

## An Empirical Analysis of Post-Contractual Behaviour in Public Works Contracts: The Czech Case as a Secondary Comparison with the Slovak Republic

Martin SCHMIDT\* – František OCHRANA\*\* – Michal PLAČEK\*\* –  
Michal PŮČEK\*\*

---

### Abstract

*The article analyzes post-contractual behavior on a sample of 200 randomly selected public works contracts, awarded in 2013, where it was possible to trace information about the final price. The study looks for factors, which have a statistically significant effect on the ratio between the actually paid price and tendered price. The findings are compared with similar studies in Slovakia. The model identifies a number of bids for a statistically significant indicator having a positive effect on the relationship between the actually paid price and the tendered price. Conversely, the ratio between the estimated and actual tendered amounts, as well as the use of subcontractors are seen as factors with a negative impact.*

**Keywords:** public procurement, post contractual behaviour, efficiency

**JEL Classification:** H57, H72, H77

---

### Introduction

A rather large volume of resources is spent annually on public contracts. In 2014, the volume of public procurement market in the Czech Republic was valued at 577 billion CZK. In 2014, the public sector and contracting entities allocated 13.5% of GDP through procurement. In 2015, this share was 13.7% of GDP (see the Annual Report of Public Procurement 2014, MMR, May 2015). In the EU-28, in 2013, the share of total Expenditure on works, goods and services (excluding utilities) as a % of GDP amounted to 13.67% (EC, 2015). As it

---

\* Martin SCHMIDT, Masaryk university, Faculty of Economics and Administration, Lipová 41a, 602 00 Brno, Czech Republic; e-mail: m.schmidt@email.cz

\*\* František OCHRANA – Michal PLAČEK – Michal PŮČEK, Charles University, Faculty of Social Sciences, Institute of Sociological Studies, U Křížce 8, 158 00 Prague 5, Czech Republic; e-mail: ochrana@fsv.cuni.cz; michalplacek@seznam.cz; milan.pucek@seznam.cz

is evident, this is a considerable amount of public funds which are being allocated through public procurement. From a procedural point of view, public procurement is carried out in three phases (EC, 2013): a preparatory phase (pre-bidding), the phase of bids, their evaluation, and selection process (bidding), and finally, the post-bidding phase. The contents of these phases is contained in the Act on Public Procurement. Scientific investigation of those phases is dealt with in both legal and economic literature. The legal analysis concentrates on examining the formal and procedural aspects. Its aim is to determine what regulatory tools and processes can be used in public procurement and how these tools are effective in regulating public procurement (Jurčík, 2012; 2014). The economic analysis focuses on studying the problems of the first and second phases, namely the investigation of the preparatory phase and the analysis of the phase regarding the submission and selection of bids. The research is focused particularly on the following problems: efficiency in public procurement and transparency in the public procurement market (Strand, Ramada and Canton et al., 2011), competition in the environment (Domberger and Rimmer, 1994; in the Czech and Slovak Republics: Nemeč and Grega, 2015; Svidroňová and Vaceková, 2012) the impact of the number of offers on the final price (Kuhlman and Johnson, 1983), the relationship between the openness of public competition and corruption (Burguet and Che, 2004), analysis of the impact of the choice of evaluation criteria and the type of tender on the awarding of public contracts (Ochrana et al., 2015), and factors that influence contracting, procurement and outsourcing (Prager, 1994; Nemeč, et al., 2014).

Until now, exploration of the post-contractual phase of public procurement has been totally neglected. In the scientific literature, we found only one published study (Pavel, Sičáková-Beblavá, 2012) on this issue. Its authors on sample data for the Slovak Republic (153 public contracts at the central level and 234 public contracts at the municipal level) verified the hypothesis of the possible corrupt abuse of amendments to contracts. They examined the influence of the factors of openness and the number of offers on the probability of an amendment being added to a contract and the ratio between the actual paid price and the tendered price. In our examination, we proceed from the conclusions of this study. We have tried to develop a conceptual framework for the problem and also to perform an analogous analysis on the data of the Czech Republic.

The aim of our study, which is based on an econometric analysis of the data set of public contracts for construction, is to identify statistically significant factors that influence the relationship between the actually paid (realized) price and tendered value of public contracts, to discuss the problem of corruption, and compare the results with the investigation carried out on the data from the Slovak Republic.

The article is divided into several parts. The first part of the study creates a conceptual framework for exploration. The second part focuses on the characteristics of the data file and an explanation of the model used. The third part presents the results of the research on which the discussion section is based. The conclusion offers a generalization of the research findings and formulates theoretical and practical recommendations for the regulation of public procurement.

## 1. Conceptual Framework of the Investigation

The research subject of this article is an analysis of chosen factors which (probably) influence the change of price of a public contract in the post-bidding phase. The change in price is published in an amendment to contracts. The authors assume that a high increase of price contained in an amendment to a contract might potentially be a sign of corruption. For the analysis of a scientific problem, its “theoretical anchorage” is important, which traditionally takes into account the (usually rich) existing scientific debate. In our article, this comprehensive discussion is missing, because as it was already mentioned, only one study on the issue was published, by Pavel and Sičáková-Beblavá (2012). In this article we build on the results of this study, while trying to develop a conceptual framework for examination of the given issue. We proceed from the idea of the life cycle of public contracts as defined by the OECD documents (1999; 2007; 2011). These documents give three official phases of public procurement – pre-bidding phase ( $T_1$ ), bidding phase ( $T_2$ ) and post-bidding phase ( $T_3$ ).<sup>1</sup> Literature dealing with phases of public procurement mainly discusses phases  $T_1$  (bidding) and  $T_2$  (pre-bidding). These phases are in scientific literature examined quite in detail from the point of view of economic theory, as well as from the point of legal analysis and regulation. It is possible to mention e.g. “contract theory” (Bolton and Dewatripoint, 2005), “a theory of incentives in procurement and regulation” (Laffont and Tirole, 1993), “bidding behaviour in a repeated procurement

---

<sup>1</sup> Apart from these officially given phases, it is possible to identify also phase  $T_0$  and phase  $T_4$ . In phase  $T_0$  (i.e. before the official start of public procurement) there might be secret agreements between participants of public procurement. The aim is to manipulate the future result of public contracting. In phase  $T_4$  then the profit from the manipulated contract is divided. Such manipulated cases of public contract in the Czech Republic are described in study by Langr and Ochrana (2015), in which the authors deal with qualitative analysis of system corruption in public procurement. Our analysis focuses on examining the role of certain factors influencing the post-contractual behavior. The original intention of the authors of this study was to involve in the analysis also the factor of corruption which increases the price of the contract in the form of price differential (Ochrana and Stehlík, 2015). However, there are no available data to make a quantitative analysis of this problem in phase  $T_0$  and  $T_4$ . That is the reason why – based on a recommendation of one of the article opponents – theories of “corrupt differential” were omitted from the analysis.

auction“ (Jofre-Bonet and Pesendorfer, 2000), “transaction cost“ (Partley and Hartley, 2003), “the efficiency of contracts“ (Crocker and Reynolds, 1993; Kuhlman and Johnson, 1983).

The study contributes to the discussion about the influence of chosen factors on relative changes in prices of a contract. The change in price of a public contract (as ratio of “paid price/tendered price”) is observed in the post-bidding phase, i.e. in time when the price is increased by a contractual amendment. Authors studying corruption consider the increase of price of a contract to be one of possible signs of corruption (so-called red flags – see EC, 2013; OECD, 2009; TI, 2014; Ware et al., 2007; Pavel and Sičáková-Beblavá, 2012). As opposed to the above mentioned works, the analysis is extended by an examination whether it is possible to prove statistically significant influence on the increase of price with these factors: type of contracting authority, type of procurement procedure, number of bids, electronic auction, economical characteristics of the region where the public procurement is contracted, centered procurement, using a sub-contractor, choice of evaluation criterion (lowest bid price), and influence of the factor of financing from EU subsidies.

It is expected that a higher number of bids leads to a higher competitive effect (Kuhlman and Johnson, 1983), better transparency of the competition (Strand et al., 2011), while lack of transparency of public procurement may be linked with corruption of public contracts (Ochrana and Maaytová, 2012). A higher number of bids creates an environment that is similar to conditions on the competitive market. The result is a lower tendered price.

The impact of the competitive effect projects also in phase  $T_3$  (post-bidding). It is expected that the competitive effect will be followed by a lower possible increase of price after the contract is signed: a higher number of bids (better competitive environment) reduces the possible increase of price after the contract is signed, as well as corruption risk. This problem in post-bidding phase was first analyzed by Pavel and Sičáková-Beblavá (2012). They verified the hypothesis of the corrupt abuse of amendments to contracts with the aim to achieve an additional price increase. The study contemplates whether the price increase in amendments to contracts is one of the “red flags” of a possible corrupt behaviour. However, for such behaviour (apart from cases of revealed corruption) there is not enough empiric evidence. It is true for the public sector, however, that corruption represents a loss of efficiency and additional costs (loss) for the public budget. Therefore, there is a hypothesis that an amendment to a contract is a potential tool for an additional price increase to the public contract and it generates additional gains. It is the case where, due to corruption, the “principal-agent” relationship fails (Klitgaard, MacLean-Abaroa and Parris, 2000). The contracting

authority does not adhere to the public interest, but to their advantage and the supplier abuses their triumph in the public tender for enrichment.

Corrupt participants can use different strategies and techniques. Among these strategies it is common that corrupt participants (the contracting authorities and the tenderer) during the phase  $T_0$  agree to corrupt practices, establish procedures regarding how to proceed, and set out rules for the division of corrupt gains (Langr and Ochrana, 2015). In order to do this, they select an appropriate strategy to get the most corrupt price differential.

The first possible strategy is to “tailor-make the public contracts”. The contracting authority sets out the conditions of the competition in the contract documentation so that “they monopolize” the public contract for the tenderer. This can, for instance, be achieved by selecting specific evaluation criteria and their values and by laying down strict eligibility criteria in determining the subject of the public contract so as to favour only one bidder (from a number of candidates). The contracting authority in this case proceeds in a discriminatory fashion because it is deliberately limiting the public tender and as such is covertly creating a monopolistic environment. It can be assumed that under these conditions, a limited number of companies will enter into the public tender. As demonstrated by empirical research (see e.g. Kuhlman and Johnson, 1983; in the Czech Republic: Pavel, 2010; Ochrana and Stehlík, 2015), a low competitive effect leads to higher costs in public contracts. The difference between the price tendered and (potentially) effective price of a public contract forms the corrupt differential which the corrupt participants will subsequently separate. The price of a public contract will not be efficient, but it will correspond to a monopolistic price. A super-normal profit (extraordinary profit) is produced, which is shared among the corrupt participants.

The contracting authority may generate a monopolistic environment (and produce supernormal profits) and a “pseudo-legal” pathway. It has the ability to use a less open type of award procedure e.g. in the form of obtaining a set of “appropriate” (corruptly agreed) companies for public tenders. The result is a low competitive environment and a relatively high price, which might be one of the “red flag” signs.

The third strategy leading to the increase of price is based on the use of amendment to a contract. This prevents secret agreements at the phase  $T_0$  between the contracting authorities and the tenderers (potential suppliers). Pavel and Sičáková-Beblavá (2012) believe that this just applies to public contracts awarded in an open tender. They work with a hypothesis that a situation may arise when “the contracting authority fails to keep the number of bids submitted under control” (Pavel and Sičáková-Beblavá, 2012, p. 638) and, as a result of

the competitive effect, the contracting firm has to submit a lower bid price in order to win the bid.

In this case, an additional corrupt price potential is an extracted form of an amendment to the contract (and it is usually under the guise of necessary additional work). The cited authors argue that the probability of an amendment is increased by the use of the open procedure as well as the number of bids. They conclude that the difference between the tendered price and the final price increases utilizing the open procedure and the number of bids submitted. They do not further expand their conclusion theoretically (conceptually), nor do they notionally specify the given problem.

If Pavel and Sičáková-Beblavá's accounts were correct, a phenomenon for which we have chosen the term "paradox competitive effect of public tendering" would be occurring. This is a case where openly corruption consequently leads to "substitution of a low tender price by an amendment to the contract". During a public tender, where there is a high number of bids and where the tendered price approaches an efficient price (similar to the price on "a perfectly competitive market"), there is also a possibility for corruption even under these conditions. In this case, it can be assumed that during phase  $T_0$  a secret agreement involving corrupt practices has been made between the contracting authority and the supplier. The supplier cannot unilaterally dictate any amendments, nor extra work. The supplier must act in coordination with the contracting authority in order to amend the contract (see § 82 par. 7 of the Public Procurement Act), as well as to charge for extra work (see the negotiated procedure without publication, § 23 of the Public Procurement Act). The corruption is formally carried out in the post-contractual phase when at the conclusion of the amendment, the corrupt price differential is extracted.

At the same time, in the discussion, it is presumed that public contracts are prone to corruption and characterized by the complexity of the subject. Within the complexity of the subject of the public contract in fact lies the potential for the generation of future amendments. It can be rationally expected that it is difficult (if not impossible) to describe all the details of the complex subject of the public contract. The complexity of the subject of the public contract is particularly common when dealing with construction.

In general, in case of construction contracts it is rational to assume that a change of the final price may occur because we do not live in a perfect world where construction projects are implemented exactly according to a plan. It is not always possible to determine ex ante the volume of some work or materials. Also, some unforeseen circumstances that require additional work may occur. This suggests that the largest number of amendments will be concluded just

for these public contracts, which by the complexity of the contract's subject are "susceptible" to the addition of amendments to the contract. Objectively, complex public contracts therefore tend to contain amendments.

The Public Procurement Act keeps this case in mind, thereby allowing the form of an amendment to the contract in response to unexpected challenges appearing during the implementation of a public contract. Corrupt participants may abuse this freedom within the regulations in their favour to obtain the corrupt price differential. At the same time, we believe that for the distribution of the size of the increase in the value of public contracts, there is typically a relatively low (several percent) increase in price compared to the tendered price. Price amendments will therefore, in most cases, be close to the tendered price. This phenomenon is called the "Effect of caution of overcharges". We assume that corrupt participants have already assumed the risk of exposure with their corrupt activity and that they do not wish to increase this risk. Therefore, they do not increase the price to extremes compared to the tendered price in order not to overcharge by a much different value than what would be considered a typical increase. However, since such a large amount of financial resources are allocated via public procurement, it can be expected that by having an increase of just several percent in the public contract, this would be a relatively large amount of financial resources that are lost from public budgets.

To be fair it is necessary to mention that price increases due to amendments may not necessarily be caused by corruption. It is necessary to conclude an amendment as there may be discovered any number of unexpected and unforeseeable circumstances during realization of complex public contracts. The Public Procurement Act takes this into consideration and sets out the conditions under which it is possible to carry out any changes, e.g. concluding a contract amendment.

These include conditions for using the so-called "negotiated procedure without publication" specified in § 23 par. 7 point a) of the Public Procurement Act. According to that provision, it is possible to utilize the same suppliers for additional construction work if the need be due to unforeseen circumstances, if such works cannot be reasonably implemented separately, and if the scope of the additional work does not exceed 30 %<sup>2</sup> of the initial public procurement. These cases where a public contract has additional amendments is the subject of our empirical analysis. The analysis examines the role of chosen factors on the price increase in amendments to a contract. The most influential factors are considered to be "factor of subcontractor" and "factor of (de)centralization of public procurement".

---

<sup>2</sup> Before the amendment to the Public Procurement Act effective 6th March 2015, it had been 20%.

We assume that the use of subcontractor increases the real paid price in comparison with the tendered price. The expected increase of price may be caused by various reasons and influences. It may be caused by other transaction costs (see Williamson and Masten, 1999) linked with the realization of the amendment to the contract. The increase of price may also be caused by “loss of information” as a result of more complicated contractor-recipient relations. When involving a subcontractor, the contractor loses their original “direct control” over costs and does not have exact information about all work that the subcontractor realizes and calculates. Therefore, we think that “delegating work” on a public contract from the contractor to subcontractor leads to the increase of costs.

It is expected that also the factor of (de)centralization of public procurement may influence the change of price in amendments to a contract. We assume that centrally awarded public contracts will show lower increase of price as central contracting authority has better information for management of public contracts. That is why also in cases of amendments to a contract it can easily “keep the price under control”. Central contracting authority is also under bigger public (media) pressure. Disproportionate increase of price in amendments to a contract is therefore quite a big risk for the contracting authority that it will become a target of public criticism. This motivates the contracting authority to have costs under control also in the phase of concluding amendments to a contract. Disproportionate increase of costs may then be understood by the public as a “red flag” sign. The other examined factors are not expected to show any substantial influence on the increase of price in a post-bidding phase.

## **2. Data and Utilized Methods**

The input data consisted of 200 randomly selected works contracts which according to the Journal of Public Procurement were awarded in 2013. Public contracts from this year were chosen because it was presumed that these contracts had been completed. Another reason was that from April 2012, the so-called Transparent amendment No. 55/2015 which lays down the obligation to disclose the actual price paid on the profile of the contracting authority came into force and would have applied to these contracts.

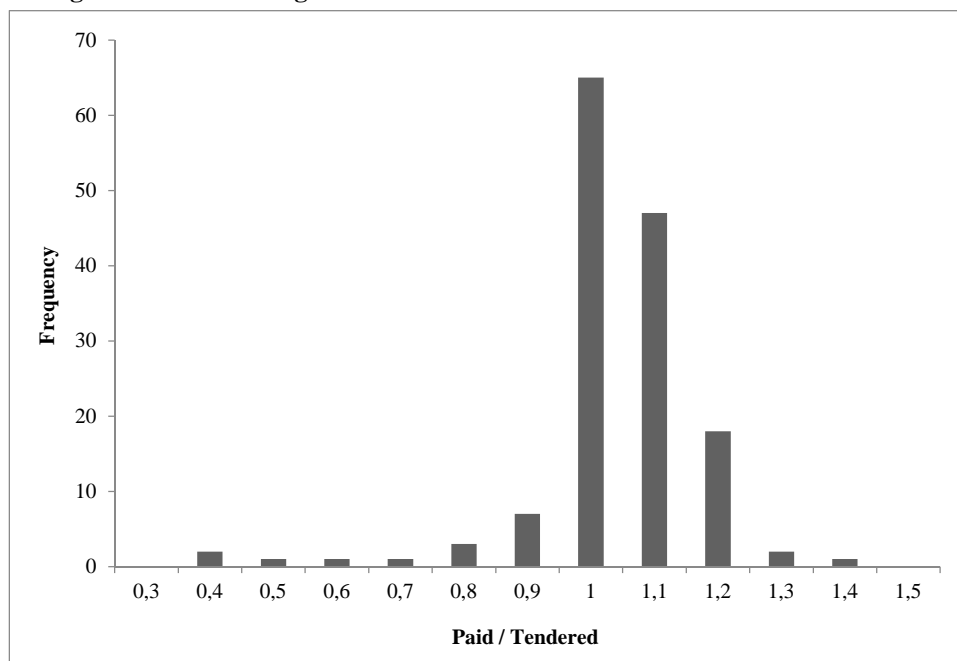
We traced the actual paid prices for the completion of the project in the above-mentioned individual profiles of the contracting authorities. While examining records, however, it was discovered that some records were incomplete. This was possibly due to some contracts having not yet been completed. Therefore, we worked with a set of 137 full records of the relevant public contracts in our analysis. We used linear regression for the analysis of the sample of public contracts.



## 2.1. Dependent Variables

In the analysis we focus on the relative changes in prices and as the dependent variable, we therefore choose the ratio of “actual paid price” and “the tendered price” (the price paid/tendered price). In this variable, the average value and the median move to 1. On average, the changes of the actual paid prices arise in a fairly neutral way, but they may be affected by some orders which were not completely implemented on the scale envisaged, just partially). The following histogram presents a more detailed frequency distribution.

Figure 1  
Histogram of Price Changes



Source: Authors.

The histogram shows that the most common example is when the order is realized at a price close to the tendered price (approximately 44% of cases) and price increases from 10% to 20% are relatively common.

## 2.2. Explanatory Variables

As the main explanatory variables, the following have been considered:

1. Tendered/expected price – this variable indicates an increase in the tendered price against the estimated value of public contracts by the contracting

authority (mean 0.71, median 0.70). This means that in the sample of public contracts from that period, the contracts managed to be completed for 30% less versus the estimated value.

2. Type of contracting authority – in this variable, we utilized the divisions according to Bulletin of Public Procurement.

Table 1

**Characteristics of the Variable: Type of Contracting Authority**

Type of Contracting Authority	Frequency
Regional or local authority	78
National or federal agency/office	16
Public institutions	10
Regional or local agency/office	12
Ministry or any other national or federal authority, including their components	7
Other	25

Source: Authors.

3. Type of procurement – for this variable we utilized the divisions of types of procurement procedures under the Public Procurement Act.

Table 2

**Characteristics of the Variable: Type of Award Procedure**

Type of Procurement Procedure	Frequency
Open	74
Limited	5
Negotiated procedure without publication	7
Simplified below-threshold	62

Source: Authors.

For other variables, the following were chosen:

- The number of bids submitted,
- Variables characterizing the region (GDP per inhabitant, the number of registered economic entities in the district, headquarters of contracting authority, the number of entities operating in the construction sector),
- Use of electronic auctions,
- Central procurement,
- Use of subcontractors,
- Evaluations according to the lowest prices,
- Funding from EU subsidies.

Individual explanatory variables have been chosen based on the results of previous studies that examined the influence of individual variables on the standard price, and also on the basis of the study Pavel and Sičáková-Beblavá (2012), and to ensure at least partial comparability.

### 3. Results

The following table presents the results of a regression model:

Model: OLS, using observations 1 – 148 (n = 137).

Missing or incomplete observations dropped: 11.

Dependent variable: paid tendered.

	Coefficient	Std. error	t-ratio	p-value	
Constant	1.15639	0.049805	23.2184	<0.00001	***
Number of bids	-0.00410278	0.00171279	-2.3954	0.01801	**
Tendered / expected price	-0.183007	0.0526566	-3.4755	0.00069	***
Central procurement	-0.279293	0.056416	-4.9506	<0.00001	***
Subcontractor	0.0564156	0.0216754	2.6027	0.01031	**

Mean dependent var	0.995787	S.D. dependent var	0.137350
Sum squared resid	1.972246	S.E. of regression	0.122234
R-squared	0.231290	Adjusted R-squared	0.207996
F(4, 132)	9.929082	P-value(F)	4.69e-07
Log-likelihood	96.10075	Akaike criterion	-182.2015
Schwarz criterion	-167.6016	Hannan-Quinn	-176.2685

White's test for heteroscedasticity.

Null hypothesis: heteroscedasticity not present.

Test statistic: LM = 18.3114.

with p-value = P(Chi-square (12) > 18.3114) = 0.106557.

The model shows that of the considered explanatory variables, the number of tenders, e.g. a higher number of bids, is an important variable. Competition reduces potential increases in prices after the signing of the contract. Another important variable is the use of a subcontractor, which, according to the model, increases the actual paid price during implementation of the contract versus the tendered price by a projection of 5.6%. The reason can seemingly be the reality that the contractor when engaging a subcontractor does not have enough control over the costs and volume of work actually carried out, but this depends to a certain extent on another subject – the subcontractors. It cannot be excluded that this increase may be a “red flag” (a symptom of corruption). The price increase may be a form of obtaining an additional corrupt price differential.

The results of the empirical analysis show that the increase in price which occur after the signing of the contract are more prone to be public contracts with lower tendered prices compared to the anticipated prices, which may to some extent confirm the hypothesis that in the presence of great pressure to have a low bid price (and tendered contracts at a price significantly lower than the anticipated price) there are additional pressures for a price increase through additional changes to the contract. These findings and the mentioned interpretation of the research results are consistent with the idea of the “paradox of the competitive

effect on public tenders” and the “effect of substituting a low tender price with an amendment to the contract”. But that's strictly not to say that every public contract, which was originally tendered at a low price and then had an amendment added to the contract is a corrupt public contract.

As the results of the empirical analysis will show, the model indicates that a decline in the tendered price versus the anticipated price of about 1% results in a subsequent rise in the price after the signing of the contract by an average of 0.2%. In reality, however, the average price increase in absolute terms represents quite an interesting sum which amounts to an average of 26,829,868 CZK (approximately 1,000,000 EUR).

The model also indicates that contracts awarded centrally account on average for smaller increases in the bid price. This may be due to the fact that, for example, contracts awarded by central government bodies are under the strict control of the national media. If we consider the cases, where public contracts are affected by corruption, then the relatively smaller increase in prices is in line with the idea of a “precautionary approach to increasing prices”. Corrupt participants increase the price so that the amount does not arise suspicion of corruption. On the other hand, it is necessary to say that these factors are not very strong given that the sample contained only a few orders that were placed centrally.

The results of empirical analysis indicate that, conversely, other parameters did not demonstrate statistical significance such as: the type of contracting authority or procurement procedure, the size of the contract, the regional characteristics, nor the method for evaluating tenders. The anticipated value, a parameter indicative of the size of the public contract, was also not statistically significant. This means that the price increase is equally likely to occur among smaller as well as larger contracts.

#### **4. Discussion**

Given the very limited number of studies on this topic we have compared our results with the studies by Pavel and Sičáková-Beblavá (2012). A comparison of the results of our research with the mentioned studies leads to the same conclusion that a more detailed treatment of the post-contractual phase is missing in the Public Procurement Act. In our opinion, this leads to two contradictory phenomena. On the one hand, the tender rules give the contracting authorities a certain degree of freedom to respond to unforeseen internal and external changes in public procurement and to conclude amendments for additional work. The question is whether this degree of freedom corresponds to the real need to optimally regulate the public tender?

There is currently a debate on a new draft law which will extend the amount of freedom as well as grant higher financial boundaries for additional work due to a critical state at the municipal level. At the lawmaker level (it is likely that there is some lobbying from suppliers as well as some authorities), there have also been suggestions (discussions in January 2016) that the volume of additional work should be increased to 50%. This proposal, on the one hand, may indicate that the contracting authorities are unable to structure public contracts exactly in order to accurately determine the estimated value of public contracts. On the other hand, such adjustments to rules, in the case of corruption, have increased the opportunities to increase “corrupt gains” extracted from the amendment. As the results of our empirical research shows, we determined that there is a risk that the contracting authority could agree with the contractor on a low cost for a public contract, which would invariably include an amendment to the contract, whose additional payments enclosed in the amendments would be misappropriated as “corrupt loot”.

Like the aforementioned authors, we have managed to identify the relationship between competitive effect and the response variable “actual price paid/tendered price” in the example of the Czech Republic. In our case, this effect reduces the price increase after the contract has been signed. With Pavel and Sičáková-Beblavá (2012), it was the other way around. We have several explanations for this difference. The first is the existence of a “precautionary price increase”. This idea does not work with Pavel and Sičáková-Beblavá. Another explanation for the difference may be due to the fact that they examined an inhomogeneous sample (such as construction contracts, services, and supplies). A further explanation can be found in the correlation of the variables “number of bids” and “tendered price/estimated value”. In our model, the variable “tendered price/the anticipated value” has a positive effect which results in price increases after the contract has been signed.

We take a different view on the issue of so-called undershooting of prices. Unlike Pavel and Sičáková-Beblavá (2012), who strictly reject the idea of “undershooting prices” (setting prices low deliberately, at a level where the contract could not even be completed), we believe that the authority and the contractor may, in phase  $T_0$ , agree to such a procedure. The winning company that submits the lowest bid has agreed that there will be an extension of the public contract for reasons that could not be foreseeable during the awarding of the public contract.

When comparing the results of the investigation, we also see a clear difference in the influence of the openness of the competition. Pavel and Sičáková-Beblavá are of the opinion that the more open the competition is, and the greater the number of tenders there is, the space for the collection of “ex ante corrupt

fees” decreases even more. This means that “if the contracting authority does not have ex-ante control over the situation (in an open procedure, it cannot affect the number of offers), or if a large number of bids is received, this increases the likelihood of an amendment” (Pavel and Sičáková-Beblavá, 2012, p. 643). Regarding this, we can agree. Our results lead to the conclusion that there is a phenomenon for which we use the term “paradox of the competitive effect”, or the “effect of substituting a low tender price with an amendment to the contract”. Conversely, the effect of transparency is proven.

The analysis identified a statistically significant role played by subcontractors as the final price paid increases when they are used. (Pavel and Sičáková-Beblavá do not work with the subcontractor factor in their model.) We have several explanations for these findings. In the cases of public contracts which are not affected by corruption, it is reasonable to expect that the subcontractor will carry out additional work (time) if these activities are profitable to them. Since they enter the public procurement process at a certain phase of the public contract, they also bring incremental transaction costs along with their activities. Another case is where there is corruption. One can assume that the involvement of subcontractors had been decided at phase  $T_0$ . Another participant is invited to share the “corrupt loot”. The costs continue to increase. In further research, it would be interesting to examine the extent to which the average price of an amendment increases depending on the number of (potentially corrupt) participants in the public contract and what is the probable corrupt price differential for each corrupt participant?

Our results also explored a different parameter: the contracting authority. Unlike the study by Pavel and Sičáková-Beblavá (2012), where the authors state that there was a lower increase in the final price paid by the municipalities rather than the state, our model did not demonstrate a statistically significant effect based on the type of authority. This is not a big difference. According to Pavel and Sičáková-Beblavá (2012) there was an increase in actual prices compared to the tendered price in 15 per cent of cases with the central government and 17 per cent of cases with municipalities.

For the main findings, the fact that the low value of the variable “tendered price/anticipated price” leading to an additional increase of the actual price paid can be considered. This corresponds to our idea of “effect of substituting a low tender price with an amendment to the contract”. In the solution of Pavel and Sičáková-Beblavá (2012), we cannot see the possibility of restricting the conclusion of amendments for extra work, but it is possible in the pre-phase where the public contract is awarded. The key to the solution lies in the accuracy of, for example, the structural definition of the subject of the tender so that when

decomposed, the subject becomes the subject of a transparent public contract in the structure, size and in the frequency of the required work. Another innovation in procurement procedures can be found in the use of assessment criteria, namely the use of the criterion of the economically advantageous tender above the criterion of the lowest price.

We believe that the criterion of the economically advantageous tender seems to be an appropriate tool for the “detection (clarification) of the complexity of the subject of the public contract”. Properly determined sub-criteria in relation to the subject of the contract can accurately identify the structure of the public contract and individual activities as well as their relevance (expressed as weights of the sub-criteria). Of course, we realize that this role can also be played by well-defined parameters of the subject of the public contract which are assessed only on the basis of the criterion of the lowest tender price. Although empirical investigation did not show any influence of the selection of the evaluation criteria on concluding amendments, nor regarding additional price increases. These findings may also provide evidence that the evaluation criteria do not adequately fulfill the function of the selection tool for public procurement based on the principle of Value for Money.

## Conclusion

The article analyses post-contractual behaviour of a random sample of public works contracts in the Czech Republic. There have been no relevant empirical investigations in this area yet (because of the difficulty of data availability). The results of the analysis are compared with secondary data for the Slovak Republic. The article creates a conceptual framework for examining the issue, and in the discussion area formulates some recommendations for public policy in the field of public procurement. The “model” of the individual phases of public procurement is used as the basis for creating the conceptual framework. Besides the officially used phase  $T_1$  (pre-bidding), bidding ( $T_2$ ) and post-bidding ( $T_3$ ), we also distinguish a  $T_0$  phase, in which the corrupt participants agree to corruption before the previously mentioned official phases. In phase  $T_4$ , the “corrupt loot” can then be divided. The paper shows that one of the symptoms of corruption as well as being one of the tools to acquire the most “corrupt gain” may be an amendment to a contract.

The study analyses the factors that may be associated with post-contractual behaviour (concluding amendments) and corruption in public procurement. Conceptual models of the research are designed and developed to explain the problem which describes how the corrupt potential price (“predatory profit” which is

shared among corrupt participants) works. There are analysed means of how to acquire a “corrupt gain” via the addition of an amendment to the contract. On the basis of empirical examination, the ways are analysed in which corruption occurs as well as what the symptoms of corruption (red flags) are.

The analysis of empirical data demonstrates that open competition can create the “paradox of the competitive effect on public tendering”. This phenomenon is understood to be this: due to corruption there can be (based on the arrangement of the contracting authority and the winning tenderer) an “effect of substituting a low tender price with an amendment to the contract”. Based on this amendment to the contract, the “corrupt gain” is extracted. In connection with the closing of amendments (and possible corruption) we notice the activity of the participants which we have named “the effect of the precautionary price increase”. Its manifestation is possible when corrupt participants do not risk too much when increasing prices, to avoid any suspicion of corruption.

We consider the main findings to be that the low value of the variable “tendered price/anticipated price” leads to an additional increase of the price actually paid as a result of an amendment to the contract. The resolution of this is not seen as a ban on the conclusion of amendments to contract (measures regarding the post-contractual phase), but in modification of rules in phase  $T_1$  and phase  $T_2$ . At the same time, we state that the proposed solutions in the article can only operate in response to a change in the approaches of the control authorities and the regulators.

As pointed out by Nemeč et al. (2014), the current administrative framework can be characterized by the term “over-legislation”. Therefore, there should be a simplification of regulations (Public Procurement Act). The control authorities and the regulator should take into account not only the procedural and formal point of view, but also the economic aspect (achieving the objective of public procurement, e.g. efficiency).

The results of the research show relatively low value of adjusted R-squared. Also other studies realized on this topic deal with this problem. This value may signal that the problem of post-contractual behaviour is influenced also by other (not involved in the analysis) factors which are of non-economic nature. They might be for instance influence of politics (factor of political partial interests), factor of management competence, factor of expert competence of people working on the tender documentation, moral factor (moral hazard, factor of corruption, or possibly other factors). It seems that post-contractual behaviour is a complicated problem whose thorough examination require a more complex interdisciplinary analysis based on examination of more scientific disciplines – economics, sociology, psychology, management, ethics.



## References

- BOLTON, P. – DEWATRIPONT, M. (2005): *Contract Theory*. London: MIT Press. ISBN 0-262-02576-0.
- BURGUET, R. – CHE, Y. K. (2004): Competitive Procurement with Corruption. *RAND Journal of Economics*, 35, No. 1, pp. 50 – 68.
- CROCKER, K. J. – REYNOLDS, K. J. (1993): The Efficiency of Incomplete Contracts: An Empirical Analysis of Air Force Engine Procurement. *The RAND Journal of Economics*, 24, No. 1, pp. 126 – 146.
- DOMBERGER, S. – RIMMER, S. (1994): Competitive Tendering and Contracting in the Public Sector: A Survey. *International Journal of the Economics of Business*, 1, No. 3, pp. 439 – 453.
- EC (2015): *Public Procurement Indicators 2013*. DG GROW G4 – Innovative and e-Procurement. [Expertise study.] Brussels: European Commission, 24 pp.
- EC (2013): *Identifying and Reducing Corruption in Public Procurement in the EU*. [Expertise study.] Brussels: European Commission, 371 pp.
- JOFRE-BONET, M. – PESENDORFER, M. (2000): Bidding Behavior in a Repeated Procurement Auction: A summary. *European Economic Review*, 44, No. 4 – 6, pp. 1006 – 1020.
- JURČÍK, R. (2012): Discussion about the Economic and Legal Aspects of the Transparency and Anti-corruption Amendment Forced from April, 1st, 2012 and Proposals of New EC Procurement Directives. *Ekonomický časopis/Journal of Economics*, 60, No 7, pp. 766 – 768.
- JURČÍK, R. (2014): Public Procurement in the Field of Public Administration in the Czech Republic, Selected Aspects. *WSEAS Transactions on Business and Economics*, 11, No. 57, pp. 615 – 624.
- KLITGAARD, R. – MACLEAN-ABAROA, R. – PARRIS, L. H. (2000): *Corrupt Cities: A Practical Guide to Cure and Prevention*. [Expertise study, No. 20922.] Washington, DC: World Bank Institute, 180 pp.
- KUHLMAN, J. R. – JOHNSON, S. R. (1983): The Number of Competitors and Bid Prices. *Southern Economic Journal*, 50, No. 1, pp. 213 – 220.
- LAFFONT, J.-J. – TIROLE, J. (1993): *A Theory of Incentives in Procurement and Regulation*. London – Cambridge, MA: MIT Press. ISBN 0-262-12174-3.
- LANGR. I. – OCHRANA, F. (2015): Systemic Corruption in Public Procurement. Two Cases from the Czech Republic. [Proceedings of the 11<sup>th</sup> International Scientific Conference. Public Economics and Administration 2015.] Ostrava: Technical University of Ostrava, Faculty of Economics, pp. 112 – 117.
- MMR (2015): *Výroční zpráva o stavu veřejných zakázek za rok 2014*. [Expertise study.] Prague: Ministerstvo pro místní rozvoj ČR.
- NEMEC, J. et al. (2014): Efficiency versus Economy in Public Procurement. [Conference Proceedings: The 8th International Days of Statistics and Economics. University of Economics Prague.] 1. ed. Prague: Melandrium, pp. 1054 – 1063.
- NEMEC, J. – GREGA, M. (2015): Factors Influencing Final Price of Public Procurement: Evidence from Slovakia. In: *Procedia Economics and Finance*. Praha: Elsevier B.V., pp. 543 – 551.
- OECD (2011): *Competition and Procurement*. [Expertise study.] Paris: Organization for Economic Cooperation and Development.
- OECD (1999): *Competition Policy and Procurement Market*. [Expertise study.] Paris: Organization for Economic Cooperation and Development.
- OECD (2007): *Policy Roundtables: Public Procurement*. [Expertise study.] Paris: Organization for Economic Cooperation and Development.
- OECD (2009): *Principles for Integrity in Public Procurement*. [Expertise study.] Paris: OECD Publishing.
- OCHRANA, F. – MAAYTOVÁ, A. (2012): Východiska pro vytváření transparentního a nekorupčního systému zadávání veřejných zakázek. *Ekonomický časopis/Journal of Economics*, 60, No. 7, pp. 732 – 745.

- OCHRANA, F. – STEHLÍK, P. (2015): Předražování veřejných zakázek na stavební práce v České republice. *Ekonomický časopis/Journal of Economics*, 63, No. 3, pp. 227 – 238.
- OCHRANA, F. et al. (2015): The Impact of the Choice of Evaluation Criteria and the Type of Tender on the Awarding Public Contracts (in the Case of Construction Contracts at the Local Level in the Czech Republic). *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, 63, No. 6, pp. 2057 – 2065.
- PARTLEY, D. – HARTLEY, D. (2003): Transaction Costs, Relational Contracting and Public Private Partnerships: A Case Study of UK Defence. *Journal of Purchasing and Supply Management*, 9, No. 3, pp. 97 – 108.
- PAVEL, J. (2010): Analýza vlivu míry konkurence na cenu rozsáhlých staveb dopravní infrastruktury. *Politická ekonomie*, 58, No. 3, pp. 343 – 356.
- PAVEL, J. – SICÁKOVÁ-BEBLAVÁ, E. (2012): Postkontraktní chování veřejných zadavatelů na Slovensku. *Politická ekonomie*, 60, No. 5, pp. 635 – 648.
- PRAGER, J. (1994): Contracting Out Government Services: Lessons from the Private Sector. *Public Administrative Review*, 54, No. 2, pp. 176 – 184.
- STRAND, I. et al. (2011): Public Procurement in Europe. Cost and Effectiveness. [A Study on Procurement Regulation, March 2011.] Brussels: European Commission.
- SVIDROŇOVÁ, M. – VACEKOVÁ, G. (2012): Current State of Self-financing of Private Non Profit Organizations in the Conditions of the Slovak Republic. *Technological and Economic Development Economy*, 18, No. 3, pp. 438 – 451.
- TI (2014): Better Indicators to Measure Corruption in Slovakia. [Expertise study.] Bratislava: Transparency International Slovakia.
- WARE, G. et al. (2007): Corruption in Public Procurement. A Perennial Challenge. In: CAMPOS, E. and PRADHAN, S. (eds): *The Many Faces of Corruption. Tracking Vulnerabilities at the Sector Level*. Washington, DC: World Bank Institute.
- WILLIAMSON, O. E. – MASTEN, S. E. (1999): *The Economics of Transaction Costs*: Cheltenham, UK – Northampton, MA: Edward Elgar Publishing Ltd. ISBN 1 85898 950 7.