

Capital Structure of Agricultural Businesses and its Determinants

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Anotace

Príspevek se zabývá analýzou kapitálové struktury zemědělských podniků právnických osob a jejich determinant. Je řešen vliv vybraných determinant na kapitálovou strukturu podniků, vyjádřenou prostřednictvím třech kategorií zadluženosti. Analýza determinant kapitálové struktury je provedena prostřednictvím vícenásobné lineární regrese. Rovněž je ověřována hypotéza, zda vliv jednotlivých determinant kapitálové struktury je v souladu s teoretickými předpoklady podmíněných teorií kapitálové struktury a empirickými studii.

Panelová data pro článek byla získána z databáze Albertina, poskytovaná společností Soliditet, s.r.o. Konkrétně byla využita data z účetních výkazů za roky 2004 – 2010 u zemědělských podniků právnických osob. Celkem bylo předmětem šetření 16075 podniků, které byly rozděleny dle právních forem (akciová společnost, družstvo a společnost s ručením omezeným) a následně příslušné velikostní skupiny. Celkem vzniklo 18 skupin podniků, kdy za každou skupinu byla sestavena průměrná rozvaha a výsledovka, na jejichž základě byly provedeny příslušné výpočty. Příspěvek je součástí grantového projektu IGA 20121069 „Identifikace hlavních determinant výsledku hospodaření zemědělských podniků právnických osob a určení jejich specifik“ a výzkumného záměru MŠMT 6046070906 „Ekonomika zdrojů českého zemědělství a jejich efektivní využívání v rámci multifunkčních zemědělskopotravinářských systémů“.

Klíčová slova

Kapitálová struktura, determinanty kapitálové struktury, zemědělské podniky, vícenásobná lineární regrese, podmíněné teorie kapitálové struktury.

Abstract

The article deals with the analysis of the capital structure of agricultural businesses of legal entities and its determinants. It discusses the effect of selected determinants on the capital structure of businesses, expressed by way of three categories of indebtedness. The analysis of the determinants of capital structure is conducted by way of multiple linear regression. Also being verified is the hypothesis of whether the effect of individual determinants of capital structure is in accordance with the theoretical assumptions of conditional theories of capital structure and empirical studies.

The panel data for the article were acquired from the Albertina database, provided by the company Soliditet, s.r.o. Specifically, the data used were those from accounting statements for the years 2004 – 2010 for the agricultural businesses of legal entities. In total, the object of examination was 16075 businesses, which were divided up according to legal forms (joint stock company, cooperative, and limited liability company) and subsequently the relevant size group. In total, 18 groups of businesses were created, whereby the average balance and profit and loss account were drawn up for each group, on the basis of which the relevant calculations were conducted. The article is a part of the grant project IGA 20121069 “Identification of the main determinants of the result of economic activity of agricultural businesses of legal entities and the determination of their specifics” and of the institutional research intentions MSM 6046070906 „Economics sources of Czech agriculture and their efficient use in the context of multifunctional agri-food systems“.

Key words

Capital structure, determinants of capital structure, agricultural businesses, multiple linear regression, theories of capital structure.

Introduction

The agricultural sector is a very significant part of the national economy. It is also included among the very sensitive areas of the economy, as it has its specifics that must be respected. Its specificity is caused primarily by the seasonal character of production, a high level of dependence on natural conditions, as well as the production structure. Those specifics are clearly reflected in the economic results of agricultural businesses and also affect the set-up of their capital structure.

The capital structure of agricultural businesses, which enables the monitoring of the utilization of capital within a business, is greatly differentiated. Such differentiation is seen at the level of countries, sectors, and of course within areas of business. The effective set-up of the capital structure is the main objective of the financial management of a business. The decision on the proportion of own and external sources of financing is key for a business in terms of further development. The generally applicable rule is that external capital is cheaper for a business than its own capital, as the business is able to maintain the control of the owners, spread risk among the owners and creditors, and can also utilize the deduction of interest from the tax base. However, that applies only up to a certain level of indebtedness, or until the moment when the costs for own capital are higher than for external capital. Then we can say that a business is able to increase the value of capital at a greater rate than is the interest rate on external resources, which has a positive effect on the rate of return of own capital. On the other hand, the utilization of an excessive amount of external capital, in the absence of the above condition, leads to a decrease in the possibility of acquiring further sources of financing and also to an effect on the actions of management, which must take into consideration the requirements of creditors. It is therefore necessary to regularly assess and effectively manage the capital structure and its determinants.

Every business aims for such a capital structure that fulfills the basic presumption of doing business, i.e. the achievement of maximum profit for the owners. For such reason, the structure of a business must be designed with the goal of its optimization, i.e. with the securing of sufficient capital with minimum costs expended for it (Nývtlová, Marinič, 2010). It is therefore evident that the utilization of any capital is associated

with costs expended for it. In the case of external capital, these are represented primarily by cost interest, and in the case of own capital they are expressed at the level of opportunity costs. In financial theory, the issue of the relationships between own and external capital is dealt with by so-called conditional theories of capital structure of businesses. Those can basically be divided up into two basic groups. The first group consists of static theories of capital structure, which are based upon economic theory, and create a proposal or model of capital structure of businesses specifically on the basis of information from economic theory. Subsequently, their theoretical verification is performed. The conclusions of individual exponents of this group differ, but they do have a common theme in that they discuss whether there is an objective balanced target state of the business, in terms of the relationship between its market value and the chosen capital structure. At the same time, they deal with whether businesses should make an effort to achieve it and secure it by way of financial decisions (Kislingerová et al., 2007). The second group consists of dynamic theories of capital structure, which are based upon a completely different principle. In creating proposals or models of capital structure, they focus on information on the actual behavior of businesses and, on the basis of that, they create theoretically generalized concepts (Kalouda, 2009). The basis of this theory is the opinion that an optimum capital structure basically does not exist and that the attempt to generalize in the area of the optimization of capital structure and its effect on the market value of a business can be misleading. They base their opinion on the assumption that every business continuously optimizes its financial decisions in view of changing specific conditions.

The evaluation of capital structure and its determinants is the object of research of a number of authors and it is thus possible to identify a broad spectrum of professional literature and articles that focus on such area. Such research comes primarily from the USA and focuses primarily on industrial businesses, specifically on small and mid-sized businesses. In the area of Europe, such research is then usually based on the USA, and is variously expanded and supplemented. Most recently, such issues are increasingly often coming to the forefront of interest of both theoretical as well as empirical studies, which focus not only on the practical utilization of individual conditional theories

of capital structure, but a number of them focus primarily on the discussion relating to the definition of the term of capital structure and the analysis of its determinants. The results of the empirical verification of the effect of selected determinants of capital structure can be summarized in the following Table 1.

The set-up of the capital structure within a business is a demanding process that is affected by a number of factors. The identification of such factors is very important primarily in terms of the future development of the business in the sense of the process of optimization of the structure of its capital, which is the result,

Determinants	Theoretical prediction	Conclusions of empirical studies
Size	(-) Pecking order theory	Total Debt (+) Rajan, Zingales (1995); Weill (2004); Song (2005); Michaelas, Chittenden, Poutziouris (1999); Delcoure (2007); Hutchinson, Hall, Michaelas (1998); Kayo, Kimura (2011); Chen (2004); Friend, Lang (1988); Total Debt (-) Chittenden, Hall, Hutchinson (1996) Long-term Debt (+) Michaelas, Chittenden, Poutziouris (1999); Mateev, Poutziouris, Ivanov (2012); Chittenden, Hall, Hutchinson (1996); Hutchinson, Hall, Michaelas (1998); Bevan, Danbolt (2002); Long-term Debt (-) Chen (2004); Delcoure (2007); Song (2005) Short-term Debt (+) Song (2005); Delcoure (2007); Mateev, Poutziouris, Ivanov (2012); Short-term Debt (-) Chittenden, Hall, Hutchinson (1996); Hutchinson, Hall, Michaelas (1998); Michaelas, Chittenden, Poutziouris (1999);
	(+) Trade-off theory	
Profitability	(-) Pecking order theory	Total Debt (+) Weill (2004); Total Debt (-) Rajan, Zingales (1995); Song (2005); Michaelas, Chittenden, Poutziouris (1999); Delcoure (2007); Chittenden, Hutchinson, Hall (1996); Hutchinson, Hall, Michaelas (1998); Bevan, Danbolt (2002); Kayo, Kimura (2011); Chen (2004); Friend, Lang (1988); Prášilová (2012); Bradley, Jarell, Kim (1984); Long-term Debt (-) Song (2005); Michaelas, Chittenden, Poutziouris (1999); Delcoure (2007); Mateev, Poutziouris, Ivanov (2012); Chittenden, Hutchinson, Hall (1996); Hutchinson, Hall, Michaelas (1998); Bevan, Danbolt (2002); Chen (2004); Short-term Debt (-) Song (2005); Michaelas, Chittenden, Poutziouris (1999); Delcoure (2007); Mateev, Poutziouris, Ivanov (2012); Chittenden, Hutchinson, Hall (1996); Hutchinson, Hall, Michaelas (1998); Bevan, Danbolt (2002);
	(+) Trade-off theory	
Tangibility	(-) Pecking order theory	Total Debt (+) Rajan, Zingales (1995); Song (2005); Michaelas, Chittenden, Poutziouris (1999); Delcoure (2007); Bevan, Danbolt (2002); Kayo, Kimura (2011); Chen (2004); Friend, Lang (1988); Total Debt (-) Weill (2004); Chittenden, Hall, Hutchinson (1996); Hutchinson, Hall, Michaelas (1998); Long-term Debt (+) Prášilová (2012); Song (2005); Michaelas, Chittenden, Poutziouris (1999); Delcoure (2007); Mateev, Poutziouris, Ivanov (2012); Chittenden, Hall, Hutchinson (1996); Hutchinson, Hall, Michaelas (1998); Bevan, Danbolt (2002); Chen (2004); Short-term Debt (+) Michaelas, Chittenden, Poutziouris (1999); Delcoure (2007);
	(+) Trade-off theory	

Source: own processing

Table 1: Theoretical prediction and conclusions of empirical studies of selected determinants of capital structure.

Determinants	Theoretical prediction	Conclusions of empirical studies
Non-debt tax shield	(-) Trade-off theory	Total Debt (+) Delcoure (2007); Bradley, Jarrell, Kim (1984); MacKie, Mason (1990); Total Debt (-) Chen (2004); DeAngelo, Masulis (1980) Long-term Debt (+) Delcoure (2007); Long-term Debt (-) Song (2005); Michaelas, Chittenden, Poutziouris (1999); Chen (2004); Short-term Debt (+) Song (2005); Delcoure (2007);
Retained profits	(-) Pecking order theory	Total Debt (+) Brav (2009)
	(+) Trade-off theory	
Liquidity	(-) Pecking order theory	Total Debt (-) Šarlija, Harc (2012); Long-term Debt (+) Šarlija, Harc (2012); Mateev, Poutziouris, Ivanov (2012); Short-term Debt (-) Šarlija, Harc (2012); Mateev, Poutziouris, Ivanov (2012);

Source: own processing

Table 1: Theoretical prediction and conclusions of empirical studies of selected determinants of capital structure, continuation.

and the determinants are the cause of such process. The individual determinants of capital structure are very closely interconnected with conditional theories of capital structure. Based on conditional theories of capital structure and in terms of the empirical studies that have already been conducted, it can be stated that the determinants of capital structure can be divided up into so-called external and internal determinants of capital structure (Prášilová, 2012). The group of external determinants includes those that the business **cannot** affect, such as economic policy, for example (primarily monetary policy and its effect on the development of interest rates), the legislative environment (level of taxation), the degree of the development of the economy, the environment, governmental intervention, the situation on the capital market, informational asymmetry, and others. The group of internal determinants, i.e. the determinants that the business can affect to a certain extent, can then be considered to include a number of factors that are primarily given by the type and economic activity of the company. In this group, Prášilová (2012) includes, for example, some indicators of the productivity of a business, such as the asset structure, the profitability of assets, liquidity, profit stability and cash-flow, or also the uniqueness of the product, the growth opportunities of the business, sector pertinence, and the age of the business.

The objective of this article is to identify the main determinants of the capital structure of agricultural businesses of legal entities in the Czech Republic and to quantify their effect, including the interconnection of the results with the conclusions of conditional theories of capital structure and empirical studies. The main objective is fulfilled by way of the following partial objectives:

- the definition of the main indicators of indebtedness, by way of which the capital structure of agricultural business will be expressed, on the basis of the recommendations of empirical studies;
- the identification of the main determinants of capital structure on the basis of the theoretical definition of the analyzed issue;
- the quantification of the effect of the main determinants, the determination of the direction of their dependency, and the assessment of their development in relation to capital structure, on the basis of multiple regression analysis;
- the definition of statistically significant determinants and the interconnection of the results of regression analysis with the conclusions of conditional theories of capital structure and the conclusions of empirical verification.

Also being verified is the hypothesis of whether the effect of individual determinants of capital structure is in accordance with the theoretical assumptions of conditional theories of capital structure and empirical studies.

Materials and methods

The analytical section is based on the data of agricultural businesses of legal entities in the Czech Republic within the period of 2004 – 2010. The data base of agricultural businesses of legal entities was obtained from the Albertina database of business entities, created by the company Soliditet, s.r.o. The object of examination was the businesses of legal entities, specifically joint stock companies, cooperatives and limited liability companies, with predominating activity in agriculture, classified as OKEČ 01 according to the OKEČ classification. The obtained accounting statements of individual businesses were further supplemented with the area of agricultural land for each business. That was obtained from a publicly accessible database administrated by the State Agricultural Intervention Fund (hereinafter the “SZIF”), containing information regarding the amount of direct payments provided to businesses of legal entities. On the basis of such information, the area of individual agricultural businesses was subsequently determined, by way of the proportion of the obtained SAPS subsidy and its unit rate in the given year.

The data were aggregated from several different information sources and the resulting table contained more than sixteen thousand entries. For the subsequent examination, only the data of companies with accounting statements pertaining to an extent of at least 6 months within the given accounting period were utilized.

The object of assessment was 16075 businesses, which were divided up according to legal forms (joint stock company, cooperative, and limited liability company) and subsequently the relevant size group (six groups). In total, 18 groups of businesses were created, whereby the average balance and profit and loss account were drawn up for each group, on the basis of which the relevant calculations were conducted.

For the quantification of the relationships between the variables and primarily also for the modeling of the dependency of selected variables on pre-defined factors, a regression model in linear form is used, which was evaluated as

the most appropriate on the basis of mathematical-statistical criteria (coefficient of determination, standard error of regression coefficients and testing) and with the use of Statistica 10 software. The general form of the multiple linear regression model can be set out as follows:

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_n x_n + \varepsilon,$$

where

y ... is the explained variable (successively total indebtedness; or long-term indebtedness; or short-term indebtedness),

x_1, \dots, x_n ... are explanatory variables (determinants of capital structure: size, ROA, collateral value of assets, non-debt tax shield, retained profit, liquidity),

β_0, \dots, β_n ... are unknown regression coefficients,

ε ... is the stochastic (random) element including the errors of the model.

The quantification of the effect of the factors on the capital structure of businesses is conducted with the utilization of the STATISTICA statistical software. Individual regression parameters are estimated by way of the method of least squares. The linear model was utilized in parameters as well as in variables and it was not necessary to linearize it in any way (Cipra, 2008). The estimated regression parameters simultaneously represent the coefficients of flexibility of the individual variables. On the basis thereof, we can therefore deduce the average changes of a dependent variable upon a unit change of a selected variable with the constant effect of the remaining variables.

Multiple linear regression is calculated for each year separately (in the time line of 2004 - 2010), so that partial changes within individual years are explained, primarily as pertains to the direction of the dependence of individual determinants of capital structure. In each of the assessed cases, all three models of indebtedness are calculated. In the regression models, its assumptions were verified as pertained to the random element and, in general, multicollinearity between the selected determinants of capital structure. The presence of multicollinearity between explanatory variables is undesirable, as it can distort the estimated parameters. Meloun and Militký (2004), or Hušek (2004) consider multicollinearity to be harmful in the event that the correlation coefficient $|r_{yx}| > 0.8$. That means that in the event that any

Indicator		Determination*
Dependent Variables	Total Debt	Total debt (BS85) / Total Assets (BS1)
	Long-term Debt	Long-term Debt (BS86+BS91+BS115) / Total Assets (BS1)
	Short-term Debt	Short-term Debt (BS102+BS116+BS115) / Total Assets (BS1)

Note: *) determination of Dependent Variables in relation to the balance sheet lines

Source: own processing

Table 2: Identification of dependent variables entering into regression models.

of the pair correlation coefficients exceeds such value, the model should be adjusted, or the structure of independent variables should be re-evaluated. In the event of the existence of multicollinearity, the relevant variable was then eliminated and the entire process of analysis was performed again.

Results and Discussion

Firstly, the main determinants of the capital structure of agricultural businesses of legal entities were first identified, on the basis of professional studies focusing on such issues. Subsequently, by way of regression analysis, their effect on the selected indicators of indebtedness was quantified and discussed, including the interconnectedness of such results with the selected empirical studies. The analysis itself is performed for agricultural businesses of legal entities in the Czech Republic within the period of the years 2004 - 2010, whereby the object of assessment was 16075 businesses, which were divided up according to legal forms (joint stock company, cooperative, and limited liability company) and subsequently the relevant size group (six groups). In total, 18 groups of businesses were created, whereby the average balance and profit and loss account were drawn up for each group, on the basis of which the relevant calculations were conducted.

1. Identification of the main determinants of the capital structure of agricultural businesses

A large number of factors that affect the capital structure of agricultural businesses can be found. However, on the basis of the specifics of the sector of agriculture and individual professional studies, primarily the following can be considered to be the main determinants:

- size of the business – expressed by way of the size of revenues;
- profitability – expressed by way of the profitability of assets;

- tangibility – expressed by way of the share of tangible assets in total assets;
- non-debt tax shield – expressed by way of the proportion of deductions to total assets;
- retained profits – expressed by way of the sum of all retained profits within the business;
- liquidity – expressed by way of the proportion of current assets to current liabilities.

A detailed identification of the main determinants of capital structure is set out in the following Table 3.

2. Quantification of the effect of the main determinants of capital structure of agricultural businesses

The following text sets out and discusses the results of multiple regression analysis of sectional data, which describes the effect of individual determinants on capital structure. Three models are drawn up in all, in such a way so that the effect of such determinants on individual categories of indebtedness can be examined separately. Each of the tables set out below contains the basic characteristics of the analyzed groups of businesses in terms of individual categories of indebtedness within the analyzed period of 2004 - 2010 (the average of the values of the relevant category of indebtedness, the median of the values, the standard deviation), the basic characteristics of the quality of the created model (the coefficient of determination and the p-value), as well as the quantification of the effect of the main determinants (estimated parameters, p-value and direction of dependency) affecting the capital structure. As statistically significant were defined those determinants that showed a statistical significance at least at a level of significance of α 0.1 in more than half of the analyzed years (4 years).

Table 4 demonstrates that no great fluctuation

Dependent Variables	Size	Total sales
	Profitability	EBIT / Total Assets
	Tangibility	Tangible Assets / Total Assets
	Non-debt tax shield	Depretiation / Total Assets
	Retained profits	Reserve funds, Statutory reserve account for cooperatives and other retained earnings + profit/loss previous years + profit/loss current year
	Liquidity	Current Assets / Short-term liabilities

Source: own processing

Table 3: Identification of the main determinants of capital structure.

Indicator/Determinants of capital structure	Characteristic	Year						
		2004	2005	2006	2007	2008	2009	2010
Total debt	Average	0.528	0.521	0.508	0.497	0.491	0.499	0.472
	Median	0.527	0.497	0.503	0.477	0.464	0.484	0.427
	Standard deviation	0.173	0.166	0.146	0.154	0.137	0.168	0.171
Quality of model	Coefficient of determination	0.82278	0.94931	0.90846	0.80886	0.70089	0.8966	0.74629
	p- value	0.000355	0.000002	0.000008	0.001912	0.006739	0.000077	0.007975
Explanatory variables								
Size	Statistical significance	**	****	****	**	*	**	-
	Regression coefficients	0	0	0	0	0	0	0
	Direction of dependency	positive	positive	positive	positive	positive	positive	positive
Profitability	Statistical significance	eliminated	*	-	-	-	**	-
	Regression coefficients	eliminated	1.76012	1.76082	0.10375	1.43597	-2.07908	-0.23752
	Direction of dependency	eliminated	positive	positive	positive	positive	negative	negative
Tangibility	Statistical significance	*	****	***	-	*	-	-
	Regression coefficients	-0.84822	-1.64386	-1.98197	-0.86171	-1.31099	-0.5032	-0.84611
	Direction of dependency	negative	negative	negative	negative	negative	negative	negative
Non-debt tax shield	Statistical significance	***	-	-	-	-	-	-
	Regression coefficients	9.51133	1.2967	0.24874	-0.9601	-4.32154	6.93468	7.03469
	Direction of dependency	positive	positive	positive	negative	negative	positive	positive
Retained profits	Statistical significance	**	***	*	*	-	***	-
	Regression coefficients	0.00001	0.00001	0	0	0	0.00001	0
	Direction of dependency	positive	positive	positive	positive	positive	positive	positive
Liquidity	Statistical significance	***	*	eliminated	**	eliminated	****	***
	Regression coefficients	-0.18563	-0.0517	eliminated	-0.09868	eliminated	-0.25042	-0.15203
	Direction of dependency	negative	negative	eliminated	negative	eliminated	negative	negative

Source: own processing

Note: Statistical significance: -) coefficient is not significant, *) $\alpha = 0.1$; **) $\alpha = 0.05$; ***) $\alpha = 0.01$; ****) $\alpha = 0.001$

Table 4: Conclusions of analysis indebtedness of agricultural businesses of legal entities in the years 2004 - 2010, Model of total indebtedness – Model 1.

of the average values of total indebtedness occurred among the assessed groups of businesses. The highest average value was achieved in 2004, specifically a value of 0.528. The lowest average value was then achieved in 2010, when the average value of indebtedness fell to a level of 0.472. The result of indebtedness in 2004 is clearly associated with the entry of the Czech Republic

into the EU, when the opportunities of access to external sources of financing improved for agricultural businesses, primarily in the form of bank loans, and a significant effect was also caused by the support of investment activities from the EU, where specifically the motivation of the co-financing of investment activities played a significant role in the making of decisions regarding the application

of further external capital within the business.

The estimated parameters show that increases in size, profitability (ROA), non-debt tax shield and the amount of retained profits have a positive impact on the value of indebtedness. However, not all such dependencies apply without exception. A change in the effects of the determinant of profitability on the value of indebtedness is apparent in 2009 and 2010, and the negative effect of the non-debt tax shield is then apparent in 2007 and 2008. For further determinants, i.e. the collateral value of assets and liquidity, a clearly negative effect on indebtedness was established.

In terms of the theoretical level, the relationship between the size of the business and indebtedness is unclear. A positive relationship is in accordance with the trade-off theory, which assumes that large businesses have lower bankruptcy costs, are more diversified, and that affects their access to external capital. On the other hand, the pecking order theory assumes that larger businesses provide less asymmetrical information on financial markets and are able to issue more own capital as compared to small companies. Fama and Jensen (1983) assume that less asymmetrical information can appear about large companies, because such companies have a tendency to provide more information to external investors than smaller companies. That should increase their preferences for the utilization of own capital in terms of debt. As regards empirical studies, the relationship between the size of the business and indebtedness is also unclear. Very often, such fact is given by the statistical insignificance of this parameter and also by the various conclusions of empirical studies that confirm both a positive relationship as well as a negative relationship. However, the majority of empirical studies confirm a positive relationship between the size of the business and indebtedness (Rajan, Zingales, 1995; Weill, 2004; Song, 2005; Friend, Lang, 1988; Delcoure, 2007; Kayo, Kimura, 2011; Michaelas, Chittenden, Poutziouris, 1999; Hutchinson, Hall, Michaelas 1998; Chen, 2004), which are also in line with the results of the conducted analysis. From an economic standpoint, it can be stated that upon a change in the size of the business (revenues) by a unit, a nearly zero change in capital structure occurs. We can therefore deduce that within the analyzed set of businesses, a nearly zero increase in total indebtedness occurred upon an increase in revenues. Such fact is entirely logical from an economic standpoint, as an increase

in the market share provides a business with a better position and stabilizes its capital structure.

The **collateral value of assets** showed a clearly negative effect on total indebtedness. The negative effect of the collateral value of assets on indebtedness is in conflict with the theoretical assumptions of the trade-off theory, which defines a positive relationship between the collateral value of assets and indebtedness, as tangible assets represent a collateral value for creditors. In the event that financial distress occurs, the business is able to quickly monetize such type of assets. However, in the case of the analyzed sample of agricultural businesses of legal entities, such fact does not apply. However, such result does correspond to the pecking order theory, which assumes that businesses with a higher level of tangible assets do not have a tendency to face problems with asymmetrical information and the utilization of debt is less probable for them. In terms of empirical verification, conclusions primarily of a positive effect of the collateral value of assets on total indebtedness predominate (Rajan, Zingales, 1995; Song, 2005; Michaelas, Chittenden, Poutziouris, 1999; Delcoure, 2007; Kayo, Kimura, 2011; Chen, 2004; Friend, Lang, 1988; Bevan, Danbolt, 2002). However, some empirical studies also speak of a negative dependency (Weill, 2004; Chittenden, Hall, Hutchinson, 1996; Hutchinson, Hall, Michaelas 1998), which is in accordance with the ascertained results. From an economic standpoint, such phenomenon within the set of agricultural businesses can be interpreted as follows: after the entry of the Czech Republic into the EU, investment activity of the agricultural sector was supported in a significant manner as part of efforts to strengthen competitiveness, new buildings were constructed for animal production, and new and more efficient machinery and technologies were acquired. The increase in investments in businesses caused greater productivity of labor, better results of economic activity, and upon their accumulation in regard to the value of own capital, a decrease in indebtedness occurred thereby.

Retained profit showed a clearly positive effect on total indebtedness. Such relationship corresponds to the assumptions of the trade-off theory and also to the results of empirical investigations (Brav, 2009), which concur on a positive direction of dependence. In terms of the strength of dependence, it can be stated that upon a change in retained profit by a unit, a nearly zero change

in capital structure occurs. It can thus be deduced that, within the analyzed set of businesses, a nearly zero increase in total indebtedness occurred upon an increase of retained profits. From an economic standpoint, such result can thus be interpreted in such a way that, with an increase in the volume of retained profits, businesses are able to simultaneously stabilize and optimize their capital structure, without a significant increase in indebtedness.

Liquidity was established as a statistically significant factor, with a negative effect on indebtedness. Such result is in accordance with the pecking order theory, which assumes that after the deduction of current liabilities, businesses with greater liquidity achieve greater current assets, or working capital, which is a prerequisite for generating a greater value of profit. Therefore, businesses with greater liquidity can generate more profit and do not have to utilize external capital.

Such result is also in accordance with the results of empirical studies - Šarlija, Harc (2012), Frieder a Martell (2006), Lipson a Mortal (2009), Morellec (2001), Myers a Rajan (1998).

Table 5 demonstrates that for the assessed groups of businesses, there was no great fluctuation in the average values of long-term indebtedness. The estimated parameters show that an increase in size, profitability (ROA), non-debt tax shield and the amount of retained profits have a positive impact on the value of indebtedness. However, not all such dependencies apply without exception. A change in the effect of the determinant of profitability on the value of indebtedness is evident in the years 2006 and 2009, and a negative effect of the non-debt tax shield is seen in the years 2005 and 2008. For the collateral value of assets, a clearly negative effect on long-term indebtedness was established. For liquidity, a negative dependence predominates, whereby it shows a change

Indicator/Determinants of capital structure	Characteristic	Year						
		2004	2005	2006	2007	2008	2009	2010
Total debt	Average	0.302	0.314	0.294	0.298	0.274	0.265	0.298
	Median	0.322	0.33	0.322	0.316	0.305	0.306	0.28
	Standard deviation	0.127	0.116	0.098	0.116	0.085	0.086	0.198
Quality of model	Coefficient of determination	0.81543	0.8963	0.82964	0.83477	0.7897	0.72859	0.67097
	p- value	0.00045	0.00008	0.00028	0.0009	0.00094	0.01112	0.02818
Explanatory variables								
Size	Statistical significance	***	***	****	**	***	**	-
	Regression coefficients	0	0	0	0	0	0	0
	Direction of dependency	positive	positive	positive	positive	positive	positive	positive
Profitability	Statistical significance	eliminated	-	-	-	**	-	-
	Regression coefficients	eliminated	1.1325	-0.95622	0.9189	1.10469	-0.25528	2.58669
	Direction of dependency	eliminated	positive	negative	positive	positive	negative	positive
Tangibility	Statistical significance	***	****	***	-	-	-	*
	Regression coefficients	-1.26953	-1.13668	-1.44019	-0.87588	-0.21062	-1.08648	1.31163
	Direction of dependency	negativni	negativni	negativni	negativni	negativni	negativni	positive
Non-debt tax shield	Statistical significance	***	-	*	**	-	-	*
	Regression coefficients	8.09558	-0.4147	4.90613	6.30879	-0.79487	2.72399	3.50873
	Direction of dependency	positive	negative	positive	positive	negative	positive	positive
Retained profits	Statistical significance	***	***	***	**	**	**	-
	Regression coefficients	0.00001	0.00001	0	0	0	0	0
	Direction of dependency	positive	positive	positive	positive	positive	positive	positive
Liquidity	Statistical significance	-	-	eliminated	-	eliminated	-	***
	Regression coefficients	-0.01897	0.00526	eliminated	-0.05086	eliminated	0.00185	-0.17209
	Direction of dependency	negative	positive	eliminated	negative	eliminated	positive	negative

Source: own processing

Note: Statistical significance: -) coefficient is not significant, *) $\alpha = 0.1$; **) $\alpha = 0.05$; ***) $\alpha = 0.01$; ****) $\alpha = 0.001$

Table 5: Conclusions of analysis indebtedness of agricultural businesses of legal entities in the years 2004 - 2010, Model of long-term indebtedness - Model 2.

in the direction of dependency to positive in 2009.

In the long-term indebtedness model, **size**, collateral value of assets, non-debt tax shield and retained profit were shown to be the statistically most significant determinants. The dependence of total indebtedness on size (expressed by way of revenues) was also clearly established as positive in such model, within the entire assessed time period. In terms of theoretical assumptions, it is not possible to establish a clear conclusion regarding the direction of the effects of such determinant. The result is thus in accordance with the trade-off theory, which presumes that large businesses have lower bankruptcy costs, are more diversified, and that positively affects their access to external capital. At the level of empirical studies, the relationship between long-term indebtedness and the size of the business is also unclear. However, conclusions of the positive relationships between the size of the business and long-term indebtedness prevail (Michaelas, Chittenden, Poutziouris, 1999; Mateev, Poutziouris, Ivanov, 2012; Chittenden, Hall, Hutchinson, 1996; Hutchinson, Hall, Michaelas, 1998; Bevan, Danbolt, 2002). However, other authors predicate a negative affect (Song, 2005, Delcoure, 2007, Chen, 2004). The **collateral value of assets** showed a predominantly negative effect on long-term indebtedness in model 2, but in 2010 a positive effect was also seen. Such resulting impact on long-term indebtedness is in accordance with the pecking order theory, which assumes that businesses with a higher level of tangible assets do not have a tendency to face problems with asymmetrical information and the utilization of debt is less likely for them. In terms of empirical studies, the conclusion that they concur upon the positive effect of the collateral value of assets on long-term indebtedness applies (Prášilová, 2012; Song, 2005; Michaelas, Chittenden, Poutziouris, 1999; Delcoure, 2007; Mateev, Poutziouris, Ivanov, 2012; Chittenden, Hall, Hutchinson, 1996; Hutchinson, Hall, Michaelas, 1998; Bevan, Danbolt, 2002; Chen, 2004). The achieved result is thus in conflict with the conclusions of empirical studies. The **non-debt tax shield** rather tended to confirm a positive effect on the value of long-term indebtedness. Although a negative dependence was also shown in 2005 and 2008. Such result is in conflict with the trade-off theory, which assumes that the non-debt tax shield is a substitute of the advantages of debt financing. From that point of view, it is thus assumed that an increase in the non-debt tax shield will lead to a decrease in indebtedness. A positive relationship between

the non-debt tax shield and long-term indebtedness is also in conflict with the conclusions of empirical studies, which confirm primarily a negative relationship (Song, 2005; Michaelas, Chittenden, Poutziouris, 1999; Chen, 2004). **Retained profit** also showed a clearly positive effect in the case of long-term indebtedness. The theoretical assumption of the trade-off theory was thus confirmed. In terms of the economic significance of this determinant, the inflexible reaction of total indebtedness to such factor was also established, at a value of nearly zero.

It is apparent from the results of the model that the effect of the selected determinants on the value of short-term indebtedness is statistically significant only for liquidity. The other factors cannot be considered to be decisive in the development of short-term indebtedness (the p-value as compared to the selected level of significance).

The estimated parameters show similar results as in the case of model 2. An increase in size, profitability (ROA), non-debt tax shield and the amount of retained profits have a positive impact on the value of indebtedness. However, not all of these dependencies apply without exception. A change in the effects of the determinant of profitability on the value of short-term indebtedness is apparent in 2009, and the negative effect of non-debt tax shield is identified in 2006 - 2008. In the case of liquidity, a clearly negative effect on short-term indebtedness was established. In the case of the collateral value of assets, a negative dependency predominates, whereby in 2004, 2009 and 2010, it shows a change in the direction of dependency to positive.

For the model of short-term indebtedness, only liquidity was confirmed as the statistically most significant determinant. **Liquidity** was established as a statistically significant factor, with a clearly negative effect on indebtedness. The conclusion of model 1, which is in accordance with the pecking order theory, was thus confirmed once again. Greater liquidity means that more current assets (working capital) remain within the business after the deduction of current liabilities and such higher volume of working capital is a prerequisite for generating a higher value of profit. A business with greater liquidity thereby does not have to utilize external capital. In terms of the direction of the dependency of liquidity in relation to short-term indebtedness, the negative dependency is not an economic matter, but a mathematical matter, where current liabilities

Indicator/Determinants of capital structure	Characteristic	Year						
		2004	2005	2006	2007	2008	2009	2010
Total debt	Average	0.225	0.207	0.214	0.2	0.217	0.234	0.233
	Median	0.183	0.176	0.193	0.19	0.206	0.201	0.166
	Standard deviation	0.094	0.067	0.081	0.096	0.089	0.163	0.181
Quality of model	Coefficient of determination	0.74362	0.84703	0.77646	0.84895	0.75467	0.90525	0.83179
	p- value	0.00287	0.00061	0.00133	0.00057	0.00224	0.00005	0.00099
Explanatory variables								
Size	Statistical significance	-	-	-	-	-	-	-
	Regression coefficients	0	0	0	0	0	0	0
	Direction of dependency	positive	positive	positive	positive	positive	positive	positive
Profitability	Statistical significance	eliminated	-	**	-	-	**	-
	Regression coefficients	eliminated	0.78599	2.34875	0.01271	0.28049	-1.89858	0.09725
	Direction of dependency	eliminated	positive	positive	positive	positive	negative	positive
Tangibility	Statistical significance	-	-	-	-	***	-	-
	Regression coefficients	0.35082	-0.37154	-0.51585	-0.24396	-1.07136	0.61893	0.27243
	Direction of dependency	positive	negative	negative	negative	negative	positive	positive
Non-debt tax shield	Statistical significance	-	-	*	-	-	-	-
	Regression coefficients	1.2945	0.8602	-4.03021	-0.82408	-3.26495	4.62227	5.10462
	Direction of dependency	positive	positive	negative	negative	negative	positive	positive
Retained profits	Statistical significance	-	-	-	-	-	-	-
	Regression coefficients	0	0	0	0	0	0	0
	Direction of dependency	positive	positive	positive	positive	positive	positive	positive
Liquidity	Statistical significance	****	***	eliminated	***	eliminated	****	****
	Regression coefficients	-0.1534	-0.05778	eliminated	-0.09062	eliminated	-0.25452	-0.18685
	Direction of dependency	negative	negative	eliminated	negative	eliminated	negative	negative

Source: own processing

Note: Statistical significance: -) coefficient is not significant, *) $\alpha = 0.1$; **) $\alpha = 0.05$; ***) $\alpha = 0.01$; ****) $\alpha = 0.001$

Table 6: Conclusions of analysis indebtedness of agricultural businesses of legal entities in the years 2004 - 2010, Model of short-term indebtedness – Model 3.

enter into the denominator in the case of the indicator of liquidity, and simultaneously into the numerator in the case of the indicator of short-term indebtedness (current assets/current liabilities versus current liabilities/total assets). In terms of empirical theories, this result is in accordance with the conclusions of Mateev, Poutziouris, Ivanov (2012), Šarlija, Harc (2012), who assume a negative dependence between short-term indebtedness and liquidity.

Conclusion

The capital structure of businesses, its monitoring and optimization represent a steadily current topic both on a theoretical level as well as on a practical level. A fundamental issue in the area of capital structure is also associated with its determinants, specifically with their identification and quantification. From a theoretical

point of view, there are currently a number of expert studies that focus on such issue. However, their conclusions are ambiguous, just as the results of empirical studies that verify such conclusions. Such situation is given primarily by the fact that there are many factors, whether external or internal, that affect the capital structure of businesses and whose spectrum is continually expanded by way of empirical studies.

The objective of this article was to identify and quantify the effect of the main determinants on the capital structure of agricultural businesses of legal entities in the Czech Republic within the period of the years 2004 – 2010. The analysis itself was based on extensive sectional data acquired from the Albertina database, supplemented with information from the publicly accessible SZIF database. The calculations were performed with the utilization of Statistica 10

statistical software.

Size, profitability, collateral value of assets, non-debt tax shield, retained profit and liquidity were selected as the main determinants of the capital structure of agricultural businesses. The effect of these determinants was quantified by way of regression analysis, whereby only some determinants were confirmed as statistically significant.

Three models in total were drawn up, within which the capital structure was expressed by way of three dependent variables, specifically total indebtedness, short-term indebtedness and long-term indebtedness. Regression analysis established size, the collateral value of assets, retained profit and liquidity as statistically the most significant determinants affecting total indebtedness of agricultural businesses. In terms of long-term indebtedness, size, the collateral value of assets, the non-debt tax shield, and retained profit were identified as the statistically significant determinants. In the case of short-term indebtedness, only liquidity was established as a statistically significant factor affecting this category of indebtedness.

The results of quantitative analysis further pointed out similar results in the assessment of individual categories of indebtedness and its determinants. Although the size and value of retained profit were confirmed as statistically significant determinants,

for both overall as well as long-term indebtedness, from an economic viewpoint the effect of those determinants on both categories of indebtedness is basically zero.

For the further examination of capital structure, it would be appropriate to focus in more detail on individual categories of indebtedness, i.e. long-term and short-term. In doing so, attention should be focused primarily on the identification of the determinants that directly relate to the development of those categories of indebtedness, as both theory and empirical studies are focused primarily on the examination of indebtedness as a whole. Primarily short-term indebtedness is in some studies also indicated as one of the determinants of capital structure as a whole and further examination in this area could thus bring new conclusions.

Acknowledgement

This paper was supported by the the grant project IGA 20121069 "Identification of the main determinants of the result of economic activity of agricultural businesses of legal entities and the determination of their specifics" and by the institutional research intentions MSM 6046070906 „Economics sources of Czech agriculture and their efficient use in the context of multifunctional agri-food systems“.

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References

- [1] Bevan, A., Danbolt, J. Capital structure and its determinants in the United Kingdom - a decompositional analysis. *Applied Financial Economics*. 2002, Vol. 12, No. 3, pp. 159-170. ISSN 0960-3107.
- [2] Bradley, M., Jarrell, G., Kim, E. H. On the existence of an optimal capital structure: theory and evidence. *The Journal of Finance*. 1984, Vol. 39, No. 3, p. 857-878. ISSN 1540-6261.
- [3] Brav, O. Access to Capital, Capital Structure, and the Funding of the Firm. *The Journal of Finance*. 2009, Vol. 64, No. 1. ISSN 1540-6261.

- [4] Cipra, T. Finanční ekonometrie. Praha: Ekopress, 2008. ISBN 978-80-86929-43-9.
- [5] Deangelo, H., Masulis, R. Leverage and Dividend Irrelevancy under Corporate and Personal Taxation. *Journal of Finance*, 1980, Vol. 35, p. 453-464. ISSN 1540-6261.
- [6] Delcours, N. The determinants of capital structure in transitional economies. *International Review of Economics and Finance*. 2007, Vol. 16, p. 400 - 415. ISSN 1059-0560.
- [7] Frank, M. F., Goyal K. V. Trade-off and Pecking Order Theories of Debt. Social Science Research Network. 2007. [Online]. Available at URL: < <http://dx.doi.org/10.2139/ssrn.670543>> [cited: 23.09.2012].
- [8] Frieder, L., Martell, R. On Capital Structure and the Liquidity of a Firm's Stock, Working paper, Purdue University, 2006. [Online]. Available at URL: <http://finance.eller.arizona.edu/documents/seminars/2005-6/LFrieder.CapStructure-Liquidity04-06.pdf> > [cited: 23.09.2012].
- [9] Friend, I., Lang, L. An empirical test of the impact of managerial self-interest on corporate capital structure. *The Journal of Finance*. 1988, Vol. 43, No. 2, p. 271-281. ISSN 1540-6261.
- [10] Hušek, R. Ekonometrická analýza. Praha: Oeconomica, 2007. ISBN 978-80-245-1300-3.
- [11] Hutchinson, P., Hall, G., Michaelas, N. The determinants of capital structure for micro, small and medium-sized enterprises. Working Paper, 1998. [Online]. Available at URL: < <http://www.sbaer.uca.edu/research/icsb/1998/44.pdf> > [cited: 20.08.2012].
- [12] Chen, J. J. Determinants of capital structure of Chinese-listed companies. *Journal of Business Research*. 2004, Vol. 57, p. 1341 - 1351. ISSN 0148-2963.
- [13] Chittenden, F., Hall, G. Hutchinson, P. Small Firm Growth, Access to Capital Markets and Financial Structure: Review of Issues and an Empirical Investigation. *Small Business Economics*. 1996, Vol. 8, No. 1, p. 59 - 67. ISSN 1573-0913.
- [14] Kalouda, F. Finanční řízení podniku. Plzeň: Vydavatelství a nakladatelství Aleš Čeněk, s.r.o., 2009. ISBN 978-80-7380-174-8.
- [15] Kayo, K. E., Kimura, H. Hierarchical determinants of capital structure. *Journal of Banking & Finance*, 2011, Vol. 35, p. 358 - 371. ISSN 0378-4266.
- [16] Kislíngrová, E. et al. Manažerské finance. 2nd edition. Praha: C. H. Beck, 2007. ISBN 978-80-7179-903-0.
- [17] Lipson, M., Mortal, S. Liquidity and capital structure. *Journal of Financial Markets*, 2009, Vol. 12, p. 611-644. ISSN 1386-4181.
- [18] Mackie-Mason, J., K. Do taxes affect corporate financing decisions? *The Journal of Finance*, 1990, Vol. 45, No. 5, p. 1471-1493. ISSN 1540-6261.
- [19] Mateev, M., Poutziouris, P., Ivanov, K. On the determinants of SME capital structure in Central and Eastern Europe: A dynamic panel analysis. *Research in International Business and Finance*, 2013, Vol. 27, p. 28 - 51. ISSN 0275-5319.
- [20] Meloun, M., Militký, J. Statistická analýza experimentálních dat. 2nd edition. Praha: Academia, 2004. ISBN 80-200-1254-0.
- [21] Michaelas, N., Chittenden, F., Poutziouris, P. Financial Policy and Capital Structure Choice in U. K. SMEs: Empirical Evidence from Company Panel Data. *Small Business Economics*, 1999, Vol. 12, p. 113 - 130. ISSN 1573-0913.
- [22] Morellec, E. Asset Liquidity, Capital Structure and Secured Debt. *Journal of Financial Economics*, 2001, Vol. 61, p. 173-206. ISSN 0304-405X.
- [23] Myers, S. C., Rajan, R. The Paradox of Liquidity. *Quarterly Journal of Economics*, 1998, Vol. 113, p. 733-771, ISSN 1531-4650.

- [24] Nývltová, R., Marinič, P. Finanční řízení podniku. 1st edition. Praha: GRADA Publishing, a.s., 2010. 208 s. ISBN 978-80-247-3158-2.
- [25] Prášilová, P. Determinanty kapitálové struktury českých podniků. E + M Ekonomie a Management. 2012, Vol.. 15, No. 1, s. 89-104. ISSN 1212-3609.
- [26] Rajan. R. G., Zingales, L. What Do We Know About Capital Structure? Some Evidence from International Data. The Journal of Finance. 1995, Vol. 50, Iss. 2, p. 1421-1459. ISSN 1540-6261.
- [27] Song, H. Capital Structure Determinants An Empirical Study of Swedish Companies. In Paper presented at the International PhD Workshop „Inovation, Entrepreneurship and Growth“. Stockholm: Royal Institute of Technology Stockholm, November 19. - 20., 2005. [Online]. Available at URL: <<http://www.kth.se/dokument/itm/cesis/CESISWP25.pdf>>, [cited: 20.09.2012].
- [28] Šarlija, N., Harc, M. The impal of liquidity on the capital structure: a case study of Croatian firms. Business Systems Research, 2012, Vol. 3, No. 1, p. 30-36. ISSN 1847-9375.
- [29] Weill, L. What Determines Leverage in Transition Countries. Finance a úvěr - Czech Journal of Economics and Finance, 2004, Vol. 54, No. 5-6, p. 234. ISSN 0015-1920.