ACTA UNIVERSITATIS LODZIENSIS
FOLIA OECONOMICA 1(310), 2015
http://dx.doi.org/10.18778/0208-6021.310.03

Leszek Czapiewski[*]
Jarosław Kubiak[**]

THE IMPACT OF INFORMATION ASYMMETRY ON THE USE OF SHORT-TERM DEBT IN SELECTED EUROPEAN STATES

Abstract. The article analysed the relation between the degree of information asymmetry and the scope of the use of short-term debt by companies from 5 European countries: France, Greece, Germany, the United Kingdom and Italy. Information asymmetry was measured by Synthetic Measure of the Degree of Information Asymmetry, which was constructed on the basis of 9 indicators. The presented analyses showed that, according to expectations resulting from the capital structure theory, the enterprises characterized by a higher degree of information asymmetry use short-term debt to a greater extent. Information asymmetry is an important determinant of the maturity structure of debt. However, the association between information asymmetry and the maturity structure of debt may be modified by various country-specific factors.

Key words: capital structure, information asymmetry, measurement of information asymmetry, the maturity structure of debt.

1. INTRODUCTION

The issue of the significance of short-term debt in the financing activities of an enterprise is relatively rarely a subject of research studies concerning capital structure formation. Nevertheless, the possibility of using short-term debt to reduce the impact of market imperfections, as information asymmetry or agency relationship, is worth discussing [Barclay and Smith 1995; Guedes and Opler 1996; Datta et al. 2005]. This article attempts to determine the relation between the degree of information asymmetry and the determination of the maturity structure of debt.

Information asymmetry is considered one of the basic determinants of an enterprise's capital structure formation. In order to investigate its influence on the use of short-term debt, it is essential to determine a method of measuring information asymmetry. Previous research studies used a variety of methods to measure this degree, since information asymmetry cannot be measured directly; one can only approximate it. One of the solutions here might be to use synthetic

[*] Ph.D., Poznan University of Economics, Department of Corporate Finance.
[**] Ph.D. hab., Poznan University of Economics, Department of Corporate Finance.

measures that simultaneously take many features approximating its degree into consideration. An example of such a measure is the Synthetic Measure of the Degree of Information Asymmetry [*Polish: Syntetyczny Miernik Asymetrii Informacji* – SMAI] [Kubiak 2013; Czapiewski and Kubiak 2012], which was used to measure this phenomenon in the research studies presented in the article.

This article attempts to investigate the relation between the degree of information asymmetry and the use of short-term debt by enterprises in the selected European countries of: France, Greece, Germany, the United Kingdom and Italy. The main hypothesis of this article is: companies with a higher level of information asymmetry are characterised by a relatively higher use of short-term debt. The association between information asymmetry and the maturity structure of debt could be modified by a variety of factors associated with a given country, especially a country's risk, its legal systems and laws associated with investor protections, and connected with that, whether the country has a sophisticated capital market or a developed banking sector.

Research studies were conducted on the basis of financial statement data from the period 2010–2012, derived from S&P CAPITAL IQ database, and concerning the enterprises for which a complete set of information indispensable to the calculate indices applied in the research was gathered.

2. INFORMATION ASYMMETRY AS A DETERMINANT OF CAPITAL STRUCTURE

The main effects of the information asymmetry phenomenon in enterprises are: underinvestment, overinvestment, and transfer of value. Their occurrence leads to non-optimal investment decisions with a resulting loss in an enterprise's value. Therefore, stakeholders of an enterprise should be interested in reducing the scope of the influence of the negative effects of information asymmetry. One of the methods of achieving this goal is proper capital structure formation. Theories of capital structure, where information asymmetry is presented as the main determinant for the behaviour of enterprises, are, chiefly, the signalling theory and pecking order theory. In addition, agency theory introduces information asymmetry as one of significant factors influencing capital structure.

According to the signalling theory, management may intentionally choose corporate financing methods to send signals about future enterprise performance to the environment. Among the signals showing the bright prospects of an enterprise are information on an intention to acquire debt, or maintain or increase dividends paid-out.

According to the pecking order theory, enterprises prefer those capitals that are characterised by the lowest sensitivity to the negative effects of information asymmetry. Therefore, they first use retained earnings; after these earnings have been exhausted, they may turn to debt; subsequently, issue

hybrid securities, and in the case of having exhausted debt capacity, raise equity capital from outside sources.

The principal–agent relationship promotes the appearance of the temptation of fraud. The greater degree of information asymmetry between an agent and a principal, the more risk of fraud. Therefore, unequal access to information between managers and owners, or between owners and creditors, implies high costs of verifying an agent's quality, as well as monitoring and supervision of already concluded contracts.

The aforementioned theories offer the possibility of reducing the negative effects of information asymmetry through the proper selection of sources of capital. All three theories – the signalling theory, the pecking order theory, and the principal–agent theory – show that thanks to using short-term debt one can reduce the problem of underinvestment and the associated moral hazard. However, the hypothesis of taking greater advantage of short-term debt in enterprises characterised by a high degree of information asymmetry is relatively rarely verified by research. This article attempts to bridge this gap.

3. SYNTHETIC MEASURE OF THE DEGREE OF INFORMATION ASYMMETRY

As was already mentioned in the introduction, information asymmetry cannot be measured directly. Therefore, one should approximate the degree of asymmetry on the basis of the occurrence of certain conditions indicating the diversity of its degree. These conditions can be of a different nature, leading to the great number of measuring methods offered in the reference books. Among others, information asymmetry is approximated by means of the following indicators: market microstructure, market-to-book value of business capital, determining the activity of managers in an enterprise's share trading, determining the diversity and errors in the forecasts of analysts evaluating an enterprise, asset structure, determining an enterprise's growth rate, measuring an enterprise size and longevity, as well as measuring its profit quality, ascertaining the public or non-public character of an enterprise, determining the level of the relationship with a grantor of credit, ownership structure, or the separation between ownership and management[1]. None of the used measures of the degree of information asymmetry can be considered an indisputable or complete measure of information asymmetry [Lee and Masulis 2009]. Therefore, on the basis of particular indicators, one cannot comprehensively determine the degree of information asymmetry and relativize it in relation to the analysed enterprises. A solution that should facilitate the achievement of this goal is the use of synthetic measures which take into consideration several

[1] A detailed description of information asymmetry measures can be found in: Kubiak [2011].

measuring methods and the corresponding partial indicators relating to various conditions of information asymmetry occurrence.

The Synthetic Measure of the Degree of Information Asymmetry (SMAI) offered in the article enables the estimation of information asymmetry on the basis of various reasons for, and conditions of its creation [Kubiak 2013]. The first group of indicators constituting SMAI is composed of those which approximate the difficulties of a proper valuation of an enterprise (difficulty of interpreting information). This includes: plant and equipment to total assets ratio, intangible assets to total assets ratio, increase in assets ratio, and sales gain ratio. The second group is composed of indicators that enable diversification of the quantity and quality of the generated information. This group includes: enterprise size measured with natural logarithm of sales revenue, enterprise size measured with natural logarithm of assets, natural logarithm of enterprise age, and binary variables determining the public or non-public character of an enterprise. The third reason for information asymmetry taken into consideration in SMAI is the differentiated access to information, approximated in the research by means of the ratio of ownership concentration. In order to achieve this, the research study used Herfindahl–Hirschman Index (HHI), which was calculated by taking the sum of squares of ownership shares of the particular enterprise's co-owners. This enables the estimation of the range of the level of supervision over inside investors' activities concerning the use of resources (after the decision on provision of capital has been made; therefore, it enables estimation of information asymmetry *ex post*). The higher degree of ownership dispersion, the more difficult it is to keep a close eye on insiders' activities; thus, the higher degree of information asymmetry.

The procedure of developing the Synthetic Measure of the Degree of Information Asymmetry is composed of several stages. First, an observation matrix for the analysed features of the enterprises was created (the values of the particular indicators used to approximate information asymmetry were calculated) and the particular features were defined as stimulants (higher values increase asymmetry) or destimulants (lower values increase asymmetry). The second stage consisted in unifying the investigated variables through converting destimulant indicators into stimulants. In order to achieve this, the following formula was applied:

$$x_{ij} = \max\left\{x_{ij}^{D}\right\} - x_{ij}^{D} \tag{1}$$

where:

x_{ij} – value of variable after conversion of a destimulant into a stimulant,

x_{ij}^{D} – variable in the form of a destimulant.

It should be emphasized that the maximum value of the particular indicator was evaluated on the basis of all the indicators; that is, those calculated for every enterprise, each year, within the period of 2010–2012.

After unifying all the indicators into the form of a stimulant, they were normalised through standardization of variables. Subsequently, with the use of weights determined for diagnostic variables, the distance between each object and the pattern was calculated:

$$q_i = \sqrt{\sum_{j=1}^{m} w_j * \left(x_{ij}^{'} - x_{0j}^{'} \right)^2} \quad (\mathrm{i} = 1, 2, \ldots \mathrm{n}) \tag{2}$$

where:

q_i – the value of SMAI coefficient for *i*-th object,

w_j – weight assigned to the particular objects,

$x_{0j}^{'}$ – model object – $\max \left\{ x_{ij}^{'} \right\}$.

Table 1. Assumed groups and the indicators creating these groups and their influence on the value of SMAI

Group	Indicator	Type	Weight
Indicators that enable the distinction of the quantity and quality of generated information	ln (sales revenue)	destimulant	0.06
	ln (assets)	destimulant	0.06
	ln (enterprise age)	destimulant	0.08
	public (1) or a non-public (0) character of an enterprise (binary variable 0–1)	destimulant	0.20
Indicators that enable the assessment of the difficulty of proper enterprises valuation	plant and equipment to total assets ratio	destimulant	0.16
	intangible assets to total assets ratio	stimulant	0.16
	increase in assets ratio	stimulant	0.04
	sales gain ratio	stimulant	0.04
Indicator that approximates the uneven access to information	Ownership concentration – Herfindahl–Hirschman Index (H–H)	stimulant	0.20

Source: own work.

Using weights enables one to take the different strengths of the influence of particular variables (partial measures) on the degree of information asymmetry

into consideration[2]. The higher the weight assigned to a variable, the more considerable the influence of the variable on the investigated phenomenon. The Synthetic Measure of the Degree of Information Asymmetry used substantive weights [Kubiak 2013] and their values are presented in Table 1.

Substantive weights should refer to the arguments determining the significance of particular features for the value of the investigated phenomenon. When investigating the relation between information asymmetry and enterprise capital structure formation, one should take the existence of information asymmetry resulting from the range of the amount of generated data into consideration to the same extent as that resulting from difficulties with proper information interpretation. The latter situation may often occur in the case of investment effectiveness evaluation conducted by investors. The type of assets and an enterprise's growth rate have their impact on difficulties with the proper evaluation of an enterprise's financial standing – this aspect of information asymmetry and a lack of complete information may equally determine enterprise capital structure. Therefore, both these groups were assigned the same weight – 40% influence on the synthetic measure. The last group (formed by one indicator approximating the uneven access to information enabling supervision over insiders) was assigned 20% weight in determining the value of synthetic measure with regard to the fact that this group mainly concerns the issue of information asymmetry *ex post* and is connected with the estimation of exposure to moral hazards resulting from weaker supervision over inside investors by outside investors.

Within the first group of indicators – diversifying the quantity and quality of generated information – the highest significance (50% in the group) was attributed to the binary variable enabling recognition of enterprises that are public companies (variable value 1) and those that do not have a public status (variable value 0). The public character of a company is connected to a number of disclosure requirements in relation to the quantity, quality and frequency of provided information. Therefore, the public character of a company considerably reduces information asymmetry in relation to data availability. A 30% weight was assigned to the enterprise size criterion, which is commonly used in research studies to approximate information asymmetry. Equal significance in determining enterprise size was attributed to the natural logarithm of sales revenue and the natural logarithm of assets. The advantage of revenue criterion is that it enables classification of enterprises operating in fields where sales volume is determined by intellectual (human) capital, and not by asset size and structure in the financial statement, as relatively large. On the other hand, asset size criterion's advantage

[2] Weights can be determined on the basis of different substantive criteria or statistical methods. Among statistical methods, one can mention weights determined on the basis of the variability of the particular indicators or their mutual correlation. More information can be found in: Kolenda [2006: 46].

is that as a measure of size it is more resistant to value fluctuations over time in comparison to the measurement based on sales revenue, which usually shows far greater fluctuations. The smallest weight in the group was attributed to the age criterion (20%). The longer an enterprise exists, the greater the level of provided information and analysts' opinions, and the more extensive the knowledge of outside investors of the character of the enterprise's operations.

In the second group of indicators – determining the difficulty of proper data interpretation (difficulty of proper asset valuation), a higher significance was attributed to two ratios defining the structure of assets: plant and equipment to total assets ratio, and intangible and legal assets to total assets ratio. Another two ratios: the increase in assets ratio and the increase in income ratio used within the second group are indicators determining an enterprise's growth rate. The higher the growth rate, the more likely the difficulties in evaluating current and future situations by outside investors. A high value of these indicators can be considered evidence pointing to the possibility of a higher degree of information asymmetry. The research study assumed that the first two indicators referring to asset mix better determine the difficulty of information interpretation than the indicators measuring an enterprise's growth rate. The necessity of using expertise to evaluate investment is more justifiable in relation to the type of assets than in relation to the rate of an increase in assets. Therefore, the indicators measuring asset mix were assigned 80% weight (40% each) within the second group, and the indicators measuring enterprise growth rate were assigned 20% weight (10% each).

The last stage of developing SMAI is the normalization of the synthetic measure, consisting of conversion of distance measures in such a way that they adopt values from range $\langle 0;1 \rangle$ and their growth is consistent with the growing degree of information asymmetry. In order to achieve that, the following formula was used:

$$SMAI_i = 1 - \frac{q_i}{q_0} \text{ (i=1, 2, ..., n)} \tag{3}$$

where:

$SMAI_i$ – Synthetic Measure of the Degree of Information Asymmetry (SMAI) of *i*-th enterprise in a particular year,

q_0 – model object – $\max\{q_i\}$ – norm ensuring adopting values from range 0–1.

Therefore, Synthetic Measure of the Degree of Information Asymmetry enables one to put the investigated enterprises in order from those of the lowest degree of information asymmetry to those of the highest degree. This measure was used to examine the relation between the degree of information asymmetry and the use of short-term debt in the enterprises analysed in the article.

4. THE IMPORTANCE OF SHORT TERM DEBT TO REDUCE THE NEGATIVE EFFECTS OF INFORMATION ASYMMETRY

In the literature, little work has been carried out on the empirical determinants of corporate debt maturity structure. What work has been done suggests using short-term debt allows one, inter alia, to: reduce errors in the valuation of investments and in the estimation of the cost of capital, frequently monitor and exert greater control, and thus reduce the possibilities of the borrower's actions having a detrimental effect on the lender, reduce free cash flow and increase the board's control in connection with the necessity of the recurring submission of reports to creditors. Some of these factors are connected with asymmetry information, which is one of the most important determinant of debt maturity structure. The issue of short term debt can minimize costs associated with asymmetry information [Mitchell 1991].

Using short term debt gives the ability to limit the negatives resulting from information asymmetry on the phenomena of underinvestment, overinvestment or value transfer. Myers [1977] argues that debt maturity can play an important role in resolving the underinvestment problem, which can be achieved by issuing short term debt that matures before any opportunity to exercise growth options. Flannery [1996] argues that debt maturity structure can be used as a signalling device when insiders are better informed about the quality of the firm than outside investors. Reputable firms may choose to signal their character by issuing short term debt. With asymmetric information, the mispricing of long--term debt is greater, though both long-term and short-term debt are mispriced. Barclay and Smith [1995] show that firms with larger potential information asymmetries use more short-term debt. Diamond [1991] shows that short-term debt can play a monitoring role in alleviating moral hazards. Short-term debt provides better monitoring of the activities of the other party in the contract. Therefore, it is believed to help relieve the problem of asset substitution and value transfer [Jun and Jen 2003].

All these arguments allow the postulation of the main hypothesis of this article: companies with a higher level of information asymmetry are characterised by a relatively higher use of short-term debt. However, the link between information asymmetry and the maturity structure of debt could be modified by various country-specific factors, especially a country's risk (a high country risk causes higher use of short-term debt), a country's legal system and laws associated with investor protection (strong protection leads to higher use of long-term debt) and whether the country has a sophisticated capital market or a developed banking sector (a developed banking sector favours long-term financing).

5. MEASUREMENT OF THE USE OF SHORT TERM DEBT

In the research study, debt was defined as interest-bearing debt. Therefore, short-term debt is credit and loans with a maturity date of one year or less, obtained in the financial market, on which interest is paid. This definition does not take operating liabilities into consideration. This approach has been dominant in the research studies concerning capital structure.

The issue concerning investigation of debt aging is free access to data enabling formulation of the definition of short-term debt. In the USA, research on debt maturity structure is conducted mainly on the basis of data concerning corporate bond issues. Access to data concerning a particular issue enables researchers to introduce their own definitions of short-term liabilities. Researchers often define short-term debt as one with a maturity date of 3 years or less [Goyal and Wang 2010]. Accordingly, research studies concerning debt aging often go beyond the measurement of short-term debt share in total debt on the basis of balance sheet data. However, in research studies concerning the determinants of debt maturity structure, the balance sheet approach is also used. For instance, Titman and Wessels [1988] or Scherr and Hulbert [2001] use indicators based on accounting records where the criterion of the classification of short-term liabilities is one year. This research study also used the balance sheet approach in defining short-term debt. The relative level of this debt was determined from two perspectives. Short-term debt to total capital ratio (W_1) was determined on the basis of the following formula:

$$W_1 = \frac{D_k}{E + D} \tag{4}$$

where:

D_k – value of short-term debt on which interest is charged,

$E + D$ – total capital value.

And short-term debt to total debt ratio (W_2) was determined on the basis of the following formula:

$$W_2 = \frac{D_k}{D} \tag{5}$$

where:

D_k – value of short-term debt on which interest is charged,

D – total debt value (interest-bearing).

6. METHOD OF INVESTIGATING THE RELATION BETWEEN THE DEGREE OF INFORMATION ASYMMETRY AND THE USE OF SHORT-TERM DEBT

The investigation of the relation between the degree of information asymmetry and the use of short-term debt was conducted in two directions. First, dependent variable regression results were estimated – of the share of short-term debt in total capital or the share of short-term debt in total debt in relation to the value of SMAI indicator (single variable regression analysis). Second, it was verified whether the means and medians of the values of indicators determining the relative use of short-term debt are higher in groups of enterprises characterised by a very high degree of information asymmetry in relation to enterprises of a very low degree of asymmetry. Using two different research methods stems from the fact that, according to theses provided by reference books, information asymmetry can be a significant factor determining the selection of financing methods only in case of a percentage of enterprises – those more exposed to its unfavourable impact. Therefore, significant differences in capital structure should be observed primarily in those groups of enterprises with substantially different SMAI values.

In order to verify this hypothesis on the basis of SMAI values, two extreme groups of enterprises were distinguished that were characterised by different degrees of information asymmetry. The enterprises for which the SMAI value was below the 0.2 quantile were recognized as ones characterised by a very low degree of information asymmetry, while the enterprises in which the SMAI value was above the 0.8 quantile were recognized as entities of a very high degree of information asymmetry. Subsequently, for these two groups the means and medians of values of the following ratios were calculated: short-term debt to total capital ratio and short-term debt to total debt ratio. According to the principles of capital structure theory, a higher use of short-term debt should occur in enterprises more exposed to the negative impact of information asymmetry. Whereas, in the group of enterprises with a very high degree of information asymmetry (upper quantile), one should observe higher values of the means and medians of short-term debt share in total capital (W_1) and in total debt (W_2), than in the group of enterprises of a low degree of information asymmetry (lower quantile). The statistical significance of any differences in the mean values of indicators between extreme quantiles was determined by means of Student's t-test, while the statistical significance of any differences in medians was determined by the Mann–Whitney test (M–W). Additionally, for both values of indicators of the use of short-term debt in extreme quantiles, distribution normality tests were carried out by means of the Jarque–Bera test (J–B).

7. THE INFLUENCE OF INFORMATION ASYMMETRY ON THE LEVEL OF SHORT-TERM DEBT IN THE ANALYSED ENTERPRISES

The investigation of the relation between information asymmetry and the relative level of short-term debt was conducted on the basis of information derived from the S&P CAPITAL IQ database. There were 3 944 enterprises selected for the research, for which it was possible to calculate the aforementioned indicators. After verification of the possibility of obtaining complete data, 5 countries with the greatest number of cases were selected: France, Greece, Germany, the United Kingdom and Italy. These countries show highly diverse levels of investment risks. There are those which use the outsider system model – focused on raising capital, above all, through the market (the United Kingdom), and those which prefer the insider control model, among others, characterised by a close relationship between enterprises and banks (a classic example here is Germany). The research used all observations for which the values of all variables concerning the analysed relation were obtained in the period 2010–2012.

Table 2 presents the basic characteristics of enterprises which entered the investigated sample.

Table 2. The basic characteristics of analysed entities

	The United Kingdom	Germany	France	Italy	Greece
Means:					
Assets	11,791.5	4,861.3	7,775.0	6,038.3	692.3
Sales revenue	8,718.6	4,204.7	4,630.2	3,166.1	436.0
Age	77.2	72.5	56.7	63.3	46.2
H–H Index	0.07	0.25	0.24	0.27	0.18
Medians:					
Assets	1,285.0	486.7	445.3	554.3	236.7
Sales revenue	1,039.6	601.4	378.2	439.2	130.8
Age	55.0	59.5	44.0	54.0	38.0
H–H Index	0.04	0.12	0.15	0.28	0.09
N	401	258	699	311	204

Source: own work.

Table 3 presents the basic characteristics of the regression of dependent variables: short-term debt to total capital ratio and short-term debt to borrowed capital ratio, in relation to the value of the SMAI indicator in particular countries.

Table 3. Characteristics of linear regression models for W_1 and W_2 indicators

	The United Kingdom	Germany	France	Italy	Greece
W1 equation:					
Intercept	–0.347	0.025	–0.043	–0.327	0.097
p-value	0.000	0.198	0.095	0.000	0.006
SMAI	0.769	0.105	0.249	0.707	0.353
p-value	0.000	0.057	0.000	0.000	0.001
adj. R^2	0.151	0.010	0.026	0.077	0.045
p-value	0.000	0.057	0.000	0.000	0.001
W2 equation:					
Intercept	–0.645	0.104	–0.108	–0.790	0.215
p-value	0.000	0.100	0.150	0.000	0.000
SMAI	1.622	0.426	0.827	1.754	0.778
p-value	0.000	0.018	0.000	0.000	0.000
adj. R^2	0.075	0.018	0.035	0.113	0.082
p-value	0.000	0.018	0.000	0.000	0.000
N	401	258	699	311	204

Source: own work.

Slope coefficients of the regression of the share of short-term debt in total capital (W_1) in relation to SMAI have positive values in all analysed countries. Therefore, the direction of this relation is consistent with that expected (positive) and is statistically significant: at a 0.1 significance level in the case of Germany, and in the case of other countries at a level below 0.001. A corresponding situation occurs in the case of the regression of the share of short-term debt in total debt (W_2) however, the slope coefficient with SMAI is higher, and in the case of German enterprises is already statistically significant at 0.05 (below 0.001 in the case of other countries). The estimated regression models have a rather low coefficient of the determination R^2, while a higher slope coefficient of the regression and coefficient of determination were estimated when the dependent variable was the share of short-term debt in borrowed capital (an exception here is the United Kingdom where the R^2 was higher when the dependent variable was the share of short-term debt in total capital). Therefore, regression analysis showed a statistically significant positive relation between the degree of information asymmetry and the use of short-term debt. A rather low level of coefficients of determination, to a great extent, stems from the fact that other variables (other than a measure approximating the degree of information asymmetry) determining the use of short-term debt in an enterprise were not considered in the models.

Table 4. Values of W_1 indicator (share of short-term debt in total capital) in the particular extreme quantiles of SMDI values of companies

	The United Kingdom	Germany	France	Italy	Greece
means of W_1 indicator					
LQ	0.0286	0.0344	0.0464	0.0681	0.1156
UQ	0.0994	0.0575	0.0924	0.2203	0.2279
p-value (t-student)	0.0002	0.1052	0.0003	0.0000	0.0011
medians of W_1 indicator					
LQ	0.0096	0.0148	0.0208	0.0345	0.0835
UQ	0.0488	0.0189	0.0298	0.1640	0.1920
p-value (M–W)	0.0001	0.6068	0.3954	0.0001	0.0007
LQ p-value (J–B)	0.0000	0.0000	0.0000	0.0000	0.0243
UQ p-value (J–B)	0.0000	0.0000	0.0000	0.0133	0.0154
N	81	52	140	63	41

LQ – companies of lower quantile 0.2, UQ – companies of upper quantile 0.8

Source: own research.

Table 5. Values of W2 indicator (share of short-term debt in total debt) in the particular extreme quantiles of SMDI values of companies

	The United Kingdom	Germany	France	Italy	Greece
Means of W_2 indicator					
LQ	0.0877	0.1575	0.1744	0.1774	0.2885
UQ	0.3615	0.2634	0.3322	0.5504	0.5166
p-value (t-student)	0.0000	0.0600	0.0000	0.0000	0.0002
Medians of W_2 indicator					
LQ	0.0325	0.0497	0.0757	0.1016	0.2637
UQ	0.2130	0.1232	0.2352	0.6337	0.5112
p-value (M–W)	0.0001	0.0292	0.0003	0.0001	0.0001
LQ p-value (J–B)	0.0000	0.0000	0.0000	0.0000	0.0393
UQ p-value (J–B)	0.0130	0.0131	0.0046	0.0522	0.1991
N	81	52	140	63	41

LQ – companies of lower quantile 0.2, UQ – companies of upper quantile 0.8

Source: own research.

As stated above, the influence of information asymmetry on capital structure formation can be observed primarily for those enterprises characterised by a relatively high degree of asymmetry. Therefore, a comparative analysis was conducted for short-term debt to total capital ratio (W_1) and short-term debt to total debt ratio (W_2) in the groups of enterprises characterised by a substantially differing degree of information asymmetry (lower quantile 0.2 and upper quantile 0.8). The values for the investigated groups of enterprises in particular countries are presented in the Table 4 and Table 5.

The data presented in the above tables generally confirm the assumed hypothesis: a higher value of short-term indicators occur in the case of enterprises characterised by a higher degree of information asymmetry. Our findings are similar to that obtain by Gao, Ng, Zhang and Zhu [2012], who examines the association between information asymmetry and capital structure based on a large sample of companies from 39 developed and developing countries from around the world. Firms with high information asymmetry have a high leverage ratio but short debt maturity.

In our survey, this dependence cannot be confirmed only in case of Germany in relation to one (W_1) indicator – short-term debt to total capital ratio (neither differences in mean values nor medians of this indicator between the groups with extremely different degrees of information asymmetry are statistically significant even for a significance level of 0.1). A similar situation occurs in France; but only in relation to the median of the (W_1) indicator. In the case of the (W_2) indicator – short-term debt to total debt ratio – both means and medians of this indicator differ significantly in the investigated groups and these differences are statistically significant (a significance of at least 0.1) for all countries.

Taking the differences in the values of both indicators between the groups of enterprises of high and low degrees of information asymmetry into consideration, one can state that in the analysed countries, apart from Germany, short-term debt is much more widely used in enterprises with a high degree of information asymmetry[3]. This relation can also be found in Germany but to a lesser extent. Substantial use of short-term debt in enterprises with a high degree of information asymmetry is especially visible in the case of the share of short-term debt in total debt. It probably stems from the fact that decisions on using short-term debt are made in the context of the selection of debt aging – thus, within the target debt margin assumed by an enterprise. The relatively low share of short-term debt in total capital and the less statistically significant differences in its level in the analysed two groups of enterprises can also result

[3] Similar conclusions concern the use of short-term debt in enterprises with a high degree of information asymmetry in Poland, which is shown by the research study introduced in: Kubiak [2013].

from the relatively high share of equity capital in the analysed enterprises which are characterised by, among others, a long history of pursuing economic activity, and were capable of raising and accumulating substantial amounts of profit.

Moreover, the data presented in Table 4 and Table 5 show that the highest degree of using short-term debt among the analysed states is visible in Greece. This probably stems not only from the high degree of information asymmetry but also from the high credit risk connected to the economic situation in the country. A very high share of short-term debt is also found in Italy. One can assume that it partially stems from the higher exposure to moral hazard in this country. Therefore, short-term debt may fulfil a control function and lead to the reduction of information asymmetry between investors, with the resulting better possibilities of risk cost of capital evaluation, especially in these two countries. Similar, moderately high levels are found for indicators of the use of short-term debt in enterprises in France and the United Kingdom. The lowest level of short--term debt occurred in Germany, and the differences in its relative use between the groups of enterprises of a very high and very low degree of information asymmetry are the smallest. This may stem from the fact that the economy of Germany is characterised by great stability, relatively low risk and also a relatively low degree of information asymmetry. Additionally, banks, which are closely connected to enterprises, have a dominant role in making debt accessible in the system of the supply of capital. In the case of bank financing, the range of information asymmetry is usually smaller than in the case of raising capital in debt markets; and the negative impact of information asymmetry may be weakened not by the reduction of the debt maturity period, but by using appropriate securities. Gao, Ng, Zhang and Zhu's survey [2012] indicates that a short-term debt ratio is strongly negatively related to the development of the banking sector, which is similar to the conclusions drawn from our research.

Determining the offered weights for the significance of particular factors (indicators) for measuring the relative degree of the information asymmetry phenomenon is the effect of the subjective assessment of these factors' influence on the degree of information asymmetry related to the process of capital allocation. Nevertheless, the aforementioned conclusions concerning higher use of short-term debt in enterprises with a higher degree of information asymmetry remain robust to a change in the estimation of the SMAI measure which was the basis for the enterprises' grouping. Using the measure instead of substantive weights or statistical weights on the basis of mutual correlation of features forming a synthetic measure does not considerably influence the observed dependences and the resulting conclusions[4].

[4] We make another robustness tests concerning weights forming SMAI estimation. The results do not change sharply if we use equal weights in three main groups and equal weights among three groups. The differences in the values of both short-term debt indicators between the groups of enterprises with a high and low degree of information asymmetry are similar to those obtained previously, but a little less statistically significant. The results do not change sharply

8. CONCLUSIONS

Short-term debt may play a major role in reducing the negative impact of information asymmetry with regard to the possibility of much more frequent verification of an enterprise's financial standing. Therefore, in relation to the analysed enterprises, one should expect a higher use of short-term debt in the case of entities who are more exposed to the negative impact of information asymmetry. These expectations were confirmed in all five analysed countries; however, this dependency was distinctly reduced in Germany. This can be explained by the fact that the financial system in Germany is based on intermediate financing, where banks are closely connected to enterprises, which leads to the reduction of information asymmetry. What is more, in order to reduce the risk stemming from a higher degree of information asymmetry, banks can use collateral securities and clauses concerning the use of credit.

The issue of the influence of information asymmetry on debt aging requires further research. Seeking and verifying other methods of information asymmetry measurement than those presented in the article seem essential. Furthermore, a research study in relation to the maturity structure of debt acquired by enterprises directly in the financial market is worth conducting, especially when its results are compared to the results of research obtained in relation to debt acquired from raising credit from banks.

REFERENCES

Barclay M., Smith C., 1995, *The Maturity Structure of Corporate Debt*, Journal of Finance" 50.

Czapiewski L., Kubiak J., 2012, *Syntetyczny miernik poziomu asymetrii informacji (SMAI)*, In: A. Kopiński, T. Słoński, B. Ryszkowska (eds.), *Zarządzanie finansami firm – teoria i praktyka*, Prace Naukowe UE, Zeszyt 271, Uniwersytet Ekonomiczny we Wrocławiu, Wrocław.

Datta S., Iskandar-Datta M., Raman K., 2005, *Managerial Stock Ownership and the Maturity Structure of Corporate Debt*, Journal of Finance 60.

Diamond D., 1991, *Debt Maturity Structure and Liquidity Risk*, Quarterly Journal of Economics 106.

Flannery M., 1986, *Asymmetric Information and Risky Debt Maturity Choice*, The Journal of Finance 41.

Gao W., Ng L., Zhang B., Zhu F., 2012, *Information Asymmetry and Capital Structure Around the World*, http://www.ccfr.org.cn/cicf2012/papers/20120126172203.pdf.

Goyal V., Wang W., 2010, *Debt Maturity and Asymmetric Information: Evidence from Default Risk Changes*, Working Paper Series [online], http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1364985 (access: 30.12.2013).

either when the definition of extreme groups was changed. We recognized the enterprises for which SMAI value was below the 0.1 or 0,25 quantile as ones characterised by a very low degree of information asymmetry, and the enterprises in which the SMAI value was respectively above the 0.9 and 0,75 quantile as entities of a very high degree of information asymmetry. The findings were the same, and still statistically significant.

Guedes J., Opler T., 1996, *The Determinants of the Maturity of Corporate Debt Issues*, Journal of Finance 51.
Jun S., Jen F., 2003, *Trade-off Model of Debt Maturity Structure*, Review of Quantitative Finance and Accounting 20.
Kolenda M., 2006, *Taksonomia numeryczna. Klasyfikacja, porządkowanie i analiza obiektów wielocechowych*, Wrocław.
Kubiak J., 2011, *Metody badania asymetrii informacji w przedsiębiorstwie w zakresie alokacji kapitału*, Gospodarka Narodowa 4.
Kubiak J., 2013, *Zjawisko asymetrii informacji a struktura kapitału przedsiębiorstw w Polsce*, Wydawnictwo UE w Poznaniu, Poznań.
Lee A., Masulis R., 2009, *Quality of Accounting Information and Expected Floation Costs*, Journal of Financial Economics 92.
Mitchell K., 1991, *The call, sinking fund and term-to-maturity features of corporate bonds: An empirical investigation*, Journal of Financial and Quantitative Analysis 26.
Myers S., 1977, *Determinants of Corporate Borrowing*, The Journal of Financial Economics 5.
Scherr F., Hulbert H., 2001, *The Debt Maturity Structure of Small Firms*, Financial Management 30.
Titman S., Wessels R., 1998, *The Determinants of Capital Structure Choice*, Journal of Finance 43.

Leszek Czapiewski, Jarosław Kubiak

WPŁYW ASYMETRII INFORMACJI NA WYKORZYSTANIE DŁUGU KRÓTKOTERMINOWEGO W WYBRANYCH PAŃSTWACH EUROPY

W artykule badano związek poziomu asymetrii informacji z zakresem wykorzystania długu krótkoterminowego przez przedsiębiorstwa w 5 państwach Europy: we Francji, w Grecji, Niemczech, Wielkiej Brytanii oraz Włoszech. Asymetria informacja była mierzona za pomocą Syntetycznej Miary Asymetrii Informacji skonstruowanej na podstawie 9 wskaźników. Przedstawione analizy wskazują na to, że zgodnie z oczekiwaniami wynikającymi z teorii struktury kapitału, przedsiębiorstwa charakteryzujące się wyższym poziomem asymetrii informacji mają wyższy poziom długu krótkoterminowego. Asymetria informacji jest zatem ważną determinantą czasowej struktury długu, przy czym siła związku asymetrii informacji z wykorzystaniem długu krótkoterminowego jest uzależniona od cech charakterystycznych systemu finansowego poszczególnych państw.

Słowa kluczowe: struktura kapitału, asymetria informacji, pomiar asymetrii informacji, struktura czasowa długu.