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EVALUATION OF LEVEL OF MANAGEMENT AND CONTROL WITHIN THE PURCHASING PROCESS REALIZATION

Petr Musil

Abstrakt: *Článek se zabývá poznatky získanými při hodnocení úrovně uplatňování řídících a kontrolních principů v rámci realizace procesu akvizice (nakupování) u vybraných subjektů veřejné správy. Vedení jednotlivých subjektů veřejné správy je odpovědné za řádné řízení a kontrolu veřejných financí a má uplatňovat postupy, které zajistí realizaci zásad jako je efektivita, hospodárnost a účelnost. Akviziční proces, realizace veřejných zakázek jsou základními předpoklady pro existenci a činnost každé organizace. Výchozími dokumenty pro jejich provádění jsou zákonné normy a předpisy, včetně předpisů a norem určených a souvisejících s řízením a činností subjektů veřejné správy. Při provádění realizace veřejných zakázek, akvizičních procesů je vedení příslušných subjektů dále odpovědné za dodržování zásad, jako jsou: transparentnost, přiměřenost, rovné zacházení a zákaz diskriminace. Hodnocení úrovně uplatňování řídících a kontrolních principů v rámci realizace procesu akvizice bylo provedeno prostřednictvím monitorování vnitřních předpisů vybraných subjektů veřejné správy. Výsledky zkoumání prezentované v článku mohou přispět ke zkvalitnění přípravy a realizace akvizičních procesů, přípravy a průběhu zadávání veřejných zakázek. Mohou se stát základem pro přijetí změn v interních předpisech a postupech.*

Klíčová slova: *akvizice, veřejná zakázka, orgán veřejné správy, vnitřní předpis organizace, zásady: transparentnost, přiměřenost, rovné zacházení, zákaz diskriminace.*

Abstract: *The paper deals with the knowledge gained during the assessment of the level of the management and control principles application within the acquisition (purchasing) process realization in selected public administration entities. The management of individual public administrations is responsible for the proper control and the control of public finances and should apply*

procedures to ensure the principles implementation such as efficiency, economy and effectiveness. The acquisition process and the implementation of public procurement are essential prerequisites for the existence and operation of each organization. Initial documents for their implementation are statutory standards and regulations, including regulations and standards designed and related to the management and activities of public authorities. During the conducting procurement and acquisition processes, the management of the relevant entities is further responsible for compliance with principles such as transparency, proportionality, equal treatment and non-discrimination. Evaluation of the level of the management and control principles application within the implementation of the acquisition process was carried out by monitoring the internal regulations of selected public administration entities. The results of the research presented in this paper can help to improve the preparation and implementation of acquisition processes, preparation and process of public procurement. These results can be used as a basis for adopting changes in internal regulations and procedures.

Keywords: *acquisitions, public procurement, public administration body, internal regulation of the organization, principles: transparency, proportionality, equal treatment, non-discrimination.*

JEL Classification: *H61*

1 ÚVOD

Existence, zabezpečování poslání a činnosti každého subjektu veřejné správy jsou závislé na realizaci postupů souvisejících s pořizováním a nabýváním majetku. Postupy nabývání majetku – akviziční procesy (nakupování) - nakupovaných produktů (v podobě materiálů, zboží, služeb apod.) jsou prováděny ve smyslu příslušných zákonných ustanovení prostřednictvím veřejných zakázek. Postupy musí vyhovovat základním principům, které jsou legislativou formulovány. V souvislosti s přípravou a realizací veřejných zakázek musí být dále zachovány i principy dle příslušných zákonných norem vztahující se k řízení a kontrole nakládání s finančními zdroji.

Vstup a integrace České republiky od roku 2004 do struktur Evropské unie (EU), znamenaly pro subjekty veřejné správy (dále jen SVS) povinnost věnovat stálou pozornost legislativním dokumentům platných pro státy EU vydávaných v podobě směrnic. Jednalo se o směrnice týkající se například základních

principů souvisejících s akviziční činností (nabýváním majetku), a v daných souvislostech i principů souvisejících s řízením a kontrolou veřejných financí.

Na podkladě uvedených skutečností se v rámci řízení jednotlivých SVS bylo nutné a stále je, učit se respektovat a uplatňovat zásady, které souvisí s řízením a kontrolou finančních zdrojů i s postupy při akvizičních procesech.

Pro řízení a kontrolu finančních zdrojů existují základní principy: správnost, hospodárnost, účelnost a efektivnost. Ty souvisí s rozhodováním o využití finančních zdrojů na vymezenou potřebu nakupovaných produktů, o určení parametrů nakupovaného produktu, včetně finančních zdrojů vynaložených v souvislosti s pořízením (na akviziční procesy) nakupovaných produktů.

Uvedené principy jsou obsaženy v zákonech týkajících se činnosti veřejné správy. Výchozí normou z hlediska z hlediska definičního vymezení principů je zákon č. 320/2001 Sb., o finanční kontrole ve veřejné správě a o změně některých zákonů v platném znění (dále jen zákon o finanční kontrole) [1]. V souvislosti s tím byla přijata vyhláška č. 416/2004 Sb., kterou se provádí zákon o finanční kontrole (dále jen vyhláška k finanční kontrole) [2]. Některé z principů jsou obsahem i dalších zákonů v platném znění: např. č. 219/2000 Sb., o majetku České republiky (o majetku) [3]; č. 128/2000 Sb., o obcích (obecní zřízení) [4]; č. 129/2000 Sb., o krajích (krajské zřízení) [5]; č. 218/2000 Sb., o rozpočtových pravidlech a o změně některých souvisejících zákonů (rozpočtová pravidla) [6]; č. 250/2000 Sb., o rozpočtových pravidlech územních rozpočtů (územní rozpočtová pravidla) [7]; č. 23/2017 o rozpočtové odpovědnosti [8] a dalších.

Pro reálné použití uvedených principů týkajících se řízení a kontroly finančních zdrojů v činnosti SVS, je předepsáno přijetí postupů souvisejících se zaváděním a udržováním kontrolního systému. Navazuje na vymezenou působnost určenou v zákoně o finanční kontrole jednotlivými §§7 a násl. Zde jsou vymezeny úkoly plynoucí z realizace veřejnosprávní kontroly uvedených orgánů zaměřené na finanční kontrolu, hospodaření, nakládání a použití veřejných prostředků (veřejnými prostředky jsou veřejné finance, věci, majetková práva a jiné majetkové hodnoty). Dále jsou zákonem o finanční kontrole v §§ 25 a následujícími řešeny úkoly v zavedení, udržování a prověřování účinnosti vnitřního kontrolního systému. Výše uvedené principy a úkoly související s jejich implementací v činnosti každého SVS mají bezprostřední vztah k různým činnostem. Daná skutečnost se týká např. formulace potřeby nakupovaných produktů, jejich zabezpečení v rámci akvizičního procesu při pořizování majetku provádí. Jedná se například

o hospodaření s finančními prostředky určené pro realizaci různých projektů, jejich využití při hospodaření s majetkem: při akvizici-nákupu produktů a služeb, při nakládání s majetkem, jeho udržování, provozování, údržbě, apod.

Pro postupy při nabývání majetku u SVS prostřednictvím veřejných zakázek existují určité principy obsažené v zákoně č. 134/2016 Sb. o zadávání veřejných zakázek (ZVZ) [9]. Při postupu podle ZVZ musí zadavatel dodržovat principy transparentnosti a přiměřenosti. Ve vztahu k dodavatelům pak rovné zacházení a zákaz diskriminace. Uvedené principy souvisí s přípravou a realizací příslušných akvizičních procesů. Jsou využitelné při provádění jednotlivých postupů veřejné soutěže a pro provádění společenské kontroly. Konkrétně se uplatní při realizaci akviziční činnosti u jednotlivých zadávacích řízení, v procesech jejich přípravy, realizace a po ukončení.

Specifické postavení mají výjimky uvedené v ZVZ při realizaci veřejných zakázek. Jedná se o případy, kdy jsou některé veřejné zakázky z podmínek postupů při zadávání podle ZVZ vyňaty zcela nebo částečně. Jedná se o veřejné zakázky např., pokud by zadávací řízení ohrozilo ochranu základních bezpečnostních zájmů České republiky, by došlo k vyzrazení utajované informace a řada dalších, dále veřejné zakázky malého rozsahu (VZMR), (podrobně viz §§ 29-31 ZVZ). Při VZMR realizaci však přesto musí být dodrženy povinnosti plynoucí uvedených principů (transparentnost, přiměřenost, rovné zacházení, zákaz diskriminace).

V každé organizaci existují procesy, které v souvislosti s implementací zákonných norem, musí být nastaveny pro příslušná pracoviště a zejména pro jednotlivé odpovědné osoby. Zásadním hlediskem je, aby byly procesy popsané ve vnitřních předpisech (dále jen VP), respektovaly poslání SVS, postihovaly činnosti managementu, poskytování a čerpání zdrojů, monitorování, měření a také přezkoumávání. Existence vnitřních předpisů vztahujících se k implementaci principů s vymezenými rolemi jednotlivých osob (vlastníků procesů) s přidělenou odpovědností a pravomocí pak umožňuje identifikaci kompetencí, které jsou pro danou činnost nezbytné [10]. Pro řízení a kontrolu finančních zdrojů a zadávacích řízení veřejných zakázek (běžných dle zákona i specifických ve smyslu výjimek) sehrávají vnitřní předpisy SVS významnou úlohu. V rámci VP by mělo být určeno, jak budou výše uvedené principy v konkrétních podmínkách SVS realizovány.

Různá úroveň existujících vnitřních předpisů jednotlivých SVS určených pro řízení procesů souvisejících se základními principy pro řízení a kontrolu finančních zdrojů i pro realizaci zadávacích řízení veřejných zakázek,

má zásadní vliv na kvalitu řízení SVS. Při nízké úrovni VP nebo jejich neexistenci, můžeme konstatovat, že jsou rozhodovací a kontrolní procesy prováděny s minimální identifikací odpovědnosti, kontroly a bez možnosti procesy systematicky řídit, usměrňovat a koordinovat.

Základním problémem vytýčeným pro zkoumání, je ověřit: Jaká je současná úroveň při uplatňování existujících principů pro řízení a kontrolu finančních zdrojů a postupy při nabývání majetku prostřednictvím vnitřních norem v rámci vybraných SVS?

Cílem článku je získat od vybraných SVS odpověď na otázky související s procesy implementace principů pro řízení a kontrolu finančních zdrojů a realizaci zadávacích řízení veřejných zakázek zachycené ve vnitřních normách SVS. Po získání výsledků a hodnocení úrovně vnitřních norem, navrhnout doporučení.

2 METODIKA A DATA

V souvislosti se zpracováním dané problematiky byly použity různé metody vědecké práce. Jednou z metod byla využita kvalitativní metoda zakotvené teorie (Grounded Theory). Ta umožňuje zúžení výzkumného problému prostřednictvím výzkumných otázek, zabývat se jednotlivými oblastmi dat, řešit je doplňující otázkami. Dále byly při zkoumání a hodnocení použity metody analýzy a syntézy, komparace a indukce.

Proces sběru, analýzy a hodnocení dat je postaven na využití teorie užitku. Teorie vychází z předpokladu o nemožnosti přímého měření užitku, ale připouští pro jeho hodnocení a uspořádání použít ordinální bodovací stupnici. Při jejím využití v jednotlivých oblastech VP se vycházelo z uspořádání míry užitku na podkladě subjektivního vyjádření pocitů uspokojení hodnotitele [11], (Ochrana, 2001): Jak je naplňována promítnuta dikce legislativních norem ve zkoumaných oblastech VP při uplatňování principů pro řízení a kontrolu veřejných financí a oblast veřejných zakázek.

Do datové základny byly stratifikovaným výběrem zařazeny SVS, tak aby v něm byly zastoupeny různé SVS. Jednalo se o organizační složky státu – ministerstva, dále kraje a obce s rozšířenou působností. Pro konkrétní zkoumání a hodnocení byly využity jejich VP týkající se implementace principů řízení a kontroly finančních zdrojů a zadávacích řízení veřejných zakázek. VP byly získány prostřednictvím webových stránek jednotlivých subjektů a dále prostřednictvím vyžádání podle příslušné legislativní normy.

Jednalo se o následující SVS: Organizační složky státu - ministerstva (získány VP od 1 subjektu z 14, p1=0,0714), [12], kraje (získány VP od 3 subjektů z celkem 14, p2=0,2143), [13] a obce s rozšířenou působností (získány VP od 12 subjektů z celkem 206, p3=0,0582), [14]. Konfrontace zvolené hladiny významnosti ($\alpha = 0,05$) s vypočtenou hladinou významnosti jednotlivých skupin SVS ukázala, že hladiny významnosti jednotlivých skupin organizací veřejné správy (p1, p2, p3)> α. Získaný počet vnitřních předpisů od jednotlivých SVS je relevantní pro provedení šetření.

Zkoumané oblasti VP jsou zachyceny v Tabulce 1.

Tabulka 1: Zkoumané oblasti vnitřních předpisů (VP)

Oblast	Oblasti VP ve vztahu k principům v prostředí přípravy a realizace veřejných zakázek a pro řízení a kontrolu veřejných financí
1.	Existence pojmů účelnost, hospodárnost, efektivnost a správnost.
2.	Existence pojmů transparentnost, přiměřenost, rovné zacházení a zákaz diskriminace.
3.	Vymezení pojmů účelnost, hospodárnost, efektivnost a správnost ve vztahu k odpovědnosti útvarů a osob v organizační struktuře.
4.	Vymezení pojmů transparentnost, přiměřenost, rovné zacházení a zákaz diskriminace ve vztahu k odpovědnosti útvarů a osob v organizační struktuře.
5.	Zahrnutí pojmů v procesech pro řízení a kontrolu veřejných financí při realizaci veřejných zakázek v rámci předběžné a průběžné finanční kontroly.
6.	Zahrnutí pojmů (transparentnost, přiměřenost, rovné zacházení a zákaz diskriminace) v procesech souvisejících s veřejnými zakázkami.

Zdroj: vlastní zpracování

Kvalitativní hodnocení jednotlivých bodových hodnot ve vztahu k vybraným oblastem je zachyceno v Tabulce 2 Bodová hodnota pro posuzování zkoumaných oblastí 1 až 6 podle tabulky 1. Ordinální bodovací stupnice je uspořádána pro hodnocení v intervalu přidělovaných bodů od 1 do 5. Slovní vyjádření hodnotícího kritéria bylo provedeno na podkladě specifik daného stavu, ve kterém se zkoumaný jev v době hodnocení nacházel. Vyjádřená bodová hodnota 5 označuje nejméně preferovaný stav a 1 označuje nejvíce preferovaný stav.

Tabulka 2: Bodová hodnota pro posuzování zkoumaných oblastí 1 až 6 dle tabulky 1.

Počet bodů	Oblast je z hlediska požadavků plněna:
1	**Bez závad.** Oblast je srozumitelně obsažena ve vnitřních dokumentech (týká se hodnocení oblasti 1,2 dle tab.1). Postupy pro procesní implementaci jsou popsány ve vztahu k odpovědným osobám (týká se hodnocení oblasti 3,4 dle tab.1). Realizace principů umožňuje měřitelnost oblasti a přímé uplatnění v rozhodovacích a kontrolních procesech (týká se hodnocení oblasti 5,6 dle tab.1).
2	**Drobné nedostatky.** Oblast je obsažena ve vnitřních dokumentech (týká se hodnocení oblasti 1,2 dle tab.1). Postupy pro procesní implementaci jsou popsány ve vztahu k odpovědným osobám (týká se hodnocení oblasti 3,4 dle tab.1). Principy jsou používány v rozhodovacích a kontrolních procesech(týká se hodnocení oblasti 5,6 dle tab.1).
3	**Závažnější nedostatky**. Oblast je obsažena ve vnitřních dokumentech (týká se hodnocení oblasti 1,2 dle tab.1). Postupy pro procesní implementaci nejsou zcela popsány (týká se hodnocení oblasti 3,4 dle tab.1). Chybí vazby, práva a odpovědnosti ve vztahu k odpovědným osobám pro uplatnění principů v rozhodovacích a kontrolních procesech(týká se hodnocení oblasti 5,6 dle tab.1) .
4	**Hrubé nedostatky.** Oblast je vyjádřena ve vnitřních dokumentech, odvolává se pouze na vyšší právní normu (týká se hodnocení oblasti 1,2 dle tab.1). Nemá vypovídací hodnotu ve vztahu k odpovědným osobám (týká se hodnocení oblasti 3,4 dle tab.1). Není jasně popsán postup a zachyceny vazby pro uplatnění principů v rozhodovacích a kontrolních procesech (týká se hodnocení oblasti 5,6 dle tab.1).
5	**Zásadní nedostatky**. Oblast není obsažena a zahrnuta ve vnitřních předpisech (týká se hodnocení oblasti 1,2 dle tab.1). Neexistuje zachycený vztah k odpovědným osobám (týká se hodnocení oblasti 3,4 dle tab.1). Neexistuje procesní postup pro uplatnění principů v rozhodovacích a kontrolních procesech (týká se hodnocení oblasti 5,6 dle tab.1).

Zdroj: vlastní zpracování

3 VÝSLEDKY A DISKUSE

Výsledky zkoumání v rámci jednotlivých oblastí 1 až 6 (viz tabulka 2) jsou znázorněny v následujících grafech.

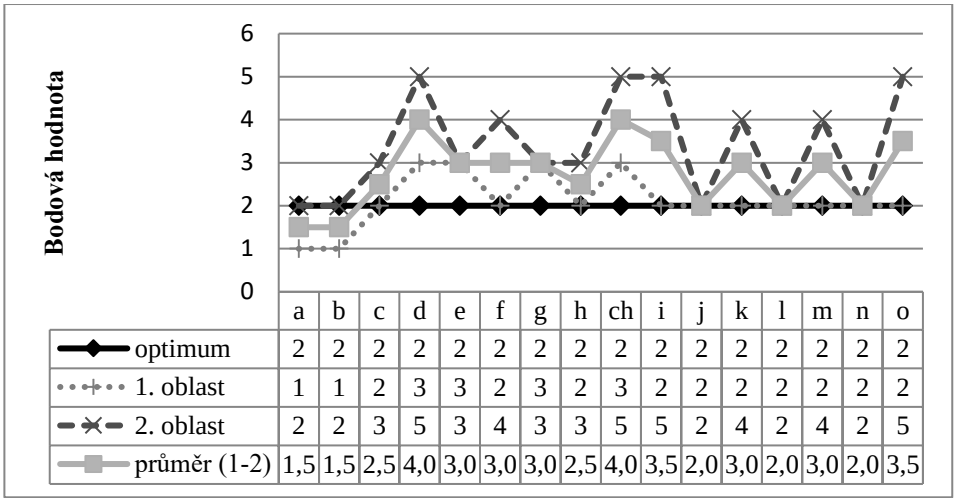
Graf 1 Výsledky za vybrané subjekty v rozsahu oblastí 1 a 2, uvádí na ose X jednotlivé SVS, na ose Y uvádí bodovou hodnotu 1 až 5 (viz tabulka 2). Součástí grafu je uvedena tabulka, která znázorňuje dosaženou bodovou hodnotu u jednotlivých SVS a hodnocených oblastí 1 a 2 (viz tabulka 1). Zkoumané oblasti vnitřních předpisů. V rámci grafu je jako součást tabulky uveden i aritmetický průměr za uvedené dvě oblasti.

Graf 2 Výsledky za vybrané subjekty v rozsahu oblastí 3 a 4, uvádí na ose X jednotlivé SVS, na ose Y uvádí bodovou hodnotu 1 až 5 (viz tabulka 2). Součástí grafu je uvedena tabulka, která znázorňuje dosaženou bodovou hodnotu u jednotlivých SVS a hodnocených oblastí 3 a 4 (viz tabulka 1). Zkoumané oblasti vnitřních předpisů. V rámci grafu je jako součást tabulky uveden i aritmetický průměr za uvedené dvě oblasti.

Graf 3 Výsledky za vybrané subjekty v rozsahu oblastí 5 a 6, uvádí na ose X jednotlivé SVS, na ose Y uvádí bodovou hodnotu 1 až 5 (viz tabulka 2). Součástí grafu je uvedena tabulka, která znázorňuje dosaženou bodovou hodnotu u jednotlivých SVS a hodnocených oblastí 5 a 6 (viz tabulka 1). Zkoumané oblasti vnitřních předpisů. V rámci grafu je jako součást tabulky uveden i aritmetický průměr za uvedené dvě oblasti.

Stanoviska uváděná v závěru této kapitoly byla konfrontována s kontrolními zjištěními prováděnými Nejvyšším kontrolním úřadem, Úřadem pro kontrolu hospodářské soutěže.

Graf 1: Výsledky za vybrané subjekty v rozsahu oblastí 1 a 2



	a	b	c	d	e	f	g	h	ch	i	j	k	l	m	n	o
optimum	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
1. oblast	1	1	2	3	3	2	3	2	3	2	2	2	2	2	2	2
2. oblast	2	2	3	5	3	4	3	3	5	5	2	4	2	4	2	5
průměr (1-2)	1,5	1,5	2,5	4,0	3,0	3,0	3,0	2,5	4,0	3,5	2,0	3,0	2,0	3,0	2,0	3,5

Zdroj: vlastní zpracování

Legenda:

Subjekty veřejné správy jsou označeny abecedním pořadím, oblasti zkoumání jsou označeny číselně a graficky. Subjekty veřejné správy: a - organizační složka státu (ministerstvo); b-d vyšší územně samosprávné celky (kraje); e-o územně samosprávné celky (obce s rozšířenou působností).

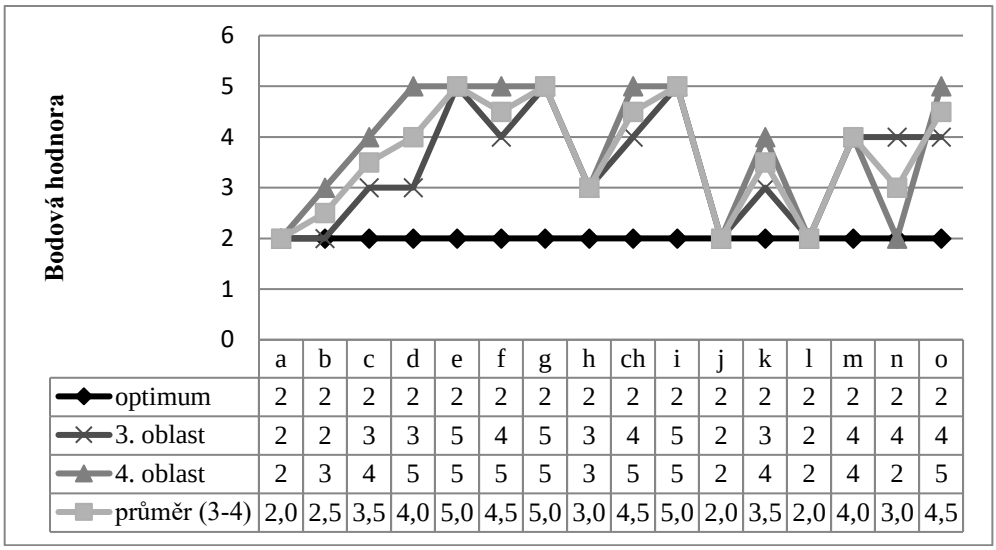
Získané výsledky znázorněné v grafu 1 Výsledky za vybrané subjekty v rozsahu oblastí 1 a 2, nám znázorňují, že možné očekávané výsledky vyjádřené optimálním stavem (optimum=bodová hodnota 2) bylo v průměru za všechny hodnocené SVS dosaženo pouze u 5 subjektů.

Oblast 1 (Existence pojmů účelnost, hospodárnost, efektivnost a správnost), kde lze u jednotlivých subjektů konstatovat pouze drobné nedostatky (16 subjektů). Žádný ze zkoumaných subjektů nevykazuje horších bodových hodnot.

V oblasti 2 (Existence pojmů transparentnost, přiměřenost, rovné zacházení a zákaz diskriminace) byly zjištěny závady s hodnocením bodovou hodnotou 5 (zásadní nedostatky). Skutečnost byla konstatována u 4 z 16 zkoumaných subjektů. Zjištění s výskytem bodového hodnoty 5 u 25 % SVS ukazuje, že přístup managementu identifikovaný prostřednictvím VP, neumožňuje měřitelnost oblasti a přímé uplatnění principů v rozhodovacích a kontrolních procesech. Odpovědní zaměstnanci se nerozhodují na podkladě měřitelných výsledků. Principy nejsou identifikovány pro řízení v použitelné podobě. To znamená, že použití rozpočtovaných prostředků SVS nemůže být doloženo

vyhodnotitelným způsobem. Není naplněno stanovisko nutné pro řízení „Chceme-li řídit, musíme vědět, a máme-li vědět, a ne se pouze domnívat, musíme být schopni měřit.“ [9] (Bazala, 2006).

Graf 2: Výsledky za vybrané subjekty v rozsahu oblastí 3 a 4



	a	b	c	d	e	f	g	h	ch	i	j	k	l	m	n	o
optimum	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
3. oblast	2	2	3	3	5	4	5	3	4	5	2	3	2	4	4	4
4. oblast	2	3	4	5	5	5	5	3	5	5	2	4	2	4	2	5
průměr (3-4)	2,0	2,5	3,5	4,0	5,0	4,5	5,0	3,0	4,5	5,0	2,0	3,5	2,0	4,0	3,0	4,5

Zdroj: vlastní zpracování

Legenda:

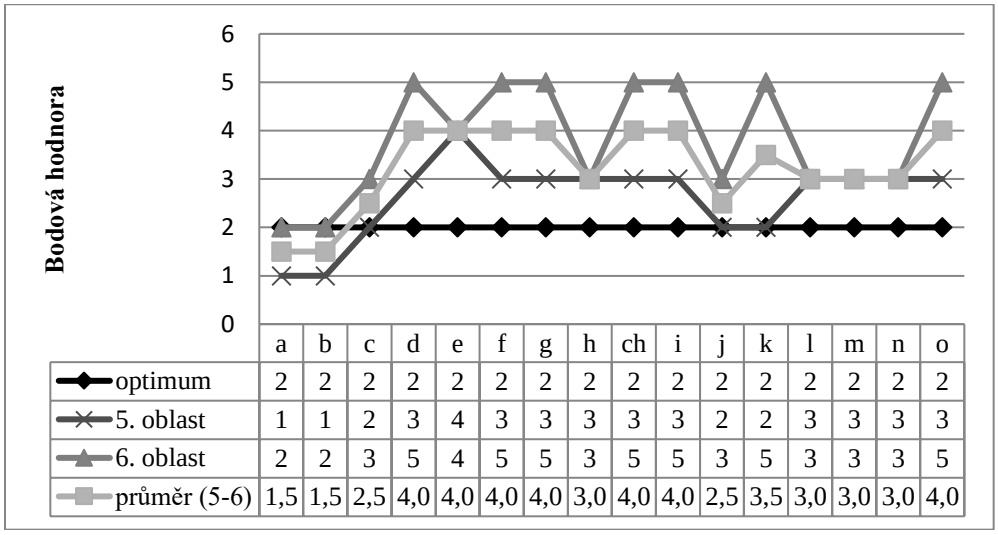
Subjekty veřejné správy jsou označeny abecedním pořadím, oblasti zkoumání jsou označeny číselně a graficky. Subjekty veřejné správy: a - organizační složka státu (ministerstvo); b-d vyšší územně samosprávné celky (kraje); e-o územně samosprávné celky (obce s rozšířenou působností).

Získané výsledky znázorněné v grafu 2 Výsledky za vybrané subjekty v rozsahu oblastí 3 a 4, ukazují, že očekávané optimum v bodové hodnotě 2 (drobné nedostatky) v průměru za všechny hodnocené oblasti bylo dosaženo pouze u tří subjektů.

Oblast 3 (Vymezení pojmů účelnost, hospodárnost, efektivnost a správnost ve vztahu k odpovědnosti útvarů a osob v organizační struktuře) je z hlediska VP nedostatečně ošetřena. Tuto skutečnost nám potvrzují výsledky, kde na optimální úrovně dosáhly 4 z analyzovaných subjektů. Z celkového počtu 16 analyzovaných subjektů čtyři SVS dosáhly na úroveň 3 (závažnější nedostatky), pět SVS na hodnocení 4 (hrubé nedostatky) a zbývající část (3 SVS) na hodnocení 5 (zásadní nedostatky).

Oblast 4 (Vymezení pojmů transparentnost, přiměřenost, rovné zacházení a zákaz diskriminace ve vztahu k odpovědnosti útvarů a osob v organizační struktuře), kde lze u jednotlivých subjektů konstatovat horší výsledky. Větší část (10) analyzovaných SVS dosáhlo na bodové hodnocení 5 (zásadní nedostatky) sedm subjektů a bodové hodnocení 4 (hrubé nedostatky) tři subjekty. To znamená, že u většiny subjektů není s odpovídající kvalitou popsán proces nabývání majetku VP (směrnice). Tyto VP se vyznačují velkou mírou nedokonalosti ve vztahu ke konkrétním postupům jednotlivých subjektů při realizaci veřejné zakázky. To vede k neefektivnosti v této analyzované oblasti.

Graf 3: Výsledky za vybrané subjekty v rozsahu oblastí 5 a 6



	a	b	c	d	e	f	g	h	ch	i	j	k	l	m	n	o
optimum	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
5. oblast	1	1	2	3	4	3	3	3	3	3	2	2	3	3	3	3
6. oblast	2	2	3	5	4	5	5	3	5	5	3	5	3	3	3	5
průměr (5-6)	1,5	1,5	2,5	4,0	4,0	4,0	4,0	3,0	4,0	4,0	2,5	3,5	3,0	3,0	3,0	4,0

Zdroj: vlastní zpracování

Legenda:

Subjekty veřejné správy jsou označeny abecedním pořadím, oblasti zkoumání jsou označeny číselně a graficky. Subjekty veřejné správy: a - organizační složka státu (ministerstvo); b-d vyšší územně samosprávné celky (kraje); e-o územně samosprávné celky (obce s rozšířenou působností).

Získané výsledky znázorněné v grafu 3 Výsledky za vybrané subjekty v rozsahu oblastí 5 a 6, představují, že očekávané optimum v bodové hodnotě 2 (drobné nedostatky) v průměru za všechny hodnocené oblasti bylo dosaženo pouze u dvou subjektů.

Oblast 5 (Zahrnutí pojmů v procesech pro řízení a kontrolu veřejných financí při realizaci veřejných zakázek v rámci předběžné a průběžné finanční kontroly) je z hlediska VP ošetřena dostatečně. Tuto skutečnost nám potvrzují výsledky, kde na optimální úrovně dosáhlo pět subjektů. Z celkového počtu 16 analyzovaných subjektů deset SVS dosáhlo na úroveň 3 (závažnější nedostatky) zbývající část (1 SVS) na hodnocení 4 (hrubé nedostatky).

Oblast 6 (Zahrnutí pojmů (transparentnost, přiměřenost, rovné zacházení a zákaz diskriminace) v procesech souvisejících s veřejnými zakázkami), kde lze u jednotlivých subjektů konstatovat horší výsledky. Menší část analyzovaných SVS dosáhlo na bodové hodnocení 2 (drobné nedostatky) celkem dva subjekty. Na bodové hodnocení 3 (závažnější nedostatky) dosáhlo šest subjektů. Polovina (8) z analyzovaných SVS bylo hodnoceno bodovým hodnocením 4 (hrubé nedostatky) jeden subjekt a bodovým hodnocením 5 (zásadní nedostatky) sedm subjektů. To znamená, že u poloviny (50 %) subjektů je sice popsán proces nabývání majetku VP (směrnice), ale nedostatečně. Uvedené VP se vyznačují velkou mírou nedokonalosti ve vztahu ke konkrétním postupům jednotlivých subjektů při realizaci veřejné zakázky. To vede k neefektivnosti v této analyzované oblasti.

DÍLČÍ ZÁVĚR

Z výše znázorněných grafů 1 až 3, je zřejmá dosažená úroveň rozpracování principů v rámci VP. Stanovisko, zakládající se na předpokladu, že existence zákona automaticky zakládá přímou implementaci principů v rámci činnosti jednotlivých odpovědných osob, je s ohledem na výsledky kontrolních zjištění různých úrovní a stupňů nesprávné. Dochází k porušování principů pro řízení a kontrolu financí, ale také principů souvisejících s nabýváním majetku.

Výše hodnocené SVS je nutné považovat za subjekty, které musí mít určitou formu byrokratické struktury založenou na jasných, formalizovaných pravidlech, které jsou předpokladem pro kvalitní a profesionální práci všech zúčastněných a odpovědných osob. Je-li implementace principů vztahujících se k jejich činnosti nedostatečně zachycena ve VP, pak nelze ani očekávat profesionální a efektivní řízení příslušného SVS. Opatření pro zlepšení stávajícího stavu by měla být založena na konceptu, kde jsou základem:

a) popsané principy v rámci VP na podmínky příslušné organizační struktury SVS;

b) propojení principů s existující organizační hierarchií a specializacemi funkcí v rámci SVS;

c) zapracované principy do příslušných procesů týkající se finančního hospodaření a nabývání majetku.

VP týkající se principů řízení a kontroly finančních zdrojů a nabývání majetku je vhodné: přijmout, protože vycházejí z právního řádu České republiky a z důvodů vydávání závazných pokynů a úkolů týkajících se činnosti jednotlivých zaměstnanců a zúčastněných osob [15].

4 ZÁVĚR

Článek se orientoval na problematiku VP u SVS ve vztahu k principům řízení a kontroly finančních zdrojů a nabývání majetku. Výsledky zkoumání ukazují řadu problémů a nedostatků. Důležitost, v článku zkoumaných principů, je pro existenci SVS natolik významná, že zanedbání nebo opomenutí popsatelné a kontrolovatelné implementace se projevuje v činnosti SVS včetně řídících a kontrolních schopností.

AFILACE

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FEATURES OF TAX EXPENDITURES IN CORPORATE INCOME TAXATION

Iryna Prokopenko

Abstract: *The article deals with the features of the using of the concept of tax expenditures from the position of administration of tax incentives of corporate income tax. Analyzed the list of basic elements of the tax expenditures according to different views of foreign academic economists. Denoted main positive and negative aspects of tax expenditures. The definition of the corporate tax base using the Shantz-Haig-Simons concept is considered. Described some elements of the benchmark (normative) structure of corporate income tax, deviation from which are defined as tax expenditures. Main attention is given to tax rate, taxable unit, taxable period, accounting rules and avoidance of double taxation. As a result, indicated, that tax expenditures have a role to play and are employed widely.*

Keywords: *corporate income tax, tax incentives, tax expenditures, Shantz-Haig-Simons concept, benchmark (normative) tax structure, tax rate, taxable unit, taxable period, accounting rules, avoidance of double taxation.*

JEL classifications: *H25*

1 INTRODUCTION

The effectiveness of the state tax system is expressed by comparing tax revenues to expenditures: the larger tax revenue in relation to the costs of obtaining them, the more effective the tax system.

The principle of the effectiveness of the tax system in practice can be realized on the basis of two conceptual approaches (Kuklina, 2014):

- neutralistic – reduction of the tax rate and tax base expansion without using of tax preference items;
- interventionist – differentiation of taxes, using of numerous tax incentives at high general tax rates.

Today most advanced is the second approach, which provides stable priming of selective types of economic activities. In this regard, the issue of the needing to save tax incentives is actively discussed in the political and scientific spheres. This tendency is explained by the fact that the world and, partly, domestic experience of using tax incentives have shown that they can have a positive impact on economic activity and the social sphere. Recently, the main purpose of tax incentives is increasingly reduced to attracting investment in production, services, as well as stimulating the development of individual sectors of the economy.

Thus, during administration of tax incentives of corporate income tax there are four different types of expenditures, namely (Zee, Stotsky and Ley, 2002):

- resource allocation costs (for example, additional investments);
- tax compliance costs;
- costs associated with lack of transparency and high corruption;
- expenditure on budget revenues (including tax expenditures).

In view of this, the concept of tax expenditures, which, exists in world practice, is interesting to study.

2 THE CONCEPT AND CHARACTER OF TAX EXPENDITURES

The term “tax expenditures” was introduced in 1967 by Assistant Secretary for Tax Policy, Stanley Surrey, in a speech calling for a “full accounting” of them. Following his speech, estimates were prepared by the U.S. Department of the Treasury (Treasury) and later by the Joint Committee on Taxation (JCT).

In 1974, the Budget Act charged the House and Senate Budget Committees with the duty “to request and evaluate continuing studies of tax expenditures, to devise methods of coordinating tax expenditures, policies, and programs with direct budget outlays, and to report the results of such studies” to Congress on a recurring basis. The Budget Act further required that the annual President’s Budget include tax expenditure estimates (Payne, 2015).

According to article 2 of Congressional Budget and Impoundment Control Act of 1974 The term “tax expenditures” means those revenue losses attributable to provisions of the Federal tax laws which allow a special exclusion, exemption, or deduction from gross income or which provide a special credit, a preferential rate of tax, or a deferral of tax liability, and the term “tax expenditures budget”

means an enumeration of such tax expenditures (Congressional Budget and Impoundment Control Act,1974).

Stanley Surrey and coauthor, Paul R. McDaniel, defined the concept thus in their 1985 treatise on the subject: The tax expenditure concept posits that an income tax is composed of two distinct elements. The first element consists of structural provisions necessary to implement a normal income tax, such as the definition of net income, the specification of accounting rules, the determination of the entities subject to tax, the determination of the rate schedule and exemption levels, and the application of the tax to international transactions. The second element consists of the special preferences found in every income tax. These provisions, often called tax incentives or tax subsidies, are departures from the normal tax structure and are designed to favor a particular industry, activity, or class or persons. They take many forms, such as permanent exclusions from income, deductions, deferrals of tax liabilities, credits against tax, or special rates. Whatever their form, these departures from the normative tax structure represent government spending for favored activities or groups, effected through the tax system rather than through direct grants, loans, or other forms of government assistance (Surrey, 1976).

3 BASIC ELEMENTS OF THE TAX EXPENDITURE

Like any instrument of the tax system, tax expenditures have a number of elements, the list of which in the historical retrospect has only been expanded and refined (Table 1).

Table 1: The views of foreign academic economists on the possible list of tax expenditures

Author	Year of publication	List of elements of tax expenditures
S. Surrey	1985	1. tax exclusion; 2. tax deduction; 3. tax deferral 4. preferential tax rate 5. tax credit
Richard A. Musgrave, Peggy B. Musgrave	1993	1. tax exemption; 2. tax deduction (standard or item)

S. H. Rosen	1999	1. tax exemption; 2. tax deduction (tax allowance; tax credit; standard deduction is a fixed amount that is available to all taxpayers and it is inflation-linked)
H. Arbutina and K. Ott	1999	1. tax exemption; 2. tax credit; 3. tax deduction; 4. preferential tax rate.
D. Brümmerhof	2000	Thinks that it is practically impossible to cover tax expenditures in an appropriate manner. Tax expenditures can arise by changes in the tax base, tax rate or tax credits. Tax preferences can, further, be final or can take on the form of a postponement of payment, and in this case the tax preferences can be comprehended only partially, via the effects of the interest rate or the effect of the tax rate on the total tax due.
C. Sandford	2000	1. tax exemption; 2. tax allowance; 3. tax deduction or tax credit 4. preferential tax rate; 5. tax deferral
V. Bratić	2006	1. tax exemption; 2. tax credit; 3. tax deduction; 4. preferential tax rate; 5. tax deferral; 6. tax exclusion
R. Kimmons	2011	1. tax exemption; 2. tax exclusion; 3. tax deduction; 4. tax credit

Source: Surrey, Stanley S. (1976), Musgrave, Richard A. and Musgrave, Peggy B. (1989), Rosen, S. H. (1999), Arbutina, H. and Ott, K. (1999), Brümmerhof, D. (2001), Sandford, C. (2000), Bratić, V. (2006), Kimmons, R. (2011).

As can be seen from Table. 1 until the end of the twentieth century, according to the R. Masgrave and P. Masgrave, there were two main elements of the tax expenditures, namely: tax exemptions and tax deduction. Later, S. Rosen multiplied tax deduction and include tax allowance; tax credit; standard

deduction is a fixed amount that is available to all taxpayers and it is inflation-linked. At the same time, it must be said that there were even thoughts (D. Brümmerhof) that it is virtually impossible to determine the components of the tax expenditures. However, since the 21st century, the list of elements of the tax expenditures began to expand considerably (S. Sandford, V. Bratić, R. Kimmons) and became more and more encompassing, approaching to the list, proposed in 1976 by S. Surrey (Stadnyk, 2017).

So, in Table 2 we describe main types of tax expenditures, which are using today in foreign tax practice.

Table 2: Main types of tax expenditures

Tax expenditure	Description
Tax exemption	Reduces gross income for taxpayers because of their status or circumstances.
Tax exclusion	Excludes income that would otherwise constitute part of a taxpayer's gross income.
Tax deduction	Reduces gross income due to expenses taxpayers incur.
Tax allowance	Amounts deducted from the benchmark to arrive at the tax base;
Tax credit	Reduces tax liability dollar-for-dollar. Additionally, some credits are refundable meaning that a credit in excess of tax liability results in a cash refund.
Preferential tax rate	Reduces tax rates on some forms of income.
Tax deferral	Delays recognition of income or accelerates some deductions otherwise attributable to future years.

Source: Tax expenditures: background and evaluation, criteria and questions, 2012.

In literature, some findings expose the positive and negative impacts of these instruments both the economy and taxpayers. It is indicated that they should pursue at least one of four objectives, such as to improve progressivity within the tax system, provide greater efficiency for the tax structure, stimulate the consumption of merit goods or encourage investment in certain sectors or regions (regional development) (Villela at al., 2010). Thus in the table 3 we show main positive and negative aspects of tax expenditures.

Table 3: Main positive and negative aspects of tax expenditures

Positive effects	Negative effects
encouraging private sector participation in economic and social programs where government plays a main role	erosion of revenue bases, which limits the scope for tax rate reductions. Such government losses could be used for the financing of direct government expenditures and which limits the ability to reduce tax rates)
promoting private decision making rather than government decision making	providing open-ended government spending, which makes it more difficult to estimate tax revenues
reducing the need for close government supervision of such spending	adding complexity to tax laws, increasing the cost of enforcing them, and enables lobbying and using government to make additional rents
	increase of repressiveness of the tax system

Source: Bratić, 2006.

So, let's try to give examples that according to S. Surrey will be tax incentives from the point of view of tax expenditures, and will be considered as a part of the basic (normative) structure of the corporate income tax.

4 TAX INCENTIVES OF CORPORATE INCOME TAX ACCORDING TO THE TAX EXPENDITURES CONCEPT

So, the tax base of corporate income tax – "net income" S. Surrey proposed to determine on the basis of the concept of Shantz-Haig-Simons (S-H-S). This concept was developed by Georg von Schanz, applied by Robert Murray Haig, and specified by Henry Simons. The S-H-S definition is very broad. According to the concept of S-H-S, income is an increase of net economic prosperity between two time points plus consumption during this period. However, this approach to income definition covers only the main aspects and have an eye for only some details, while not taking into account a number of current problems. In addition, elements such as self-service, gifts and inheritance, income in the form of movable property and capital gains, which fall within the definition of the income of the S-H-C concept, are traditionally excluded from the definition of income for tax purposes. Therefore, for the use of S-H-C income as the tax base of the corporate income tax should be regulated under the "generally accepted structure of income tax, based on the principle "ability-to-pay" (Surrey, 1979), according to which the tax burden is distributed according to the level of income. Therefore, to the income, calculated with using of S-H-C

concept, should be used additional amendments, because in the context of corporate income tax, the aspect of consumption is not significant (Surrey and McDaniel, 1985).

Essentially, the concept of a normal (or normative) income tax structure was one of applying a rate schedule against the taxable unit's net income base – ascertained by including all items of gross income and deducting all expenditures associated with the production of that income, with capital expenditures allocated over time in accordance with generally accepted accounting practices (Surrey and McDaniel, 1976). However, due to the using of separate accounting principles such as the principle of matching and prudence, that out of contact with tax rules, taxable profit cannot be calculated directly from the Balance Sheet or the Profit and Loss Statement. In practice S-H-C income is the starting point for most countries in formulating of a benchmark tax base.

Also, we should to say, that S-H-S definition provides no guidance on the rate structure, the proper taxpaying unit, the relationship between a corporation's income and its shareholders' tax liability, or the proper accounting period. According to Bittker, Surrey's silent incorporation of his own judgments on these structural elements into his "accepted concept of net income" succeeded in "bringing some issues to the fore only to conceal others (Bittker, 2009).

But no country uses this concept in its pure form, but provides a wide range of rationalizations about why their national tax base structure should (and sometimes significantly) diverge from this theoretical model.

Thus, in practice, according to the OECD methodology benchmark tax system identity by three approaches (Tyson, 2014; OECD, 2010):

- Conceptual approach, in which an "optimal" tax system is used as the norm created on the basis of theoretical taxation concepts in different areas of the economy (income define with using of S-H-C concept);
- Legal approach, based on the country's own tax laws in order to indicate differential or preferential treatments (tax expenditures);
- Expenditure subsidy approach, in which tax expenditures are the amounts that may be replaced by public subsidies (budget expenditures).

Conceptual benchmarks are based on clearly stated principles and so there is less room for subjective judgements. But, in practice, there are significant distinctions in stipulating the tax benchmark within both economists' and national reporting. Thus, current tax law benchmarks are more subjective but

have the advantage that they are more closely related to the current tax system, so that the estimate of the cost of a tax expenditure is equivalent to estimating the revenue gain of removing the corresponding legal provision. This is not true of a conceptual benchmark if the general provisions of the tax law do not correspond to the benchmark.

Now try to study main elements of the corporate income tax in case of using tax expenditure concept.

So, there is no clearly defined normative corporate income tax rate that would be recognized as a benchmark. This is due to the fact that the tax rate scale is determined on the basis of fiscal policy of the government and political goals. However, once a benchmark national tax rate is established, any special (reduced or increased) rate, that is different from the adopted (base) rate, will be considered as tax expenditure (Surrey and. McDaniel, 1985). Some countries offer a lower tax rate for small and medium-sized businesses. Whether this constitutes a tax expenditure depends on the country's policy and the intention of the government when they first introduced this rate Usually, if the special rate is given to provide incentives, or to assist certain industries or activities, it should be treated as a tax expenditure. Likewise, a rate higher than the benchmark suggests a negative tax expenditure.

Also, we should to note that, according to international definitions negative tax expenditure is a provision in the tax law, motivated by a social or industrial policy, that increases tax liability of a taxable entity in order to discourage a particular activity.

Definition of taxable unit – taxpayer (subject of taxation) is important in determining of tax expenditures. In the case of corporate income tax, if the tax unit is an individual company, then any intra-group loss set-off is a tax expenditure. The corporate tax unit could also be more specific, for example small and medium enterprises versus large companies, or special tax treatment for special lines of business such as insurance and banking. As a result of these specific tax units, any different tax treatments involving different tax units are considered part of the benchmark and do not give rise to tax expenditures or negative tax expenditures.

During determining the benchmark (normative) structure of the corporate income tax, one must also take into account such a general reference as avoidance of double taxation both in international transactions and, for example, in paying dividends. So, if tax incentives in international taxation

using to avoid double taxation, then such benefits are not tax expenditures (Stadnyk, 2017).

S. Surrey (1985) also suggested to use accounting rules as the benchmark (normative) tax structure for several elements, that are not covered by the S-H-S income concept, especially in the definition of the taxable period. Tax must be calculated over a specified period. As the S-H-S income concept does not specify the period, the standard practice for taxation follows the accounting practice, to calculate income (and therefore tax) over a period of 12 months. Other elements that relate to the use of accounting period should also be included in the benchmark, such as the allocation of income and expenditure to appropriate periods (Yussof, 2013). Nevertheless, S. Surrey (1985) also pointed out that the use of the standard accounting rules should be tempered by resort to practical concerns of tax collection and tax administration. With this point of view, we fully agree.

One example is the issue of deductibility of expenses to be incurred in future years. Thus, there are several controversial points between financial and tax accounting: in tax accounting expenditures determines ex post, while in financial accounting requires a current assessment of such the expenditures, that will be incurred in the next accounting period. The different treatment in financial accounting and taxation results in deferral of deductions to a future period, which is negative a tax expenditure. However, if the government takes the view that this deviation is due to the concerns over tax collection and tax administration, then the deviation does not constitute a tax expenditure (Surrey and McDaniel, 1985).

Hence, we see, that significant importance in determining of tax expenditures in corporate taxation is not only the compatibility of tax incentives with generally accepted characteristics according tax expenditure concept, but also the domestic policy of the country and government goals.

5 CONCLUSION

Tax expenditures are enacted because there are perceived legitimate reasons for their use. Tax expenditures have a role to play; they are employed widely, and there are few, if any, suggestions that all tax expenditures should be repealed. The main advantages of tax expenditures are the greater flexibility in operative terms which results in a faster provision of resources to beneficiaries, and the absence of government interference with the choice of projects.

But in practice, tax codes and tax systems are differently defined in different countries, which make them difficult to compare. Just as there is no single accepted definition of tax expenditure, so there is also no broadly accepted methodology for calculating it. According to the majority of methodologies used, all items that are in fact a certain deviation or change from the existing tax system are considered tax expenditures.

The plurality of views on the definition of tax expenditures generates the uncertainty and possibilities for manipulation of the tax legislation in own interests. In this regard, the issue is not so much in reviewing and reducing the number of tax incentives of corporate income tax. The main thing in reforming should be unification, construction of a clear logical scheme for their using in order to improve the administration and monitoring processes. To summarize, tax expenditure analysis can and should serve as an effective and neutral analytical tool for policymakers in their consideration of individual tax proposals or larger tax reforms.

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EXPLORING BITCOIN PRICE PREDICTION MODELS

Mojmír Sabolovič, Emina Hukic

Abstract: *Bitcoin is a digital currency based on Blockchain technology and not controlled by any government. In this paper, we undertake economic and econometric modeling of Bitcoin prices. The main assumption of the paper is that Bayesian regression should forecast future values of Bitcoin with greater accuracy than ARIMA (1, 2, 2). The predictions yielded the return of 89%. By turning away from conventional use towards different approach such a Bayesian approach is could result in models with greater predictive accuracy that would be significant to the financial world. Obtained forecasts are compared using Mean Squared Error of Prediction and Mean Absolute Percentage Error. In both categories, Bayesian linear regression provides better results, i.e. smaller deviations from actual values for a given period. However, the Bayesian model which used only time series of Bitcoin Close price yielded the worst results among the three models. ARIMA (1, 2, 2) ranked second but with errors 7 times higher than of Bayesian regression. Models could be further improved by incorporating external variable into the modeling historical Bitcoin price data.*

Keywords: *Bitcoin, Price Prediction, ARIMA, Bayesian linear regression*

JEL classifications: *G1, C22, C5*

1 INTRODUCTION

Bitcoin is very complex topic, covering cryptography, economics and software engineering. Bitcoin is a digital, decentralized, partially anonymous currency, not backed by any government or other legal entity, and not redeemable for gold or another commodity (Grinberg, 2011). It was created in 2007 by man under pseudonym Satoshi Nakamoto. Two years later, on January 12, 2009, the first Bitcoin transaction took place. The exchange rate for Bitcoin was established in October 2009 where at that time one U.S. dollar equaled 1,309.3 Bitcoin. Bitcoin operates through a peer-to-peer network system without any control imposed by person nor institution, such as the central bank or government. The code is open source, meaning that it belongs to the public domain, therefore it can be controlled by "anyone". Kristoufek (2013) inspects

relationship between Bitcoin price and interest in currency measured by online searches. Relationship between the price of Bitcoin and financial indicators such as Dow Jones Index and oil price, and supply and demand forces of this cryptocurrencies is studied by Ciaian, Rajcaniova and Kancs (2014). Volatility of Bitcoin has mainly been investigated using different Generalized Autoregressive Conditional Heteroskedasticity models by Katsiampa (2017), and Cermak and Chen et al. (2016). Bouoiyour and Selmi (2014) analyzed daily Bitcoin prices using GARCH-optimal model and concluded that volatility has decreased in 2015 compared with earlier years of Bitcoin. The heart of the Bitcoin network is Blockchain technology, which is an open public ledger with the purpose of recording transactions. All financial information and transactions occurring are publicly available, except the identities of parties involved in the transaction. With blockchain technology, contracts are transparent and protected from tampering, revision, and deletion. Distributed ledger system keeps all of the data synchronized between millions of systems, meaning that database in one central location that can be hacked is the matter of the past. In the past several years Bitcoin has caught the attention of the general public, governments, and investors due to its efficiency, low transaction costs, and Blockchain technology. The popularization of Bitcoin has brought important questions and polemics on issues of this cryptocurrency. Investors and governments are interested in defining the Bitcoin and discovering it's proper use in financial markets and portfolios. Therefore, understanding of Bitcoin price movement and volatility is the crucial aspect of creating regulations for its formal use in economies worldwide. With the discovery of the driving forces of Bitcoin, the risk of using and investing with this cryptocurrency can be reduced. Furthermore, by virtue of the public ledger system, that Bitcoin uses, greater transparency in financial transactions can be achieved. Therefore it is highly significant to comprehend Bitcoin and to truly understand the way it works in order to be formally useThe rising interest to research on properties and price formation of Bitcoin, as well as various statistical analyses of Bitcoin, is identified since Bitcoin was created the decade back. Kristoufek (2013) inspects the relationship between Bitcoin price and interest in currency measured by online searches. The relationship between the price of Bitcoin and financial indicators such as the Dow Jones Index and oil price, and supply and demand forces of this cryptocurrencies is studied by Ciaian, Rajcaniova, and Kancs (2014). The volatility of Bitcoin has mainly been investigated using different Generalized Autoregressive Conditional Heteroskedasticity models by Katsiampa (2017), and Cermak and Chen et al. (2016). Bouoiyour and Selmi (2014) analyzed daily Bitcoin prices using

GARCH-optimal model and concluded that volatility has decreased in 2015 compared with earlier years of Bitcoin. Research is conducted to predict the price movement of Bitcoin using Autoregressive Integrated Moving Average Model and Bayesian linear regression model. The motivation for the research is derived from the survey on using Bayesian regression for predicting the price of and Bitcoin by Shah and Zgang (2015). By utilizing Bayesian inference for "latent source model" was developed the trading algorithm which identifies patterns and trades accordingly. Research experiment yielded a successful trading strategy where in 50 days the return was around 89% with a Sharpe ratio of 4. Research is conducted to predict the price movement of Bitcoin using Autoregressive Integrated Moving Average Model and Bayesian linear regression model. Motivation for the research is derived by survey on using Bayesian regression for predicting the price of and Bitcoin by Shah and Zgang (2015). By utilizing Bayesian inference for "latent source model" was developed trading algorithm which identifies patterns and trades accordingly. Research experiment yielded successful trading strategy where in 50 days the return was around 89% with Sharpe ratio of 4.10. Autoregressive Integrated Moving Average model (ARIMA) is the one of the most popular and frequently used for prediction of stochastic time series (Asteriou & Hall, 2007). The idea behind this paper is to compare between ARIMA and Bayesian linear regression models when it comes to Bitcoin price prediction. Particularly, the interest of the research is to explore which model has better predictive power and better overall fit to time series data on Bitcoin price. The main assumption of the paper is that Bayesian linear regression has better predictive accuracy than ARIMA models.

2 MATERIAL AND METHODS

Ciaian, Rajcaniova, & Kancs (2015) identified characteristics of Bitcoin as currency with low transaction costs, learning spillover effects, high anonymity, privacy and no inflationary pressures. Limitations of Bitcoin arising from the nature of Bitcoin were identified as the absence of an institution enforcing dispute resolution, the absence of Bitcoin-denominated credits, deflationary pressure, extremely high price volatility, and issues with cybersecurity. Buchholz et al. (2012) argue that Bitcoin price is determined as the outcome of the interaction between supply and demand. Kristoufek (2013) in his study states that the Bitcoin price formation cannot be described by standard economic theories because demand for Bitcoin is driven by investors' speculative behavior and because Bitcoin is not issued by a government or

central bank, therefore, detaching it from the real economy. Wjik (2013) analyzes the role of global financial development on Bitcoin price formation. Ciaian, Rajcaniova, & Kancs (2015) concluded that market forces (supply and demand) are key drivers of Bitcoin price formation, in particular, demand-side drivers, such as the size of Bitcoin economy and velocity of its circulation have the greatest impact on Bitcoin price. The hypothesis that speculation and attractiveness of Bitcoins to investors affects its price was not rejected. Speculative trading is beneficial activity in terms of absorbing excess risk and providing liquidity to the market. The crucial finding is that macro-financial indicators are not supported as Bitcoin price drivers. Kristoufek (2013) concluded that standard fundamental factors (usage in trade, money supply, and price level) have the significant role in Bitcoin price over the long term. The interest in cryptocurrency by investors is one of the main drivers of its price movement, having an asymmetric effect during the bubble formation and bursting. During the bubble formation, interest boosts the prices further, and during the bursting, it pushes them lower. Balcilar, Bouri, Gupta, & Roubaud (2017) employed non-parametric causality-in-quantiles test in order to analyze the causal relation between trading volume and Bitcoin returns and volatility, over the whole of their respective conditional distributions. When the market is operating around normal mode, a volume can predict returns and provide the investors with valuable predictive information.

When the market is in bull or bear phase, information about volume does not offer a relevant prediction. Garcia, Tessone, & Perony (2014) used autoregression techniques and identified two positive loops that led to price bubbles. One feedback loop was driven by word of mouth and second by new Bitcoin adopters. Spikes in information search, associated with external events, precede drastic price declines. Amjad & Shah (2016) used historical time series for trading strategy and price prediction. Authors developed of the theoretical framework for time series analysis based on generic properties of a time series (stationarity and mixing), and design of the real-time algorithm for prediction and training that yielded high prediction accuracy and highly profitable returns on investment. Then Later, through the paper, the comparison between ARIMA and Bayesian linear regression is done in order to investigate which model has a greater predictive power of Bitcoin prices.

2.1 Autoregressive Integrated Moving Average Model

An Autoregressive Integrated Moving Average process (ARIMA) is the mathematical model used for forecasting time series (Box & Jenkins, 1976). ARIMA is derived from Mixed Autoregressive Moving Average; it is a combination of Autoregressive process AR(p) and Moving Average process MA(q). In AR(p) component, the future value of a variable is assumed to be the linear combination of p past observations and random error term together with the constant term. The number p in parenthesis denotes the order of the autoregressive process and therefore the number of lagged dependent variables that the model will have (Asteriou & Hall, 2007).

AR(p) process can mathematically be estimated by equation (1) (Montgomery, 2008)

$$y_{t=\,\delta+}\phi_1 y_{t-1} + \phi_2 y_{t-2} + \cdots + \phi_p y_{t-p} + \varepsilon_{t=}\,\delta + \sum_{t=1}^{p} \phi_i y_{t-i} + \varepsilon_t\ , \tag{1}$$

where y_t represents actual value and ε_t relates to random error or random shock at time period *t*. Model parameters are represented by φ_i *(1,2,3...p)* and δ is a constant term (Montgomery, 2008). The implication of *AR (p)* model is that behavior of y_t is determined to large extent by its own value in preceding period *t-1*. Moving average *(q)* process uses past error terms as explanatory variables.

MA (q) model represents linear regression of the current observation of time series against the random shocks of one or more prior observations. *MA (q)* model implies that future value of time series (y_t) is largely determined by random process. Random shocks are assumed to be a sequence of independent and identically distributed random variables with zero mean and constant variance; random shocks are assumed to be white noise process following the normal distribution. The model is articulated by equation (2)

$$y_t = \mu + \theta_1 \epsilon_{t-1} + \theta_2 \varepsilon_{t-2} + \cdots + \theta_q \varepsilon_{t-q} = \sum_{t=1}^{q} \theta_i \varepsilon_{t-1}, \tag{2}$$

where *Bitcoin* represents actual value, θ_i *(1,2,3...p)* is the model parameter and ε_{t-i} represents a random error, shocks. Equation (2) implies that value of time series depends on random shock of past observations. Because any *MA(q)* process is, by definition, an average of *q* stationary white-noise processes, it follows that every moving average model is stationary, as long as *q* is finite (Asteriou & Hall, 2007). Stationary time series with complex autocorrelation behavior are more adequately modeled by ARMA processes than by either pure

AR(p) or *MA(q)* process (Ruppert & Matterson, 2015). ARMA (p,q) model is expressed by equation (3)

$$y_t = \delta + \phi_1 y_{t-1} + \phi_2 y_{t-2} + \cdots + \phi_p y_{t-p} + \varepsilon_t - \theta_1 \epsilon_{t-1} - \theta_2 \varepsilon_{t-2} - \cdots - \theta_q \varepsilon_{t-q} = \delta + \sum_{t=1}^{p} \phi_i y_{t-i} + \varepsilon_t - \sum_{t=1}^{q} \theta_i \varepsilon_{t-1} \quad (3)$$

In reality, much economic time series behave as though they had no fixed mean (e.g. stock prices). These types of industrial and economic time series are demonstrating specific kind of homogenous nonstationary behavior. This kind of time series can be represented by the stochastic model modified form of the autoregressive moving average process. The first difference of time series *($w_t = y_t - y_{t-1} = (1 - L)y_t$)* or higher order differences *($w_t = (1 - L)^d y$)* produce stationary time series (Montgomery, 2008). The mathematical formulation of ARIMA(p,d,q) model using lag polynomials is represented by following equations (4)

$$\left(1 - \sum_{i=1}^{p} \phi_i L^i\right)(1 - L)^d y_t = \left(1 + \sum_{j=1}^{q} \theta_j L^j\right)\varepsilon_t, \quad (4)$$

where *p,d* and *q* are integers greater than or equal to zero and refer to the order of autoregressive, integrated and moving average parts respectively. Integer *d* refers to differencing of time series and controls level of differencing.

2.2 Bayesian statistical approach

Bayesian approach requires sampling model and prior distribution on all unknowns in the model including missing data and parameters. Prior distribution and likehood are then used to compute posterior distribution, i.e. conditional distribution of the unknowns given the observed data (Carlin & Louis, 2009). Following mathematical expression (5) represents Bayes' rule

$$P(B_j|A) = \frac{P(A|B_j)P(B_j)}{P(A)} = \frac{P(A|B_j)P(B_j)}{P(A|B_1)P(B_1) + \cdots + P(A|B_K)P(B_K)}, \quad (5)$$

where *A* and *B* are events and probability $P(B_j) \neq 0$, $P(B_j|A)$ is conditional probability where the likelihood of event *A* occurring given that *B* is true.

Widely used in practical application and well known non-informative prior is Jeffreys prior. This prior is invariant under reparametrization of θ and is defined

as proportional to the square root of the determinant of the Fisher information matrix (6) (Koduvely, 2015)

$$P(\theta) \propto \sqrt{\det I\ (\theta)}.$$

(6)

After determining a prior distribution of data, the key step in the Bayesian analysis is the use of Bayes's theorem to combine the prior knowledge about $\boldsymbol{\theta}$ with the information in the data. The likelihood is defined in the same way in a non-Bayesian analysis, but in Bayesian statistics, the likelihood has a different interpretation—the likelihood is the conditional distribution of the data $\boldsymbol{\theta}$**.** (Ruppert & Matterson, 2015)**.** The likelihood function is written as f(*Bitcoin*| θ). The joint density of θ and Bitcoin is the product of prior and the likelihood (7) (Ruppert & Matterson, 2015)

$$f(y, \theta) = \pi(\theta) f(y|\theta).$$

(7)

The marginal density of BITCOIN is found by integrating θ out of joint density (8)

$$f(y) = \int \pi(\theta) f(y|\theta) d\theta.$$

(8)

The conditional density of θ given *BITCOIN* in following equation represents form of Bayes's theorem where density on left side represents posterior density. That posterior distribution gives the probability distribution of θ after observing the *data (BITCOIN),* see equation (9)

$$\pi(\theta|Y) = \frac{\pi(\theta) f(Y|\theta)}{f(Y)} = \frac{\pi(\theta) f(Y|\theta)}{\int \pi(\theta) f(y|\theta) d\theta}$$

(9)

Recent developments in computing methods and statistical software, especially advancements in Monte Carlo computing methods allow accurate computations of complex integrals, thus permitting advanced Bayesian analysis to be done. Estimation and uncertainty analysis in Bayesian approach is based upon the posterior distribution. Commonly used summaries of location are the mean, median, and mode(s) of the distribution; variation is commonly summarized by the standard deviation, the interquartile range, and other quantiles. (Charlin &

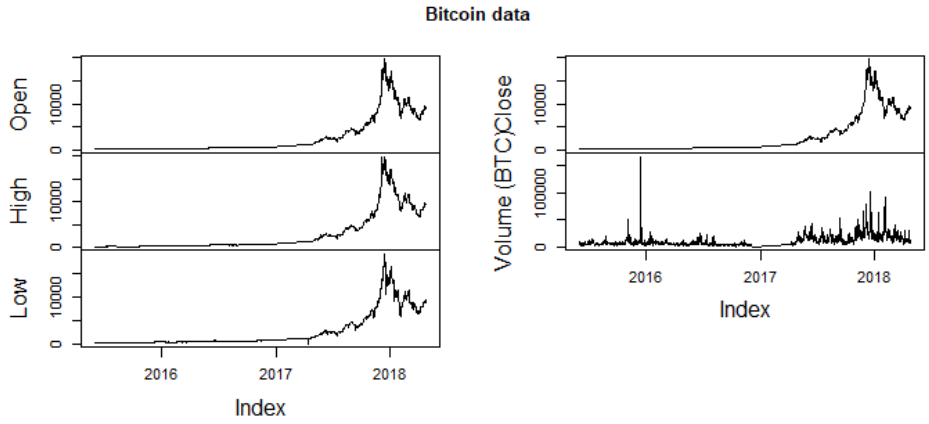
Louis, 2009). Mean is the posterior expectation of the parameter, while mode can be understood as "most likely" value given the data and the model. The mode is called maximum posterior estimator (MAP).

When it comes to hypothesis testing, the Bayesian approach is much simpler and more sensible in principle than traditional hypothesis testing. In the Bayesian hypothesis testing, there can be more than two hypotheses taken into consideration, and they do not necessarily stand in an asymmetric relationship. (Levy, 2007) Bayesian analysis generates probability values that are used to study relative support for one hypothesis over another. Briefly, Bayesians seek probability support for hypothesis while frequentist is searching for significance. A version of a t-test, a probability of H0 and alternative hypothesis, in Bayesian approach is statistics called Bayes factor (BF) which represents a ratio that compares the likelihood of one model over another.

3 DATA

Time series data on the price of Bitcoin were obtained from Coinbase Exchange. The exchange is available in 33 countries and as of 2017, it was the World Largest Bitcoin broker. In order to apply methods and techniques for forecasting time series, raw data is divided into two parts. Training set were observations of Bitcoin Close price with daily frequency from May 30, 2015, to May 30, 2018. The test set comprises from daily observations of Bitcoin Close price from May 31, 2018, to April 30, 2018.

Figure 1: Historical Bitcoin daily data



Source: author's elaboration

As can be noted from Figure 1. Bitcoin had the substantial increase in its price from the mid- 2017, with record high at the end of 2017 of $ 19,650. This digital currency has begun a year with the price under $ 1,000, experiencing growth in value by more than 1300%. Increased interest in Bitcoin started in May 2017, period known as the summer of bulls. A decision by the government of Japan on April 1, that year to declare Bitcoin as legal currency unquestionably assisted growth in price. Rising Significance of BITCOIN was recognized by Commodities Futures Trading Commission on December 1, 2017. Namely, CFTC approved Bitcoin future which allows investors to speculate about future value without "touching" the coin. According to Bloomberg, the fact that there will be finite supply added to increased investments in Bitcoin, in order not to miss the opportunity. However, after reaching high and period of substantial growth, at the beginning of the 2018 price of Bitcoin started to decline. For example, on April 5 dropped to $ 6,600, and in the period from February price of Bitcoin struggles around 7,000 USD. Increased regulation on Bitcoin that multiple countries have pursued and bankruptcy of Mt. Gox exchange contributed to decrease in the price of the coin. Furthermore, the rumour that Finance exchange has been hacked additionally shook the stability of the Bitcoin price.

Table 1: Summary of Bitcoin training data

	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
Close Price	211.2	386.1	597	1938.6	2347.5	19650
Volume	683.8	5053.9	7063.5	10527.1	12264.7	165542.8

Source: author's elaboration

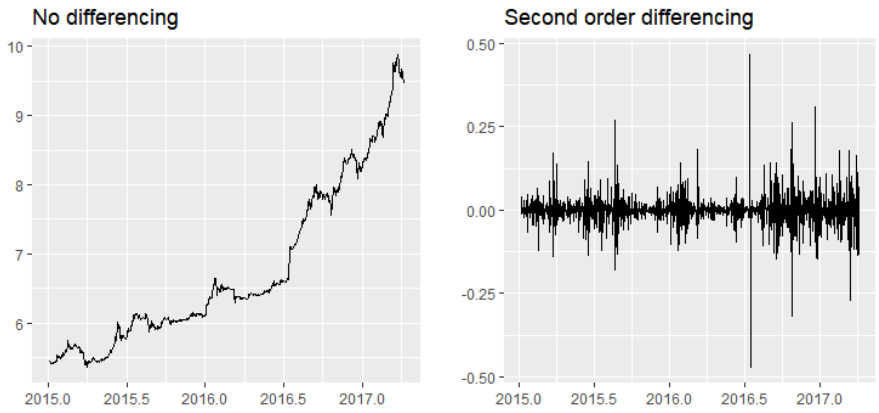
Furthermore, summary statistics in Table 1. displays broad range of Bitcoin Close price data for inspected period, implying great interest for Bitcoin that evolved in short period. Values of standard deviation and variance, 3224.687 and 10398607 respectively are showing substantial dispersion of USD values of Bitcoin prices. These behavior that data exhibits support the need for logarithmic transformation of series. In order to get more homogenous variance across sample, logarithmic transformation of the data is performed to stabilize variance hence getting more adequate model for forecasting.

Results

3.1 ARIMA (1,2,2) Model

ARIMA was created by following Box-Jenkins Methodology. The stated methodology does not assume any specific pattern in historical time series observation but uses an iterative approach which comprises model identification, parameter estimation, and diagnostic checking (Box & Jenkins, 1976). The modelling is done using software RStudio (Box & Jenkins, 1976), specifical packages such as series, TTR, forecast. Quandl, dev tools, ggplot2, etc. Model identification refers to the inspection of the time series to determine an order of p, d, and q components in the ARIMA model. By performing Augmented Dickey-Fuller (ADF) test and Kwiatkowski, Phillips, Schmidt, and Shin (KPSS) test log Bitcoin price series was tested for stationarity and used to determine the level of difference, i.e. d component of ARIMA (p, d, q) model. ADF tests for non-stationarity of time series by following procedure based on the presence of unit root. Results of test on log Bitcoin price, both suggest that the observed time series is not-stationary. After first order differencing of time series data, results of tests are offering mixed results. ADF rejects a null hypothesis of the presence of unit root with the p-value lower than 0.01, while KPSS rejects the hypothesis of stationarity of time series. Since results of ADF and KPSS test were inconclusive, second order differencing was performed, see Figure 2. Both KPSS and ADF tests yielded results that Bitcoin price historical data appears to be stationary. Therefore, the d component of the ARIMA model equals 2. Box Jenkins methodology provides a way to identify the ARIMA model according to autocorrelation and partial autocorrelation graph of the series, making AFC and PACF the core of ARIMA modelling.

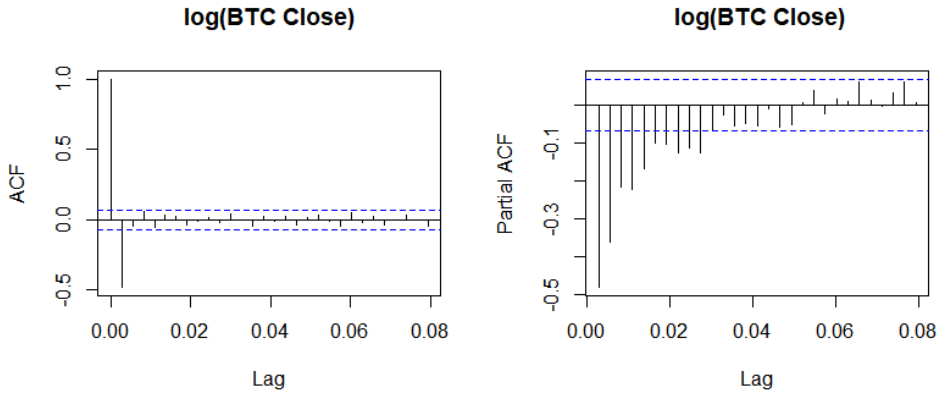
Figure 2: Representation of differentiation of training data



Source: author's elaboration

By examining AFC a PACF plot (Figure 4) on log Bitcoin Close price to identify ARIMA (p, d, q) model, several possibilities of p and q values are emerging. However, ACF and PACF plots are narrowing the choice of models on ARIMA (1,2,2) model or ARIMA (2,2,2) model. ACF plot cuts off after lag *2* and PACF plot is exponentially decaying implying that order of moving average operator is *2*, i.e. *q=2*. However, regarding the autoregressive operator, it is unclear whether p should be 1 or 2, because of the large spikes on first and second lag. Therefore, to examine which model is the better fit for the data Akaike Information Criterion (AIC) is examined further.

Figure 4: Autocorrelation and partial autocorrelation plots of log (BITCOIN Close) price



Source: author's elaboration

Model selection step refers to the choice of statistical model that best describes data among several competing models (Sinharay, 2010). Comparing AIC values from different models, the one with lowest value of Akaike Information Criterion is considered to be "best fit". Yang (2005) suggests that AIC is asymptotically optimal in selection of the model, under the assumption that true model is not in the candidate set, as virtually it is always the case in the practice (Snipes, 2016). It is important to note that AIC score is ordinal and means nothing on its own. AIC score is calculated as follows (Box & Jenkins, 1976):

$$AIC_{p,q} = \frac{-2\ln(maximized\ likelihood)+2r}{n} \approx \ln\left(\widehat{\sigma^2}\right) + r\frac{2}{n} + constant, \tag{10}$$

where $\widehat{\sigma^2}$ is the maximum likelihood estimate of variance and *r (r =p+q+1)* is the number of estimated parameters, including the constant term. Model selection step refers to the choice of statistical model that best describes Using command arima, under package stats, several ARIMA models have been explored in order to find the model that provides the best fit to the historical observations of Bitcoin prices. Results of the ARIMA modelling, with AIC, are given in Table 2. Results are showing that ARIMA (1,2,2) model is the better fit to the historical data of Bitcoin close price since it has the lowest value of AIC. However the values of AIC criterion for ARIMA (1,2,2) and ARIMA (2, 2, 2) are not differing that much, -3235.47 and -3134.78 respectively, which can be explained that ARIMA (2,2,2) can be used as well for explaining the behaviour of the Bitcoin price movement from May 30, 2015, to April 30, 2018. Other models from Table… have comparable AIC values as well and could be taken into consideration for modelling Bitcoin price. But, using the criteria stated above that model with the lowest AIC value should be taken as "best" model, which in this case is ARIMA (1, 2, 2).

Table 2: Summary statistics of ARIMA (1, 2, 2)

```
Coefficients:

          ar1      ma1      ma2
      -0.3747  -0.6264  -0.3736
s.e.      NaN      NaN      NaN

sigma^2 estimated as 0.001627:  log likelihood = 1681.85,  aic = -3355.7

Training set error measures:
                      ME       RMSE        MAE        MPE      MAPE      MASE
ACF1
Training set 0.0008944974 0.04029053 0.02614424 0.01183182 0.3536577 0.9943218 -
0.009569967
```

Source: author's elaboration

In order to validate the model further, residuals of ARIMA (1, 2, 2) are examined. To assume that model is the true process generating the data, then the observed residuals should be realized values of white noise sequence.60 Representation of residuals in Figure 4. shows that residuals from ARIMA (1, 2, 2) are exhibiting random behavior similar to white noise. Next, the autocorrelation function plot and partial autocorrelation plots of observed residuals should lie within the $\pm 1.96/\sqrt{n}$ roughly 95% of the time. If the correlations are substantially more than 5% outside of the range, then the better-fitting model should be introduced.61The interval is marked as dashed blue line. ACF and PACF of residuals, Figure 5.; are showing that for observed residuals that resulted from ARIMA (1,2,2) model correlation spikes are arranged within the desired range. Furthermore, compatibility of the distribution of the residuals with normal distribution or t-distribution is checked by examining corresponding density plot. In addition, the Box-Ljung test provides the different approach to double check the model. Box-Ljung test is meant to test the autocorrelation in which it should be verified whether the autocorrelations of a time series are different from 0. The test is applied to the residuals of fitted time series by ARIMA (p, d, q) model. Since Box-Ljung test examines autocorrelation o the residuals, is said that model does not exhibit lack of fit to the data if values of autocorrelations are very small.62 This means that there still remains serial correlation in the series and that modification of the model is necessary. The null hypothesis is that the model does not exhibit a lack of fit.

Table 3: Box-Ljung test of goodness of fit

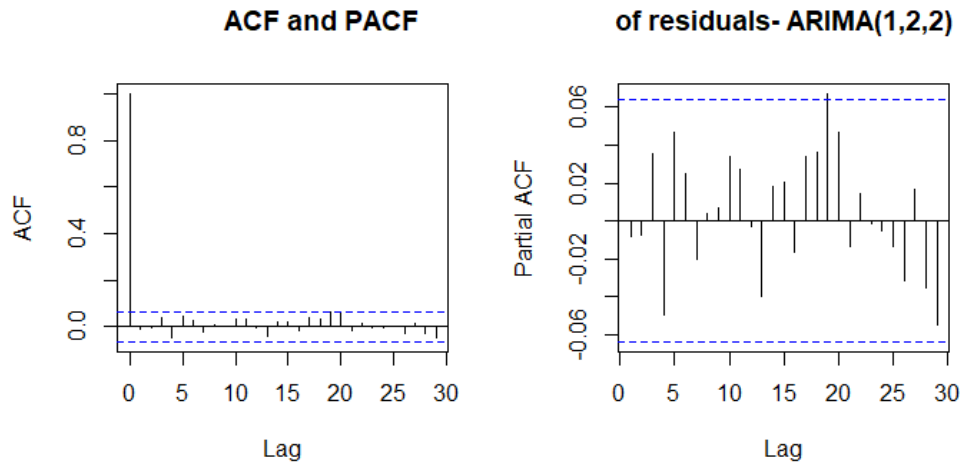
```
        Box-Ljung test

data:  ARRRR$residuals
X-squared = 5.8067e-05, df = 1, p-value = 0.9939
```

Source: author's elaboration

Table 3. represents test statistics of residuals from ARIMA (2, 2, 2) model. Large p-value, p=0.9939, indicates that the null hypothesis is no rejected, meaning that this model does not require further modification and that there is a fit between Bitcoin price data and tested model.

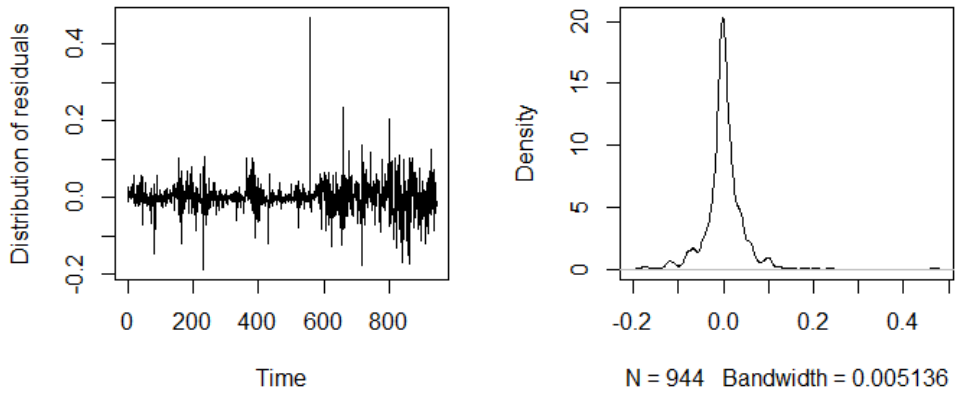
Figure 5: Autocorrelation and partial autocorrelation plots of residuals



Source: author's elaboration

After the identification phase, parameters of the model are estimated. Prediction of the future value of Bitcoin close price was done with RStudio, particularly with command predict. The forecast was done to estimate 30 future values of Bitcoin close price. However, since the original time series was transformed by natural logarithm, inverse logarithm was applied to predicted values. The reason is that it can be easily compared with real values. Also, at this point of modeling of ARIMA (1,2,2) to Bitcoin close price, test dataset will be used, comprising of actual values.

Figure 6: Distribution and density plot of residuals

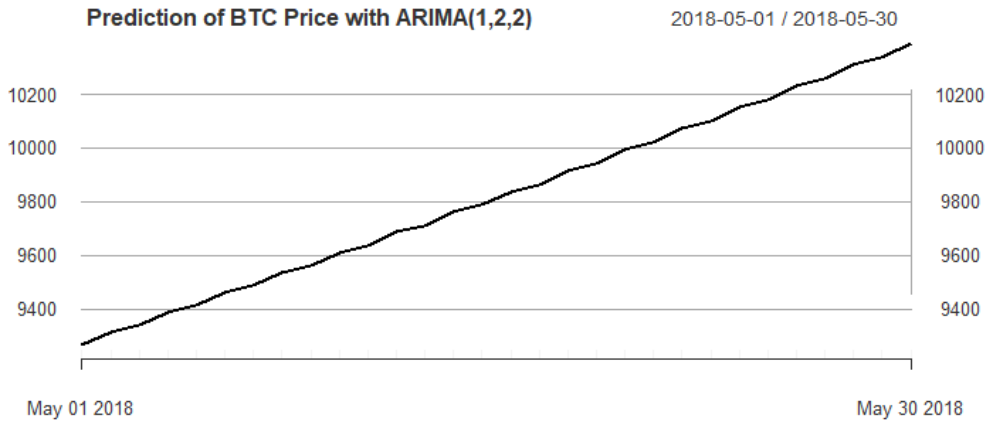


Source: author's elaboration

Figure 6 represents the density plot of observed residuals which shows that mean is close to zero and the shape of distribution suggests that the assumption of Gaussian white noise process is not so unreasonable.

Figure 7. graphically represents forecasted values for a given period. As can be noted from the figure, the prediction of ARIMA (1,2,2) on Bitcoin close price, yields results that are not expected. Namely, the forecast of the Bitcoin price for 30 days is exhibiting an upward linear trend. Obtained forecast seem bit unrealistic, especially when considering the movement of historical Bitcoin price which does not reflect the behavior of estimated values. These predicted values are much of surprise, firstly because according to the test criteria performed on the ARIMA (1, 2, 2,), the model satisfies the criteria and results from tests stated above are implying that this particular model provides the good fit to the data. Despite results from test statistics, it seems that the model needs some kind of transformation and modification to be done. However, it is unclear which type of change model requires in order to obtain valid and more accurate predictions. One thought is that the time interval used in training data, for modeling the ARIMA, maybe somehow long for prediction of Bitcoin. That is, time horizon used can be the reason why prediction failed, because it incorporates a period of "price stagnation" together with a period of the rapid increase in the price of Bitcoin from May 2017. Another possibility is that there is another type of model, other than ARIMA, that can represent and predict the better behavior of Bitcoin price.

Figure 7: Forecast of BITCOIN price



Source: author's elaboration

Bakar & Rosbi (2017) shown that classical time series regression algorithms such as ARIMA could be used to forecast price changes, yet they have poor prediction performance of Bitcoin time series. Instead, the article proposes two different approaches for forecasting Bitcoin price, classification algorithms and directly learning empirical conditional distribution (EC). Both of the proposed models outperformed the ARIMA model. In model used for forecasting method produces reliable forecasting model.

3.2 Analysis and prediction of Bitcoin price using Bayesian models

Bayesian approach has unique characteristic over standard, frequentist approach. This approach has yielded very impressive results, where predictions based on Bayesian approach succeeded to nearly double the investment in less than 60-day period. The most widely used technique for Bayesian analysis simulates a Markov chain whose stationary distribution is posterior, then the sample from this chain is used for Bayesian inference. This method is known as Markov Chain Monte Carlo or MCMC. Majority of Bayesian MCMC computing is done by using one of the two basic algorithms, the Metropolis-Hastings, and the Gibbs sampler. MCMC methods are designed to successfully simulate values of X vector based on a strategy designed to eventually draw these values from the target, posterior distribution. (West & Harrison, 1997) A sequence of simulated values X_1, X_2,…, is generated by firstly specifying starting value, then sample successive values from specified transition distribution with density $f(X_i|X_i\text{-}1)$, for $i = 2, 3, \ldots$; X_i is generated conditionally independently of X_{i-2}, X_{i-3},...

Modeling is done with help of RStudio using package but which performs time series regression using dynamic linear models fit using Markov Chain Monte Carlo. Firstly, the Bayesian model which only uses the time series of the Close price of Bitcoin. The second model is simple Bayesian regression using only a single model. Following the regression equation (11) was used

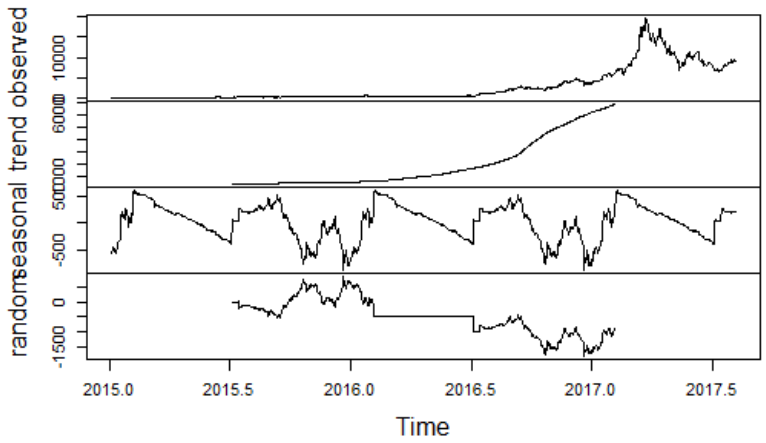
$$y_t = \mu_t + \tau_t + \beta^T X_t + \varepsilon_t,$$

(11)

where μ_t represents trend term, τ_t is seasonal component and $\beta^T X_t$ refers to regression component. Residuals are designated as ε_t, and they are assumed to follow Gaussian distribution.

When first model was created, seasonal trend is added, particularly 3 seasonal periods were added. From Figure 8 it can be noted that Bitcoin price exhibits seasonal behavior, one per year. Also, linear trend was added to the model because decomposition graph shows that Bitcoin Close Price experiences overall growth trend.

Figure 8: Decomposition of BITCOIN time series

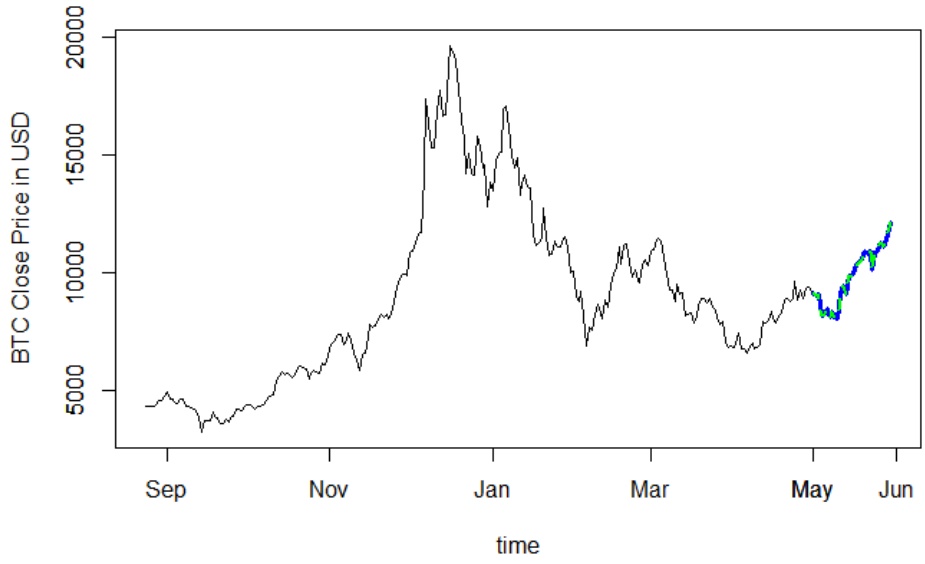


Source: author's elaboration

After 50 MCMC iterations are performed to form a Bayesian model which uses just Close price observations, the model predicted for 30 periods, in order to reflect the length of the test data. Summary statistics of the model states that R squared value is 0.9994511, meaning that this model explains 99% of data behavior, which implies that the model itself fits Bitcoin price data. The

standard deviation of residuals is 96.1782, and standard deviation of prediction is 330.7511. Figure 9 represents the plot of Bitcoin price data together with predictions for the following 30 days. Plotted predictions are implying that the price of Bitcoin should exhibit continuation of the downtrend at the beginning of May. However, predicted values are showing that during the May, as values are approaching June, Bitcoin should experience growth. To be exact predicted value for the end of May is $ 12,161.542.

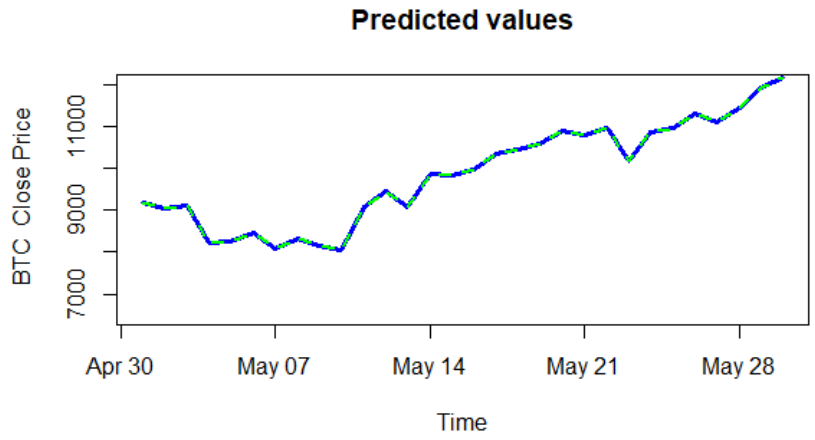
Figure 9: Prediction od Bitcoin price with Bayesian model



Source: author's elaboration

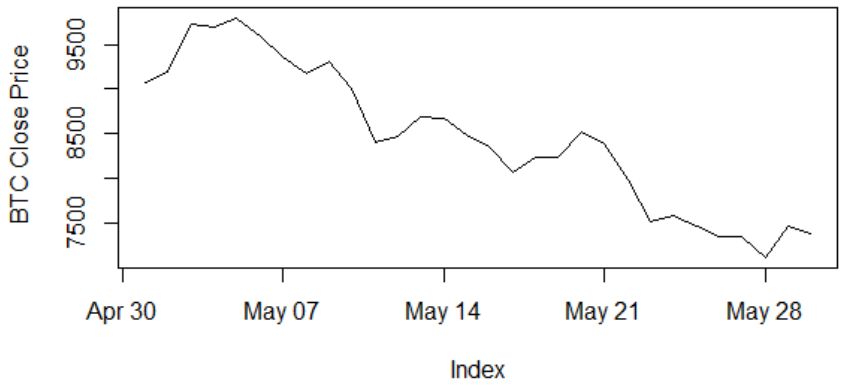
Figure 10 and 11 represents plots of predicted values of Bitcoin close price (upper figure), while lower graph represents actual values of Bitcoin close price for the period May 1 – May 30, 2018, which is test data.

Figure 10: Predicted Values



Source: author's elaboration

Figure 11: Test (actual) data



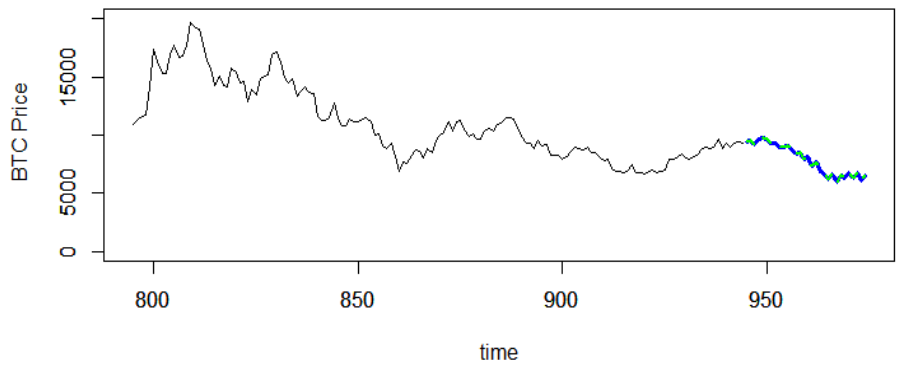
Source: author's elaboration

As Figure 11shows, for the first 7 days of May prediction values indicated that the value of Bitcoin is decreasing, the price dropped around $ 8,000. But, when looking at actual data, the Bitcoin price in that period actually went up, reaching almost $10,000. When plots are inspected further, it is clear that predicted values are not reflecting the behavior of test data. In fact, the model predicts an increase in the value of Bitcoin, while actual observed Bitcoin prices are exhibiting downtrend. The inaccuracy of predictions of the previous model may be caused by inappropriate time horizon of observed data or inadequate frequency of Bitcoin historical price data. In chosen time period for training data, May 30, 2015- April 30, 2018, Bitcoin price exhibits sudden growth in

last quarter of 2017, after which in first quarter of 2018 loses almost double of its value. These sharp movements of price in long-term period probably affected the model resulting in the prediction that went in the opposite direction from test values. Furthermore, modeling was done with daily Bitcoin close price data, but the better solution may be to use more frequent observations, such as hourly or 15-min intervals. In the paper, Bayesian Regression and Bitcoin, authors have used frequency of 1-min intervals, which has yielded very accurate predictions resulting in "profitable" trading strategy. However, this type of data is usually unavailable for modeling.

The second model, Bayesian linear regression, with a single model yielded somewhat better results than the previous model. For this model seasonal component and trend, the component was added as well. When comes to determination of the prior, modeling was done using non-informative prior. In other words, it is assumed that there is not enough information to determine prior distribution. Again 50 MCMC iterations were done prior to building the stated model. R- square statistics for the model is very high, 0.9998768, implying that model is the good fit to the data and explains the behavior of past observations. A standard deviation of residuals is 45.56947, which is the lower value than of the first Bayesian model. However, a standard deviation of prediction is slightly higher than for the first model and it is 334.6618. Following the plot, Figure 12 represents the prediction of the simplest Bayesian linear regression for 30 periods.

Figure 12: Bitcoin price prediction with Bayesian linear regression

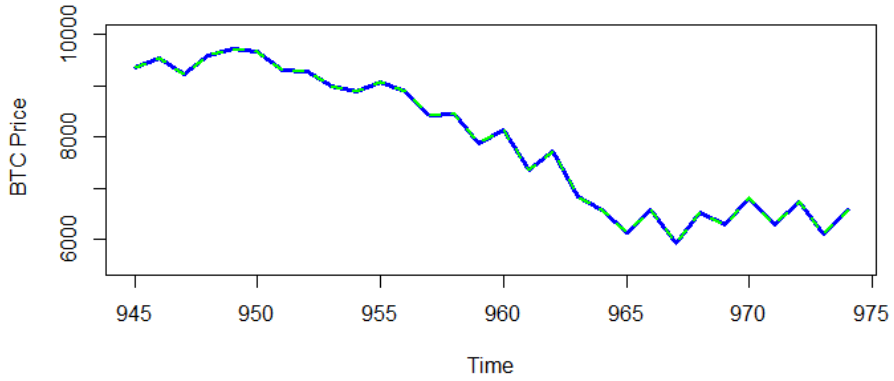


Source: author's elaboration

Figure 12 displays that predicted Bitcoin Close price values are exhibiting downtrend, forecasting that at the end of May price of Bitcoin should decline to $ 6,577. 026. When predictions are plotted against test data for the stated

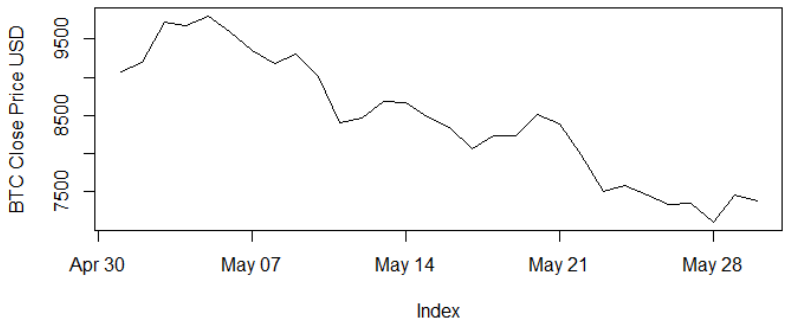
period, it is observed that forecast using Bayesian linear regression yielded results that are "reflecting" true values of Bitcoin price. Figure 13 represents Bitcoin price prediction (upper plot) while the second plot represents the actual values of the price of cryptocurrency.

Figure 13: Predicted Values



Source: author's elaboration

Figure 14: Test (actual) Values



Source: author's elaboration

By inspecting Figures 13 and 14 it is clear that so far Bayesian linear regression offered superior results, which are reflecting behavior of actual data for period May 1-May 31, 2018. Model predicted decline of Bitcoin value, from $ 9,359.663 to $ $6,577.026 at the end of the period. The value of Bitcoin using actual data shows that at the end of stated period 35 was $ 7,380.01. However, even though predictions are not precise, model predicted down trend for price of Bitcoin, which has happened with actual values. The Bayesian linear regression turns out to model Bitcoin price data accurately by predicting price movements that reflected actual observations.

In addition, model could be improved further by using more frequent data observations for Bitcoin close price and by incorporating some other regressor that influences behavior of Bitcoin. Because of the increased interest for Bitcoin and its increased use in business operations it is possible that some external factor, such as macro financial indicator or trending of Bitcoin among investors, should be added as explanatory variable in the model.

4 COMPARISON OF MODELS AND DISCUSSION

This section is dedicated to comparison of the ARIMA (1,2,2) model, the Bayesian model which uses just Bitcoin close price time series for prediction, and simple Bayesian linear regression. When the main purpose of the model is prediction then it is reasonable to select Mean square error (MSEP) of prediction and Mean Absolute Percentage Error (MAPE) as criteria for determining model quality (Wallach & Goffinet, 1989).

MSEP represents the average squared difference between the quantity of interest and the model prediction of that particular quantity. In other words, it is a measure of the predictive accuracy of the model. Mean square error of prediction is calculated using formula (12)

$$MSEP = \frac{1}{n} \sum_{i=1}^{n} (Y_i - \widehat{Y}_i)^2, \tag{12}$$

where $(Y_i - \widehat{Y}_i)^2$ is squared difference between ith actual value of Y and the corresponding model forecast and n represents number of observations. The Table 7. represents Mean square error of prediction values for models presented in the paper, while Table 6. represents squared errors of prediction and absolute percentage error. As can be seen from the table the highest value of MSEP or lowest predictive accuracy belongs to the Bayesian model which only uses BTC time series for prediction. ARIMA (1, 2, 2) seems to have somewhat smaller MSEP but compared to the Bayesian linear regression model, its value is still relatively high meaning that predictions of the model were not so accurate as well. It is clear that simple Bayesian regression has the greatest accuracy on the prediction of Bitcoin price. MSEP of the model is more than 7 times smaller than of ARIMA (1, 2, 2). Therefore, under the MSEP criteria, it can be concluded that Bayesian regression fitted the Bitcoin price data the best, yielding results with highest predictive accuracy. Also, Bayesian regression model succeeded to predict the overall price movement of Bitcoin, while the other two models predicted movements in opposite direction from actual ones.

The Table 4 represents Mean square error of prediction values for models presented in the paper, while Table 6. represents squared errors of prediction and absolute percentage error. As can be seen from the table the highest value of MSEP or lowest predictive accuracy belongs to the Bayesian model which only uses BTC time series for prediction. ARIMA (1, 2, 2) seems to have somewhat smaller MSEP but compared to the Bayesian linear regression model, its value is still relatively high meaning that predictions of the model were not so accurate as well.

Table 4: Box-Ljung test of goodness of fit

Mean Square Error of prediction (MSEP)			Mean Absolute Percentage Error		
ARIMA (1,2,2)	Bayesian 1	Bayesian regression	ARIMA (1,2,2)	Bayesian 1	Bayesian regression
3117683.922	5834738.392	804994.9931	18.40436%	25.44960%	8.46927%

Source: author's elaboration

It is clear that simple Bayesian regression has the greatest accuracy on a prediction of Bitcoin price. MSEP of the model is more than 7 times smaller than of ARIMA (1, 2, 2). Therefore, under the MSEP criteria, it can be concluded that Bayesian regression fitted the Bitcoin price data the best, yielding results with highest predictive accuracy. Also, Bayesian regression model succeeded to predict the overall price movement of Bitcoin, while the other two models predicted movements in opposite direction from actual ones.

MAPE is widely used in practice because of its intuitive interpretation in terms of relative error. It measures the size of the absolute error in percentage terms. MAPE has an advantage of being scale independent allowing comparison of forecast performance of different data set. It is calculated using the following formula (13)

$$MAPE = \frac{100\%}{n} \sum_{i=1}^{n} \frac{|Y_i - \widehat{Y_i}|}{Y_i}, \tag{13}$$

where $|Y_i - \widehat{Y_i}|$ is absolute error between actual observation and forecasted value, i.e. Y_i is ith observation of real observed value and n is the number of observations.

Table 4. also summarizes MAPE for the three models discussed in the paper. MAPE values are confirming the evaluations of the models with MSPE. Again, a Bayesian model which uses only historical observations for prediction proved

to have lowest predictive power, with MAPE of 25.44960%. ARIMA (1,2,2) shows that its forecast is deviating on average 18.40436% from test data. Bayesian linear regression has the lowest MAPE value, confirming its position of the model with best predictive accuracy. When looking at absolute errors of predictions, Bayesian regression has very low percentage error, especially in the first 10 forecasted periods where absolute errors do not exceed 8%. price.

Considering MSEP and MAPE as criteria for determining the best model, it can be concluded that Bayesian linear regression has the greatest predictive power and accuracy, over the other two models discussed in the paper. Also, following logical reasoning, model forecasts mirror price movements of Bitcoin. Since the beginning of 2018, Bitcoin has lost almost 50 % of its value. Many debates are at the place about the cause of this drastic fall in Bitcoin price. The central argument in the financial world is that this sudden decline in the price of most influential cryptocurrency is tied to launch of Bitcoin futures contract on Chicago Mercantile Exchange. According to FED's researches, the launch of these types of futures allowed pessimists to enter the market, which contributes to a reversal of Bitcoin price dynamics. When taking into the consideration recent happenings and their effect on Bitcoin price movements, modeling of Bitcoin price further in research should include external factors. Research and studies about financial indicators as price drivers of Bitcoin are proposing mixed results. For example van Wijk in his study " What can be expected from Bitcoin?" concludes that several financial indicators such as Dow Jones Index, the euro-dollar exchange rate, and WTI oil price have the significant effect on the value of Bitcoin price in the long run. However, P. Cianian et al. (2015) found that global macro-financial developments do not significantly affect the price of Bitcoin. Furthermore, Yermack (2014) argues that Bitcoin's price is not responsive to macroeconomic variables and therefore is not effective as a tool for risk management. This means that Bitcoin cannot be hedged against other assets that are driven by macroeconomic developments. In recent period Bitcoin drove the attention of the public and investors. More and more people are buying Bitcoins and more and more firms are accepting Bitcoin as a medium of payment. Because of the recent popularity of Bitcoin among investors, it is important to understand what drives Bitcoin and which factors are influencing its price movements. Because of previously stated reasons, further research on Bitcoin should focus on determining external factors, especially on macroeconomic indicators, that are important for modeling and prediction of Bitcoin price. Even though there were no any significant results about a connection of financial indicators and Bitcoin in previous years, recent

interest and developments showed that Bitcoin is integrating itself in a global financial system and pretends to become one of the global players in financial markets. Due to the integration of Bitcoin into the world markets, external factors are certainly starting to influence Bitcoin and its price movements.

5 CONCLUSIONS

Bitcoin price dynamic has been the live issue since cryptocurrencies caught attention and increase the interest of a wide audience. It is the most successful virtual currency in terms of its impressive growth in price as well as the number of currency users. As a result of recent developments in Bitcoin exchanges, there is an increasing need for understanding the behavior of Bitcoin and underlying characteristics. Identification of these factors would contribute to the efficient use of Bitcoin in financial markets. The paper approaches the modeling and prediction of Bitcoin Close price from two perspectives, by comparing the predictive accuracy of ARIMA (1, 2, 2) and Bayesian methods. The main assumption of research was that Bayesian linear regression better fit the Bitcoin price data and therefore it provides more accurate estimates of short-term future values. Some interesting findings and points have emerged. The first model discussed, ARIMA (1, 2, 2), produced unexpected results in the prediction on Bitcoin price. Nevertheless, according to test statistics that have been used for model validation, such as ACF, PACF, and ADF, the model showed to provide a good fit to logarithmically transformed BITCOIN Close price data. Further, ARIMA (1, 2, 2) has the lowest value of AIC which further implied that the model should not be modified and adequate for modeling the data. However, predictions that were obtained were far from true values. Moreover, the model predicted that the price of Bitcoin should experience growth in the predicted period exactly opposite from actual price movements for the stated period. Its Mean squared error of predictions is seven times MSE of Bayesian linear regression and with Mean Absolute Percentage Error of 18.40436%. A second model, the Bayesian method that Close 39 Bitcoin price time series for prediction and by far produced the most inaccurate results. Value of R square statistics was unreasonably high implying the strong explanatory power of the model. On contrary, the MSE of the model was largest and its value of MAPE is 25.44960%, which were the poorest results in both criteria. Forecasts implied linear growing trend for Bitcoin Close price. This model proved to be most deficient compared to the other two models discussed. On the other side, the Bayesian linear regression produced results that closely reflected the behavior of actual Bitcoin price movements. This simple

regression has the value of R square close to one as well, but its standard deviation was much lower than of the model previously mentioned. The model proved to have the best predictive accuracy and explanation of data on both criteria, MSE and MAPE. It has the very low value of MAPE, 8.46927%, with absolute percentage errors that were around 1% in the first few periods.

After completion of the models, the assumption that Bayesian linear regression should have better predictive accuracy when Bitcoin price data is modeled is confirmed for the period, May 30, 2015- April 30, 2018. With doing better on both criteria than ARIMA (1, 2, 2) further implies that the focus of the research of Bitcoin should be on applying Bayesian statistics to model its historical data. However, the model could be improved and developed additionally by adding external macro-financial factors when modeling the Bitcoin price. This could improve model and predictions because of the rapid development and integration of Bitcoin into the global financial system. Another point on future research is that increasing frequency of the data, using hourly or lower intervals, can yield better forecasts and explanation of price movements of Bitcoin. The significance of knowledge about Bitcoin's characteristics, drivers and behavior are recognized in Academia as well as in the financial world. The better understanding would bring the efficient use of Bitcoin together with its application in business risk management sphere.

AFFILIATION

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MUTUAL CAUSAL RELATION BETWEEN INDEBTEDNESS AND NUMBER OF EXECUTIONS IN YEAR 2010-2016

Denisa Kotrbová, Petr Strejček

Abstract: *The purpose of the following article is to explain the process of continuous growth of indebtedness of Czech households and to find a potential correlation to the development of the number of ordered executions. The time period of our research is framed by the years 2010-2016. The characteristic and relevant events of the period we would like to point out: a change in debt perception by Czech households, dynamic growth of indebtedness and related increase of the number of executions in the years 2011 and 2014, and last but not least, the progress of indebtedness growth in the households of the Czech Republic becoming a political theme, which reflected for example in the amendment of the Consumer Loan Act, the more stringent rules of the Czech National Bank for mortgage and other loan provision or the new decree of the Ministry of Justice on remunerations and compensations for court executors (as at 1 April 2017).*

Keywords: *Payment discipline, household, indebtedness, bank, loan, execution*

JEL: *A14, E21, E16, H31, J40*

1 INTRODUCTION

Household consumption may be seen as an important GDP determining factor. House-holds as economic entities significantly contribute to important macro data by their consumption. The question is how the households finance their own functioning and consumption. In 1990s the source of household financing was still largely represented by periodic income in the form of wages and potential savings. As the time passed, the finance product portfolio extended and advertising and offer of finance products developed priorities changed radically in terms of consummation preference over saving. Individuals and households have become a strong credit potential for financial institutions. The philosophy of household economy has changed, leading to dramatic increase of the relatively low indebtedness of 1990s in the recent two decades.

2 TIME PERIOD 2010 - 2016

The period selected for our research is a recent past of the indebtedness increase trend characterising Czech households. The characteristic feature of this particular period is slow-down of the year-on-year growth of overall indebtedness, showing some attenuation of the initial indebtedness boom. Thanks to the favourable atmosphere after the turn of the millennium encouraging indebtedness loans became a frequently used source of financing of more or less important household needs. This often led to temporary increase of the living standards of families financed by foreign resources.

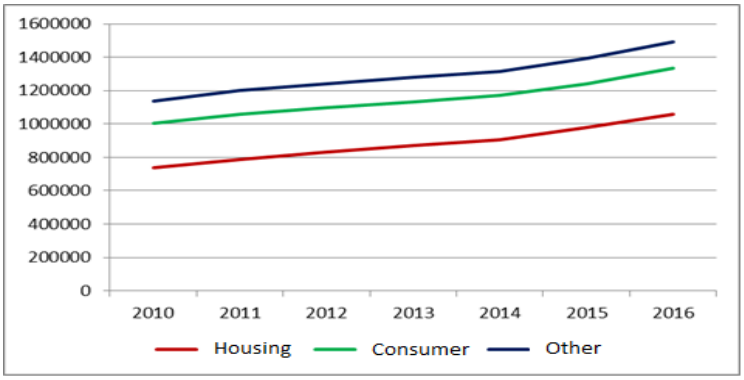
2.1 Overall Indebtedness of Czech Households

The below diagram (Fig. 1) shows development of overall indebtedness of Czech households divided by debt structure. The shown development of this indicator reflects slow indebtedness growth with year-on-year increments keeping a low level, on average ranging around 4.5 %. This confirms the assumption expressed above that the rapid increase of overall indebtedness, caused by the atmosphere encouraging indebtedness, as well as by the beneficial conditions offered and also by a certain lack of knowledge of the consequences of an impetuously accepted loan, has really been mitigated. The value of total debt of Czech households at the beginning of the period of interest, the year 2010, was CZK 1.1 billion. That year was also marked by the lowest indebtedness in-crease in the year-on-year comparison, by the mere 2.5 %. In the years that followed the indebtedness growth rate increased slightly, with the year-on-year increase not exceeding 3-5 %, though, which does not represent alarming data in the light of the situation in the previous decade. At the end of the studied period, i.e. in the years 2015 and 2016, household indebtedness grew most significantly, in particular by 5.8 and 7.13 %, respectively. The final value of total household debt was CZK 1.49 billion. Thus total indebtedness of Czech households increased across the period in question by more than CZK 354 milliard.

The period of the previous seven years was marked by another relaxation of the atmosphere, as the Czech Republic was recovering from the financial crisis affecting the world markets and debts were becoming part of (not only) public debate as one of its hot themes. With it also the negative side of indebtedness began to be manifested, for example when many of the debtors, unable to assess their ability to repay their debts, faced the merciless enforcement methods of non-bank credit institutions, including forced executions. Thanks to the financial crisis putting the actual creditworthiness of debtors at test, the huge

potential seen in the household sector was reduced considerably, and the debtor register was extended. Every day people are exposed to a flood of advertisements of the growing number of non-bank entities providing seemingly beneficial loans "overnight" and extending the already wide offer of loan products. Individuals with low financial literacy and economic education are unable to properly assess this offer and benefits or disadvantages of the individual loans and the related costs. Comparison of the individual offers should be facilitated by the amended consumer loan act, introducing a fixed structure of information about loan costs with the aim to increase transparency of the loan offers and facilitate their assessment.

Fig. 1 Total household debt at banks and financial institutions including debt structure in the period 2010-2016 in CZK million:



Source: Data of the Czech National Bank

2.2 Structure of Czech Household Debt

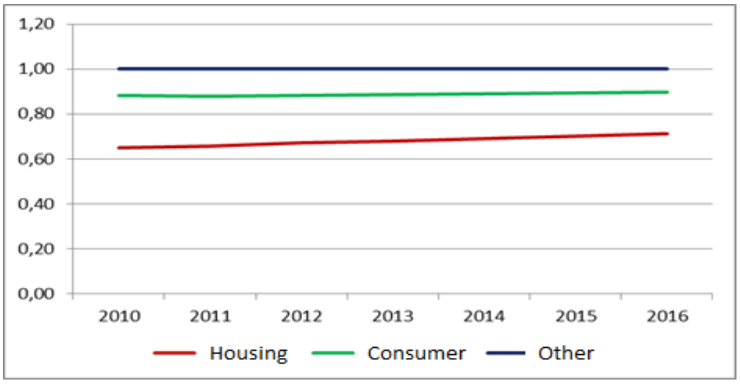
The below diagram (Fig. 2) shows development of the percentages of the individual components of household indebtedness. The progress of all the curves is relatively stable, without significant breaks across the period of interest.

The highest percentage is represented by housing loans in the long run, given by the high amounts provided for this purpose, which makes it impossible to witness any change in this proportion. The diagram shows that the proportion of housing loans slightly increased across the studied period at the expense of consumer loans, the latter rather showing a year-on-year decrease in virtually all years of the period. You can see then that after the years of uncertainty caused by the financial crisis people again began to increasingly use other resources for financing their housing needs. This trend was certainly further enhanced by the historically lowest interest rates of mortgage loans, stabilised real estate property prices and last but not least the expected increase of the

VAT rate since 2012 (partners.cz, 2013). The total value of housing loans is partly biased, though, for it also includes mortgage loans used for refinancing. This fact could mainly be manifested in 2011, marked by the end of the fixation period of mortgage loans provided in 2008 with the accompanying decrease of interest rates, making refinancing beneficial for many debtors. In the latter half of the period of interest the increase of the mortgage loan number continuously decreased despite the continuing decrease of mortgage loan interest rates, in 2014 even ranging around 2.5 % p. a. Another significant increase only came in 2015 and 2016, when the interest rates even dropped below 2 % p. a. (hypoindex.cz, 2016). The percentage of mortgage loans attacked the level of 70 % at the end of the period, showing the main reason why households use foreign resources and risk uncertain future under the long-term repayment liability.

The shares of the other loan types in overall household indebtedness did not change, ranging around 11 % all the time. Only in 2012 and 2014, for the first time in history, the volume of other loans received dropped year-on-year. This included cash loans without purpose specification or financial leasing.

Fig. 2 Shares of individual loan types in total household debt in the period 2010-2016:

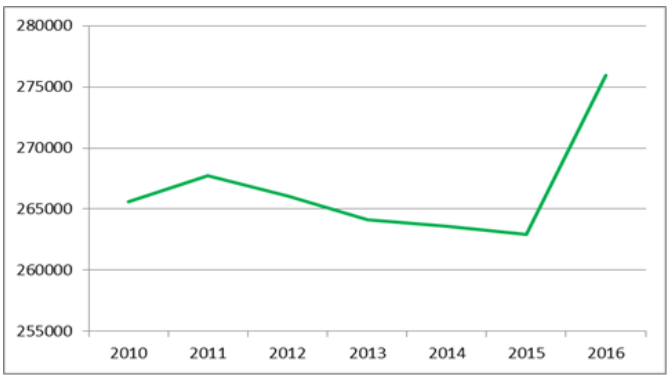


Source: Data of the Czech National Bank

The following diagram (Fig. 3) shows a detailed development of the consumer loan volume provided in the years 2010-2016. At the beginning of the period a growth in the number of consumer loans can be seen, in particular by 2 milliard in comparison to the previous year, with the reason including the current drop of interest rates (hypoindex.cz, 2014), but also the extended bank offer of loan consolidation and refinancing. These products reduce monthly instalment amounts and thus overall loan costs. Beginning with the following year consumer loan indebtedness of households began to decrease. In 2012 the year-

on-year decrease amounted to CZK 1.7 milliard and in the following year even CZK 1.9 milliard. The cause of this drop was the decreasing demand for non-bank loan products, for consumer loan indebtedness in the bank sector only slightly dropped in those years. The end of the studied period was marked by resumed growing trends with a relatively significant increase of consumer loans. The main cause is probably represented by the continual drop of interest rates in the years 2015 and 2016, which reached their historic minimum, thus increasing accessibility of these loans for the general public. The above mentioned decrease of consumer loans provided by non-bank institutions might be a signal of a certain lesson learned by the households manifested by a potential diversion from this source of finance. However, the year 2014 reversed this assumption by another increase of household indebtedness in relation to the non-bank sector by CZK 3.2 milliard year-on-year. Thus the drop of indebtedness in the non-bank sector again appears accidental. The amount of the increment is not alarming, but shows that households still consider non-bank loans a solution to their lack of finances and do not forsake them, at least for the time being. Non-bank loans may be for them a solution of their financial emergency when a bank loan is not possible for a debtor not meeting the conditions for the loan provision.

Fig. 3 Household indebtedness with consumer loans received from banks and financial institutions in CZK million in the years 2010-2016:



Source: Data of the Czech National Bank

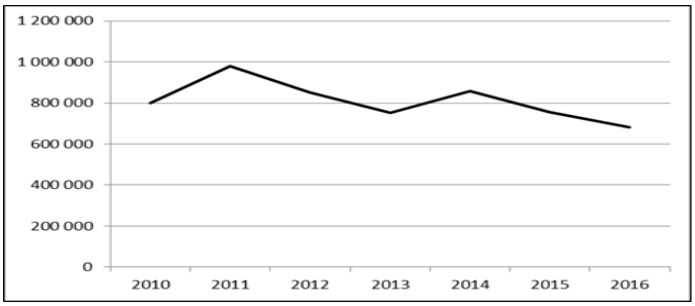
2.3 Ordered Executions

The below diagram (Fig. 4) shows development of the number of ordered executions in the years 2010-2016. At the beginning of the period the numbers of executions decreased like in the previous years, with signs of revival of Czech economy. As the bank criteria for client creditworthiness assessment

became more stringent, risk groups indebtedness decreased, including low-income families with the relatively high risk of inability to repay the loan in the case of unfavourable future financial development. The number of ordered executions in 2011 exceeded 978,000, with year-on-year increase by nearly 179,000 orders, after 2008 the second highest increment since 2003. In the following two years, on the other hand, the number of ordered executions decreased, in 2012 even by nearly 127,000 which is 13 % in comparison to the previous year, and in 2013 by 98,000 executions year-on-year. Another turning point in this trend was brought by the year 2014 when the number of ordered executions again increased by 104,000. At the end of the period of interest the number of newly ordered executions decreased and the total number of executions at the end of the period was lower as well.

A problem that has intensified recently is represented by over-indebtedness of individuals. A number of debtors have become permanent debtors, often falling into the debt trap. On the basis of data of the Czech Chamber of Executors (2015) up to 50 % of the newly ordered executions apply to debtors with 10 or more executions, with a rapid decrease of the number of debtors with 1 – 3 executions, and only 4 % of executions concerning individuals with only one execution.

Fig. 4 Total numbers of ordered executions in the years 2010-2016:



Source: Data of the Ministry of Justice of the Czech Republic

A detailed view of year-on-year changes in the number of ordered executions in the years 2010-2016, offered by the following diagram (Fig. 5) suggests a changeable development trend, in 2012 for the first time in the period with a negative change in the year-on-year figure of ordered executions. The highest increase in the number of ordered executions was recorded in 2011, when together with earlier executions the total number of ordered executions reached the record 978,409, with year-on-year increase by nearly 179,000. The reasons for the enormous increase of the number of newly ordered executions included the still existent, albeit fading financial crisis, but also and above all the

amendment of the Rules of Execution, with effect since March 2012 reducing potential costs of attorneys charged for debt enforcement (Chamber of Executors of the Czech Republic, 2013). Creditors thus repeatedly petitioned years old receivables for the proceeding to be still held under the original conditions and the executors could still receive the high remunerations and cost compensations in connection with the debt enforcement. Creditors also began to increasingly use services of court executors at the expense of the sometimes illegal ways of debt enforcement.

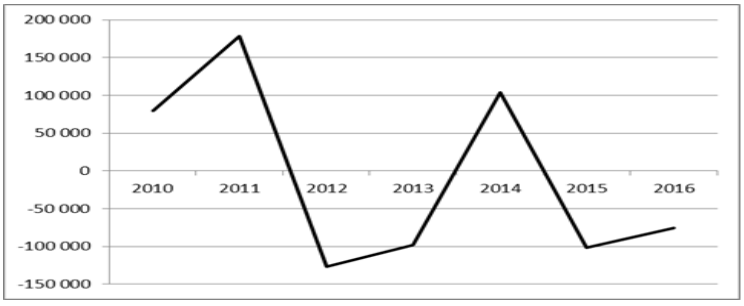
In 2012 and 2013 the numbers of ordered executions decreased year-on-year, first by nearly 129,000 and then by another 98,000, showing a decreasing trend. Considering the situation and the reasons for the rapid increase of executions in the previous year one can assume that the execution number was decreased by these very older receivables submitted for court enforcement under the original conditions and the number of ordered executions increased again in comparison to year 2010. The following decrease of executions in 2013 was certainly affected by the above mentioned amendment of the Rules of Execution and the Rules of Civic Court Proceeding, thanks to which different executions against the same individual managed by a single execution office could be merged into one. Debtors thus could avoid the high costs of every individual execution proceeding significantly increasing the amount due. In comparison of the number of executions to the situation in 2010, preceding the period of legislative changes and the related highest year-on-year increase, the year 2013 really shows a decrease in the absolute number of ordered executions.

The year 2014 reversed the existing trend by another increase of the number of ordered executions. The reason stated by the Chamber of Executors of the Czech Republic (2015) was above all low responsibility of debtors related to fulfilment of minor liabilities, such as files imposed by city transport companies or the police, with the carelessness or lack of finances for the fine payment resulting in ordered executions. Although currently more and more debtors, often with the help of the State and authorities, show interest in increasing their financial literacy, this is a long-term matter and its results may only be expected within a long-time horizon.

The last two years of the period under investigation the numbers of ordered executions decreased year-on-year. According to the Chamber of Executors of CR (2015), on the other hand, the number of individuals with 4 and more executions increases steeply. Thus executions concentrate within a narrow

sector of the society with the mean number of executions per individual being 5, 8. Most executions can be found in the age group of 28-47 years (Chamber of Executors of CR 2017). The growing number of executions per person, however, decreases the probability of their successful enforcement and the executors, only paid for receivables successfully enforced, thus have about 60 % of their work unpaid. The increasing number of multiple executions per individual together with increasing costs of enforcement represent one of the main reasons for the worsening economic situation of court executors. The total debt being enforced currently amounts to around CZK 302 milliard, making one fourth of the state budget, meaning that the drop of enforceability connected with the decreased income of court executors might unfavourably affect the whole national economy. The main reason for the current development, according to the Chamber of Executors of CR (2015) is abuse of court executor service. For creditors court execution is always free of charge, even if is unsuccessful. For that reason some creditors behave irresponsibly and file new and new execution petitions, although the debtor is long-term insolvent and thus enforcement of the debt is virtually impossible. The only solution might therefore be to motivate creditors to consider beforehand whether filing a petition for court execution makes sense or not, to avoid destabilisation of debt enforcement. One of the preliminary suggestions is introduction of territorial competence. Executions would thus be allocated to executors according to the place of permanent residence of the liable party, which would reinforce independence of court executors and open ways towards increased financial participation of creditors in the costs of executions.

Fig. 5 Year-on-year changes in numbers of ordered executions in years 2010-2016:



Source: Data of the Ministry of Justice of the Czech Republic

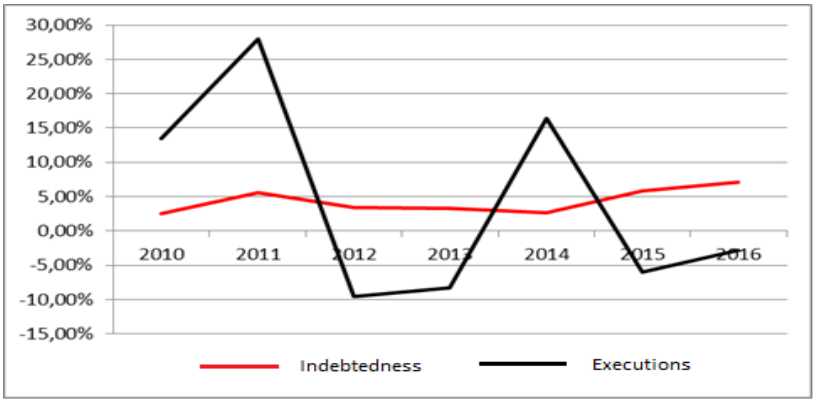
The below diagram (Fig. 6) shows year-on-year percentage changes of overall indebtedness of Czech households and numbers of newly ordered executions in the period in question. The diagram shows a differing progress of the two

curves. In 2010 and 2011 both indicators showed year-on-year increments. As already mentioned, the increase in the number of executions was partly caused by the amendment of the Rules of Execution, but still the number of ordered executions was high, pointing to worsened payment morals of the households, which according to the Czech National Bank (2015b) also confirms increasing numbers of failed loans. The amended Rules of Execution will thus not be the main reason for the enormous number of the newly established executions.

Subsequently, in 2012, the curves began to show a difference in their development. While the number of newly ordered executions decreased by 13 % year-on-year, household indebtedness continued to grow, albeit very slowly. Loan products ceased to be a tempting new development in financing of household needs from foreign resources and the beneficial conditions accompanying the origin of the extensive indebtedness of Czech households provided with the aim to indebt the greatest possible number of clients ceased. Banks changed their strategy and began to check applicants for loans more profoundly. Suitable candidates for a loan ceased to be nearly all individuals with stable income like before. Regardless the year 2011 with the enormous number of newly ordered executions, for the reasons mentioned above, the payment morals of the households, in comparison to 2010, worsened again, for the number of ordered executions again increased. According to the Czech National Bank (2015b) this assumption is confirmed by the increased number of failed loans.

A similar trend in indebtedness of Czech households continued through to 2013, only the increment was slightly lower than in the previous year. The number of ordered executions continued to decrease, which might reflect a slight improvement of the ability of the households to cope with their financial liabilities. The decrease was evident in comparison to both the previous year and year 2010 and according to the Czech National Bank (2015b) the number of the failed loans increased only slightly.

Fig. 6 Year-on-year changes in indebtedness and numbers of ordered executions in the period 2010-2016:



Source: Data of the Ministry of Justice of the Czech Republic

3 DISCUSSION AND CONCLUSION

The beginning of the period of interest (2010) was characterised by slowed-down year-on-year growth of overall household indebtedness, but at the same time by continuous relaxation of the atmosphere with the Czech economy recovering from the consequences of the previous financial crisis. Household indebtedness became a widely publicly discussed theme for already in 2008 the total debt exceeded the limit of 1 billion CZK and a growing trend could be expected also in the following years in the environment of extending portfolios of finance products and loan advertising campaigns. Also the legislative changes in household crediting may contribute to further growth. Their primary aim is to provide increased protection to debtors an easier orientation in the individual offers of loan providers. This assumption is confirmed by the above diagrams of overall development of household indebtedness in the past 7 years.

The structure of Czech household indebtedness across the period of interest was marked by a high share of housing loans, ranging between 60 and 70 % of the total household debt. While at the beginning of the period under investigation the markets recovered from the past financial crisis and the year-on-year increments were low, the end of the period in question is connected with the biggest increase of the volume of the provided mortgage loans. The year 2016 is generally considered by economist as a turn-ing point which can be summarised - for it is marked with a number of major events and changes in the mortgage loan market. In the very year 2016 the psychological barrier of 2% interest rates of mortgage loans was broken. Continual decrease pushed the interest rates down to the historic minimum of 1.77 %. The mean rate then

amounted to 2.12 %, which, together with the very favourable economic situation and effectiveness of the consumer loan act, enormously increased interest in mortgage loans. The volume of the provided mortgage loans increased in 2016 year-on-year from CZK 184 milliard to CZK 225 milliard. At the same time the mean amount of the loan in-creased by up to 10 %. The LTV also continued to decrease, which should mean a higher proportion of the client´s own resources and restriction of excessive burden on the debtor. The question is whether this is to result in additional financing of mortgage loans by monies from other loan types or not. A similar increase towards the end of the studied period could also be seen in the case of consumer loans, supported, in addition to the low interest rates, by the growing consumption by Czech households following from increasing wages and dropping unemployment rates.

The development of the numbers of ordered executions across the period under investigation was very changeable with a first historic negative year-on-year change. Significant increases of executions were recorded in the years 2011 and 2014. The main reason was not only the poor payment morals of debtors but also and above all the above mentioned legislative changes concerning remuneration of executors and later, in 2014, carelessness of debtors in fulfilment of minor payment liabilities following from fines. In the last two years there is a decreasing trend in the number of ordered executions. The biggest problem however continues to be over-indebtedness of individuals, which in effect reduces probability of debt enforcement. Although more and more people show interest in increase of their financial literacy, the results will only be manifested after years.

Although statistical methods are able to prove existence of a correlation between indebtedness and the number of executions, the question is the extent of the correlation and also to what extent the calculation will affect for example legislative changes. In the context of the scope and needs of this article the mutual causality between the dynamics of the growing household indebtedness and the number of ordered executions may also be proved by a qualitative assessment. As the increase is more or less expectable in both cases, let us look in more detail on the antagonistic (positive) movements.

In general two recent positive social trends may be characterised. The first successful development is that despite the growing household debt the number of the performed executions has dropped (2012-2016, except for years 2011 and 2014). The second positive phenomenon is represented by the fact that the

number of non-payers with a low number of debts decreases and in the same way the number of new indebtedness cases of notorious debtors will decrease (recording of debtors, careful approach of insti-tutions, more profound review of applicants…). Let me remind that still in 2014 the whole 50 % of new executions were represented by case of multiple debtors. Both trends represent a positive signal for the future. Notorious debtors access to new loans (and debts) has been made more difficult by the current legislative amendment and the number of executions of "singular" debtors has been decreasing. A significant contribution to these positive trends can be seen in the financial "education" of the society, the growing numbers of financial advisors, the increasing numbers of financial literacy courses and of course the younger generation´s increased interest in their own financial positions.

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THE IMPACT OF REMITTANCES ON GDP GROWTH: THE CASE STUDY IN THE REPUBLIC OF MACEDONIA

Florida Veljanoska

Abstract: *Remittances are one of the main sources of international financial flows in the developing countries. The total amount of remittances in the developing world is as large as foreign direct investments, which is twice the size of official development aid. It is widely recognized that remittances are the most beneficial form of private financial inflows towards the developing countries. They are stable and mitigate shocks, they strengthen the balance of payment, reduce the poverty and provide financials for local development investment project, and as a final result they boost the local economy.*

Remittances are very important source of international finances for the Macedonian economy as well. They surpass both official and other private transfers in the country. They are crucial for the balance of payment and represent the major source that finances the deficit in the current account. Many experts argue that remittances are also very important for the economic development, and that they enhance the economic growth.

The main objective of this paper is to determine whether the remittances influence on economic growth in the Republic of Macedonia. We have used remittances inflows and GDP growth rate for the period 1996-2016 as variables, in order to determine the inter-relationship. The data were provided from the National Bank of the Republic of Macedonia, as well as from the World Bank database. Granger Causality Test was carried out, using the contemporary econometric software EViews10, in order to determine the inter-relationship between the variables. Unit root test was conducted in order to determine whether the variables are stationary, and also the Cointegration test was performed.

The Johansen Cointegration test has shown that there is no long-run relationship between the remittances and GDP growth rate. Additionally, the Granger causality test has shown that we should accept the null hypothesis that remittances does not Granger cause GDP per capita, which means that remittances can't be used as a credible base for forecasting the future values of GDP growth rates.

The outcomes of this research should be used by the policymakers, who should introduce measures in order to stimulate the investments of remittances.

***Keywords**: Remittances, GDP growth rate, Johanses Cointegration Test, Granger Causality Test.*

***JEL classification:** F62, O11*

1 INTRODUCTION

The remittances represent one of the main sources of the international financial resources. Given the number of the international global migrants – 232 million and additionally about 70 million internal migrants, and the fact that the majority of migrants are coming from developing countries, it is understandable why remittances are as large as foreign direct investments inflows in developing countries, and why remittances are twice the size of official development aid. It is estimated that the global remittances were about $582 billion[1] in 2015, of which about 70-75% are directed towards the developing countries, where they approximately represent about 27% of GDP. The data themselves indicates the importance of the remittances for the overall economic stability and prosperity in the developing countries.

Macedonia as a developing country has about 200.000 people, who live abroad. Additionally, it is estimated that up to 500.000 people are established abroad, bringing the emigrant rate above 25% of the total population in the country. That is why remittances represent by far the most important item in the balance of payment of Macedonia, in the past years. The data suggests that formal and informal private transfers surpass both official and other private transfers and are the greatest contributor for covering the trade deficit.

Even that the positive effects of remittances are widely recognized and almost all economists agree that remittances are counter-cyclical, they stabilize the economy, reduce poverty and enhance economic development, and even that all of them are aware of the possible consequences of so-called "Dutch disease", there has been very little literature devoted to exploring the effects of remittances on recipient countries. Despite that, the existing literature is mostly concentrated on estimating the effects of remittances on shocks mitigation,

[1] "Migration and remittances: Recent developments and Outlook", World Bank, Washington D.C., April 2017

while there is much less researches about the impact of remittances on economic growth.

The main objective of this paper is to discover whether remittances have impact on the economic growth. We have used remittances inflows and GDP growth rate in Macedonia for the period 1996-2016 as variables, in order to determine the inter-relationship. The data were provided from the National Bank of the Republic of Macedonia, as well as from the World Bank database. Granger Causality Test was carried out, using the contemporary econometric software EViews10, in order to determine the inter-relationship between the variables. Unit root test was conducted in order to determine whether the variables are stationary, and also the Cointegration test was performed.

The paper is organized in three sections. The first section is dedicated to literature review. In the second section we will present the data about the remittances and GDP growth in Macedonia and in the same time we will elaborate the main effects of remittances inflows in Macedonia. In the third section we will explain the methodology and present the empirical results from the research. The paper finishes with the final conclusions, where we have sublimated the results from the study.

2 LITERATURE REVIEW

We already mentioned that remittances are very important for the developing countries, since they bring many positive impulses in the economy. However, there are some researches, which emphasize that remittances might be volatile and unpredictable, they support excessive consumption, and finally may lead to so-called "Dutch disease". Hence, we can analyze the remittances impact on recipient economy at least from two angles. From a development perspective, remittances are crucial for poverty reduction, consumption smoothing, saving and funding small scale investments, and from risk perspective – they may be potentially volatile and unpredictable and they may artificially support excess private demand for extended period of time, which prevent the adjustment of relative prices and the efficient allocation of labor and resources across sectors.[2]

The literature which underlines the positive effects of remittances on growth, distinguishes counter-cyclical and pro-cyclical remittances, depending on whether they are channeled towards consumption or investments. So, there are

[2] M. Gerard, P. Gitton, G. Nacevski, M.T. Sanjani, "Former Yugoslav Republic of Macedonia Selected Issues", IMF, June 14 2014

altruistic remittances, which are sent to relatives at home and are directed towards consumption smoothing, which means that they are counter-cyclical with regard to economic condition. The second type is so-called self-interest remittances which are pro-cyclical, and refer to the remittances which are sent for direct or portfolio investments. This form of remittances leads to improvement of business climate during the expansions and weakening during the difficult times.

Adams and Page (2005),[3] Acosta et al.and World Bank (2007)[4]argued that migrant remittances impact positively on the balance of payments in many developing countries as well as enhance economic growth, via their direct implications on savings and investment in human and physical capital and, indirect effects through consumption. Iqbal and Sattar (2005)[5]argue that in the absence of worker remittances, it is likely that exchange rate, monetary and fiscal policies will come under pressure. Rao and Hassan (2011)[6] have analyzed the effects of remittances on growth with the help of Solow growth model. The study found that migrant remittances have positive but marginal effect on growth. World Bank and IMF findings show that remittances indirectly increase the growth rate by reducing output volatility. Fayissa and Nsiah (2010)[7] had investigated the inter-relationship between economic growth and remittances through panel data of 64 different countries from Africa, Asia, and Latin American and Caribbean from 1987–2007. They conducted unitroot and panel co-integration tests in order to investigate the relationship between remittances and economic growth. They found that there is positive relationship between remittances and economic growth throughout the whole group. Giuliano and Ruiz-Arranz (2009)[8] have analyzed the data from 100 developing countries in the period 1975–2002 and discovered that remittances enhance economic growth only in less financially developed countries. The positive developmental effects of remittances focuses on the multiplier effects of

[3] R. Adams, J. Page, "Do international migration and remittances reduce poverty in developing countries", World Development 33, 1645–1669, 2005

[4] P. Acosta, P.Fajnzylber, J. H., Lopez, "The Impact of Remittances on Poverty and Human Capital: Evidence from Latin American Household Surveys", World Bank Policy Research Working Paper, p. 4247, 2007

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[8] P. Giuliano, M. Ruiz-Arranz, "Remittances, financial development, and growth", Journal of Development Economics 90,pp 144–152., 2009

consumption, development of the financial institutions that handle remittance payments, use of remittances as foreign exchange, and the role of remittances as an alternative to debt that helps alleviate individuals credit constraints in countries where micro-financing is not widely available.

Despite the researches, which have shown the positive impact of remittances on the overall economy, there are some studies that emphasize the negative effects of remittances.Lipton (1980),[9]Ahlburg and Brown (1999)[10] and Ahlburg(1991)[11]argued that remittances undermine productivity and growth in low-income countries because they are readily spent on consumption likely to be dominated by foreign goods than on productive investments. Chami and Jahjah (2005)[12] found that migrant remittances have negative impact on growth in per capita incomes. The study reported three stylized facts: first, that a "significant proportion, and often the majority," of remittances are spent on consumption; secondly, that a smaller part of remittance funds goes into saving or investment; and thirdly, the ways in which remittances are typically saved or invested – in housing, land and jewelry – are "not necessarily productive" to the economy as a whole. Empirical results also indicate that remittances may indirectly affect real exchange rate leading to the "Dutch Disease" phenomenon, where remittances inflow causes a real appreciation, or postpones depreciation, of the exchange rate. Exchange rates appreciate in countries with large remittances which will in turn hurt the economic growth. Amuedo-Dorantes and Pozo (2006)[13] and López et al. (2007)[14] found that remittances, like capital flows can appreciate the real exchange rate in recipient economies and therefore generate a resource allocation from the tradable to the non-tradable sector. Rodrik (2006)[15] argue that real exchange rate overvaluation undermines long-term economic growth, particularly for developing countries,

[9] M. Lipton, "Migration from the rural areas of poor countries: The impact on rural productivity and income distribution", World Dev., 8, pp 1-24,1980
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[13] C.A. dorantes and S. Pozo, "Migration, remittances and Male and Female Employment Patterns", American Economic Review, Vol.26, No.2, pp222-226, May 2006
[14] P. Fajnzylber and J. H. Lopez, "Remittances and Development: Lessons from Latin America", World Bank, Washington D.C., 2007
[15] D. Rodrik, "The social cost of foreign exchange reserves", International Economic Journal, 19 20 (3), pp 253–266, 2006

where tradable goods production suffers disproportionately from weak institutions and market failures.

As for the remittances in Macedonia, the previous studies found that the remittances were counter-cyclical with respect to Macedonian GDP and pro-cyclical with respect to EU - GDP[16]. This is understandable, considering the fact that the majority of remittances in Macedonia are coming from the EU countries. Petreski and Jovanovic (2016)[17] found that remittances reduce both poverty and income inequality and point the resilience of remittances devoted to consumption during the crisis. Gerard et.al (2014)[18] point out that remittances in Macedonia are undermining the external competitiveness of the country, by supporting the excess liquidity in the long run. They also argue that remittances are interest sensitive and put upward pressure on internal real exchange rate.

In terms of remittances in Macedonia it worth mentioning the research, which was conducted by Dr. SeadinDzaferi (2002),[19] who was investigating the structure of remittances in Macedonia. Dr. Dzaferi found that remittances in Macedonia are mainly consumption smoothing – 54,6% for basic needs of the families of the migrants and 13% for home repairs and building new homes, and the rest of the remittances are intended for investments and saving – 15.3% for investments and 3.1% for savings. Given the small amount of remittances directed towards investments and savings, Dr. Dzaferi has concluded that this proportion of remittances intended for investments is not sufficient to enhance the economic development and to reduce the unemployment rate in the country. Other research, made by Robert, et.al. (1985)[20] indicate that 74.1% of total remittances in Macedonia are directed for current spending, 8.8% for home construction, 5.7% for home maintenance and 13.7% for saving. According to this research investments are not considered as an important use of recipients, thus directly they do not have positive impact on growth, but indirect impact, through consumption and savings.

[16] Ibidem.
[17] M. Petreski, and B. Jovanovic, "Do Remittances Reduce Poverty and Inequality in the Western Balkans? Evidence from Macedonia?",2016
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3 REMITTANCED AND GDP IN MACEDONIA

Although the remittances inflows in Macedonia are below the level in neighboring countries, they still represent by far the most important item in the country's balance of payment. The remittances surpass both – the official and other private capital transfers, and they play a major role in covering the country's' trade deficit. Robert et.al.[21]argue that nearly 43% of the remittance recipients receive at least 1.000 EUR annually, while 39% of recipients have responded that remittances constitute half of their disposable income, and that on average they annually receive 2.486 EUR. Considering the current economic situation in Macedonia and consider the number of migrants from Macedonia[22] it is clear that these numbers are very important for the overall Macedonian economy. In the relation with the Macedonian GDP, remittances have shown to be a very stable source of foreign capital, fluctuating between 13-21% of GDP.

Before we move on presenting the data about the remittances and GDP in Macedonia, we would like to point out that it is very difficult to get accurate data about the remittances. The reason is that the majority of the remittances are transferred through informal channels. There are many reasons for that: to escape the taxation, to avoid the payment of transactional expenses, which on average cost between 1-5% of the value (they are especially unsuitable for transfer of small values, because of the minimal cost of about 5-50$), and the wish to keep the information about the transfer of money as a secret.

The majority of Macedonian emigrant are trying to escape the usage of formal channels and they prefer to use the informal channels, and that is the reason why it is very difficult to find out the real amount of remittances inflow, and to discover their impact on economy. From the other side it is essential to have the proper measurement of remittances in order to determine their impact on the economy and to make the proper decisions. Increasing the formality of transfers is crucial, because it makes the whole process more secure, easily monitored and the finances can be used in a more effective way. It is true that the formality of remittances has grown in the past years, due to the adoption of more innovative and cheap technology for money transfer, but still the majority of the private transfers are still informal.

[21] ibidem

[22] It is estimated that about 200.000 people with Macedonian citizenship are living abroad, and additionally 550.000 Macedonians are established abroad, that makes emigrant rate above 25% of total population in Macedonia.

Officially recorder remittances are only small share of total private transfers. National Bank of the Republic of Macedonia breaks down the private transfers into two items:

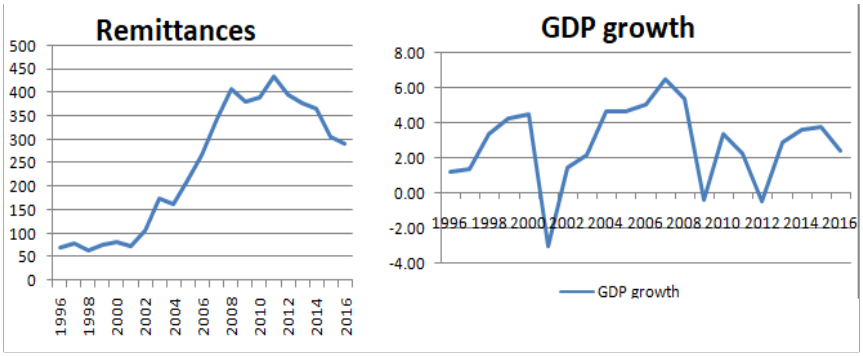
- Workers' remittances – received through official channels and reported as such by individuals. On average they represent about 2.5% of GDP. The data for this item are provided by Bank International Transactional Reporting System, which includes money transfers by banks and fast money transfer counters.
- Net cash exchange – which consist of net cash exchange (represent the largest share of private transfers and are recorded by banks and private exchange offices) and other private transfers (rents, pensions, disability assistances coming from abroad, etc.).

For the purpose of this research we have used the data about the personal migrant remittances inflow provided from the World Bank database. World Bank is calculating the personal remittances as personal transfers and compensation of employees. Personal transfers consist of all current transfers in cash or in kind made or received by resident households to or from nonresident households. Personal transfers thus include all current transfers between resident and nonresident individuals. Compensation of employees refers to the income of border, seasonal, and other short-term workers who are employed in an economy where they are not resident and of residents employed by nonresident entities.[23]

In addition we will present the data about the remittances and GDP growth rate in the Republic of Macedonia.

[23] https://data.worldbank.org/indicator/BX.TRF.PWKR.CD.DT?locations=MK&view=chart

Graph 1: Remittances and GDP growth rate in the Republic of Macedonia



Source: Research calculation

From the presented graphs, we can see that the remittances and the GDP growth rate do not have similar trend. Namely, GDP growth rate has more unstable movement, compared to the remittances. Despite that it is obvious that the remittances in Macedonia are counter-cyclical, since they have grown during the periods of slowdowns in Macedonian economies – 2001, 2009 and 2012, and have mitigated the crisis. These claims confirm the findings of Dr. Dzaferi, who found that the remittances in the Republic of Macedonia are consumption smoothing, rather than directed in investments.

4 METHODOLOGY AND RESULTS

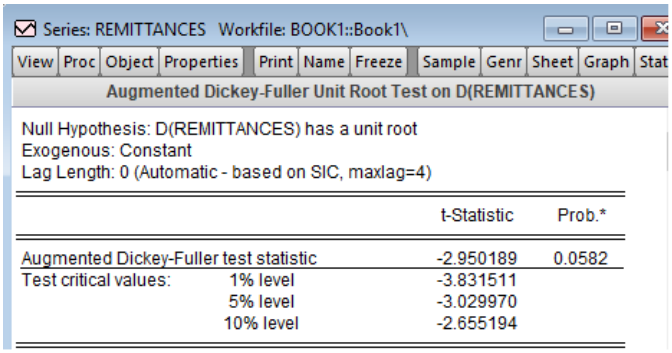
In order to get reliable results about the influence of remittances on GDP growth rate, we will use the data provided from the National Bank of the Republic of Macedonia and from the World Bank database. The annual data are for the period from 1996 to 2016. We will use Johansen Cointegration Test in order to investigate whether there is a long run relationship between the variables and Granger Causality test to explore the causal relationship between remittances and GDP growth rate in the Republic of Macedonia. Before we go on Johansen cointegration test and Granger Causality test, we must explore whether the variables are stationary. For that purpose we will do the unit root test, using Augmented Dickey–Fuller test (ADF).

4.1 Augmented Dickey–Fuller ADF unit root test

In order to use Granger causality test first we need to explore whether the variables are stationary. That is why we will conduct the Augmented Dickey–Fullertest (ADF). The null hypothesis in ADF test is that there is a unit root, and the alternate hypothesis is that the time series do not have unit root. The

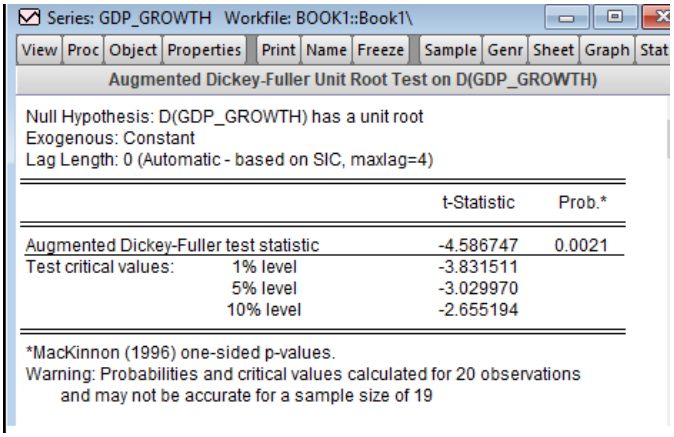
ADF unit root test was done first in level form and then in 1st difference. The lag length for ADF test was chosen by using Schwarz's criterion (SC's information criterions). Below we will present the results for ADF test for both variables.

Table 1: ADF unit root test for remittances



Source: Research calculations

Table 2: ADF unit root test for GDP growth rate



Source: Research calculations

The results from the ADF test indicate that remittance series is non-stationary at its level form, but it achieves stationary in its first difference. We got the same results for the GDP growth rate series. We have considered critical values for 5% level of significance. In addition, we have also done Phillips-Perron unit root test, and we got the same results. Since, the results from the unit root test are adequate for Granger causality test, we can now go further to the Johansen Cointegration Test and Granger Causality test.

4.2 Johansen Cointegration Test

The main purpose of the Johansen Cointegration Test is to discover whether there is a long-run interrelationship between the variables. In addition we will present the results from the Johansen cointegration test.

Table 3: Johansen Cointegration test

Johansen Cointegration Test

Date: 03/31/18 Time: 22:36
Sample (adjusted): 1999 2016
Included observations: 18 after adjustments
Trend assumption: Linear deterministic trend
Series: REMITTANCES GDP_GROWTH
Lags interval (in first differences): 1 to 2

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.330729	7.431641	15.49471	0.5280
At most 1	0.011239	0.203439	3.841466	0.6520

Trace test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Source: Research calculations

The results from Johansen Cointegration test have shown that there is not long-run relationship between the remittances and the GDP growth rate. The results have shown that there is not any cointegration at the level of significance of 5%.

4.3 Granger Causality Test

As the results from the unit root test are eligible, we can now investigate the impact of remittances on GDP growth rate, using the Granger Causality Test. The null hypothesis is that remittances does not granger cause GDP growth rate. The alternate hypothesis is that remittances does granger cause GDP growth rate.

Since, the EViews 10 software automatically gives the results not only about the impact of remittances on GDP growth rate, but also vice versa, we will present the results about the impact of GDP growth rate on remittances, also. So, for this case the null hypothesis is that GDP growth rate does not granger cause remittances and the alternate hypothesis is that GDP growth rate does granger cause remittances.

The results from the Granger Causality Test are presented in the Table 4. The Akaike Information Criterion(AIK) and the Schwarz's criterion were used in order to determine the lag lengths, and both found that the optimal lag length is 2.

Table 4: Granger Causality Tests Results (2 lags)

View | Proc | Object | Print | Name | Freeze | Sample | Sheet | Stats | Spec

Pairwise Granger Causality Tests
Date: 03/31/18 Time: 22:38
Sample: 1996 2016
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
GDP_GROWTH does not Granger Cause REMITTANCES	19	1.10413	0.3587
REMITTANCES does not Granger Cause GDP_GROWTH		1.35322	0.2902

Source: Research calculation

The results from the causality analysis are showing the inter-relationship between the remittances and the GDP growth rate. The Granger Causality test gives information about the impact of one variable on the other and vice versa. As we mentioned before, although the main target of our interest is ascertaining whether the remittances contribute to the growth of GDP, the analysis have given us broader information.

From the Table 3 we can conclude that we failed to reject the hull hypothesis that remittances does not granger cause GDP growth rate. We have considered 5% level of significance, which is usually set as mostly acceptable, and since p value is bigger than the accepted value of significance of 5%, we will accept the null hypothesis and conclude that the past values of remittances cannot be used as a credible base for forecasting the future value of the GDP growth rate.

Although the impact of GDP growth rate on remittances is not the exact field of interest of this paper, we will comment the results. The p value in is in the range 0.35, which is far above the determined level of significance of 5%. The results suggest that we failed to reject the null hypothesis, that GDP growth rate does not Granger Cause remittances. The results indicate that GDP growth rate is not a variable that determines the future value of remittances.

The Granger Causality test which explored the causality relationship between the GDP growth rate and the remittances in the Republic of Macedonia showed that GDP growth rate is not connected with the level of remittances in the Republic of Macedonia. The results were expected, considering the fact that remittances are mainly consumption smoothing and very small share of the

overall remittances are directed towards investments. Of course that increase in consumption will increase the production of tradable and non-tradable goods, but a part will be compensated with import. That is the reason why consumption smoothing remittances do not have always positive impact on GDP growth. Contrary, remittances which are directed toward investments have more positive impact on GDP growth rate.

5 CONCLUSION

Remittances are very important for developing countries. The total remittances inflows toward developing countries have reached $582 billion in 2015, of which about 70-75% are directed to developing countries, where they approximately represent about 27% of GDP. The data themselves indicates the importance of the remittances for the overall economic stability and prosperity in the developing countries. Remittances have many positive impacts on recipient economies, such as shock mitigation and stabilization of the economy, poverty reduction, balance of payment stabilization, economic development boosting, etc..Despite these positive effects, remittances might have some negative implications on the economy, and may lead to the so-called "Dutch disease". The effects from the remittances mainly depend on their usage – whether they are consumption smoothing or self – interest. Remittances produce greatest positive effects, if they are self - interest, since they stimulate the investments and increase the production.

The main objective of this paper was to discover whether the remittances inflows in Macedonia influence on GDP growth in the country. We have conducted Johanses cointegration test and Granger causality test, in order to determine whether there is a long-run relationship between the variables and whether remittances can be used as a basis for forecasting the future values of GDO growth.

The results from the Johanses Cointegration test have shown that there is not any cointegration between remittances and GDP growth rate, which means that there is not long-run relationship between the variables. The results from the Granger Causality test have suggested that we should accept the null hypothesis that remittances does not granger cause GDP growth rate, which means that the past values of remittances can not be used as credible base for forecasting the future values of GDP growth.

The analysis from Johanses cointegration test as well as from the Granger causality test, have confirm our expectations that remittances do not influence

on GDP growth. The main reason for that is the fact that remittances inflows in Macedonia are mostly altruistic – consumption smoothing, and not self-interested which are directed towards investments and savings. Contrary to self– interest remittances, which always increase the production, the altruistic remittances may have the different impact. Namely, they increase the overall consumption of tradable and non-tradable goods, and in most cases they increase the import. As a result in some cases they do not influence on GDP growth, just like it is the case in Macedonia.

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PERFORMANCE MEASUREMENT: THE EVIDENCE FROM CZECH AND SLOVAK ENTERPRISES

Roman Zámečník, Rastislav Rajnoha

Abstract: *We are currently seeing the growth in significance and emphasis of a range of new success factors – which are for the time being under-used in Controlling, and which are mutually interlinked and interdependent. Performance Measurement tools can be successfully applied to the resolution of the above-mentioned problems. For this reason, this paper presents selected research results oriented on business process performance measurement in Czech and Slovak enterprises. The theoretical part of the paper provides a detailed characterisation of the current state of affairs of the investigated performance measurement issue. The following part of the paper defines the basic research methodology and expected contributions of the study. In the final part of the paper, results of the survey are introduced.*

Keywords*: Controlling, Performance Management, Performance Measurement, Business Process Management*

JEL classifications: *L25, M21*

1 INTRODUCTION

The traditional heavily financially-oriented management concept that predominantly works on the basis of numerical figures and on the balance sheet and accounting statements is being faced by an ever-growing degree of criticism both by academic scientists and working practice. This criticism is directed towards many differing aspects. Apart from the neglection of non-monetary indices, it points up among others, the lack of inter-linkage with strategic planning, its overly-dependent orientation on the past and on the short-term, its woefully insufficient orientation on the customer, and incorrect index points for incentives. Based upon these deficits, the end of the nineteen-eighties saw the first attempts to create new concepts. Professional literature written in English in the fields of Controlling and Management began to use the term "Performance Measurement" in order to describe conceptual new beginnings as well as the use of these new concepts and indices for the management of

enterprises. This paper is oriented on the presentation of selected research results relating to business process performance measurement in Czech and Slovak enterprises. The outcomes of our research study investigation are concurrently confronted with those arising from professional studies conducted above all in Germany and in Austria.

2 LITERATURE REVIEW

Performance measurement system define X. Gimbert, J. Bisbe and X. Mendoza (2010) as a set of financial and non-financial measures to support enterprise decision-making by collecting, processing and analyzing quantified information regarding its performance and presented in a brief review. A subset of this category is a strategic performance measurement system (SPMS), whose typical feature is the design of these systems to support decision making by managers through financial and also non-financial indicators covering different perspectives and which in combination enables to transform strategy into a comprehensive set of performance measures (Chenhall, 2005).

In the current conditions, competition in the market is not easy for businesses, without a critical information and data even impossible. At present, information is becoming one of the factors of production enterprises and therefore the enterprise's information system is a key factor in business competitiveness (Frankovský, Štefko, Baumgartner, 2006). Higher-quality, lower-cost information is a key to unlocking more sources of finance for SMEs (Belás et al., 2016). As the report of RSA Tomorrow's Company shows (Neely et al., 2000), to achieve a sustainable corporate success in the demanding world market the enterprise should use some relevant indicators to measure business performance. Among the contemporary problems which businesses have to face in connection with the strategic management we can mention the problem of strategy implementation. Currently, performance measuring can significantly contribute to achieving and solving this problem. The importance of these problems has significantly increased during the economic crisis, because many enterprises in the world reduced their performance (Novák, Popesko, 2014).

The most typical example of such systems is a system of balanced objectives and indicators so called Balanced Scorecard (BSC). This presents a fundamental change in the basic assumptions about performance measurement and complements traditional financial indicators with a measure the performance of the customer perspective, internal processes, perspective of

growth and learning with a focus on current and future success of the business (Kaplan, Norton, 1993). BSC can be also useful in creating a new corporate culture, corresponding to the strategy in terms of shared assumptions about the mission, strategy and objectives, in understanding the means to achieve these goals, measuring results and reactions when events do not respond to the plan (Gibbons, Kaplan, 2015).

The term "Performance Measurement (Business Performance Measurement, Corporate Performance Measurement or Enterprise Performance Measurement)" means the creation and use of usually several indicators of various dimensions (e.g., cost, time, quality, innovation capacity, customer satisfaction), which are used to assess effectiveness and efficiency of the performance and performance potentials of different objects in the enterprise, the so-called levels of performance (e.g., organizational units of various sizes, staff, processes), as indicated, e.g., by Reiss (1992), Neely et al. (1995) and Gleich (1997). Based on a critical literature review, we identified the following most frequently used methods and performance management and measurement tools (Young and O'Byrne, 2001; Neely et al., 2002; Gleich, 2002; Strack and Villis, 2002; Tangen, 2004; Wulf and Hoboken, 2006; Neely, 2007; and others:

- Management Accounting (based on the traditional absorption costing and alternative variable costing),
- Process management accounting method (including the concepts of ABM, ABC, ABB),
- Controlling,
- Classical financial performance indicators (especially indicators of the absolute value of earnings, cash flow and profitability indicators),
- Balanced Scorecard (BSC),
- Total Quality Management (including the concepts of European Foundation for Quality Management (EFQM), Malcolm Baldrige National Quality Award, Six Sigma, Benchmarking),
- Value Based Management (VBM),
- Theory of Constraints,
- Business Process Reengineering,
- Lean Production (including JIT and Kanban concepts).

For several years, measuring corporate performance has been in the centre of attention not only in the academic field but also in business area. New approaches to corporate performance which support traditional indicators have been preferred for some years. The examination of the measuring corporate performance issues is dedicated to many authors from different points of view: the effect of the Balanced Scorecard (BSC) concept and its importance as a strategic tool for measuring and managing business and management performance (Knápková, Homolka, Pavelková, 2014), the effect of strategic performance measurement system of human resources and corporate results (Bento, White, 2014), the relations among customer satisfaction, customer loyalty and financial performance of a commercial bank (Belás, Gabčová, 2016), the customer satisfaction in banking business and its importance for financial performance of commercial bank (Korauš, Štefko, Dobrovič, 2015), the tax revenue administration and its process model for Slovakia's economic performance (Dobrovič, Korauš, 2015), the strategic business performance management on the base of controlling and managerial information support (Zámečník, Rajnoha, 2015). Štefko et al. analyzed the prices as a key competitive factor in the steel industry in Slovakia and Poland (Štefko, Slusarczyk, Kot, Kolmasiak, 2012).

Next research was focused on business performance in scope of investment measurement and management using of investment effectiveness evaluation methods. Research results confirmed some assumptions, that use of investment valuation methods is limited by foreign ownership of company and certain methods caused better business performance (Rajnoha, Novák, Merková, 2016). Similar study is dedicated to the issue of the process performance measurement in Czech companies (Tuček et al., 2013).

3 RESEARCH METHODOLOGY

This paper sets out to present selected results and outcomes of some research oriented on the mapping of the current situation in the field of activity performance measurement using Controlling in Czech and Slovak enterprises. To be specific, the results set out in the introductory section of the research study (i.e. the evaluation of the first two questions in the questionnaire) – which were targeted on the exploitation of Process Management (ProM) and the measurement and evaluation of an enterprise's processes Performance Measurement (PMes) in the enterprises that we addressed. Our research study was oriented on encouraging and determining responses to questions which characterise the situation extant in the field of the evaluation the quality of the

performance of the Controlling function in the enterprises we investigated. Our aim was above all to monitor the current situation regarding the given field of problems and issues in Czech and Slovak enterprises and, at the same time, equally to discover the potential opportunities, possibilities and interest of those questioned regarding their future implementation in the business practices of these enterprises. The research study we undertook sought for answers to the following basic questions:

- What is the current state of affairs pertaining in the fields of performance measurement and evaluation and the optimalisation of the Controlling processes in the everyday practices of Czech and Slovak enterprises?
- Is the measurement and evaluation of the enterprise's process ranked as one of the fundamental tasks of the enterprise's Controlling activities?
- What indices can (best) be used to realise such measurement and evaluation activities?
- Does Performance Measurement (i.e. Controlling) contribute to growth in the enterprise's value?
- If yes, how and in what ways can this contribution be quantified?

The research study took place in two phases – the quantitative and the qualitative. Herein below, we will outline the results and outcomes of the quantitative phase. In order to be able to create a sample, we used a technique based upon the Random selection Method – i.e. a targeted selection. While the random selection method does not guarantee in and of itself the true representative nature of the sample, and also makes generalisation on the basis of the attained results more difficult – it is, in essence, the only way to acquire certain "sensitive" data. This research study included individuals or enterprises of other organisations that the researchers considered to be suitable for the purposes of this research study.The user data-base of the company - Controller-Institut, Contrast Consulting Praha, spol. s.r.o (Prague, Co. Ltd.) was used for the purpose of identifying and selecting appropriate respondents. This database was deliberately chosen with a view to the character of the problems and issue to be resolved and to the narrowly sector-specificity of the investigative questionnaire – which presupposed (counted on) the existence of a Controlling department within the enterprises and organisations under investigation and which this database guarantees. The people addressed by our questionnaire were the Heads of the Controlling Department/Section in our selected targets. Overall, we addressed some 748 companies and organisations (652 Czech and

96 Slovak). We elected the quantitative investigative method to be the key method used for our questionnaire. We used the questionnaire method for the following reasons:

- To acquire data from a larger number of respondents than, for instance, from interviews.
- To try to ensure greater unity of the data, i.e. that it was more quantifiable and the ability to be able to process it using statistical approaches.
- To generate more openness and honesty from the respondents through the anonymity offered by a questionnaire.
- It is more efficient and leads to greater time savings than interviews and qualitative methods.
- To try to reduce the degree of subjectivity of the questioners.

The questionnaire was sent out to all of the above-mentioned 748 enterprises and organisations. We received 59 completed questionnaires. Relevant data for quantitative investigative purposes was contained in 56 of these questionnaires. Therefore, the so-called "return rate" amounted to not quite 8 %. We can therefore classify this as being a very low response rate. It is however necessary to take the very narrow orientation of the questionnaire into consideration as well as the "sensitivity" of the data under investigation. Were we to compare this response rate with similar research studies in the field of Controlling either in the Czech Republic or in Germany or Austria, we would begin to see the achieved rate in a somewhat different light. The Controller – Institut company shows a response rate of about 10 % for similar research it has conducted. Eschenbach (2004, pp. 158 – 159), mentions a response rate for research conducted in the field of Controlling in German-speaking countries for the period 1976 – 1993. This was within the range of 7 % to 47 %. These research studies were however much more general in their character and nature. The actual subject of our research study was therefore the 56 Czech and Slovak enterprises and organisations who filled in and returned our questionnaire and which were part of the Controller-Institut, Contrast Consulting Praha, spol. s r.o. `s database. The conception of the analysis of the individual responses to the questions was oriented on the determination of the basic indices for a given set – i.e. the absolute and relative frequency of the chosen distinguishing features. The results are presented in a descriptive, graphical form, accompanied by a statistical analysis.

4 RESULTS AND DISCUSSION

This section contains the results and outcomes of our evaluation of the introductory part of the questionnaire, which were targeted on the discovery of the basic areas requisite for the successful measurement and subsequent evaluation of the performance of an enterprise's activities (i.e. of its Controlling) processes. The intent was to discover whether the enterprise/organisation in question applied Process Management techniques, evaluated its processes with the aid of pre-defined indices, what measurement and evaluation tools it used for the measurement and evaluation of their performance, etc.

Evaluation of Question №. 1

Qn. 1. Please mark with a cross (x) the possibility which best corresponds to the situation in your company.

The first question in the questionnaire had a general orientation on the use of Process Management in the companies being analysed. This question is composed of a total of eight sub-questions (1a – 1h, see Table 1). In the course of the statistical evaluation, consideration was taken of the size of the company in question (1 – micro-enterprise, 2 – small enterprise, 3 – medium-sized enterprise, 4 – large-scale enterprise). This form of designation was used throughout the questionnaire for all of the other questions.

Tab. 1: Evaluation of Question № 1 in the questionnaire

	YES	NO
a) Has your company created a (complete) list of all of its processes?		
b) Are all of its activities a component of one of these company processes?		
c) Does each company process have its own defined indices, by means of which this process is measured and evaluated?		
d) Is there a set periodicity to the recording of the values of the given indices?		
e) Has responsibility for the evaluation of the given indices been allocated/defined?		
f) Have correctional measures been set in place to counter exceeding the set values for these indices?		
g) Does data regarding the cost of company processes exist for the last accounting period?		
h) Does company performance evaluation serve as the basis for its improvement?		

Source: Own

The Results and outcomes of the analysis of the first question are presented with the aid of Tab 2, which only depicts a summary of the values for the whole multiple of the enterprises/organisations under investigation (i.e. the mean

values for the individual sub-questions and the size of the enterprises/organisations are designated for their positive response). As is clear from Tab. 2, 63 % of the analysed enterprises/organisations have already created lists of all of their company processes. 59% of the v questioned indicated that all of their activities are components of some other process. Despite this fact however, only in 41 of these enterprises/organisations has each of these company processes been allocated a defined index by means of which these processes are measured and evaluated. 68% of these enterprises/organisations regularly record the values of the given index, and for 70 % of these enterprises/organisations, responsibility for the measurement and evaluation has also been allocated. 54% of the enterprises/organisations we investigated set corrective measures for cases where the set values of a given index have been exceeded. The costliness of a given process is tracked in 64% of these enterprises/organisations, and for 80 % of them the measurement and evaluation of its processes serves as the basis for their improvement.

Tab. 2: Relative frequency of responses – Evaluation of Question №. 1

	Size:				
Sub-question:	1	2	3	4	**Overall Average:**
1a	0.60	0.50	0.76	0.64	0.63
1b	0.80	0.31	0.65	0.72	0.59
1c	0.60	0.25	0.53	0.39	0.41
1d	0.60	0.50	0.82	0.72	0.68
1e	0.60	0.50	0.76	0.83	0.70
1f	0.40	0.31	0.59	0.72	0.54
1g	0.40	0.50	0.71	0.78	0.64
1h	0.60	0.63	0.94	0.89	0.80

Source:Own

Evaluation of Question №. 2

Qn. 2. Which of the following systems for the measurement and evaluation of enterprises or of its processes respectively (i.e. Performance Measurement – further only: PM) does your company use?

a) The Activity Based Costing (ABC) Method
b) The Balanced Scorecard (BSC) Method
c) The Benchmarking Method
d) The European Foundation for Quality Management (EFQM) Method
e) The Performance Pyramid Method
f) The Six Sigma Method
g) The Du Pont System of Indices
h) The Value Based Management (VBM) Method
i) Other …

The second question's aim was to clarify which systems for measuring and evaluating company performance levels are used most frequently in the everyday practices of Czech and Slovak enterprises. It is composed of 9 sub-questions in total, which represent concrete company process performance level measurement and evaluation tools (2a – 2i). The results and outcomes of the analysis of this part of the questionnaire are shown in Tab. 3.

Tab. 3: Relative frequency of responses – Evaluation of Question №. 2

Sub-question:	Size: 1	2	3	4	Overall Average:
2a	0.40	0.13	0.24	0.33	0.25
2b	0.00	0.25	0.09	0.39	0.22
2c	0.00	0.25	0.47	0.56	0.39
2d	0.00	0.06	0.12	0.11	0.09
2e	0.00	0.00	0.00	0.00	0.00
2f	0.00	0.00	0.06	0.11	0.05
2g	0.20	0.13	0.15	0.17	0.15
2h	0.00	0.06	0.06	0.11	0.07
2i	0.00	0.06	0.24	0.33	0.20

Source: Own

As is clear from the distribution of the relative frequency (of responses), the method that is most frequently used for the measurement and evaluation of the performance levels of company processes is the Benchmarking Method. It is clear to see that this method has undergone a significant increase and expansion of its use in our enterprises and organisations over the past few years. Solař and Bartoš (2003, pp. 19 – 20) have stated that these methods are inadequately used in the Czech Republic, and have mentioned the following reasons for this insufficient widespread usage of the Benchmarking method as a suitable method for the measurement and evaluation of a company's performance levels:

- A general prevailing tendency to overvalue their own results.
- A generally accepted moral approach – in that, "it is dishonest to copy and to appropriate someone else's results for yourself."
- Little motivation on the part of analysts to improve their own enterprise.
- A company culture that refuses information from outside its own borders.

- The fundamental resistance of top managements to admit to their own insufficiencies and to adopt "foreign" approaches.
- Poor accessibility of the relevant information.

In total, this method is used by 39 % of the respondents` enterprises or organisations. A quarter of the enterprises under investigation (i.e. 14) indicated that they use the Activity Based Costing method. If we were to compare the general use of the ABC method with research studies which took place earlier here, then there is a clear shift in the use and exploitation of this method. Popesko (2004, p. 93), in his evaluation of his research study oriented on the use of calculation methods in Czech enterprises and organisations states, that only 5 % of the companies he analysed in the basic set made up of a total of 117 enterprises and organisations use the ABC/M method. Further, this piece of research was also targeted on discovering the reasons arguing for and against the implementation of the ABC/M method. An interesting outcome is the relatively high percentage of enterprises and organisations which have considered implementing the ABC/M method, but who subsequently discarded the implementation impulse. They mainly justify their decision especially on the basis of how demanding this method is due to the sheer expanse of the data to be processed, insufficient pre-suppositions, a bad IS system, their wide product and series range, the unsuitable character of the production process itself, or even the low share of overhead costs on overall costs. The reason why other organisations have never interested themselves in these methods is above all their lack of knowledge about it, or a lack of sufficient information regarding the use and exploitation of these methods, or as the case may be – the lack of independence of the leadership due to the dominance of decision-making by the owners of the enterprise or organisation.

The reasons which led these organisations and enterprises to implement these methods were ranked by Popesko (2004, p. 100) according to their frequency of occurrence in the responses and this ranking demonstrated their degree of importance within the sample set he investigated (Table 4).

Tab. 4: Reasons for implementing the ABC/M Method

	Reason for implementation:	Frequency Rate:
1.-2.	The original system did not reflect the differences in the execution of operations	6
1.-2.	Improving the quality of information about the operations	6
3.	The need to change prices due to greater competition	5
4.	The necessity to reduce costs	4
5.-6.	Growth in innovation activities	1
5.-6.	Changes in the processes of the creation of operations	1

Source: Popesko (2004, p. 100)

The EFQM system is used by approximately 9 % of the sample enterprises and organisations which took part in this research study. The Performance Pyramid Method remains for the time being a complete unknown for the Czech and Slovak enterprises and organisations we investigated. Not one of the enterprise or organisation makes use of this method. As was confirmed by Günther and Grüning (2000, p. 4), this method does not have great significance in everyday practice and is not so well-known. This was documented in a piece of research conducted in 2000, where only 3 of 123 German enterprises and organisations used this method and it was known by only 10 of the enterprises and organisations addressed in the research study. Recently, the buzzword on everyone's lips is the Six Sigma methd, but this is only used by 5 % enterprises and organisations within the context of the measurement and evaluation of their processes` performance. 15 % of the analysed enterprises and organisations use the classical (and well-known) Du Pont System of Indices method for these purposes. In the same piece of research mentioned above, Günther and Grüning (2000, p. 3) indicate its use in 7 enterprises and organisations and that it is known by 51 enterprises and organisations of the total number of 123 that they investigated. The Value-based Management Concept is used by 7 % of the enterprises and organisations in our sample. For comparison purposes, we once again will make use of the piece of research work conducted by Günther and Grüning (2000, p. 3):

- 11 enterprises and organisations put this method into practice.
- 12 enterprises and organisations were in the implementation phase.
- 23 enterprises and organisations made use of only the basic concepts of this method.
- 25 enterprises and organisations knew about this method, but did not use it.

For interest's sake, we will once again make use of the overall results of Günther and Grüning`s research study regarding the extent to which PM systems are in use in German enterprises and organisations. In 2000, 36 % of German enterprises and organisations already made use of PM systems in their working practices, while 17 % of the enterprises and organisations were in the implementation phase of some sort of PM system. 15 % of the enterprises and organisations at the time were investigating the possibilities and opportunities of using one or more of these systems in their enterprises and organisations. 20 % of the investigated enterprises and organisations mentioned that they used another system for measuring and evaluating the performance levels of their processes. The most frequently mentioned were the ISO 9001 and 14001 norms and the EVA indices for value-added. Furthermore, enterprises and organisations usually make use of a set of their own specific indicators for these purposes. One of the enterprises and organisations we investigated indicated that it used the Variable Costs Method and the Surcharge/Mark-up Calculation Method. We have left discussion of the Balanced Scorecard method – which somewhat surprisingly ranked third as to its level of use in the enterprises and organisations that we investigated to the conclusion of our evaluation. It is used by only 22 % of the enterprises and organisations to measure and evaluate their process performance levels. These results however, roughly correspond to the outcomes of the research that was conducted by the Controller-Institut, Contrast Consulting Praha, spol. s r.o. company in 2002. This study was in the form of a questionnaire-based investigation and was targeted on respondents in managerial positions. 384 enterprises and organisations were randomly selected from its database; of which 56 enterprises or organisations responded, which represents a return (response) rate of not quite l5 %. In view of the small number of those questioned, while it is not possible to generalise the results and outcomes of this study for the whole of the Czech Republic, they can however be used to indicate the current state of affairs regarding the use of BSC, as well as its potential trends here. BSC is used in 56 Czech enterprises or organisations. The first group is made up of enterprises or organisations which had set up a BSC system. If we were to add these to those enterprises or organisations which were in the process of creating such a system at the time the study was conducted, the result would then be 30 % who had actively encountered the use of the BSC method. A positive fact is the reality that 83 % of the respondents knew the term Balanced Scorecard. Unfortunately, however, at the present time a more detailed research study mapping the current extent of the use of BSC in our enterprises and organisations is still lacking. One year later, once again under the aegis of the Controller – Institut, a similar research

study was conducted that was oriented on the degree of familiarity with and the extent to which it was used of the concept of the BSC method. This study was targeted on large-scale Czech enterprises and organisations and the information acquired from the 68 respondents was processed and evaluated. From the results and outcomes of this study, it is clear that while the concept of the BSC method has a relatively widespread level of familiarity in these large-scale enterprises and organisations, its use continues to remain relatively low. This fact is documented by selected results from this study. To begin with, we shall first mention the results relating to the degree of familiarity of Czech large-scale enterprises and organisations with the concept of the BSC method:

- 16 % of them have a very good knowledge of the BSC concept.
- Another 37 % indicated that they have a good knowledge of this concept.
- 29 % of them have only "heard about" the BSC concept.
- 16 % have yet to hear about this concept.
- 2 % of the respondents did not reply to this question.

Within the context of this study, the extent to which the BSC concept is used was established:

- The extent of the use of the BSC method is relatively low in Czech enterprises and organisations – only 15 % of them indicated that they used the BSC method.
- 7 % of these enterprises and organisations were in the process of creating a BSC system, and in 2 % of these enterprises and organisations the creation of a BSC concept was in the planning stage.
- 10 % of these enterprises and organisations were considering the implementation of a BSC concept.
- 18 % of these enterprises and organisations had no plans at all to introduce a BSC system, and 45 % of them had "only heard about" the BSC method – or had not even heard about it; it can therefore be supposed that the introduction or implementation of a BSC system was not a matter of the "order of the day" for these enterprises or organisations.
- 2 % of these enterprises or organisations did not respond at all to this question. (Bazal, 2004)

What was interesting was the reasons given for not introducing or implementing a BSC system, these are shown in Table 5.

Tab. 5: Reasons for not implementing the BSC concept in large-scale Czech enterprises and organisations

Reasons for not implementing the BSC concept (n=11 enterprises and organisations)	**Agreement** (%)
A similar management system already exists within the enterprise or organisation	27
It very difficult to identify non-monetary indices and data	27
The high costs associated with the creation of a BSC system	18
The BSC method is just a fashionable trend	18
Success with the use of a BSC system is uncertain	18
The existing management system within the enterprise or organisation is sufficient	18

Source: Bazal (2004, p.15)

An important discovery was that 80 % of the enterprises and organisations that were approached perceived the BSC method as underpinning and supporting the measurement and evaluation of process performance levels, and 56 % of them also saw a link with the reward and remuneration system. We analyse this phenomenon more deeply in various industries in Slovakia, along with other select tools and concepts of strategic business performance management from the quantitative point of view analysing the frequency of their use in the firms.

The analysis of the frequency of use of the concepts, methods and tools for strategic management of business performance is based mostly on the data given in the Table 6. The analysis shows that in the long-term, companies most often use data mainly from financial accounting (the total as many as 86% of enterprises). The data taken from managerial accounting (47%) and quality management systems (45%) is also used quite intensely for more than 5 years. The concept of controlling is also relatively popular, as about 39% of companies reviewed use it and an additional 9% of companies plans to use it in the future. Other concepts and tools are used in very limited numbers.

Tab. 6: Frequency of response: The use of selected concepts and tools for strategic business performance management

	Selected concepts and tools for strategic business performance management	We do not use it	We do not use it but we plan to	We have used it for <2 year	We have used it for 2-5 years	We have used it for > 5 years
1	Financial indicators based on	17	6	20	20	101
%	data from financial accounting	10.37	3.66	12.20	12.20	61.59
2	The outputs from managerial	73	14	14	10	53
%	accounting	44.51	8.54	8.54	6.10	32.32
3	Controlling	85	15	16	13	35
%		51.83	9.15	9.76	7.93	21.34
4	Balanced Scorecard (BSC)	142	7	3	6	6
%		86.59	4.27	1.83	3.66	3.66
5	Economic Value Added	123	7	12	8	14
%	(EVA)	75.00	4.27	7.32	4.88	8.54
6	ABC costing (Activity Based	116	11	6	7	24
%	Costing)	70.73	6.71	3.66	4.27	14.63
7	Knowledge information	134	18	3	4	5
%	system type BI (Business Intelligence)	81.71	10.98	1.83	2.44	3.05
8	Quality Management System	78	12	9	18	47
%		47.56	7.32	5.49	10.98	28.66
9	Lean and Kaizen management	144	4	6	5	5
%		87.80	2.44	3.66	3.05	3.05
10	The concept of CRM	142	8	5	4	5
%		86.59	4.88	3.05	2.44	3.05
11	The KPI	129	7	4	12	12
%	(Key Performance Indicators)	78.66	4.27	2.44	7.32	7.32

Source: Own

5 CONCLUSION

The results and outcomes of our research study confirmed the fact, pointed out by Solař (2000, p.5) for instance, who stated that: "the field of the measurement and evaluation of enterprises and organisations performance is – both in theory and in the practices of Czech managements, unpopular and considered as a matter of course to be resolved within the framework of the existing information systems in these enterprises and organisations." Solař further went on to generalise and state, that without a basic feedback mechanism, which is created by systems for the measurement and evaluation of enterprises and organisations performance and processes, no progressive form of management

can exist or function – thus, not even the Controlling function, since the old saw: "What I don't (or can't) measure – I can't manage" still holds true and is generally valid. It was also obvious from the results and outcomes of the research study that was conducted that Czech and Slovak enterprises and organisations still devote a lot less than sufficient attention to the measurement and evaluation of their companies` processes, than these would actually deserve.

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