

## ***The impact of agreement on government procurement use on the competition in Slovak healthcare sector***

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**Abstract:** *The efficiency of the public finance system is conditioned also by the efficiency of public procurement processes. The Slovak healthcare system has been under pressure to increase long-term efficiency. With respect to achieve the efficiency in healthcare system, the efficient public procurement is necessary condition. It is important to examine the factors influencing the public procurement system in the health sector as well as the causal relationships that would provide a valuable platform for the evaluation mechanisms aimed at the effectiveness of the planned purchases. The healthcare sector is specific because it is difficult to consider the effectiveness of the medical equipment in public procurement as well as its long-term effects, the total cost of the treatment and the individual requirements of the patient. The aim of the study is to clarify, whether the use of GPA impact the occurrence of savings within the public procurement process and if application of GPA induces the competition among tenders, thus whether the use of GPA increase number of offers. We use data on public procurement in healthcare sector in Slovak republic in 2019. The focus of analysis is on the Agreement on Government Procurement use by Slovak public procurement bodies and its impact on competition and creation of savings in public procurement process. Our findings suggest that the use of Agreement on Government Procurement induce emergence of savings in public procurement and increases the level of competition. Analysis also indicates that there exists relatively tight correspondence between competition and emergence of savings within public procurement process. It holds that higher the number of offers is, the higher savings are.*

**Keywords:** Agreement on Government Procurement, public procurement, public contract, savings, sector efficiency, healthcare system efficiency, sustainability of public finances.

**JEL:** D20, H32

**DOI:** 10.24818/amp/2021.36-06

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### **Introduction**

The main goal of public procurement in healthcare is to ensure innovative and high-quality treatment for patients at a reasonable price. Public procurement represents an important tool of the state and the public authorities (Mori, 2017). In the healthcare sector, quality should be a priority, not lowest price in procurement process. Most of the medicines and the medical equipment are procured through an electronic auction with the lowest price being the criterion for evaluation of the offered bids. In public procurement, it is very problematic to consider the effectiveness of the medical equipment as well as their long-term effects, the total cost of treatment and the individual requirements of the patient (Decarolis and Giorgiantonio, 2015). This requires an application of the sophisticated methodologies and access to deeper structured data too (Beaulieu et al. 2018; Bustinza et al. 2010; Marco-Simó and Pastor-Collado, 2020). Public procurement is not just about using all public resources economically, but it is important for all the contracting authorities and tenderers to behave responsibly, ethically and not to use a variety of the corruption activities (Fazekas et al. 2016; Hunsaker, 2009; Olken and Pande, 2012). The application of the competitive procedures, such as public tendering, restricted competition and negotiated procedures, which are regulated by the Public Procurement Act, represents a tool for ensuring the economy and the ethical behaviour of all the participants (Šumpíková and Ďurčeková, 2019; Nemeč et al., 2014, 2016).

One of the biggest problems in the field of public procurement in the Slovak healthcare system is the low long-term competitiveness. In practice, there are quite often public procurement contracts, where only one tenderer is involved in, what result to no real competition between tenderers in such public procurement (Plaček et al. 2019).

In the scientific literature, public procurement processes are analyzed from a microeconomic as well as macroeconomic point of view and the interconnection of these aspects is important for the creation of relevant policies (Padhi and Mohapatra, 2011). The absence of public procurement policies is highlighted by many research studies. For this reason, multidimensional analyses are necessary to examine the causal relationships between variables in the public procurement system and to identify new factors as well as critical points in public procurement (Pollitt and Bouckaert, 2011; Racca, 2010). This is also the motivation to carry out our research that is aimed to examine whether the use of GPA has an impact on the occurrence of savings within the public procurement process and if the application of GPA induces the competition among tenders, thus whether the use of GPA increases the number of offers. The results of the analyses represent valuable findings for policymakers as well as for the creation of national and international benchmarking indicators enabling comparative analyses.

Public procurement processes and its barriers in the various health systems are the subject of the numerous international and national research studies (Skipworth et al. 2020; Sullivan and Ngwenyama, 2005; Uyarra et al. 2014).

Although their comparison is problematic due to the considerable heterogeneity of the research studies, they provide valuable input for follow-up research and for evaluation of the effectiveness of the policies linked to the public procurement processes in the individual countries.

Siegfried Schnitzer (2010) analyses the degree of fragmentation of the system of international agreements related to public procurement in the European Union. The author validates the importance of this fragmentation because the categorization and stylization of agreements on public procurement law is very important from a point of view of the legislation of a specific agreement. Turrell (2013) examines the potential application of public value management theory to the practice of healthcare procurement in the United Kingdom. Study also tries to examine the mechanisms that can be applied to healthcare procurement and are identified together with the mechanisms that can be used in procurement to protect public values and to enhance the creation of public value. Rothery (2003) states that the Chinese government has also developed the regulations, laws, and implementation procedures necessary for public procurement to have a comprehensive administrative as well as legal framework since a half of the 90s of the twentieth century. The study analyses the history of the development of the legal framework and thus, it justifies the motivation for its modification – improving the quality of public projects, increasing transparency, the relationship with trade and the development of the national standards. The study benefits from an evaluation of the unique aspects of Chinese procurement and their impact on social and economic policy as well as the use of public procurement agents. Arrowsmith (2010) also highlights the significant macroeconomic effects of public procurement. Author sees its importance primarily in supporting economic, environmental, and social policies related to disadvantaged social groups. The study examines the policy implications of the different approaches as well as the development of regulatory frameworks to support the public procurement processes. In their study, Ahsan and Rahman (2017) address the issue of green public procurement in public health in Australia. The data set of analysis was formed by the data from the structured interviews of the managers from the health departments, while a multicriteria decision-making model as an instance of the analytical hierarchical process was applied. The outcome of the analyses declares the fact that the key challenges of green public procurement are mainly related to governmental, non-governmental and public issues, as well as to the environmental issues of the institution. Authors emphasize that the most critical problems are embodied by the lack of public procurement legislation, top management support for green public procurement, government incentives to promote green purchasing and the lack of financial support. The most critical challenges are strategic, but the least critical are of operational characteristics – environmental purchasing preferences, understanding of environmental policy, and so forth. Miller and Lehoux (2020) explore the innovative aspects of healthcare procurement. They underscore the importance of the public procurement authorities that are considered to be the professional intermediaries and the important initiators of innovative

development in public procurement. Therefore, they have a systemic impact on innovation. The implication trajectories of the study are aimed at emphasizing the social purpose of innovation in public procurement. The importance of innovation in the health sector will continue to grow and thus, the importance and a role of the actors in the public procurement system become more considerable. Rolfstam (2013) also appeals to the need to examine innovations in the public procurement system in his monograph. His view on the study of the system areas is based on trajectory–theory–policy–practice. Public procurement has been established on the three platforms over the last years – academic research, innovative policy making and practice. Each of these components is more or less preferable at the various times. In conclusion, the author emphasizes that the cooperation of several actors will still be important for the further development of public procurement – the coordination activities of researchers, policymakers and practitioners. Hence, the study implicitly highlights the importance of science for practice and its necessary connections in the economic system. Kastanioti et al. (2013) assess the development of policies affecting the public procurement system in Greece. The authors evaluate the retrospective development of the public procurement policies and the procedures that have been criticized for distorting competition. The study describes the implementation of reforms and legislative processes aimed at reducing expenditure in the sector. They consider the transfer of public tenders to regional health systems to be beneficial. Kautsch et al. (2014) examine the issues with innovation in public procurement processes in the healthcare sector in Poland. They apply the case studies from the Polish hospitals that use an innovative approach in public procurement. The results of the analyses show that innovative development in public procurement in Poland is still at an early stage, but the interest of the health institutions in innovation processes is high. There are several obstacles to the introduction of the innovative methods in the hospital procurement processes – a conservative organizational culture of the hospitals, a lack of knowledge and know-how, a lack of trust and understanding for an introduction of the new approaches to public procurement processes. Askfors and Fornstedt (2018) explore the impact of the legislative changes on innovation development in public procurement processes. They apply a case study of public procurement of a low-tech medical equipment innovation in the Swedish healthcare system. The research method is constructed of the interviews that examine the various perspectives of the different professions involved in the complex task of setting the requirement specification for the tender. The results of the study call for a deeper examination of the social aspects in public procurement.

The effectiveness of public procurement in Slovakia is also investigated by Grega et al. (2019) through an implementation of primary research. The authors found that there is a significant agreement between the suppliers and the contractors. The two main factors causing inefficiency include excessive bureaucracy and corruption or ethical shortcomings. If competition is insufficient and the criterion of the lowest price is overused to select a winning bid, the efficiency of public procurement will not increase. Savings are highest when there

are six to eight bidders in the tender. Electronic auctions generally produce greater savings than more traditional methods and Slovak procurement procedures are costly compared to a majority of the other European Union member countries. These results are followed by the research study by Nemeč et al. (2020), who examine the degree of competitiveness of public procurement in the Czech and Slovak healthcare systems and its impact on the final price of a contract. The results of the analyses confirm the conclusions of the previous studies carried out in the countries involved – the higher the number of tenderers, the lower the final price. The average number of bidders was two and in the Czech Republic for more than half of the tenders only one a single bid was submitted. Plaček et al. (2019) carried out the interesting comparative analysis aimed at a comparison of the length of the public procurement procedures in the Czech Republic and in the United Kingdom and the reasons for the delay. They consider the involvement and commitment of all the actors in this process – politicians, the public and officials – to be a basic precondition for improving public procurement results. The results of the presented research studies are beneficial for the detection and investigation of the other factors in the public procurement systems as well as for the investigation of the causal relationships and the implementation of the comparative analyses.

## 2. Research section

Analysed cross sectional dataset consists of contract award notices which took place in healthcare sector during 2019 in Slovak Republic. We use data coming from EU Open Data Portal and in total we use 1231 observations on the level of submitted orders. In this analysis we will look closer on the use of Agreement on Government Procurement (GPA) in Slovak republic. GPA should ensure open, fair, and transparent conditions of competition in the government procurements. Agreement on Government Procurement is framework of rights and obligations among countries with aim to ensure international fair, and transparent competition without favouritism of domestic tenderers. Countries that signed Agreement on Government Procurement consent that suppliers of goods and services from other signatory countries will be treated at the same manner, as domestic suppliers. Out of 1231 procurements, 40% were done under the plurilateral Agreement on Government Procurement. However, majority, thus 60% were not done under Agreement on Government Procurement. If we look closer on the type of contract, see Table 1, we can note that Government Procurement Agreement is mostly used in case of works, followed by supplies, and least often used in case of services.

**Table 1. Use of Agreement on Government Procurement**

		<b>Services</b>	<b>Supplies</b>	<b>Works</b>
Government Procurement Agreement	No	53.5%	58.0%	71.4%
	Yes	46.5%	39.6%	28.6%

(Source: own data processing)

**The impact of agreement on government procurement use on the competition  
in Slovak healthcare sector**

If we look closer on the average value of the contract in connection to Government Procurement Agreement, see Table 2, we note that when Government Procurement Agreement is not used in case of Services, average procurement value is much higher than in cases when Government Procurement Agreement is used. In case of Supplies and Works we observe inverse patterns, thus when Government Procurement Agreement is not used, an average estimated price of the contract is lower.

**Table 2. Estimated value of the contracts**

		Average estimated value of the contract (EUR)		
		Services	Supplies	Works
Government Procurement Agreement	No	1 502 535	231 524	6 305 723
	Yes	679 631	580 795	6 949 098

(Source: own data processing)

Further analysis will be focused on achievement of savings in public procurement process with regard to use of GPA. Savings are understood as difference between estimated value/price of the contract and the final value/price of the contract. We are aware of the limitation of this approach of saving calculation, but due to the size of the dataset, we are not able to estimate market price for each item within dataset. Savings are calculated as a percentage difference between estimated price and final price, in following manner:

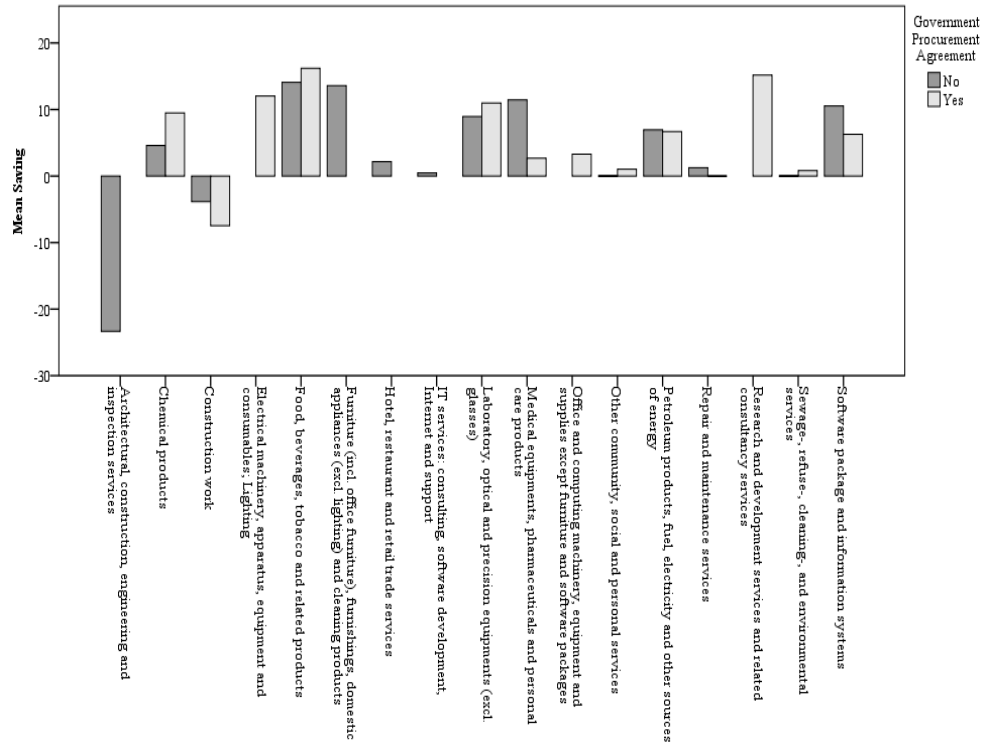
$$Saving = \left[ \left( \frac{Final\ price}{Estimated\ price} \right) \times 100 \right]$$

Figure 1 propose the average savings with respect to Common Procurement Vocabulary (CPV) items in procurements that took place in the healthcare sector in Slovakia in 2019. First evident anomaly can be seen in case of Architectural, construction, engineering, and inspection services. We notice here highly negative savings and the fact, that GPA was not at all used within Architectural, construction, engineering, and inspection services. In case of Chemical products, we observe the savings creation in both cases, when GPA is used, but also in cases where it is not. However, when GPA is not used saving are on the level 5%, and on the level 9% when GPA is used. In CPV chapter Construction work, we detect negative savings. The interesting fact in this chapter of CPV is, that negative savings are more substantial in cases when GPA is used, -7% as compared to cases when GPA were not used, -4%. In subchapter of CPV Electrical machinery, apparatus, equipment, and consumables, lighting we declare use of GPA in all public procurements and the presence of positive savings on the level of 12%. The pattern of positive saving is also observed in procurement of Food, beverages, tobacco, and related products where we observe savings on the level 14% when GPA is not used and even savings on the level 16% in cases, when GPA were present. In CPV chapter Furniture (incl. office furniture), furnishings,

## The impact of agreement on government procurement use on the competition in Slovak healthcare sector

domestic appliances (excl. lighting) and cleaning products we observe complete absence of GPA use, but we notice relatively high creation of savings on the level of 12%. Complete absence of GPA use is visible also in CPV chapter Hotel, restaurant, and retail trade services where savings are on the level of 2%; and chapter IT services: consulting, software development, Internet, and support, where the savings close to 0% are present.

**Figure 1. Savings and Agreement on Government Procurement**



(Source: own data processing)

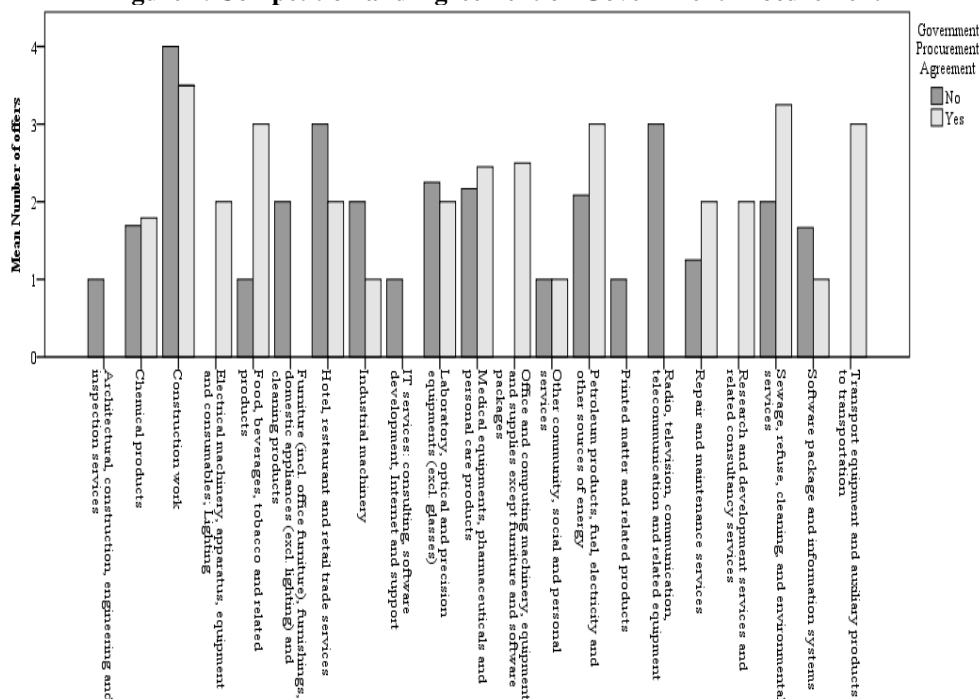
In case of Laboratory, optical and precision equipment (excl. glasses) the positive, relatively high savings are present if both cases, when GPA were used, and when GPA were not used. When GPA occurred withing chapter of Laboratory, optical and precision equipment (excl. glasses) savings were at the level 11%, when GPA did not occur, savings were at the level 9%. In our opinion, interesting pattern can be seen within CPV chapter of Medical equipment, pharmaceuticals, and personal care products. We observe in this chapter relatively high difference between GPA and non-GPA public procurements in terms of savings. We document here biggest difference between observed phenomenon, but also its

direction is opposite. By that we mean that saving is higher, on the level of 11% when GPA is not used and only on the level 3% when GPA is present. In CPV chapter Office and computing machinery, equipment and supplies except furniture and software packages we find only public procurements that used of Agreement on Government Procurement and we document positive savings on the level 3%. In CPV chapter Other community, social and personal services savings are relatively low, close to 0% in cases when GPA were not present and 1% in cases when GPA took place. In procurements of Petroleum products, fuel, electricity, and other sources of energy within healthcare sector, no difference between savings creation within procurements are observed, and in both cases, thus when GPA took place and did not, savings are on the level of 7%. Small differences, and also small magnitude of savings are reached also in CPV chapter Repair and maintenance services, where we notice savings on the level 1% in the procurements where GPA is applied and 0% savings in cases, when GPA was not applied. Second highest savings, on the level of 15% are reached in case of procurements in CPV chapter Research and development services and related consultancy services in cases when GPA were applied. Moreover, in this CPV chapter we notice only procurements, which were run in GPA mode. In CPV chapter Sewage, refuse, cleaning, and environmental services, relatively low savings are detected. We notice here zero savings in cases of non-GPA procurements and 1% saving in cases when GPA was applied. Finally, in CPV chapter Software package and information systems we document same opposite pattern as in case of Medical equipment, pharmaceuticals, and personal care products, where the difference between GPA and non-GPA procurements was relatively high and its direction was opposite compared to the rest of the database. Software package and information systems were procured with saving on the level 11% when GPA were not applied and 6% in cases, when GPA were applied. In next part of analysis, we will look closer on the competition in terms of number of bids in relation to GPA application. The mean number of bids in respective chapter of the Common Procurement Vocabulary is presented on the Figure 2.

It is needless to say that public procurement in Slovak republic suffers in long term from low competition. We document the mentioned fact in Figure 2. The toughest competition in terms of number of bids can be observed in CPV chapter Construction work, where in cases when GPA were applied, we observe 4 bids per contract award and 3.5 bids in cases, when GPA were not applied. Second most competitive CPV chapter is the chapter of Sewage, refuse, cleaning, and environmental services, where we document 3 bids per contract in cases when GPA were applied and 2 bids in cases, when not. On the third place in terms of competition within CPV chapter is chapter of Food, beverages, tobacco, and related products where 3 bids were on average observed in procurement process when GPA were applied and 1 bid when not. Similar competition can be seen in Transport equipment and auxiliary products to transportation chapter, where all procurements were done under GPA and average number of bids is equal to 3.



Figure 2. Competition and Agreement on Government Procurement

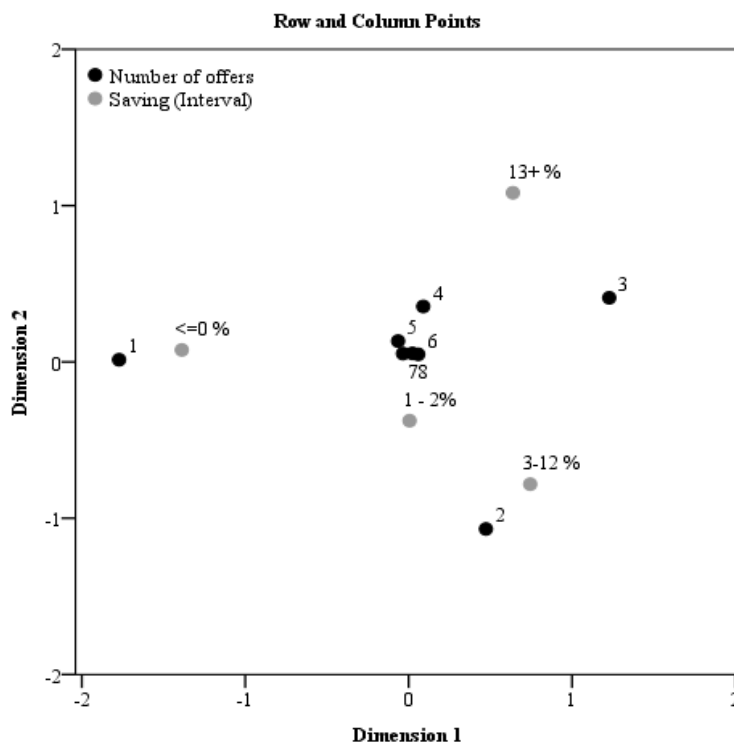


(Source: own data processing)

We document here 3 bids per procurement when GPA were applied and 2 bids per procurement when GPA were not applied. In chapters Hotel, restaurant, and retail trade services, Industrial machinery and Laboratory, optical and precision equipment (excl. glasses), we observe opposite pattern, meaning that non-GPA procurements contained more competition, than GPA procurements. In chapter Hotel, restaurant and retail trade services we find 3 bids per procurement when GPA were not applied and 2 bids per procurement, when GPA were applied. In Laboratory, optical and precision equipment we find weakly more bids in non-GPA procurements, than in GPA procurements. In industrial machinery chapter we notice 2 bids on average when GPA are not applied and 1 bid on average, when GPA is applied. Poorest competition is within chapters of Administration, defence and social security services; IT services: consulting, software development, Internet and support; Other community, social and personal services; Printed matter and related products where we find on average only 1 bid per contract, while it does not matter whether procurement was done with GPA, or not. In final part of analysis, we run correspondence analysis to verify whether number of bids influence the savings that occur during procurement process. We do not split dataset on GPA and non-GPA procurements, because differences between results were minimal, when we tried to do so. Figure 3 propose the output of correspondence analysis. Correspondence analysis is a data visualisation method,

where data are displayed to correspondence map. The position of the points indicates the similarity between the line categories and column categories of the pivot table and reveal some possible relationships and associations between analysed variables. We consider two categorical variables in presented correspondence analysis. Number of offers is categorical variable indicating the total number of offers submitted by potential contractors during procurement process. Saving is derived categorical variable from continuous variable Savings. By data binning we created 4 intervals of savings, which are less than 0%, (1;2), (3;12) and more than 13%. Bins were created by using optimal scaling of intervals, where we consider quartiles.

**Figure 3. Correspondence analysis Number of offers and Savings**



(Source: own data processing)

Correspondence analysis firstly reveals that negative savings, less than 0% are associated with 1 offer, thus lowest level of competition. Second conclusion that can be drawn is that relatively high savings are associated with duopolistic competition, thus with two offers per contract. Interesting is also fact that relatively small positive savings, 1-2% are associated to 4-8 number of offers per procurement. Finally, high savings are weakly associated with 3 and 4 offers per procurement.

### **3. Conclusions**

The aim of our study is to examine whether the use of GPA has an impact on the occurrence of savings within the public procurement process and if the application of GPA induces the competition among tenders, thus whether the use of GPA increases the number of offers. The outcome of the analyses brings up the interesting findings. The use of the Government Procurement Agreement – GPA stimulates the creation of savings in the selected items of the common procurement vocabulary, for the selected CPV codes, respectively. Higher savings in GPA use are achieved within the following CPV chapters: Chemical products; Food, beverages, tobacco and related products; Laboratory, optical and precision equipment (excl. Glasses); Sewage, refuse, cleaning, and environmental services, and Other community, social and personal services. When examining the competition within the CPV chapters, it was found that the use of GPA increases competition, resp., the number of offers from competing companies in the following subchapters of the CPV: Chemical products; Food, beverages, tobacco and related products; Medical equipment, pharmaceuticals, and personal care products; Fuel, electricity, and other sources of energy; Repair and maintenance services and Sewage, refuse, cleaning, and environmental services. The results of the correspondence analysis declare that the negative savings are associated with one offer and thus, the lowest level of competition. Relatively high savings were associated with duopolistic competition, where two bids per procurement are present. Also, there is the interesting fact that relatively small positive savings, 1 % to 2 % are related to 4 to 8 offers. The high savings correspond slightly to 3 and 4 bids in per procurement. To ensure the efficiency of public procurement, it is necessary to eliminate non-transparent procurements that is related to the inefficient use of public finances as well as corruption. Attention must also be paid to the legislative system within the Slovak Republic along with the timely implementation of the legal norms in practice.

#### **Authors Contributions**

The authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

#### **Conflict of Interest Statement**

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

#### **Acknowledgement**

This research was funded by the RO/2020/05 Internal Grant Scheme of the Tomas Bata University in Zlin under name “Economic quantification of marketing processes aimed at increasing value for the patient in the process of construction of

system in order to measure and to manage performance in healthcare facilities in the Czech Republic”.

This research was funded by the Slovak Research and Development Agency under the contract No. APVV-17-0360: “Multidimensional analysis of significant determinants of public procurement efficiency with emphasis on the application of Health Technology Assessment in the procurement preparation phase”.

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