accuracy is 94.1 percent; it predicted non-NH companies with accuracy of 92.7 percent and NH ones with 95.2 percent, respectively.

Table 10
Scoreboard of binary logistic regression

			Variables in equation					
	B	**S.E.**	**Wald**	**df**	**Sig.**	**Exp(B)**	**95% C.I.for EXP(B)**	
							Lower	**Upper**
DSperTA (Change turnover in proportion to tangible assets)	**0.663**	0.147	20.415	1	**0**	**1.94**	1.455	2.587
dS1918 (Change turnover)	**−0.726**	0.259	7.855	1	**0.005**	**0.484**	0.291	0.804
Cliq (Cash liquidity2019)	**−0.95**	0.155	37.432	1	**0**	**0.387**	0.285	0.524
LgVF (10-base logarithm of balance sheet total 2019)	**−2.222**	0.209	112.996	1	**0**	**0.108**	0.072	0.163
DinLiq (Dynamic liquidity 2019)	**−1.539**	0.138	124.048	1	**0**	**0.215**	0.164	0.281
Constant	**8.55**	0.71	145.051	1	**0**	5167.617		

			Prediction		
	Observation		NH		Accurate classification %
			No	Yes	
Step1	NH	No	454	36	92.7
			28	560	95.2
	Total classification %				94.1

Source: own calculation from Amadeus database, 2021

On the scoreboard of binary logistic regression, I think the signs of ExpB and Column B of the results of the Wald statistics provide the most information. Negative values reduce the change of getting into difficulty. According to Column B, change in turnover, the 2019 value of cash liquidity, the 2019 value of the 10-base logarithm of the balance sheet total and the 2019 value of dynamic liquidity revealed from the decision tree reduce the chance of a difficulty arising. The column Exp(B) shows by how much getting into a difficulty is reduced (in percentage) if the variable in question changes by 1 percent. Thus, one can say change in turnover mitigated the probability of becoming NH by 0.48 percent, cash liquidity in the given year by 0.39 percent and dynamic liquidity in 2019 by 0.22 percent, respectively. Nevertheless, the change of turnover in proportion to tangible assets had the most important impact on getting into difficulty, since a 1-percent change of the indicator raised the probability of becoming NH by 1.94 percent.

6   CONCLUSIONS AND PROPOSALS

The findings of the study and its main proposals are summed up as follows:

1.) **The ratio of „undertakings in difficulty" (NH) is low in the group of operational SMEs engaged in genuine activities.** The results suggest the share of enterprises meeting the definition of „difficulty" was low even in the limited sample. Still, the last year available was 2019, so their number has probably increased based on the empirical experience of the economic crisis triggered by the consequences of the Corona virus pandemic. It can be a further topic of research.

2.) **The ratio of NH enterprises is higher in the strategic branches of the national economy.** Their ratio is higher than the national average in the processing industry and services export. It is particularly obvious in services offering accommodation and catering, which reiterated research findings by *Rikovics (2021) and Szemerédi (2021),* who had already pointed out the vulnerability of the sector before the pandemic.

3.) **Geographical characteristics do not define NH of SMEs.** A comparison of „undertakings in difficulty" (NH) and operational partnerships has shown no significant difference by regions. In other words, the nationwide distribution of undertakings defines the distribution of NH enterprises too. Some counties significantly deviate, though (e.g., Heves County)

4.) **NH is mostly affected by turnover, followed by liquidity and company size.** An increase of turnover reduces the probability of getting into difficulty; on the other hand, proper liquidity in the given year and liquidity position measured with operating profit can also mitigate the threat. Factors related to turnover and dynamic liquidity can be regarded flow variables in full and in part, respectively. So, one can state getting into difficulty is a process. Its primary factor is the decline of turnover leading to less cash obtained which then will affect access to finance.

5.) **Evaluation of the hypotheses: based on mathematical-statistical methods, I believe both hypotheses can be accepted.** It has been proved on the research sample that company size (measured by FTE number) and classification in national economic branches correlate with NH. On the other hand, the relation between the variables is stronger than medium in the latter case only (based on the cross-board analysis and Cramer V indicator). I could also verify that undertakings in difficulty can be reliably detected on the basis of the variables of economic position.

6.) New and innovative results. The methodological approach and the novelty of the study are new results. In addition, the verification of the hypotheses using 2019 data can be regarded a new result.

The findings of the study can be summed up for enterprises as follows: What should they do to avoid getting into difficulty and be excluded from eligibility for EU support and Hungarian state aid because of their status? In this regard, I agree with the opinion of *Zéman* and *Tóth* (2018) and Zéman–Lentner (2018), who have stated **liquidity** plays an outstanding part in companies' strategic financial management, because it is the factor that defines if the going concern principle prevails. At the same time, **the stability of turnover** is decisive from the aspect of the management to reach liquidity, so enterprises must strive for that even in the current difficult economic situation. **Tight cost control** is the second important factor, because it helps ensure the profitability of core activities. It is particularly important in industries where the ratio of fixed assets tied up is high leading to high fix costs. It is one of the reasons why the ratio of NH enterprises is high in the processing industry, trade, accommodation, and transport (cf. Szemán, 2008). The third factor follows from it: **sales revenues must actually be received to reach a proper liquidity position,** which is subject to the credit policy and market position of the company. The former is an endogenous, the latter an exogenous factor. Enterprises have some room for manoeuvre in credit policy, but market position cannot be neglected, since it is they have to adapt to in the short run. The third factor is, in fact, **the stability of cash and cash equivalent,** i.e., enterprises should budget a higher expected liquidity. *Figure 2* is a summary of how enterprises can intervene.

An important lesson of the study for economic decision makers is that **supporting their enterprises' income generating abilities** through, for instance, bridging loans and/or compensation for lost income to a certain extent may be necessary measures to counter the consequences of the Corona virus pandemic in addition to cost-side support (loan moratorium, tax relief, wage subsidies in certain sectors).

Figure 2
**"For the road" for companies to counter the economic crisis
caused by the Corona virus pandemic**
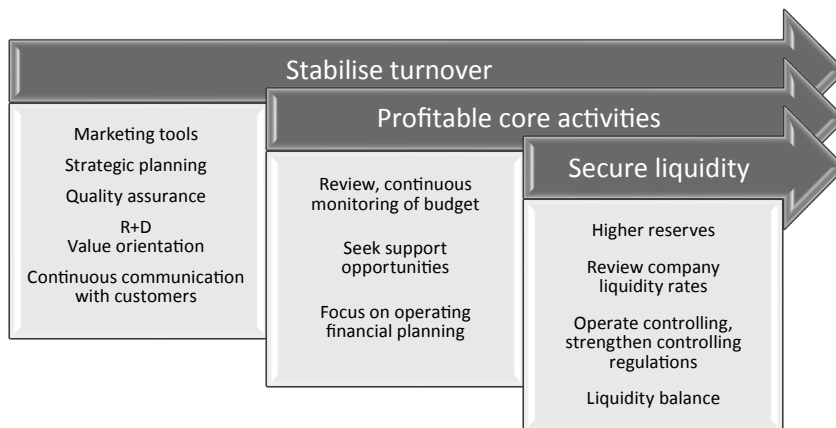
Source: own design based on research findings

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