Influence of Transparent Procurement Procedure to the Final Price of Public Contracts in Relation to Small and Medium Size Enterprises

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Abstract
The presented study analyzes a sample of public contracts, based on data from the Journal of Public Contracts and the Official Journal of European Union (Tender Electronic Daily) in relation to the Czech Republic and selected countries. We are dealing with the following fundamental research question: 'does the final price of public contracts depend on the type of public procurement procedure either open or restricted?' The next important question is about the setting of the tender condition influencing the number of suppliers. The last question is 'what is the share of small and medium size enterprises (SMEs) in the number of suppliers?' The result is based on regression economic model of transparent tender procedure, which gives the exact probability of winning of SMEs in public procurement as explained value form on relevant explaining variable as portion of SMEs in public procurement.

1. Introduction

The aim of the paper is to determine whether the choice of public procedure has influence on the final price of public contracts. Public procurement is regulated in the Czech Republic by law no 137/2006 Coll., on public contracts, which is based on the European Directives. Contracting authorities have responsibility to use more types of procurement (contracting) procedures (Němec et al., 2002; Ochrana, 1996). The most transparent is open procedure, next is restricted procedure. Contracting authority has possibility to use both of them. This article evaluates which of these procedures has the lower final price.

The second goal of this article is as follows: How many SMEs are winners of public contracts? The European Union, under the new legal framework for public procurement, to be implemented on 18 April 2016, supports a greater share of SMEs in public procurement in the EU (Jurčík, 2012). Ideally, this proportion should be at the level of the share of this type of enterprises in gross domestic products and job creation. This is the reason why we focused on the portion of SMEs of public contracts in the Czech Republic.

The non-transparency of the contracting authority leads to the breach of public procurement law and the granting of illegal state aid (Ochrana, 2001; Jurčík, 2015). We can evaluate influence of transparent procurement procedure to the final price of public contracts in relation to SMEs from more aspects. Some authors analyze the relation between transaction cost and saving of public money (Wang, 2003, Boerner and Macher, 2002, Brown and Potoski, 2002). Some authors focused on the relation between the number of bids and transparency of public contracts (Pavel, 2005). The additional benefit of this article is that authors focused on transparency in relation to SMEs which is relatively new in EU politics. We can conclude that public procurement law has more aspects and is focused on more politics of the European Union (Gongol and Muenster, 2014; Gongol, 2012).

2. Material and Methods

The article discussed effectiveness of the public procurement through the type of procurement procedure. The main added value of this article is prepared in the context of a comprehensive evaluation of transparency of public procurement procedure and to help possible improvement of future procurement policy (Jurčík, 2013; Pavel, 2005).

Working on the assumption that a sufficient extent of competition on the offering side is a condition for an efficiently working public procurement system and being able to estimate the average number of submitted offers of such a procurement procedure, then a sufficient number of offers makes it possible due to the existence of a competition effect (inversely proportional relation between the number of submitted offers and the tendered price), to achieve favorable prices for the contracting authority (Mlčoch, 1996).

In order to be able to describe the possible dependency of selected parameters influencing the intensity of tenders, we have carried out a quantitative analysis of secondary data acquired from the Journal of Procurement containing 197 procurement procedures. Individual data has been selected randomly and acquired from published Contract notices and Contract award notices, by selecting following tender conditions:

- Open procedure
- Restricted procedure

The reason to narrow the selection to two types of procurement procedures was their high share of the total number and of the total financial value of public procedures in the Czech Republic (Table 1). Data from negotiated procedures without publication have intentionally not been used, even though their share on the total number is higher than in the case of restricted procedures, because it is the character of such procedure to only have one offer.

Table 1: Structure of Procurement Procedures in the Czech Republic (Selection)

2014	% from total procurement procedures	% from total financial value of public contracts
Public procedure	52.4	68.3
Restricted procedure	6.2	17.1

Source: Jurčík (2015)

By using a regression function, the authors have attempted to estimate the regression level coefficient expressed by a linear regression function (Koten, 2001, Walsh and Davis, 1993).

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \mathcal{E} \qquad (1)$$

Y … is the explained value (dependent variable)
X_n … is value explaining the variables
β_x … is layered constant
$\mathcal{E}$ … is an unsystematic (random) element

Because we are interested in the possible influence of explaining variables, specifically the type of procurement procedure (X_1 as open and restricted), number of offers in procurement procedure (X_2) and the estimated value of the public procurement (X_3), on the explained variable defined as the difference between the estimated value of the public procurement and the tendered price offered by the winning candidate (Y), we have included the before mentioned variables into the model (model No. 1). We have calculated the following values.

Table 2: Regression Statistics of Model No. 1

Regression Statistics	
Multiple R	0.931
Reliability value R	0.867
Given reliability R	0.872
Standard error	11758694.78
Observation	204

Source: authors' calculations

Table 3: Regression of Variance (Anova Model) No. 1

	Difference	SS	MS	F	Importance F
Regression	3	$.77876e^{+17}$	$.9292e^{+16}$	420.9111569	$2.1614e^{-84}$
Residue	193	$2.71871e^{+16}$	$1.40866e^{+14}$		
Total	196	$2.05063e^{+17}$			

Source: authors' calculations

The adjusted coefficient of determination R^2 as 86.7 implies that it is possible to explain 87% of the variability of values of the explained variable thanks to this regression model.

We used the F-test for a complex evaluation of the model. The tested hypothesis contains a claim that all regression parameters β_j (j=1 …, k) are, except the β_0 constant, equal to zero, i.e. the model does not contain any explaining X_j variable, which is statistically important.

H0: $\beta_0 = c$; $\beta_1 = \beta_2 = … \beta_k = 0$

H1: *non H0*

It is obvious from Table 3 that the P-value of the F-test is 2.1614E-84 $< \alpha = 0.05$, so we can dismiss the zero hypothesis about an improper model.

We continued with partial t-tests, mainly the hypothesis test regarding the β_0 parameter and parameters β_1, β_2 and β_3. Based on the calculated reliability intervals, we reject the tested hypothesis for β_0, β_1 and β_2. However, the reliability interval for the partial β_3 t-test contains zero. We do not reject the zero hypothesis (H0: $\beta_3 = 0$; H1: $\beta_3 \neq 0$).

We will try to improve the described model in the next step and we will exclude the explaining X_2 variable. In this case we will receive the following parameters (model No. 2).

Table 4: Regression Statistics of Model No. 2.

Regression Statistics	
Multiple R	0.930
Reliability value R	0.853
Given reliability R	0.856
Standard error	11856626.37
Observation	205

Source: authors' calculations

Thanks to the adjusted coefficient of determination $R^2 = 86.5$, we are able to see that it is possible to explain 86% of the variability of values of the explained variable thanks to this regression model. Compared with model No. 1 this value has changed minimally, thus we can continue considering the use of such model. As well as for the P-value of the F-test being 1.5473E -84 $< \alpha = 0.05$, we can dismiss the zero hypothesis about an improper model.

Table 5: Anova Model No. 2.

	Difference	SS	MS	F	Importance F
Regression	2	$1.78676e^{+17}$	$8.87378e^{+16}$	630.313	$1.6373e^{-85}$
Residue	195	$2.83876e^{+16}$	$1.42273e^{+14}$		
Total	198	$2.06163e^{+17}$			

Source: authors' calculations

After finishing partial t-tests (hypothesis test of parameter β_0 and parameters β_1 and β_2), it is possible to state that the constant as well as both explaining variables of the procurement procedure type (X_1) and the estimated value (X_2) contribute to explain the model. The regression level has the following form:

Price difference =-9178287.082+8900448.76*type of procedure+0.3942*estimated value (2)

If the procedure is restricted then the equation implies that the price difference will decrease, meaning a higher achieved tendered price in comparison to its estimated value (β_1 is equal to 0).

3. Portion of SMEs on Public Contracts

In the beginning an empirical analysis of the dependant variable and chosen independent variable is conducted. The first step is to model the probability of winning SMEs in the public contract as a function of 1 regressor (winners of public contracts) using OLS method in Gretl software. We suppose that there will be a positive relationship that more public contracts are won by SMEs.

Table 6: Model No. 1 (linear): Probability of Winning of SMEs

	Coefficient	Std. Error	T-ratio	P-value	Variable Significance
Const.	733262	$1.69345e^{+06}$	0.433	0.666	
Portion of SMEs	0.930	0.01	66.85	$1.20e^{-095}$	**

Source: authors' calculations

Table 7: Information Criteria of Model No.1

Mean dependent var.	52994576	S.D. dependent var.	$1.02e^{+08}$
Sum squared resid.	$3.20e^{+16}$	S.E. of regression	16455984
R-squared	0.974	Adjusted R-squared	0.974059
F(1, 98)	4469.336	P-value(F)	$1.20e^{-95}$
Log-likelihood	−2163.208	Akaike criterion	4330.416
Schwarz criterion	4335.991	Hannan-Quinn	4332.680

Source: authors' calculations

From Table 6 and Table 7 it can be seen that there is very high probability of winning of SMEs of public contracts in the Czech Republic. However, from the P-value of the constant it can be claimed that constant is not significant in the model, which in statistical terms means a need to change the model. (p- value is higher than 0.05 and variable is not significant as there is not seen an asterisk). For this reason the model has been modified into the model without a constant. This modification is statistically needed, so the model can be more significant and it has a greater explanatory power in economic terms. Result can be seen bellow.

Table 8: Model No. 2 (Linear without Constant): Probability of Winning of SMEs

	Coefficient	Std. Error	T-ratio	P-value	Variable significance
Portion of SMEs	0.933	0.01	75.85	$1.32e^{-102}$	**

Source: authors' calculations

Table 9: Information Criteria of Model No. 2

Mean dependent var.	52994576	S.D. dependent var.	$1.02e^{+08}$
Sum squared resid.	$3.20e^{+16}$	S.E. of regression	16399709
R-squared	0.979734	Adjusted R-squared	0.979734
F(1, 98)	5752.933	P-value(F)	$1.3e^{-102}$
Log-likelihood	-2163.303	Akaike criterion	4328.607
Schwarz criterion	4331.394	Hannan-Quinn	4329.739

Source: authors' calculations

From Table 8 and Table 9 it is clear that among these two models the better one is the model 2 (linear model without constant). It has lower value of information criteria (Akaike, Schwarz and Hannah) and higher value of adjusted R^2. Generally, if a model has lower information criteria and higher adjusted R^2 comparing to other model, it has a greater explanatory power and is more relevant. Also the variables are significant (p-value is much lower than 0.05).

The results of correlation analyses confirm that there was established the relationship between winners and SMEs. We can say that it was confirmed that there is very high probability that the winner will be SMEs. Thus, the analysis confirms the existence of probability of winning of SMEs.

4. Conclusion

This article demonstrated dependence of savings rates on the kind of selected procurement procedure. The more the tender procedure more transparent, the less the price of a public contract, which was due to an even larger number of suppliers involved in specific public contract. In contrast, the Czech Republic has not confirmed that it was a larger share of public contracts from larger suppliers. For the most part public contracts all kinds obtained in the Czech Republic compared to EU SMEs.

Considering that currently the market economy and the overall market environment characterized by globalization and major imbalances in the labor market in different countries, which had a remarkable impact on SMEs, which have been the real engine of industrial development in Europe for many years. SMEs are better in adapting to these conditions than large companies. Hence the growing importance of SMEs not only in the EU but also in individual countries. They represent 99% of all enterprises in the EU, providing two thirds of jobs in the private sector, e.g. play an important role in overcoming of unemployment in the member states and contribute more than half of the total value-added created by enterprises in the EU. By the European Commission is a presumption that SMEs are the key to ensuring innovation, economic growth as contributors to GDP and employment, export, job creation, and social integration in the EU.

As a result, new procurement directive in the EU's aim to increase the share of SMEs in public procurement as a consequence of their high contribution to economic growth. In the paper it was shown that there is the high share of SMEs, as 97.9% according to R^2, in public procurement in the Czech Republic. Some exceptions are the winners of public procurement for SMEs. As it has been mentioned in the opinion of the authors, many multinational companies offer fulfillment in the context of public procurement by Czech companies (SMEs), e.g. licenses of Microsoft Office made by multinational companies in the Czech Republic sold by SMEs and therefore also by participating in public procurement they play an important role in economic growth.

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