Determinants of the Slovak Enterprises Profitability: Quantile Regression Approach

Štefan Kováč[1] | *Technical University of Košice, Slovakia*
Tomáš Želinský[2] | *Technical University of Košice, Slovakia*

Abstract

The goal of this paper is to analyze profitability of the Slovak enterprises by means of quantile regression. The analysis is based on individual data from the 2001, 2006 and 2011 financial statements of the Slovak companies. Profitability is proxied by ratio of profit/loss to total assets, and twelve covariates are used in the study, including two nominal variables: region and sector. According to the findings size, short- and long-term indebtedness, ratio of long-term assets to total assets, ratio of sales revenue to cost of sales, region and sector are the possible determinants of profitability of the companies in Slovakia. The results further suggest that the changes over time have influenced the magnitude of the effects of given variables.

Keywords

Profitability, quantile regression, Slovakia

JEL code

C51, L25

INTRODUCTION

Company's profit still remains one of the most frequently used indicators when assessing the company's performance. Profit itself has many drawbacks, and is often criticized, as it does not reflect the overall financial situation of the company.

There exist numerous sources dealing with financial performance of the firms. The authors analyzing profitability consider size (Gschwandtner, 2005), liquidity (Adams and Buckle, 2003), debt (Goddard, Tavakoli and Wilson, 2005), research and development intensity (Andries and Debackere, 2007), risk (Adams and Buckle, 2003), and managerial control (Garicano, 2000) the most important factors affecting firms' profitability (for further discussion see e. g. Nunes, Serrasqueiro and Leitao, 2010).

Most of the studies are based on sample data (Steinerowska-Streb, 2012; Asimakopoulos, Samitasand Papadogonas, 2009). In our research we use administrative data from individual financial statements of the Slovak firms provided by the Financial Directorate of the Slovak Republic. The advantage of such data is that it covers almost all enterprises in Slovakia, but the limitation subsists in the fact that only the data collected by the Financial Directorate for tax purposes can be used. We do not have data on the number of employees, which can be considered as the most significant shortcoming of the study.

[1] Faculty of Economics, Technical University of Košice, Němcovej 32, Košice, Slovakia.
[2] Faculty of Economics, Technical University of Košice, Němcovej 32, Košice, Slovakia. Corresponding author: e-mail: tomas.zelinsky@tuke.sk, phone: (+421)556023293.

The goal of this paper is to identify determinants of the Slovak companies' profit/loss. This exploratory analysis is focused on revealing associations and relations among the net income and selected ratios. As variability of the dependent variable is very high, quantile regression is a suitable tool for analyzing the given problem. Quantile regression allows us to check whether the relationship between net income (profit or loss) and the determinants over the distribution of net income is uniform or not (Nunes, Serrasqueiro and Leitao, 2010). Hence, the results give an answer to the question whether there are differences in the magnitude of factors (estimated coefficients) among the firms with high/low profits/losses. That is to say whether for instance firms with high profits are affected by liquidity more significantly than firms with low profits.

In this exploratory study we investigate which of the usually considered potential factors (proposed by literature) significantly influence the Slovak firms' profitability. On one hand our aim is to identify which factors are significant and which are insignificant in explaining profitability. On the other hand our aim is to analyze the magnitude of significant factors (regression coefficients) at particular quantiles.

1 METHODOLOGY

1.1 Observation Units and Description of the Data

This study is based on administrative financial data from individual financial statements of the Slovak firms using the double-entry bookkeeping. The data were obtained from the Financial Directorate of the Slovak Republic for research purposes. We use data of three selected years: 2001, 2006 and 2011. Consistency of the data was checked only by comparing profit/loss values from the individual profit and loss statements, and balance sheets. Around three percent of all statements show inconsistencies (such observations were dropped from the analysis).

The original data sets include 30 053 (2001), 94 999 (2006) and 149 063 (2011) observations. Due to incompleteness of the data 11 068 (2001), 26 888 (2006) and 32 493 (2011) observations were used in the study. Observations with missing data for any of the variables described below were dropped from the analysis.

Table 1 Variables used in regression analysis

Variables	Abbr.	Measurement
Dependent		
Profitability	*roa*	Ratio of profit/loss to total assets
Independent		
Size	*siz*	Logarithm of total sales revenue
Liquidity	*liq*	Ratio of current assets to short-term debt
Short-term indebtedness	*sti*	Ratio of short-term debt to total assets
Long-term indebtedness	*lti*	Ratio of long-term debt to total assets
Days accounts receivable	*dar*	(Ratio of accounts receivable to total sales revenue) / 360
Days sales of inventory	*dsi*	(Ratio of inventory to total sales revenue) / 360
Asset to sales ratio	*asr*	Ratio of total assets to total sales revenue
Share of long-term assets	*lta*	Ratio of long-term assets to total assets
Value added index	*vai*	Ratio of sales revenue to cost of sales
Labor costs	*lab*	Ratio of labor costs to value added
Region	*reg*	Dummy variables for NUTS-2 regions: [*reference category*] Bratislava Region *regWS:* Western Slovak Region *regCS:* Central Slovak Region *regES:* Eastern Slovak Region
Sector	*sec*	Dummy variables for NACE branches: [*reference category*] primary sector: A–B branches *secS:* secondary sector: C–F branches *secT:* tertiary sector: G–P branch

Source: Own construction

1.2 Variables

Table 1 presents variables used in this study. Profitability is the dependent variable, and is given by the ratio net income (profit/loss) to total assets.

Twelve independent variables are considered in the study. The size of an enterprise is given by logarithm of total sales, liquidity is defined as ratio of current assets to short-term debt, short/long-term indebtedness is given by ratio of short/long-term debt to total assets, and the following four standard ratios are used: days accounts receivable, days sales of inventory, asset to sales ratio, and share of long-term assets. Value added index is defined as ratio of sales revenue to cost of sales, and the last ratio indicating labor intensiveness is given by labor costs to value added. Two dummy variables (region and sector) are employed to control for the specific effects of economic activity and location on profitability.

1.3 Estimation method

This study is aimed at assessing relationship between profitability and its determinants, over the distribution of profitability of the Slovak enterprises. As proposed by Nunes, Serrasqueiro and Leitao (2010), quantile conditional regression (Koenker and Bassett, 1978; Koenker and Hallock, 2001) is the most appropriate methodology for such type of a study.

Quantile regression generalizes the concept of a univariate quantile to a conditional quantile given one or more covariates (Chen, 2005). For a random variable Y with probability distribution function $F(y) = \text{Prob}(Y \leq y)$ the τ^{th} quantile of Y is defined as the inverse function $Q(\tau) = \inf\{y : F(y) \geq \tau\}$ where $0 < \tau < 1$. Considering that the τ^{th} quantile of the conditional distribution of the dependent variable (Y_i) is a linear function of the vector of the independent variables (X_i), the quantile conditional regression can be presented in the following way:

$$y_i = \alpha_\tau + \boldsymbol{\beta}_\tau \mathbf{x}_{i\cdot} + z_{\tau i}, \tag{1}$$

and

$$Q_\tau(y_i \mid \boldsymbol{x}_{i\cdot}) \equiv \inf\{y_i : F_i(y_i \mid \boldsymbol{x}_{i\cdot}) \geq \tau\} = \alpha_\tau + \boldsymbol{\beta}_\tau \boldsymbol{x}_{i\cdot}, \tag{2}$$

with the following restriction:

$$Q_\tau(z_{\tau i} \mid \mathbf{x}_{i\cdot}) = 0, \tag{3}$$

where:

y_i is i^{th} element of n-by-1 vector y of dependent variable,

$\mathbf{x}_{i\cdot}$ is i^{th} row of n-by-k matrix $\mathbf{X}$ of independent variables,

α_τ, $\boldsymbol{\beta}_\tau$ are parameters to be estimated for different values of $\tau \in (0;1)$,

$z_{\tau i}$ is the error term,

n is the number of observations,

k is the number of independent variables.

In this study we test the relationship between profitability and its determinants for the 5$^{\text{th}}$, 10$^{\text{th}}$, 25$^{\text{th}}$, 50$^{\text{th}}$, 75$^{\text{th}}$, 90$^{\text{th}}$, and 95$^{\text{th}}$ percentiles of the distribution of probability of the Slovak enterprises. Estimation of coefficients standard errors and hypotheses tests are based on bootstrapping (Parzen, Wei and Ying, 1994). Variance inflation factor (Fox and Monette, 1992) was used for multicollinearity diagnostics. Goodness of fit diagnostics for the estimated quantile regression models is based on $R^1(\tau)$ measure (which is the analog of traditional R-squared) and the associated likelihood ratio test proposed by Koenker and Machado (1999). $R^1(\tau)$ measures the relative success of the corresponding quantile regression models at a specific quantile, i.e. $R^1(\tau)$ is a local measure of goodness of fit for a particular quantile. The full model (i.e. model with covariates) is better at the τ-quantile than the restricted model (including only an 'intercept' parameter) if the τ^{th} conditional quantile function is significantly altered by the influence of the covariates. Koenker and Machado (1999) further explore behavior of the proposed measures using a range of artificial data. According to their findings $R^1(\tau)$ does not perform well (has low values) in case of high variability of the data (which is our case), and hence p-value of the associated likelihood ratio test will be taken into consideration as a criterion of goodness of fit for a particular quantile. In order to check for multicollinearity in the model, variance inflation factors (see Fox and Monette, 1992; Fox and Weisberg, 2011 for details regarding estimation of variance inflation factors for categorical variables) are estimated. Almost all values are close to one, which indicates very low level of multicollinearity among the variables. The variable 'dar' was strongly correlated with two other variables (which was indicated by a high value of variance inflation factor), and that is why 'dar' was dropped from the 2001 analysis.

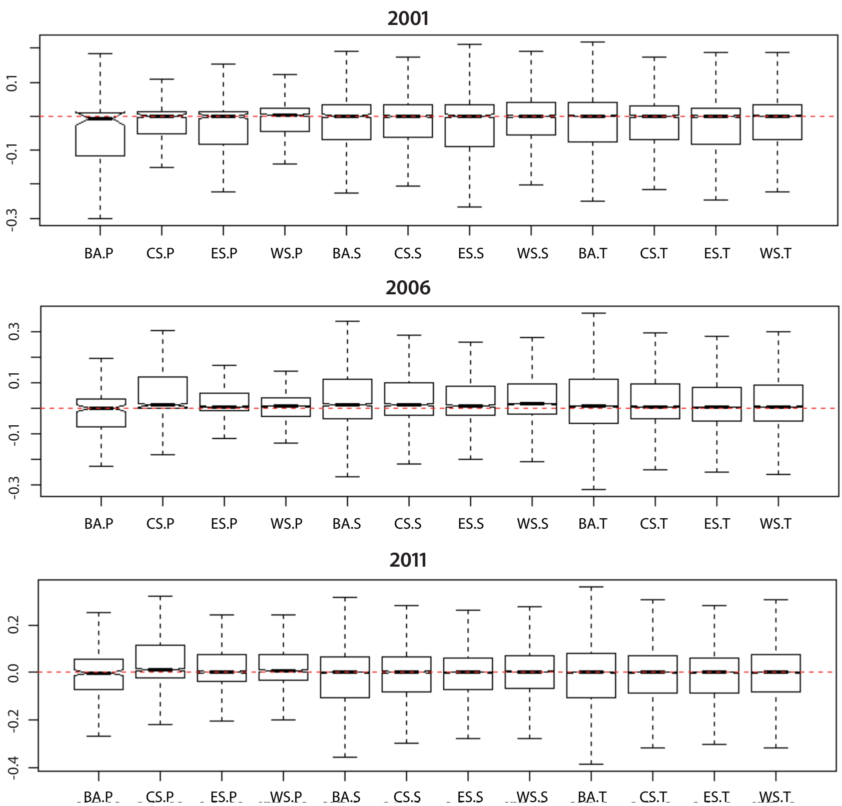
All estimations have been performed in R environment (R Core Team, 2012) using package 'quantreg' (Koenker, 2012).

2 RESULTS AND DISCUSSION

2.1 Descriptive Statistics

Figure 1 presents distribution of the dependent variable, i.e. profitability (*measured as return on assets – 'roa'*) across regions and sectors of Slovakia using notched box plots (Chambers et al., 1983). The box plots indicate that the Slovak enterprises performed in 2006 better than in 2001 and 2011, while the highest proportion of loss-making enterprises was in 2001. The median value of *'roa'* was around zero across all regions and sectors in all three periods.

Figure 1 Distribution of *'roa'* across regions and sectors in 2001, 2006 and 2011

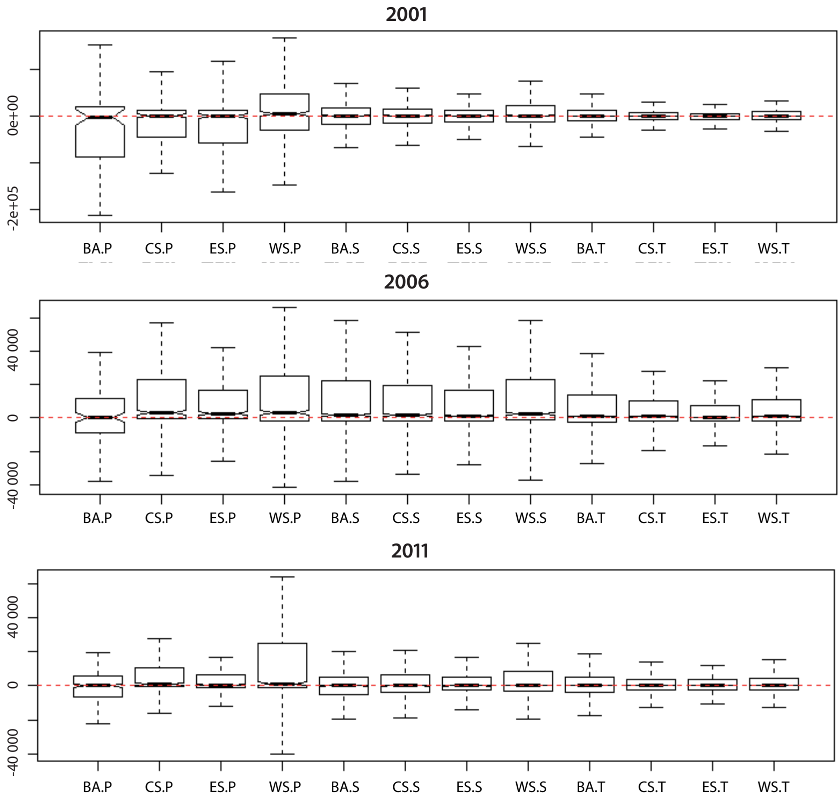


Legend: BA/CS/ES/WS: Bratislava/Central/Eastern/Western Slovak Region; P: primary, S: secondary, T: tertiary sector.
Source: Own construction

As for distribution by sectors, performance of primary sector companies improved considerably in 2006 and 2011 in comparison to 2001. Enterprises from Bratislava Region have the highest variability of *'roa'*.

Figure 2 presents the distribution of net income (profit/loss). The box plots indicate that variability of profit/loss was the highest in 2006 and lowest in 2011. Variability of net income of primary sector enterprises from Western Slovakia Region remains the highest also in 2011.

Figure 2 Distribution of profit/loss (in EUR, prices of 2005) across regions and sectors in 2001, 2006 and 2011



Legend: BA/CS/ES/WS: Bratislava/Central/Eastern/Western Slovak Region; P: primary, S: secondary, T: tertiary sector.
Source: Own construction

Table 2 Descriptive statistics

Var.	2001			2006			2011		
	median	mean	st. dev.	median	mean	st. dev.	median	mean	st. dev.
roa	0.0056	–0.0745	0.8679	0.0223	–0.0262	2.7887	0.0068	–0.0877	1.5834
siz	16.9526	16.9044	1.8006	16.1929	16.2075	1.9248	12.5738	12.6334	1.8943
liq	0.9300	1.5661	6.8211	0.9612	1.9877	13.6099	1.5297	154.0318	7094.1550
sti	0.7619	0.8464	1.3091	0.7287	0.9415	6.2211	0.0364	0.1106	1.8478
lti	0.0000	0.0902	0.2431	0.0082	0.1131	0.8403	0.0063	0.1232	1.7545
dar	0.0003	0.0031	0.1197	0.0003	0.0057	0.4546	0.0000	0.0000	0.0009
dsi	0.0002	0.0021	0.1423	0.0002	0.0015	0.0661	0.0000	0.0001	0.0047
asr	0.0014	0.0145	0.5688	0.0015	0.0166	0.6127	0.0017	0.0137	0.3672
lta	0.2152	0.3039	0.7596	0.2290	0.3104	0.2980	0.2660	0.3379	0.3813
vai	1.1530	1.3062	1.0468	1.1621	1.3383	4.0629	1.1574	1.3246	1.2049
lab	0.6918	0.8060	8.5262	0.4849	0.4856	18.7693	0.4616	0.0835	59.9087

Source: Own construction

Detailed descriptive statistics of variables used in regression analyses at national level are presented in Table 2.

According to the results relative variability of almost all variables is considerably high (coefficient of variation ranges from 0.11 for 'size' in 2001 to 717.47 for the 'ratio of labor costs to value added' in 2011).

Break-down of the results by sectors indicate that the size of companies decreased over time and is the lowest in tertiary sector companies. Liquidity of companies from all sectors improved between 2001 and 2011, while the highest median liquidity was in 2011 (mean values of liquidity in 2011 are high due to outliers, but median remains relatively stable over time). Short-term indebtedness of companies decreased over time in all sectors and very low values were reached in 2011 in comparison to 2001 and 2006. Long-term indebtedness did not change considerably during the analyzed period, and the same applies to the days accounts receivable, while asset to sales ratio changed only slightly. As one would expect, ratio of long-term assets to total assets was the highest in primary sector, and the lowest in tertiary sector. Ratio of sales revenue to cost of sales was the highest in primary sector and the lowest in tertiary sector and did not change considerably during the analyzed period. Ratio of labor costs to value added decreased considerably in all sectors. The ratio decreased from 0.84 to 0.51 in primary sector, from 0.75 to 0.55 in secondary sector and from 0.66 to 0.44 in tertiary sector. This indicates that production becomes less labor-intensive in all sectors.

As for regional distribution of the variables, companies from Eastern Slovakia region have the lowest profitability. Furthermore liquidity increased, size of companies and short-term indebtedness decreased in all regions over time. Ratio of sales revenue to cost of sales was the lowest in Eastern Slovakia Region and did not change considerably during the analyzed period. Ratio of labor costs to value added decreased sharply in all regions. The ratio decreased from around 0.64 to 0.42 in Bratislava Region and from around 0.71 to 0.47 in other regions.

2.2 The Estimated Model

The results of estimated models by years are presented in Tables 3, 4 and 5 and the corresponding Figures 3, 4 and 5. The first column of each table contains ordinary least squares (OLS) estimates, estimated coefficients in all other columns are based on quantile regression.

According to the OLS regression, 'sector' is not statistically significant at all. Variable 'region' appears as significant only in 2011. On the other hand both dummy variables were statistically significant in case of estimates based on quantile regression.

Variables *days accounts receivable, days sales of inventory, asset to sales ratio,* and *labor costs* are not statistically significant according to OLS nor quantile regression.

In all periods, there is positive statistically significant relationship between profitability and size up to the 75^{th} quantile. In the periods of 2006 and 2011, the relationship between profitability and size becomes negative at the 95^{th} quantile.

According to the results, there is not a statistically significant relationship between profitability and liquidity in 2001 and 2011, but there is a negative statistically significant relationship between profitability and liquidity in 2006 up to the 50^{th} quantile.

As for the short- and long-term indebtedness, the relationship between profitability and indebtedness is negative. However, at certain quantiles the relationship is not statistically significant.

There is not a statistically significant relationship among profitability and days account receivable, days sales of inventory, asset to sales ratio and labor costs (however, there was statistically negative relationship between profitability and labor costs at the 75^{th}, 90^{th} and 95^{th} quantiles in 2001).

For the quantiles of profitability distribution as a whole, the relationship between profitability and share of long-term assets is negative.

Further, there is positive statistically significant relationship between profitability and ratio of sales revenue to cost of sales (however, the relationship is not significant at few quantiles).

The qualitative variables 'region' and 'sector' may be interpreted relative to the omitted categories (Bratislava Region and primary sector). According to the results, up to the 50th quantile, the profitability of the companies from WS/CS/ES is higher than profitability of companies from Bratislava, but in the upper quantiles, probability of these companies is lower in comparison to the companies from Bratislava Region. Relationship between profitability and sectors yields interesting results – in 2001 and 2006 secondary and tertiary sector companies had higher profitability and primary sector firms, but the situation changed in 2011 and these companies are less profitable than primary sector firms.

For the goodness of fit diagnostics (R-squared for OLS models and $R^1(\tau)$ for quantile regression models) see the last two rows of Tables 3, 4 and 5. Values of $R^1(\tau)$ measure decrease at the higher quantiles which is due to significantly higher variability of data at higher quantiles. It means that lower quantiles are more successful in reducing variability relative to the unconditional counterpart (see e. g. Koenker and Machado, 1999 for further discussion). As p-values of the associated likelihood ratio test are <0.0001, we can conclude that the full models (with covariates) are better than the restricted models (without covariates) at all quantiles.

2.3 Discussion

In this section we will discuss the most important results described in the previous section. In Figures 3, 4 and 5, the regression coefficient at a given quantile indicates the effect on profitability of a unit change in that variable, assuming that the other variables are fixed, with 95% confidence interval bands.

In each figure the full line shows the ordinary least squares estimate of the conditional mean effect. The two dashed lines represent 95% confidence intervals for the least squares estimate. The dotted full-line depicts estimated coefficients estimated by quantile regression and the shaded grey area represents a 95% confidence band for the quantile regression estimates.

At any chosen quantile we can say, for instance, how the profitability of firms changes among sectors or regions, given a specification of the other conditioning variables.

The intercept can be interpreted as the estimated conditional quantile function of the *profitability* distribution of a primary sector company from Bratislava Region.

The relationship between profitability and size is not uniform over the distribution of profitability. The effect of size on profitability is greater at the lower quantiles than at the upper quantiles. The results suggest that there is no or very weak relationship between profitability of high profitable firms and size of the companies. The economies of scale hypothesis seems to be working for low profitable firms, as the estimated coefficients are positive, and hence the size of a company may be in positive association with its profitability.

The relationship between profitability and *short- and long-term indebtedness* is negative and the effect of indebtedness on profitability is bigger at the lower quantiles than at the upper quantiles. Again, the more profitable the firm is, the more robust to the effect of indebtedness the firm is. The results suggest that the more extensive use of debt has a negative effect on profitability of the Slovak firms. The results further show that the Slovak firms do not use debt effectively.

There is a negative relationship between profitability and *share of long-term assets.* The magnitude of long-term assets effect on profitability decreases until the 50th quantile, and then increases again. These findings suggest that high and low profitable firms are negatively affected by a high proportion of long-term assets. Such firms have excessively high proportion of the long-term assets and probably do not make an effective use of them.

The *ratio of sales revenue to cost of sales,* which might be perceived as a kind of value added index is in positive relationship with profitability. The relationship shows gradually increasing magnitude throughout the profitability distribution. The ratio has a great importance in determining the profitability at the upper quantiles of the probability distribution and relatively low importance in determining the profitability at the lower quantiles of the probability distribution. The results further suggest that the value added is a good predictor of profit, but not such a good predictor of loss.

Also *region* has a significant effect on explaining profitability. Location of a company in a region other than Bratislava increases profitability up to the 50^{th} quantile, but it pushes down profitability at the higher quantiles, or in other words, location of a high profitable company in Bratislava Region contributes positively to its profitability. However, for some quantiles the effect in statistical terms is insignificant. As for changes over time, the results indicate that the magnitude of location effects increase over time.

Sector is the last variable with statistically significant effects on profitability. In 2001 and 2006 secondary and tertiary sector companies showed higher profitability than primary sector companies. But the situation changed in 2011. At the lower quantiles the secondary and tertiary sector companies had lower profitability than primary sector companies, and at the higher quantiles the magnitude of the effects approaches zero, and hence sector does not play a significant role in explaining profitability in case of high profitable enterprises. These findings suggest structural changes in profitability of companies across sectors, which would require further analyses.

It is obvious that in the most of the cases the quantile regression estimates lie outside the confidence intervals for the OLS regression. This suggests that the effects of these covariates may not be constant across the conditional distribution of the profitability.

CONCLUSION

There are several possibilities how companies' profitability determinants may be identified. As variability of profitability is very high, analysis based on quantile regression is used in this paper.

The results show that the covariates are not constant across the conditional distribution of the profitability, and hence quantile regression is an appropriate method. The exploratory analysis performed in this study is based on the administrative data from the financial statements of the Slovak companies for the periods of 2001, 2006 and 2011. According to the findings size, short- and long-term indebtedness, ratio of long-term assets to total assets, ratio of sales revenue to cost of sales, region and sector are the possible determinants of profitability of the companies in Slovakia. The results further suggest that the changes over time have influenced the magnitude of the effects produced by the given variables.

The literature suggests that variables such as days accounts receivable, days sales of inventory, asset to sales ratio, and labor costs are significant determinants of profitability, but according to our results these variables are not statistically significant according to OLS nor quantile regression.

The study could be improved significantly if the number of employees of each company could be considered. But the number of employees is not collected for the tax purposes, and hence the data could not be provided. This can be perceived as one of the limitations of the study.

As region is a significant variable in determining profitability, we will focus more on spatial aspects of profitability of the Slovak enterprises in the future. Further analyses will also concentrate on differences in profitability determinants among specific NACE branches (a more detailed view of them), as it may be assumed that differences among particular NACE branches within the same sector might be significant. Such a detailed analysis is behind the scope of this paper.

ACKNOWLEDGMENTS

This work was supported by the Slovak Scientific Grant Agency, as a part of the research project *VEGA 2/0004/12 Paradigms of Future Changes in the 21st Century (geopolitical, economic and cultural aspects)* and by the *Jan Hus Educational Foundation*.

References

ADAMS, M., BUCKLE, M. The Determinants of Corporate Financial Performance in the Bermuda Insurance Market. *Applied Financial Economics*, 2003, 2, pp. 133–143.

ANDRIES, P., DEBACKERE, K. Adaptation and Performance in New Businesses: Understanding the Moderating Effects of Independence and Industry. *Small Business Economics*, 2007, 1, pp. 81–99.

ASIMAKOPOULOS, I., SAMITAS, A., PAPADOGONAS, T. Firm-specific and Economy Wide Weterminants of Firm Profitability: Greek Evidence Using Panel Data. *Managerial Finance,* 2009, 11, pp. 930–939.

FOX, J., MONETTE, G. Generalized Collinearity Diagnostics. *Journal of the American Statistical Association*, 1992, 417, pp. 178–183.

FOX, J., WEISBERG, S. *An R Companion to Applied Regression.* Thousand Oaks, CA, USA: Sage, 2011.

CHAMBERS, J. M. et al. *Graphical Methods for Data Analysis.* Pacific Grove, CA, USA: Wadsworth & Brooks/Cole Publishing Company, 1983.

CHEN, C. *An Introduction to Quantile Regression and the QUANTREG Procedure.* SAS Conference Proceedings: SAS Users Group International 30. April 10–13, 2005, Philadelphia, Pennsylvania, USA. Paper 213–30.

GARICANO, L. Hierarchies and the Organization of Knowledge in Production. *Journal of Political Economy,* 2000, 5, pp. 874–904.

GODDARD, J., TAVAKOLI, M., WILSON, J. Determinants of Profitability in European Manufacturing and Services: Evidence from a Dynamic Panel Data. *Applied Financial Economics,* 2005, 8, pp.1269–1282.

GSCHWANDTNER, A. Profit Persistence in the 'Very' Long Run: Evidence from Survivors and Exiters. *Applied Economics,* 2005, 7, pp. 793–806.

KOENKER, R. *Quantreg: Quantile Regression* [online]. R package version 4.94, 2012. <http://CRAN.R-project.org/package=quantreg>.

KOENKER, R., BASSETT, G. Regression Quantiles. *Econometrica,* 1978, 1, pp. 33–50.

KOENKER, R., HALLOCK, K. Quantile Regression: An Introduction. *Journal of Economic Perspectives,* 2001, 4, pp. 143–156.

KOENKER, R., MACHADO, J. A. F. Goodness of Fit and Related Inference Processes for Quantile Regression. *Journal of the American Statistical Association,* 1999, 448, pp. 1296–1310.

NUNES, P. M., SERRASQUEIRO, Z. S., LEITAO, J. Are there Nonlinear Relationships between the Profitability of Portuguese Service SME and its Specific Determinants? *The Service Industries Journal,* 2010, 8, pp. 1313–1341.

PARZEN, M. I., WEI, L., YING, Z. A Resampling Method Based on Pivotal Estimating Functions. *Biometrika,* 1994, 2, pp. 341–350.

R CORE TEAM. R: *A Language and Environment for Statistical Computing* [online]. R Foundation for Statistical Computing. Vienna, Austria, 2012. ISBN 3-900051-07-0. <http://www.R-project.org>.

STEINEROWSKA-STREB, I. The Determinants of Enterprise Profitability during Reduced Economic Activity. *Journal of Business Economics and Management,* 2012, 4, pp. 745–762.

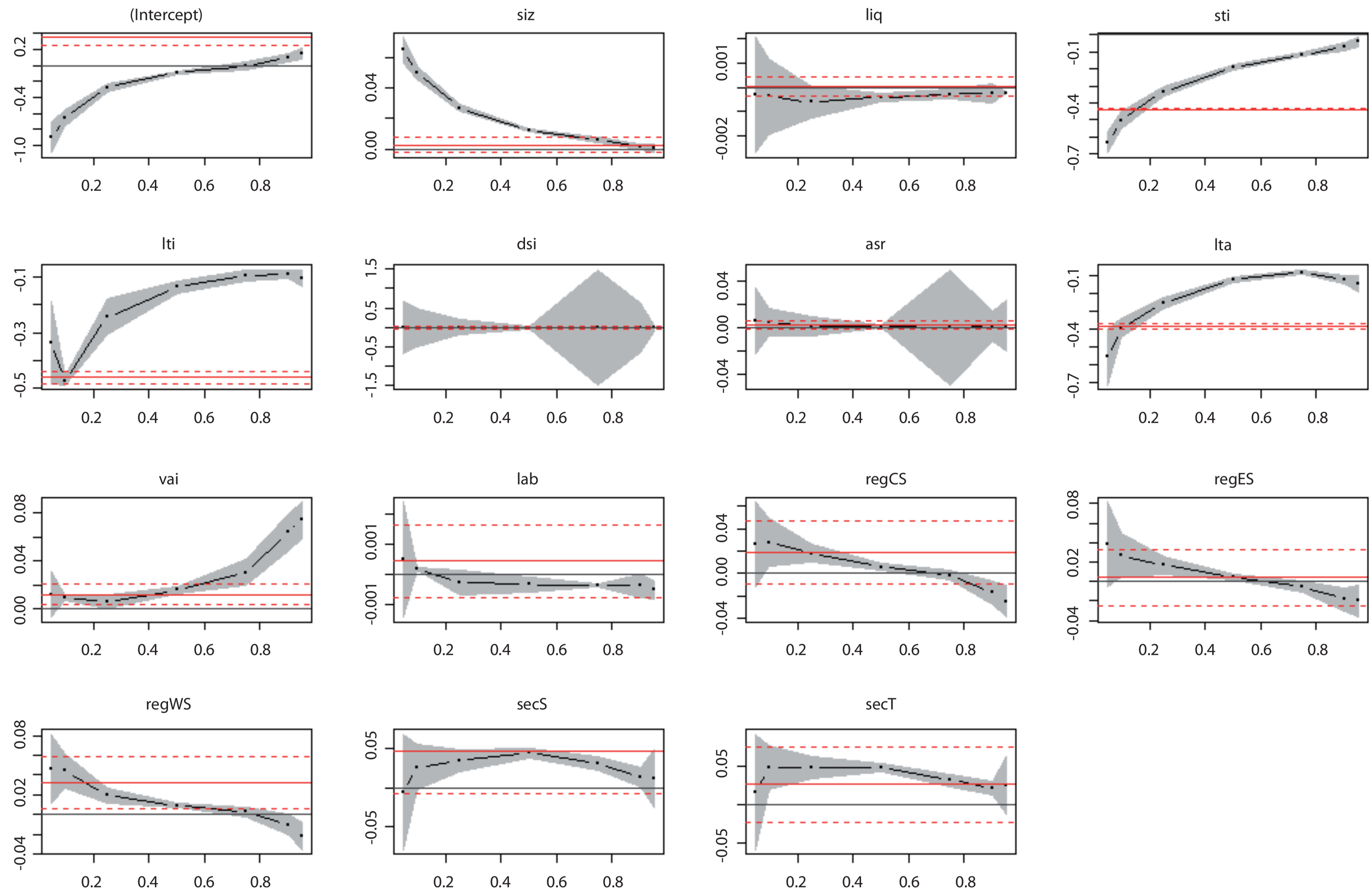
ANNEX

Table 3 Estimated regression coefficients (2001)

	OLS	Quantile regression						
		$\tau = 0.05$	$\tau = 0.10$	$\tau = 0.25$	$\tau = 0.50$	$\tau = 0.75$	$\tau = 0.90$	$\tau = 0.95$
Intercept	0.3510*** (0.0631)	–0.8999*** (0.1294)	–0.6534*** (0.0993)	–0.2738*** (0.0436)	–0.0898*** (0.0238)	–0.0069 (0.0229)	0.0940*** (0.0337)	0.1396*** (0.0472)
siz	0.0028 (0.0031)	0.0648*** (0.0066)	0.0499*** (0.0039)	0.0271*** (0.0015)	0.0123*** (0.0007)	0.0064*** (0.0008)	0.0018 (0.0012)	0.0011 (0.0020)
liq	0.0001 (0.0002)	–0.0003 (0.0082)	–0.0004 (0.0062)	–0.0006 (0.0034)	–0.0004 (0.0006)	–0.0003** (0.0001)	–0.0002 (0.0007)	–0.0002 (0.0012)
sti	–0.4385*** (0.0027)	–0.6290*** (0.0622)	–0.5015*** (0.0573)	–0.3341*** (0.0262)	–0.1922*** (0.0268)	–0.1184*** (0.0132)	–0.0747*** (0.0158)	–0.0418*** (0.0143)
lti	–0.4606*** (0.0141)	–0.3367*** (0.0786)	–0.4715*** (0.0753)	–0.2439*** (0.0719)	–0.1361*** (0.0295)	–0.0937*** (0.0129)	–0.0892*** (0.0126)	–0.1042*** (0.0131)
dar	x	x	x	x	x	x	x	x
dsi	0.0063 (0.0366)	0.0151 (0.2351)	–0.0136 (0.1631)	–0.0246 (0.2045)	–0.0034 (0.1208)	0.0024 (0.0685)	–0.0145 (0.2467)	0.0054 (0.1417)
asr	0.0049 (0.0047)	0.0093 (0.0276)	0.0046 (0.0194)	0.0003 (0.0166)	0.0011 (0.0122)	0.0011 (0.0087)	0.0054 (0.0060)	0.0054 (0.0052)
lta	–0.3849*** (0.0087)	–0.5536*** (0.1393)	–0.3897*** (0.0869)	–0.2479*** (0.0353)	–0.1209*** (0.0186)	–0.0797*** (0.0086)	–0.1239*** (0.0096)	–0.1458*** (0.0145)
vai	0.0121** (0.0054)	0.0123** (0.0049)	0.0091** (0.0038)	0.0060 (0.0051)	0.0158*** (0.0042)	0.0306*** (0.0070)	0.0630*** (0.0112)	0.0772*** (0.0171)
lab	0.0004 (0.0007)	0.0005 (0.0005)	0.0002 (0.0004)	–0.0002 (0.0004)	–0.0003 (0.0004)	–0.0004** (0.0002)	–0.0004* (0.0002)	–0.0005*** (0.0002)
regCS	0.0187 (0.0174)	0.0258 (0.0184)	0.0275* (0.0143)	0.0176*** (0.0056)	0.0058** (0.0028)	–0.0016 (0.0033)	–0.0181** (0.0069)	–0.0253** (0.0106)
regES	0.0040 (0.0173)	0.0384 (0.0246)	0.0268* (0.0138)	0.0171*** (0.0061)	0.0047* (0.0028)	–0.0052 (0.0036)	–0.0176** (0.0069)	–0.0199* (0.0112)
regWS	0.0324** (0.0160)	0.0463*** (0.0152)	0.0441*** (0.0106)	0.0190*** (0.0054)	0.0088*** (0.0026)	0.0024 (0.0034)	–0.0107 (0.0066)	–0.0210** (0.0103)
secS	0.0453 (0.0318)	–0.0056 (0.0361)	0.0258 (0.0194)	0.0347*** (0.0129)	0.0437*** (0.0104)	0.0305*** (0.0065)	0.0146 (0.0098)	0.0116 (0.0173)
secT	0.0262 (0.0298)	0.0165 (0.0402)	0.0483** (0.0260)	0.0500*** (0.0160)	0.0485*** (0.0111)	0.0319*** (0.0059)	0.0229** (0.0098)	0.0253 (0.0169)
$R^2 / R^1(\tau)$ *p-value*	0.7410 <0.0001	0.5557 <0.0001	0.4567 <0.0001	0.2881 <0.0001	0.1413 <0.0001	0.1015 <0.0001	0.0898 <0.0001	0.0893 <0.0001

Source: Own construction (standard errors estimates in parentheses; significance codes: 0 *** 0.01 ** 0.05 * 0.1)

Figure 3 Ordinary least squares and quantile regression estimates for profitability model (2001)



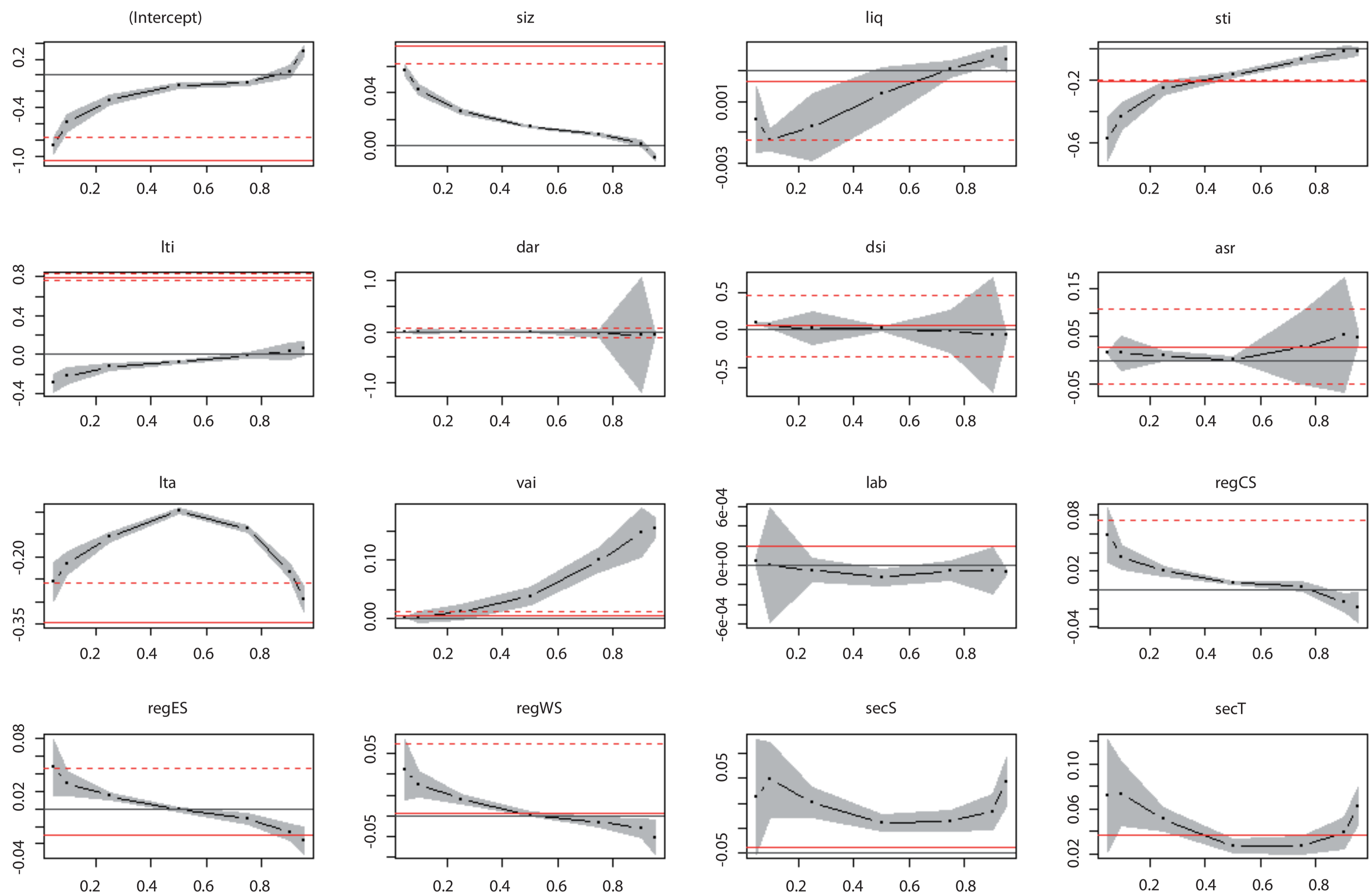
Source: Own construction (full line: OLS mean effect estimates; dashed lines: 95% confidence intervals for OLS estimates; dotted full-line: quantile regression estimates, shaded grey area: 95% confidence band for quantile regression estimates)

Table 4 Estimated regression coefficients (2006)

	OLS	Quantile regression						
		$\tau = 0.05$	$\tau = 0.10$	$\tau = 0.25$	$\tau = 0.50$	$\tau = 0.75$	$\tau = 0.90$	$\tau = 0.95$
Intercept	−1.0592*** (0.1780)	−0.8676*** (0.0633)	−0.5899*** (0.0396)	−0.3056*** (0.0284)	−0.1238*** (0.0339)	−0.0943** (0.0416)	0.0469 (0.0434)	0.2898*** (0.0534)
siz	0.0747*** (0.0083)	0.0562*** (0.0028)	0.0420*** (0.0016)	0.0257*** (0.0008)	0.0142*** (0.0005)	0.0083*** (0.0009)	0.0016 (0.0014)	−0.0087*** (0.0021)
liq	−0.0003 (0.0012)	−0.0016* (0.0008)	−0.0023** (0.0009)	−0.0018*** (0.0006)	−0.0008* (0.0005)	0.0001 (0.0003)	0.0005 (0.0004)	0.0004* (0.0002)
sti	−0.2052*** (0.0031)	−0.5786*** (0.0447)	−0.4357*** (0.0279)	−0.2529*** (0.0218)	−0.1623*** (0.0339)	−0.0699** (0.0284)	−0.0177 (0.0165)	−0.0117 (0.0106)
lti	0.7978*** (0.0227)	−0.2928*** (0.0508)	−0.2180*** (0.0394)	−0.1233*** (0.0209)	−0.0778** (0.0319)	−0.0079 (0.0387)	0.0331 (0.0441)	0.0616 (0.0421)
dar	−0.0227 (0.0630)	−0.0006 (0.0725)	−0.0050 (0.0477)	−0.0048 (0.0280)	0.0008 (0.0340)	−0.0267 (0.0432)	−0.0580 (0.0610)	−0.0557 (0.1457)
dsi	0.0502 (0.2479)	0.0849 (0.2050)	0.0518 (0.0739)	0.0218 (0.0909)	0.0122 (0.0593)	−0.0213 (0.0752)	−0.0651 (0.1147)	−0.0778 (0.1868)
asr	0.0290 (0.0476)	0.0161 (0.0327)	0.0155 (0.0298)	0.0102 (0.0205)	0.0028 (0.0187)	0.0268 (0.0292)	0.0544 (0.0499)	0.0491 (0.1219)
lta	−0.3476*** (0.0537)	−0.2571*** (0.0290)	−0.2156*** (0.0192)	−0.1560*** (0.0096)	−0.0982*** (0.0098)	−0.1386*** (0.0102)	−0.2329*** (0.0118)	−0.2944*** (0.0195)
vai	0.0055 (0.0039)	0.0017 (0.0099)	0.0016 (0.0101)	0.0109 (0.0133)	0.0384** (0.0169)	0.1010*** (0.0199)	0.1478*** (0.0191)	0.1559*** (0.0257)
lab	0.0002 (0.0008)	0.0000 (0.0003)	0.0000 (0.0001)	−0.0001 (0.0001)	−0.0001 (0.0001)	−0.0001 (0.0002)	−0.0001 (0.0002)	−0.0001 (0.0002)
regCS	0.0004 (0.0450)	0.0584*** (0.0132)	0.0354*** (0.0084)	0.0203*** (0.0037)	0.0073*** (0.0023)	0.0033 (0.0031)	−0.0136** (0.0060)	−0.0189* (0.0102)
regES	−0.0296 (0.0460)	0.0475*** (0.0143)	0.0295*** (0.0080)	0.0145*** (0.0038)	−0.0009 (0.0025)	−0.0112*** (0.0033)	−0.0275*** (0.0062)	−0.0365*** (0.0093)
regWS	0.0020 (0.0414)	0.0445*** (0.0129)	0.0305*** (0.0077)	0.0162*** (0.0035)	0.0014 (0.0020)	−0.0060* (0.0034)	−0.0118** (0.0057)	−0.0205** (0.0094)
secS	0.0046 (0.1088)	0.0453** (0.0179)	0.0592*** (0.0140)	0.0407*** (0.0082)	0.0240*** (0.0082)	0.0255*** (0.0054)	0.0328*** (0.0101)	0.0573*** (0.0161)
secT	0.0366 (0.1037)	0.0717*** (0.0163)	0.0733*** (0.0127)	0.0508*** (0.0077)	0.0269*** (0.0087)	0.0274*** (0.0050)	0.0389*** (0.0089)	0.0619*** (0.0145)
$R^2 / R^1(\tau)$ *p-value*	0.1482 <0.0001	0.4493 <0.0001	0.3679 <0.0001	0.2208 <0.0001	0.1035 <0.0001	0.0721 <0.0001	0.0626 <0.0001	0.0529 <0.0001

Source: Own construction (standard errors estimates in parentheses; significance codes: 0 *** 0.01 ** 0.05 * 0.1)

Figure 4 Ordinary least squares and quantile regression estimates for profitability model (2006)



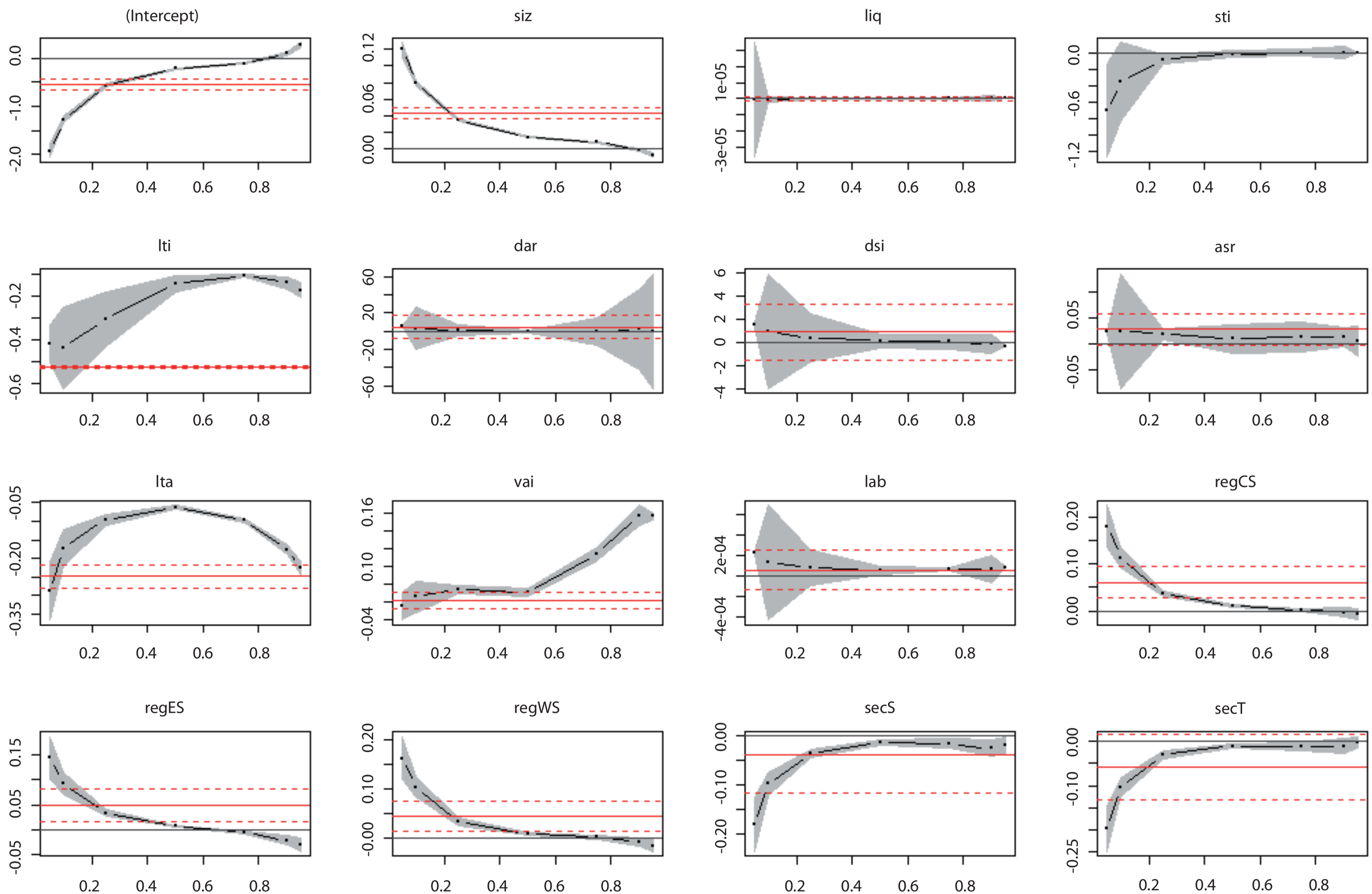
Source: Own construction (full line: OLS mean effect estimates; dashed lines: 95% confidence intervals for OLS estimates; dotted full-line: quantile regression estimates, shaded grey area: 95% confidence band for quantile regression estimates)

Table 5 Estimated regression coefficients (2011)

	OLS	Quantile regression						
		τ = 0.05	τ = 0.10	τ = 0.25	τ = 0.50	τ = 0.75	τ = 0.90	τ = 0.95
Intercept	–0.5403*** (0.0698)	–1.9247*** (0.0708)	–1.2746*** (0.0359)	–0.5582*** (0.0224)	–0.2169*** (0.0122)	–0.1159*** (0.0164)	0.0951** (0.0481)	0.2814** (0.1126)
siz	0.0425*** (0.0038)	0.1199*** (0.0035)	0.0794*** (0.0022)	0.0345*** (0.0013)	0.0133*** (0.0007)	0.0075*** (0.0007)	–0.0022 (0.0016)	–0.0084** (0.0040)
liq	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)
sti	–0.0031 (0.0038)	–0.7027*** (0.1960)	–0.3486** (0.1393)	–0.0794 (0.0515)	–0.0186 (0.0317)	0.0031 (0.0393)	0.0030 (0.0587)	0.0027 (0.0997)
lti	–0.5258*** (0.0041)	–0.4183*** (0.1134)	–0.4377*** (0.0507)	–0.3073*** (0.0473)	–0.1451*** (0.0427)	–0.1048*** (0.0394)	–0.1407** (0.0698)	–0.1740* (0.1026)
dar	4.8320 (7.9870)	5.6407 (15.6500)	3.3387 (6.5154)	1.1647 (3.3495)	0.2201 (0.9655)	–0.3750 (1.7039)	2.1300 (3.0560)	0.0258 (4.0675)
dsi	0.9409 (1.4780)	1.5512 (1.1246)	0.9777 (0.6920)	0.4133 (0.3182)	0.1454 (0.2512)	0.0610 (0.1729)	–0.1412 (0.2211)	–0.3306 (0.2079)
asr	0.0278 (0.0192)	0.0229 (0.0183)	0.0243 (0.0175)	0.0186* (0.0115)	0.0093 (0.0063)	0.0121 (0.0102)	0.0128 (0.0123)	0.0044 (0.0114)
lta	–0.2473*** (0.0191)	–0.2877*** (0.0641)	–0.1723*** (0.0365)	–0.0958*** (0.0110)	–0.0615*** (0.0044)	–0.0975*** (0.0051)	–0.1755*** (0.0239)	–0.2248*** (0.0487)
vai	0.0611*** (0.0058)	0.0545*** (0.0137)	0.0649*** (0.0125)	0.0738*** (0.0070)	0.0699*** (0.0056)	0.1136*** (0.0090)	0.1570*** (0.0216)	0.1560*** (0.0393)
lab	0.0001 (0.0001)	0.0002 (0.0004)	0.0001 (0.0002)	0.0001* (0.0000)	0.0001 (0.0001)	0.0001 (0.0001)	0.0001 (0.0001)	0.0001 (0.0001)
regCS	0.0612*** (0.0203)	0.1807*** (0.0248)	0.1140*** (0.0122)	0.0371*** (0.0040)	0.0106*** (0.0019)	0.0018 (0.0030)	–0.0028 (0.0057)	–0.0080 (0.0098)
regES	0.0489** (0.0207)	0.1449*** (0.0266)	0.0933*** (0.0121)	0.0324*** (0.0045)	0.0061*** (0.0018)	–0.0060** (0.0031)	–0.0221*** (0.0066)	–0.0306*** (0.0112)
regWS	0.0444** (0.0185)	0.1631*** (0.0256)	0.1038*** (0.0112)	0.0328*** (0.0037)	0.0091*** (0.0017)	0.0012 (0.0025)	–0.0090 (0.0057)	–0.0159 (0.0110)
secS	–0.0383 (0.0482)	–0.1814*** (0.0282)	–0.0983*** (0.0150)	–0.0363*** (0.0055)	–0.0136*** (0.0036)	–0.0153*** (0.0054)	–0.0254** (0.0108)	–0.0177 (0.0186)
secT	–0.0585 (0.0457)	–0.1987*** (0.0253)	–0.1043*** (0.0135)	–0.0303*** (0.0054)	–0.0097*** (0.0032)	–0.0106** (0.0054)	–0.0102 (0.0113)	–0.0007 (0.0169)
$R^2 / R^1(\tau)$ *p-value*	0.3666 <0.0001	0.1489 <0.0001	0.1327 <0.0001	0.0916 <0.0001	0.0476 <0.0001	0.0705 <0.0001	0.1050 <0.0001	0.1190 <0.0001

Source: Own construction (standard errors estimates in parentheses; significance codes: 0 *** 0.01 ** 0.05 * 0.1)

Figure 5 Ordinary least squares and quantile regression estimates for profitability model (2011)



Source: Own construction (full line: OLS mean effect estimates; dashed lines: 95% confidence intervals for OLS estimates; dotted full-line: quantile regression estimates, shaded grey area: 95% confidence band for quantile regression estimates)