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DAŇOVÁ KONKURENCIA Z POHĽADU ZDANENIA A VPLYVU MAKROEKONOMICKÝCH DETERMINANTOV

TAX COMPETITIVENESS FROM THE PERSPECTIVE OF TAXATION AND INFLUENCE OF MACROECONOMIC DETERMINANTS

Alena Andrejovská, Erika Liptáková

Abstract: *Market economy, capital mobility and heterogeneity of the tax system currently creates strong pressure on investors in determining the location of investment. The countries are attracting the foreign investors to increase their competitiveness and attractiveness of tax. The aim of this paper is to assess tax competitiveness of new and old member states in regards macroeconomic situation. Submitted contribution deals with the issue of tax competition between the new and old EU Member States through the economically transparent and effective categorization of the EU countries with regard to the predetermined segmentation criteria using hierarchical Ward's method of clustering. The final group of these multidimensional objects with characteristic features were compared to each other and subjected to economic verification and quantification of the impact of selected macroeconomic indicators to the overall amount of tax revenues from the view of the tax competitiveness. Quantification was carried out by means of regression analysis, the random and fixed effect models were used (pooling, fixed effects and random effects model). The analysis confirmed that the differences are particularly important in the level of nominal and effective corporate taxation between the old and new EU Member States. The gross domestic product, employment and foreign direct investment showed the biggest impact on the tax revenues(strongcorrelation).*

Keywords: *Tax competitiveness, Macroeconomic indicators, Tax burden, Income tax, Corporate taxation*

JEL Classification*: H21, H25.*

Úvod

Daň z príjmov právnických osôb je korporátna daň, ktorá v sebe agreguje ekonomické, politické, ale aj sociálne aspekty. Jedným z posledných trendov v celkovom vývoji daní za posledné dve desaťročia je presun daňového zaťaženia z priamych na nepriame dane. Tento zámer sa zintenzívnil najmä po roku 2009, kedy v rámci krajín EÚ-27, výnos z nepriamych daní rástol o 0,90 % za obdobie 2009-2012, kým priemer daňového zaťaženia podnikov klesal o 0,20 % za to isté obdobie. Trendami v zdaňovaní korporácií sú najmä rozširovanie daňového základu a daňová transparentnosť. Jedným z dôvodov presunu daňového zaťaženia je okrem odporúčaní Európskej komisie aj skutočnosť, že korporátne dane sú považované za najviac distorzné a škodlivé pre ekonomický rast.

Prínos príspevku spočíva v posúdení konkurencieschopnosti nových a starých členských krajín so zreteľom na makroekonomické determinanty, ktoré túto konkurencieschopnosť ovplyvňujú.

1 Formulácia problematiky

Druhá polovica 20. storočia bola charakterizovaná nástupom globalizácie a prechodu od regionálnych trhových systémov k celosvetovým. V tomto období došlo k výraznému pohybu v medzinárodnom obchode, k presunu kapitálu a k mobilite daňových základov, čo málo za následok prelínanie rôznych daňových systémov. Dôvody, kvôli ktorým sa daňové systémy jednotlivých krajín odlišovali a samostatne vyvíjali, prestávali platiť (Kawano a Slemrod, 2014). Jednotlivé krajiny, ktoré mali vybudované vlastné daňové systémy odvodené od svojich národných tradícií vrátane náboženstva, prírodných podmienok, politickej situácie, zvyklostí museli zrazu reagovať na daňové systémy obchodných partnerov. Čím narastal tlak daňovej konkurencie, prostredníctvom ktorej sa krajiny snažili prilákať viac kapitálu, alebo zdaniteľného zisku, a to najmä znížením sadzby dane na kapitál (Bird, Martinez-Vazquez, a Torgler, 2008).

Daňová konkurencia rozdeľuje odborníkov na dve skupiny. Jednu skupinu tvoria predstavitelia, ktorí ju považujú za pozitívnu pre ekonomický rast (Tiebout, 1956; Fenochietto a Pessino, 2013). Zástancovia daňovej konkurencie argumentujú názorom o pozitívnom vplyve na zvýšenie efektivity verejných financií a výberu daní. Ako uvádza (Szarowská, 2013), niektorí autori ju chápu ako pozitívnu bariéru pre rozpínavosť verejného sektora a obmedzovanie rozvoja súkromného sektora. Druhá skupina odborníkov ju považuje za škodlivú (Cassou, 1997; Alstadsæter a Fjærli, 2009; Heinemann, Overesch, a Rincke, 2010; Devereux a Griffith, 1998). Poukazujú na okolnosti, že vo verejných financiách trh zlyháva, a tým ohrozuje daňové príjmy a nemôže zaistiť efektívnu alokáciu daňových zdrojov. Ťažiskom problémov je možnosť daňovníkov platiť dane v štátoch s nízkym daňovým zaťažením a zároveň využívať vysoko kvalitné verejné služby v štáte s vysokým daňovým zaťažením. Vyššie daňové zaťaženie v jednotlivých krajinách nemusí vždy odradiť investorov od výnosného investovania. Krajina, ktorá má vyššie daňové zaťaženie môže ľahko prilákať investorov na zdravé makroekonomické prostredie, dobre vybudovanú infraštruktúru a kvalitné verejné služby. Na druhej strane nízke daňové zaťaženie nemusí byť vždy zárukou výnosnosti investícií (Haufler a Stähler, 2013). V Európe sa problém daňovej konkurencie prejavuje už od začiatku šesťdesiatych rokov 20-teho storočia. Vo viacerých krajinách sa v tomto období začalo s poklesom nominálnych sadzieb daní, čo malo za následok negatívny vplyv na fiškálne externality, ktoré vychádzali z nezávislej súťaže mobilných základov dane. Je nevyhnutné zdôrazniť, že od polovice roku 1980, boli vo všetkých krajinách podstatne znížené štatutárne korporátne daňové sadzby. Tento jav pretrváva dodnes a ich klesajúca tendencia je permanentne viditeľná (staré a nové členské krajiny) hlavne pri použití efektívnej priemernej daňovej sadzby, čo má za následok rozšírenie daňového základu, ku ktorému došlo v mnohých krajinách. Daňová konkurencia vždy existovala a bude existovať (Piancastelli, 2001). Daňovým subjektom vďaka tomu ponúka stále väčší priestor na presun daňových základov do krajín s nižšou úrovňou zdanenia, optimalizáciou daňovej povinnosti, ba dokonca úplnému vyhýbaniu sa platenia daní. Daňové príjmy, ktoré sú príjmami štátneho rozpočtu nie sú ovplyvňované len zmenami sadzby daní, ale aj ďalšími mikro a makroekonomickými faktormi.

2 Metódy, cieľ a dáta

Cieľom príspevku je zhodnotiť daňovú konkurencieschopnosť nových a starých členských krajín s dôrazom na makroekonomickú situáciu. V prvej časti príspevku bola vykonaná ekonomicky priehľadná a účelná kategorizácia krajín EÚ so zreteľom na vopred určené segmentačné kritériá využitím Wardovej hierarchickej metódy zhlukovania. Druhá časť príspevku kvantifikovala vplyv vybraných indikátorov na celkovú výšku daňových príjmov za obdobie 2004 - 2015. Dáta boli štruktúrované ako panelové dáta z databázy Eurostatu (2015) pre 28 členských krajín EÚ. Analýza bola vykonaná v štatistickom programe SAS Enterprise Guide 7.1 a v programe R.

Výber ukazovateľov pre sledovanie daňovej konkurencieschopnosti bol podmienený teoretickými východiskami autorov (Dwenger a Steiner, 2008; Gupta a Object, 2007; Brychta, 2013; Bayer, 2011; Kubátová a Říhová, 2009). Autori sledovali nemalé množstvo determinantov, ktorých vplyv na objem daňových príjmov plynúcich do rozpočtov jednotlivých krajín bol priamy, alebo nepriamy. Stupeň vplyvu týchto faktorov sa líšil v závislosti na intenzite vzťahu medzi jednotlivými premennými. Samotné determinanty boli veľmi špecifické a dynamické javy, ktoré sa neustále vyvíjali a navzájom ovplyvňovali.

Kategorizácia krajín pomocou zhlukovej analýzy bola uskutočnená pomocou viacerých metodických prístupov k štúdiu dát, ktoré boli založené na koncepcii euklidovskej metriky (Monteiro, 2011; Tvaronavičienė, Razminienė, a Piccinetti, 2015). V súlade so stanoveným zámerom príspevku bola v rámci metodológie zhlukovej analýzy využitá hierarchická Wardová linkage metóda (v praxi najčastejšie využívaná) pomocou funkcie hclust() (Arnold, 2003). Analýza bola vykonaná v štatistickom jazyku R s použitím psych, GPArotation, nFactors, cluster a NbClust. Pri analýze boli posudzované tieto makroekonomické determinanty:

- Celkové daňové príjmy: vyjadrujú celkové daňové príjmy z priamych a nepriamych daní v bežných cenách (v mil. €).
- Nominálna (štatutárna) sadzba dane z príjmov PO (NTR), vyjadrená v %.
- Efektívna sadzba dane z príjmov PO (EATR), vyjadrená v %.
- Hrubý domáci produkt: vyjadrený v bežných cenách (v mil. €).
- Miera zamestnanosti: ukazovateľ predstavuje podiel zamestnaných vo veku od 15 do 64 rokov.
- Miera inflácie: meraná na základe harmonizovaného indexu spotrebiteľských cien.
- Verejný dlh: predstavuje verejný dlh ako pomer dlhu k HDP v %.
- Priame zahraničné investície: vyjadrujú pomer prílivu a odlivu priamych zahraničných investícií v bežných cenách (v mil. €).

Keďže vstupné premenné nadobúdali diametrálne rozdielne hodnoty, v prvom kroku analýzy boli dáta transformované pomocou transformácie na z-skóre. Každá položka bola podriadená štandardizácii/normalizácii odpočítaním strednej hodnoty a delením štandardnou odchýlkou, čím sme dosiahli nulovosť strednej hodnoty a jednotkovosť štandardnej odchýlky.

V druhej časti príspevku sme skúmali vplyv spomínaných determinantov pomocou panelovej regresie, pričom: vysvetľovaná (závislá) premenná predstavovala celkové daňové príjmy a vysvetľujúce (nezávislé) premenné predstavovali už spomínané ostatné premenné (Hsiao a Hsiao, 2006; Boubtane, Coulibaly, a Rault, 2013).

Všeobecný panelový model bol definovaný:

$$y_{it} = \alpha + \beta_{it}^{T} x_{it} + u_{it} \quad (1)$$

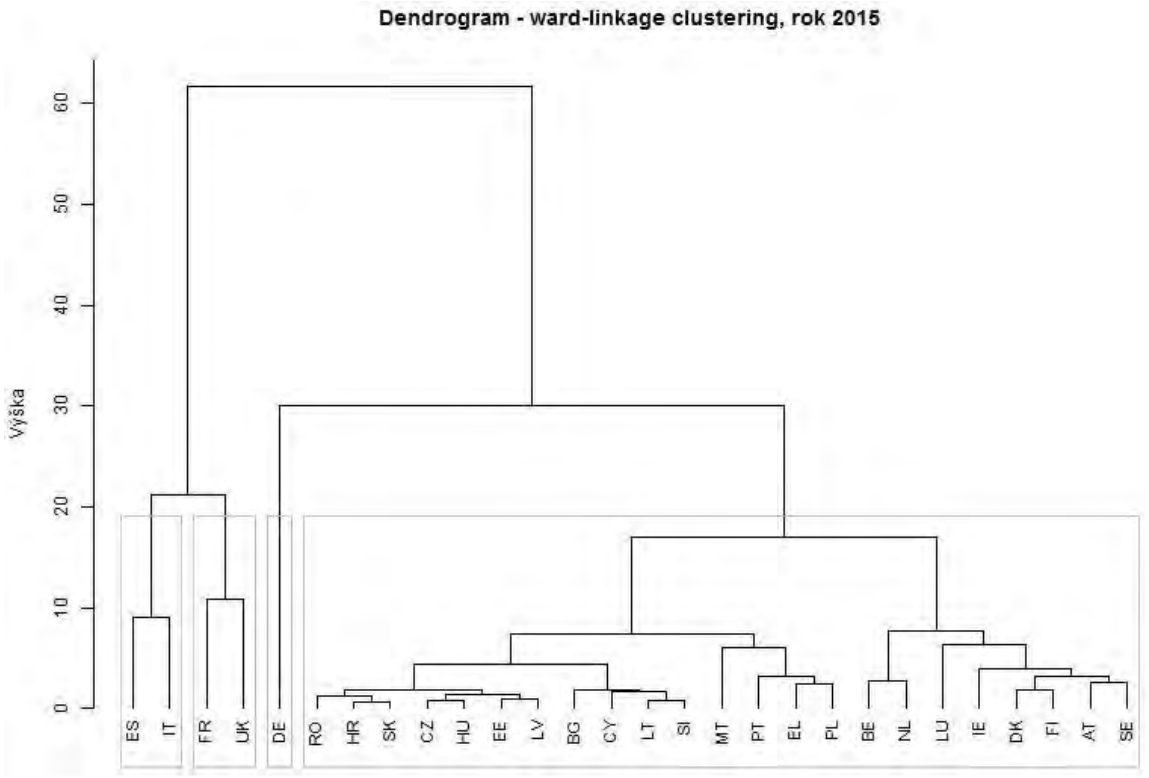
kde y_{it} je závislá premenná (celkové daňové príjmy), x_{it} je vektor vysvetľujúcich premenných (HDP, miera zamestnanosti, miera inflácie, verejný dlh, priame zahraničné investície, štatutárna a efektívna sadzba), $i = 1,\ldots, n$ je index príslušnej krajiny, $t = 1,\ldots, m$ je časový index a u_{it} je chyba modelu so strednou hodnotou rovnou 0. V rámci analýzy boli použité tri modely: pooling model: Pooling model (PM), model fixných efektov: Fixed effects model (FEM) a model náhodných efektov: Random effects model (REM). Pooling model poskytoval neskreslený a efektívny odhad v prípade štatisticky nevýznamných individuálnych chýb. Štatistickú významnosť individuálnych komponentov bolo testované pomocou poolability F testu. Testovanie štatistickej významnosti individuálnych a časových efektov bolo testované pomocou Lagrange multiplier testu a F testu založenom na porovnaní modelov pooling a fixných efektov. Na porovnanie vhodnosti použitia dvoch rôznych špecifikácií modelov a dvoch rôznych estimátorov bol pri analýze použitý univerzálny Hausmanov test. V našom prípade bol tento test použitý na výber medzi modelmi fixných a náhodných efektov. Odhad modelov bol realizovaný v prostredí SAS Enterprise Guide 7.1 (www.sas.com). Vzhľadom k významným rozdielom (silnej korelačnej závislosti) v makroekonomických ukazovateľoch medzi jednotlivými krajinami sme analýzu realizovali osobitne pre 5 ekonomicky najvyspelejších krajín (Nemecko, Spojené Kráľovstvo, Francúzsko, Taliansko, Španielsko) a osobitne pre zvyšných 23 krajín tvorených mixom 10 starých (Belgicko, Dánsko, Fínsko, Grécko, Holandsko, Írsko, Luxembursko, Portugalsko, Rakúsko a Švédsko) a 13 nových (Bulharsko, Cyprus, Česká republika, Estónsko, Chorvátsko, Lotyšsko, Litva, Maďarsko, Malta, Poľsko, Rumunsko, Slovensko a Slovinsko) členských krajín.

3 Výsledky analýz

Dendrogram na Obrázok 1 prezentuje výsledok našej zhlukovej analýzy pomocou Wardovej metódy za rok 2015. Dendrogram rozdeľuje krajiny do štyroch zhlukov s podobnými vlastnosťami v rámci nami vybraných determinantov. Prostredníctvom testu NbClust sme overili správnosť počtu zvolených zhlukov.

Prvé tri zhluky boli tvorené starými členskými krajinami a posledný štvrtý, najpočetnejší (23 krajín), bol tvorený mixom starých a nových členských krajín. Prvý zhluk tvorili Španielsko a Taliansko s najvyšším priemerom daňových sadzieb (štatutárných 29,70 %, ale aj efektívnych 27,45 %), verejným zaťažením (116,00 %) a defláciou na úrovni 0,30 %. Druhý zhluk bol tvorený Francúzskom a Spojeným kráľovstvom. Tento zhluk vykazoval druhý najvyšší verejný dlh (92,50 %) spomedzi sledovaných krajín. Miera inflácie spolu s tretím zhlukom bola na rovnakej úrovni vo výške 0,10 %. Tretiemu zhluku bolo priradené Nemecko, ktorého daňová sadzba bola na úrovni 29,60 % a zaťaženie verejných financií vo výške 71,20 %. Prvý a tretí zhluk boli tvorené výlučne krajinami, ktoré zaraďujeme medzi staré členské krajiny. Posledný štvrtý zhluk bol tvorený mixom starých a nových členských krajín. Ide o zhluk s najnižším priemerom daňových sadzieb (štatutárnych 20,90 % a efektívnych 18,46 %), ale aj verejným zaťažením (67,10 %) a defláciou na úrovni 0,10 %.

Obr. 1: Dendrogram: Wardova metóda (rok 2015)



Zdroj: vlastné spracovanie v programe R

Krajiny v rámci štvrtého zhluku sa vyznačovali nízkym stupňom konvergencie v oblasti korporátneho zdanenia, nakoľko sa nominálna sadzba pohybovala v intervale 10 % – 25 %, čo je omnoho nižší interval ako v predchádzajúcich zhlukoch. Vo štvrtom zhluku môžeme sledovať vzájomné zoskupenie nových členských krajín, ktoré sa zoskupili v prvej a druhej vetve tohto zhluku. Staré členské krajiny naopak vyjadrili svoju vzájomnú blízkosť v tretej a vo štvrtej vetve daného zhluku. Dôvod vzájomnej blízkosti a rozdelenia vo štvrtom zhluku bol vyjadrený hlavne v podobnosti výšky hodnôt sledovaných ukazovateľov. Rozdiel medzi hodnotami ukazovateľov starých a nových členských krajín bol v tomto zhluku rádovo desaťnásobný. Nové členské krajiny pri korporátnom zdanení sú, ako uvádzajú viacerí autori, (Egger a Maria Radulescu, 2011; Ángeles Castro a Ramírez Camarillo, 2014) viac konkurencieschopné a to hlavne z dôvodu nižších štatutárnych sadzieb (od 10 % do 22 %) a efektívnych sadzieb (od 11,33 % do 24,20 %). Posledný štvrtý zhluk hodnotíme s najnižším daňovým, ale aj verejným zaťažením a najvyššou mierou rastu HDP. Nízke daňové sadzby a celkové daňové zaťaženie zatraktívňuje podnikanie a aj investovanie, čím dochádza ku vzniku konkurenčnej výhody pre spoločnosti v uvedených krajinách (Clausing, 2007). Existencia daňovej konkurencie prináša dva základné efekty pre daňové systémy jednotlivých krajín (Sinn, 1990). Ak si môžu krajiny medzi sebou navzájom daňovo konkurovať, bude prvým dôsledkom zníženie daňových sadzieb, čím krajiny prilákajú zahraničný kapitál z ostatných krajín. Druhý efekt je, že ostatné krajiny budú nútené reformovať svoje daňové systémy a snažiť sa znižovať daňové sadzby, aby získali kapitál späť. Práve tieto efekty aj podľa našej analýzy zabezpečili najvyššiu konkurencieschopnosť, ktorú majú krajiny tohto zhluku.

Regresná analýza

Sledovanie daňovej konkurencieschopnosti sme ďalej rozoberali pomocou regresnej analýzy, ktorá poukázala na vplyv makroekonomických determinantov na daňovú konkurencieschopnosť. V prvom kroku analýzy sme vypočítali základné číselné charakteristiky premenných osobitne pre dve skupiny krajín (ako bolo spomenuté v metodike). Bolo analyzovaných 60 hodnôt pre každú premennú (5 krajín za 12 rokov). V tejto skupine krajín boli priemerné hodnoty efektívnej (30,64 %) a štatutárnej (31,49 %) sadzby nad európskym priemerom (23,00 %), ale aj nad priemerom za eurozónu (25,70 %). Miera inflácie sa pohybovala v rozmedzí -0,60 % (deflácia) po 4,50 %. Výška daňových príjmov (v priemere 724 243 mil. €), ale aj priamych zahraničných investícií (497 457 mil. €) bola nad európskym priemerom, keďže išlo o ekonomicky najvyspelejšie krajiny Európskej únie. Ďalším krokom bolo zistenie vzájomnej závislosti medzi premennými. Silnú priamu závislosť vo vzťahu k daňovým príjmom vykazuje hrubý domáci produkt (r = 0,93). O niečo slabšie, ale štatisticky významné korelácie, vykazujú priame zahraničné investície (r = 0,72) a miera zamestnanosti (r = 0,55). Vo všetkých spomenutých prípadoch ide o pozitívnu závislosť, teda s rastom vstupnej premennej rastie i hodnota výstupnej premennej. Nepriamu veľmi silnú závislosť vykazuje verejný dlh (r = -0,74), ak sa zvýši verejný dlh, klesajú daňové príjmy. Nepriamu závislosť, ale slabú vykazuje vo vzťahu k daňovým príjmom ešte miera inflácie (r = -0,23) a efektívna daňová sadzba (r = -0,12). Vstupná premenná v podobe štatutárnej sadzby nemá takmer žiadny vplyv na daňové príjmy a jej korelačný koeficient bol na úrovni 0,06.

Druhú skupinu krajín tvoril mix 10 starých a 13 nových členských krajín (uvedených v metodike). Pri každej premennej bolo analyzovaných 276 pozorovaní (23 krajín za 12 rokov). Priemerná výška efektívnej (19,70 %) a štatutárnej (21,82 %) daňovej sadzby bola výrazne pod európskym priemerom (23,00 %), ale aj pod priemerom eurozóny (25,70 %), keďže išlo o krajiny, ktorých sadzba dane sa pohybovala v rozpätí od 10 % (Bulharsko) do 35 % (Malta). Zaťaženie verejných financií bolo vo výške 99 557 mil. €, čo je výrazne nad limitom Maastrichtských kritérií (60,00 %). Daňové príjmy, ako aj výška priamych zahraničných investícií boli viac ako 60 000 mil. €. Pozitívne v tejto, ako aj v predchádzajúcej skupine krajín sa javí miera zamestnanosti, ktorá dosahovala v priemere úroveň 64,11 %. Opačný negatívny dopad bol zaevidovaný pri miere inflácie vo výške 2,50 %. Silná priama závislosť bola zistená pri hrubom domácom produkte (r = 0,98) a priamych zahraničných investíciách (r = 0,85). O niečo slabšiu závislosť vykazovala miera zamestnanosti (r = 0,49) a efektívna daňová sadzba (r = 0,38). Pri týchto krajinách štatutárna daňová sadzba vykazovala pomerne silnú závislosť (r = 0,41). No pri prechádzajúcej skupine krajín štatutárna daňová sadzba nemala takmer žiadny vplyv na daňové príjmy. Nepriama silná závislosť vo vzťahu k daňovým príjmom bola zistená pri verejnom dlhu (r = -0,85) a o niečo nižšia závislosť bola pri miere inflácie (r = -0,24).

Našu pozornosť sme venovali daňovým sadzbám efektívnej, aj štatutárnej, ktoré vykazovali priamu závislosť v skupine mixu nových a starých členských krajín. Nepriamu závislosť (efektívna sadzba) a takmer žiadnu (štatutárna sadzba) vykazovali vo vyspelých 5 (starých) krajinách.

a) Modelovanie pre krajiny: Nemecko, Veľká Británia, Francúzsko, Španielsko, Taliansko

Na základe p-hodnoty Hausmanovho testu (p-value = 0,88) sme uprednostnili model náhodných efektov. Zo vstupných premenných (HDP, MZ, VD, PZI, MI a ETR) zahrnutých do modelu, HDP, MZ a PZI vystupovali ako štatisticky významné premenné (tabuľka 1).

Tab. 1: Modelovanie vstupných premenných

	Model fixných efektov	**Model náhodných efektov**	**Pooling model**
	Odhad	**Odhad**	Odhad
Konštanta	-103 594	**-56 086**	-321 910**
HDP	0,3758**	**0,3831****	0,4188**
MI	3 779	**3 627**	-10 030
ETR	1 651	**2 071**	9 433**
MZ	9 939**	**10 072****	12 591**
VD	0,0268	**0,0317**	0,2549**
PZI	0,4463**	**0,4342****	0,2386
R2	0,9736	**0,6580**	0,7701

Poznámka: *, ** predstavuje štatistickú významnosť na hladine 5%, resp. 1%

Legenda: R2: determinačný koeficient, HDP: hrubý domáci produkt, MI: miera inflácie, ETR: efektívna sadzba dane, MZ: miera zamestnanosti, VD: verejný dlh, PZI: priame zahraničné investície

Zdroj: vlastné spracovanie v programe SAS

Tabuľka 1 deklaruje pozitívny efekt HDP na daňové príjmy. Regresný koeficient poukazuje na fakt, že ak vzrastie HDP o 1 mil. €, celkové daňové príjmy vzrastú 0,383 mil. €. Ďalšími významnými premennými boli miera zamestnanosti, pri ktorej 1 % nárast zamestnanosti zvýši daňové príjmy o 10 072 mil. € a priame zahraničné investície, ktorých zvýšenie o 1 mil. € zabezpečí zvýšenie daňových príjmov o 0,434 mil. €.

b) Modelovanie pre krajiny: Belgicko, Dánsko, Fínsko, Grécko, Holandsko, Írsko, Luxembursko, Portugalsko, Rakúsko a Švédsko. Nové členské krajiny tvorilo 13 krajín a to: Bulharsko, Cyprus, Česká republika, Estónsko, Chorvátsko, Lotyšsko, Litva, Maďarsko, Malta, Poľsko, Rumunsko, Slovensko a Slovinsko.

Na základe p-hodnoty Hausmanovho testu (p-value = <.0001) sme uprednostnili model fixných efektov. Aj v tomto prípade HDP, MZ, PZI vystupovali ako štatistický významné premenné (tabuľka 2).

Tab. 2: Modelovanie vstupných premenných

	Model fixných efektov Odhad	Model náhodných efektov Odhad	Pooling model Odhad
Konštanta	**-9 819****	2 595	-13 639**
HDP	**0,3524****	0,3677**	0,3832**
MI	**-23**	-26	-310
ETR	**161**	141	-1 413**
STR	**-331**	-140	1 927**
MZ	**1 483****	1 597**	2 540**
VD	**-0,1806****	-0,1918**	-0,3261**
PZI	**0,0504****	0,0653**	0,1527**
R2	**0,9898**	0,5985	0,874

Poznámka: *, ** predstavuje štatistickú významnosť na hladine 5%, resp. 1%

Legenda: R2: determinačný koeficient, HDP: hrubý domáci produkt, MI: miera inflácie, ETR: efektívna sadzba dane, STR: štatutárna sadzba dane, MZ: miera zamestnanosti, VD: verejný dlh, PZI: priame zahraničné investície

Zdroj: vlastné spracovanie v programe SAS

Nárast hrubého domáceho produktu o 1 mil. € spôsobí nárast daňových príjmov v sledovaných krajinách o 0,352 mil. €. Zvýšenie miery zamestnanosti o 1 % spôsobí zvýšenie daňových príjmov o 1 483 mil. €. Pri zvýšení zahraničných investícií o 1 mil. € sa zvýšia daňové príjmy o 0,050 mil. €. Naopak, nárast verejného dlhu o 1 mil. € spôsobí pokles daňových príjmov o 0,180 mil. € (tabuľka 2).

4 Diskusia

Z pohľadu zdaňovania korporácií sú značné divergencie v rámci členských krajín EÚ. Čo sa potvrdilo aj pri zhlukoch 1, 2 a 3 našej analýzy. V týchto zhlukoch sú zakladajúce, pôvodné a staršie krajiny (s dátumom prístupu 1957-2003). Úroveň efektívneho zdanenia korporácií medzi týmito dvoma skupinami dosahovala rozdiel v intervale 3,80 % – 10,50 %. Kým krajiny zhlukov 1, 2 a 3 možno považovať za daňovo najmenej príťažlivé, krajiny v zhluku 4 sú pre daňových poplatníkov z pohľadu daňovej konkurencie zaujímavejšie. Tieto krajiny tak vytvárajú priestor pre rast nákladov (Bayer, 2011; Kubátová a Říhová, 2009; Arnold et al., 2011; Geciková, Papcunová a Belajová, 2014). Práve daňová konkurencia mala prispieť k tomu, aby vláda každej krajiny pristupovala zodpovedne k tvorbe daňovej politiky a aby podnikateľské prostredie malo nižšie daňové zaťaženie, čím by sa daňová politika stala nástrojom k vytvoreniu vhodných podmienok pre celkový ekonomický rast krajiny.

Regresná analýza svojimi modelmi (1, 2 a 3 zhluk) zhodnotila, že najväčší vplyv na daňové príjmy vykazovali hrubý domáci produkt, miera zamestnanosti a priame zahraničné investície. Ak by sa tieto determinanty zvýšili o 1 mil. € (pri zamestnanosti o 1 %) došlo by k zvýšeniu daňových príjmov o 10 072 mil. € (pri miere zamestnanosti) o 0,383 mil. € (pri HDP) a o 0,434 mil. € (pri priamych zahraničných investíciách). Sledovaním 23 krajín (4 zhluk) sa zistilo, že nie všetky makroekonomické determinanty

pozitívne vplývajú na daňové príjmy. Vládny dlh, miera inflácie a dokonca štatutárna daňová sadzba negatívne ovplyvňuje daňové príjmy. Nárast verejného dlhu o 1 mil. € by znížil daňové príjmy o 23 mil. €. Opačný výsledok pri svojich výskumoch dosiahol (Guziejewska, Grabowski, a Bryndziak, 2014), ktorý pri sledovaní vplyvu vybraných ukazovateľov na daňové príjmy zistil, že výsledky jeho regresnej analýzy preukázali, že 1 % rast premennej dlhovej služby v pomere k HDP zabezpečuje rast daňových príjmov v krajine v priemere o 0,2 p.b. Rozhodujúcou z daňového hľadiska, ale zanedbateľnou pri našej analýze bola štatutárna sadzba, ktorej zvýšenie o 1 % zníži celkové daňové príjmy o 331 mil. €. Toto zistenie platí pre 23 krajín (4 zhluk), pri 5 krajinách (1, 2 a 3 zhluk) nemala štatutárna sadzba takmer žiadnu závislosť (musela byť zo sledovania vyradená). K podobným zisteniam došli (Bartelsman a Beetsma, 2003; Ferreira a Hitchcock, 2009), ktorí sledovali 16 krajín formou panelovej regresie za obdobie 1979-1997 a zistili, že zvýšenie sadzby o 1% zníži daňové príjmy o 1,5 p.b. Regresnú analýzu vo svojich výskumoch použili (Garrett, 1995; Mooij a Ederveen, 2008; Garrett a Mitchell, 2001; Bretschger a Hettich, 2002; Swank a Steinmo, 2002; Slemrod, 2004; a Winner, 2005) pokúšajúc sa vysvetliť vplyv daňových sadzieb a ostatných faktorov špecifikovaných pre konkrétnu krajinu vrátane kapitálovej mobility. Zaoberali sa odhadom redukovaného tvaru rovníc, bez významnejšej teoretickej špecifikácie. Odlišovali sa rozličnými metódami vrátane, použitých premenných a ekonometrických špecifikácii. Tieto dokumenty zahŕňajú napríklad výskumy prezentujúce zmiešaný obraz vplyvu kapitálovej mobility, pričom všetci zhodne tvrdia, že najčastejšie používanou mierou zdanenia je sadzba štatutárnej dane, hoci dôležité sú aj efektívne daňové sadzby a výšky daňových príjmov, čo však naša analýza nepotvrdila. Okrem sledovania závislosti makroekonomických premenných sa nesmie zabúdať na mnohé ďalšie kvantitatívne ukazovatele, ktoré vplývajú na vývoj korporátnej dane a celkovú výšku daňových príjmov (Tanzi, 1989; Mintz, 1990). K takýmto faktorom podľa autorov patria geografická poloha štátu, ktorá má vplyv na viaceré daňovo-právne prvky konštrukcie korporátnej dane, nakoľko v rámci EÚ koexistujú vedľa seba kontinentálny, aj angloamerický právny systém s viacerými podstatnými odlišnosťami.

Záver

Analýzou sa preukázalo, že napriek pokračujúcej integrácii v rámci EÚ a snahám o harmonizáciu daňových systémov, stále pretrvávajú významné diferencie medzi vybranými krajinami. Rozdiely sú významné najmä na úrovni nominálneho a efektívneho zdanenia korporácií, ktoré v sebe agreguje rozdielnosť, aj v oblasti ekonomickej vyspelosti krajín a ich fiškálneho hospodárenia. Analýza poukázala zároveň na významné rozdiely medzi starými a novými členskými krajinami. Pri analýze makroekonomických determinantov vplývajúcich na daňovú konkurencieschopnosť krajín EÚ (a tým na daňové príjmy) sme zistili, že najväčší vplyv na daňové príjmy (silnú koreláciu) vykazovali hrubý domáci produkt, miera zamestnanosti a priame zahraničné investície. Rozhodujúcou z daňového hľadiska, ale zanedbateľnou pri našej analýze bola štatutárna sadzba. Toto zistenie platilo pre mix starých a nových členských krajín. Výlučne pre vyspelé „staré“ členské krajiny nemala štatutárna sadzba takmer žiadny význam (z testovania bola vyradená). Záverom môžeme konštatovať, že všetky analyzované premenné hrajú dôležitú úlohu v pomere korporátnej dane z príjmov, avšak je potrebné podotknúť, že rôzne determinanty znamenajú rôzne efekty. Hoci výsledky analýzy sú v súlade s teoretickými poznatkami,

hodnotíme, že v budúcnosti by bolo potrebné súčasné analýzy rozšíriť o ďalšie determinanty, ktoré by mohli potenciálne hlbšie vysvetliť príjmy z korporátnych daní.

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FAILURE OF THE CORPORATE RESPONSIBILITY SYSTEM IN A LARGE MULTINATIONAL CORPORATION CASE STUDY "DIESELGATE"

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Abstract: *Corporate Social Responsibility (CSR) is an important factor of the positive image of corporations and their competitiveness. However, in some cases, serious misconduct occurs in this area. The article summarizes the results of qualitative research into the failure of the Volkswagen Group's corporate social responsibility system. The purpose of this research, conducted in the form of a case study, was to elucidate the causes and consequences of fraudulent behavior of falsifying the results of exhaust emission tests for diesel-powered cars. It was found that the main cause was the Group's organizational culture characterized by very strong elements of competition where the strategic goal had to be met at any cost. If necessary, it would include ways that are contrary to the ethical code. The whole sophisticated CSR system of the Volkswagen Group fatally failed in this case. The consequences became evident mainly in a significant reduction in the market value of the Group and a decrease in investors' confidence. It is clear that the experience of this case goes significantly beyond the limits of the Volkswagen Group. It can be assumed that it will significantly affect the behavior of companies not only in the automotive industry, but also in other sectors. Further to this case, the critique of the current CSR concept is also becoming more intense and the first impulses to redesign this concept have started to occur.*

Keywords: *Corporate Social Responsibility, Case study, Sustainability Report, Code of Conduct, Volkswagen Group, Dieselgate.*

JEL Classification: *L62, M14*

Introduction

In September 2015, the United States Environmental Protection Agency (US EPA) announced that diesel-powered Volkswagen vehicles included software that enabled to significantly reduce the production of emissions during emission control. In response to these findings, the Volkswagen Group admitted after some delay that the fraudulent software was installed in a total of about 11 million vehicles. After the broad media coverage of this case, which came to the attention of the wider public as the Dieselgate case, the Group's CEO Martin Winterkorn resigned and an extensive investigation was launched (Slovák, 2016).

1 Problem formulation

Can this case of corporate social responsibility failure be considered unique? Of course not. There are a number of cases of unethical behavior of such entities, and some of them even have a more significant impact than this case in terms of the seriousness of the consequences.

From the most famous ones, we can recall two major disasters, whose demonstrable cause was the fatal neglect of occupational safety at factories located in poor countries. In 1984, there was a leak of toxic gas from the factory of Union Carbide, an American corporation, in the Indian city of Bhopal. About 20,000 people died of the consequences. In 2013, the Rana Plaza textile factory building collapsed on the outskirts of the Bangladeshi capital of Dhaka. There were more than 800 dead in the ruins and about 2,500 people were injured (Blažek, Šafrová, 2013).

Financial scandals represent a peculiar group. Although they did not result in drastic losses of human lives, their consequences involved large property losses. Klusoň (2010) analyzes the cases of Enron, Artur Andersen, Ahold, Parmalat and many other corporations that became victims of fraudulent behavior of their top management at the beginning of the twenty-first century. The value of their shares fell and their shareholders' ownership rights were damaged significantly. Coffee (2005) shows that the common cause was the dispersed ownership of these corporations that made it impossible for the owners to supervise top management sufficiently.

The Dieselgate case does not belong to any of the above groups, however. Neither employees nor customers were directly injured. The fraudulent behavior that covertly allowed exceeding the emission limits in the normal use of cars damaged to an unprecedented extent the public interest in environmental protection.

Serious failure of the Volkswagen Group in the field of corporate social responsibility raises questions that ask about both the causes and consequences of this scandal. Searching for answers has become the objective of this qualitative research conducted in the form of a case study. The results are presented in the following parts of this paper.

However, firstly we present a brief overview of the theoretical definition of the corporate social responsibility concept and the methodological aspect of using the case study for the implementation of the qualitative research.

2 Theoretical and methodical basis

2.1 Corporate Social Responsibility (CSR)

Corporate Social Responsibility is a major competitiveness factor in today's globalized markets. However, the theoretical basis of this phenomenon began to appear about a hundred years ago. In his article from the year 1916, Clark criticizes capitalism and promotes a new model of business ethics. He states that "if men are responsible for the known results of their actions, business responsibilities must include the known results of business dealings, whether these have been recognized by law or not." (Clark, 1916, p. 223). According to McGuire, "the idea of social responsibilities supposes that the corporation has not only economic and legal obligations but also certain responsibilities to society which extend beyond these obligations." (McGuire, 1963, p. 144).

In the second half of the twentieth century, Carrol (1999) brings an analysis of the development of the CSR concept. Although the concept of this phenomenon has been under discussion for many decades, its generally valid and world-recognized definition does not yet exist. Kašparová and Kunz claim that CSR is based on volunteering and it

does not have clearly set boundaries, which provides space for a very broad and varied understanding of this concept (Kašparová, Kunz, 2013). However, analyses of CSR definitions show that there are five basic dimensions that occur most frequently. It is the stakeholder dimension, the social dimension, the economic dimension, the dimension of volunteering, and the environmental dimension (Dahlsrud, 2008, p. 5).

The tool which companies can use to inform their stakeholders and the wider community about their CSR activities is CSR reporting. In its processing, corporations can use one of the many standards that the CSR reporting field offers. These include, for example, the OECD Guidelines for Multinational Corporations, ISO 14000 and ISO 26000, standards Global Reporting Initiative and Global Sullivan Principles, and others.

The tools of Corporate Social Responsibility system implementation also include ethical audit and ethical code.

Claiming social responsibility is a voluntary commitment of a corporation, which thus declares its awareness of the social overlap of its business. Corporations assume part of the responsibility for the development of the society and its direction, beyond what is required by law. Although this commitment is voluntary, assuming CSR is nowadays becoming a standard, especially for large multinationals. The concept of social responsibility emphasizes behavior in accordance with ethical principles and requirements of sustainable development.

2.2 Research method

As mentioned above, the analysis of the Dieselgate case was conducted using the case study method.

Case study is one of the basic methods used in social sciences for qualitative research. While a relatively small amount of data from a large number of subjects (cases) is collected and evaluated in a statistical survey, which is typical of quantitative research, a case study involves the collection and evaluation of a large amount of data about one or a few cases, respectively. A case study is about capturing the complexity of the case, describing the relationships in their entirety (Hendl, 2005).

A case study always involves a combination of different techniques for collecting information. The most commonly used information sources are: “documentation, archival records, interviews, direct observations, participant-observation, and physical artifacts.” (Yin, 2014, p. 101).

The purpose of case study application is to understand the context of the whole case. “It is assumed that by thorough examination of one case we will understand other similar cases. At the end of the study, the case under consideration is interpreted in a broader context.” (Hendl, 2005, p. 104).

Yin defines the case study as “a strategy for examining a predetermined phenomenon ... within its real context, especially when the boundaries between the phenomenon and the context are not entirely clear” (Yin, 2014, p. 16). Case study is “a suitable research method if we need to answer how and why questions, with a focus on current events” (Yin, 2014, p. 9).

In relation to the topic of our research, we have formulated two research questions:

- What were the causes of this failure?
- What were the consequences of this failure?

Finding answers to both of these questions has led to meeting the goal of the research, which is the analysis of the case with the possibility of generalizing the conclusions made.

While respecting the above principles of application of the case study method, we first dealt with the characteristics of the object, i.e. the Volkswagen Group, and the characteristics of its external environment, i.e. the car market. Then, we focused on the analysis of the causes and consequences of the Group's corporate social responsibility failure. The discussion of the results focused mainly on understanding the context of the whole case, searching for the possibility to generalize the acquired knowledge, and predicting the development in the given field.

We used publicly available sources for the research. We used mainly articles published in specialized journals as well as daily newspapers, the Volkswagen Group's corporate resources, various sources of statistical information, press releases of rating companies, and a number of other publicly available resources. The information obtained was analyzed and compared so as to ensure their credibility and objectivity.

There is no doubt that information from the ongoing investigation would be very beneficial; but of course, it was not available to us.

3 Problem analysis

3.1 The Group's characteristics

The Volkswagen Group (henceforth also the VW Group) is one of the largest corporations in the world. The parent company of the Group is Volkswagen Aktiengesellschaft (Wolkswagen AG), which holds controlling shareholdings in seven other joint-stock companies. They produce a total of twelve makes of passenger cars, trucks and motorcycles. Specifically, the makes of passenger cars are Volkswagen, Škoda, Seat, Audi, Bentley, Bugatti, Lamborghini, or Porsche, the makes of trucks are Volkswagen, Scania, or MAN, and Ducatti motorcycles.

Porsche Automobil Holding SE (30.8% share), Qatar Holding LLC (14.6%) and the Federal State of Lower Saxony (11.8%) are the three largest shareholders in the Group. However, as Slovák explains in detail, the voting rights are quite different from ownership interests. The Federal State of Lower Saxony holds a privileged ownership position as it can veto the decisions taken at the shareholders' meetings despite its capital position (Slovák, 2016, p. 30). The VW Group can be classified as a so-called semi-state company. A number of distinctive figures of the German political life were members of the Group's board of directors in the past. The state's ingerence towards this subject has always been and still is extremely important. This stems from its extraordinary importance to the German economy. The Group employs more than 280,000 workers in the Federal Republic of Germany and indirectly generates hundreds of thousands of jobs (Barthel, K., Böhler Baedeker, S., Bormann, R. et al., 2015). The automotive industry is the largest industrial sector in the German economy. In 2016, its turnover accounted

for €404 billion (Automotive Industry 2017). In 2015, the company's spending on research and development was more than 7% of total R&D investment in Germany. Cars and automotive components make up 18% of the volume of German exports.

The Volkswagen Group also holds a significant position on the global scale. In 2015, before the Dieselgate case, it was ranked 49th in the ranking of the world's largest multinational corporations, measured by their market value. Within the automotive sector, it was second. It employed approximately 600,000 employees (Global 500, 2015). In that year, it produced about 10 million cars, accounting for about 12% of the world's passenger car market.

3.2 Basic tools of the Group's corporate social responsibility system

In connection with the case, it is important to mention the way of implementing the corporate social responsibility system in the Volkswagen Group. The basic tools are the Code of Conduct and CSR reporting.

The Code of Conduct is the basic document that formulates the ethical maxima of the Volkswagen Group and all the controlled companies (Volkswagen AG 2015).

From a research point of view, it is essential that the Code puts great emphasis on the ecology and responsibility of each employee. The company also devotes relatively large space to management responsibility. All managers are responsible for compliance with rules within their field of responsibility.

Both the VW Group and its controlled companies publish regular CSR assessments in the form of a report called the Sustainability Report. It is compiled in accordance with the G4 Sustainability Reporting Guidelines of the Global Reporting Initiative program and is reviewed by the renowned PricewaterhouseCoopers auditing company (Volkswagen AG, 2014).

The document is written in a very high-style language and is infused with the ethos of responsibility, sustainability and ecology. In the section on business values, the report states: "We know that growth can only take place hand in hand with responsibility and environmental protection." (Volkswagen AG, 2014, p. 14). In a total of 156 pages, the term "environment" is used 335 times!

In September 2015, the Volkswagen Group even ranked first in the prestigious CSR ranking of the Dow Jones Sustainability Index. According to the comment on the evaluation, "sustainability is the very basis of the Group's policy."

Note: A few days after the scandal broke out, the VW Group was completely removed from the ranking with reference to the proven manipulation of emission tests (Volkswagen AG to be removed from the Dow Jones Sustainability Indices, 2015).

3.3 Specific features of the external environment of the automotive industry

The external environment of the automotive industry is characterized by three specific features.

The first specific feature is the high competition on the world passenger car market. This creates strong pressure to lower prices. According to a study by the Automotive Research Center of the university in Duisburg-Essen, which is based on data for the first

half of 2016, the profit margins of the largest car manufacturers range from 4 to 8%. The VW Group's profit margin was 4.5% (Ulrich, 2016). However, it is not only about the pressure on the purchase price of cars, but also about the pressure to reduce operating costs, i.e. the reduction of fuel consumption. This leads to increasingly more challenging technical and economic measures that car manufacturers must implement because of their competitiveness.

Another important feature is represented by the ever-increasing tightening of governments' demands to reduce emissions of harmful substances. The technical solutions that make it possible to meet these standards are very costly. As the former CEO of the VW Group, Martin Winterkorn, said: "The reduction in CO_2 emissions of one gram costs us in our fleet average a hundred million euros for development ... It's a hundred million euros that we have to pay in advance without knowing if this investment will return." (Dvořák, 2014).

The third specific feature is represented by the fact that the world's leading carmakers are both economically and socially important subjects, and therefore they may experience the "too big to fall" syndrome; in other words, it is the assumption that in case of bankruptcy they can anticipate the help of the state. This leads to moral hazard. It can be said that this fact can be very significant in the case of the VW Group. As mentioned above, the Group is an extremely important entity with a significant influence on the German economy. The Federal State of Lower Saxony is the Group's significant shareholder with a privileged co-ownership position.

3.4 The Group's expansion strategy

In 2007 the Volkswagen Group wrote up the "Strategy 2018" document where it formulated its goal to become the global leader in the passenger car market. An important factor for this strategy should have been the expansion of diesel-powered cars in the US market. However, this market is characterized by a number of specifics, as commented by Slovák in detail (Slovák, 2016, p. 32).

In 2008, the Group launched the "Clean Diesel" project, based on the concept of "Powertrain and fuel strategy". It involved the development of diesel engines that would be economical and at the same time they would meet very strict emission limits. An engine marked as BlueTDI was developed to meet even the strictest emission standard in the United States, i.e. California's "Tier2 Bin5" standard. The implementation of the project had a positive response and the annual sales of VW cars on the US market increased almost 1.7 times between 2010 and 2015.

However, in 2013, first suspicions regarding compliance with emission standards occurred. It was the findings of the California Air Resources Board (CARB), in whose laboratories the tests were conducted and which contacted the carmaker asking for an explanation. The Volkswagen Group responded relatively quickly. It recalled over 400,000 cars for calibration and informed CARB about the remedy. However, repeated tests showed that the correction was ineffective.

Another measurement of the Group's car emissions was conducted in May 2014 by West Virginia University. These measurements confirmed that real-time emissions are many times higher than those measured in the test mode.

Testing organizations reported their findings to the Federal Environmental Protection Agency of the United States (EPA). On that basis, EPA officially launched an investigation into violations of environmental laws on 18 September 2015. The Group was charged with equipping some types of diesel engines with a program that allowed falsification of the emission test results. EPA assumes that the Group's actions were deliberate in order to violate US environmental laws (EPA, 2015).

As we mentioned at the beginning of this paper, CEO Martin Winterkorn admitted on 22 September 2015 that the Group had committed what it was charged with. He announced opening the case investigation by an external agency (Rushe, 2015). He subsequently resigned, but denied any fault of his own; after that Matthias Müller took his place.

Martin Winterkorn's admission gave rise to an extensive response across the globe and triggered the launch of investigations in many countries. Shortly, on 24 September 2015, the British Ministry of Transport launched its own investigation (Wearden, 2015). Two days later, it banned the sale of most of the diesel cars branded as Volkswagen Switzerland (Ruddick, 2015a). Investigations were also launched in Italy, Spain, France, South Korea, and China. The European Investment Bank also launched its investigation on suspicion that the Volkswagen Group had used EU public funds in the form of loans and grant funds in connection with the case.

4 Research results and their discussion

The results of the qualitative research conducted by the case study method result in answers to the two research questions that relate to the causes and consequences of corporate responsibility failure of the Volkswagen Group.

4.1 The causes of the Group's corporate social responsibility failure

An analysis of available information suggests that the primary cause was the strategic goal of becoming the world's largest carmaker by 2018. This goal was set out in 2007 in the above-mentioned "Strategy 2018" document. This goal was followed by another one to significantly expand the VW Group's presence in the North American diesel-powered car market.

Strenuous efforts to meet these extremely ambitious strategic goals, regardless of the strong competition prevailing in the global car market, and in particular of the ever-tightening emission standards, led to evolutionary changes in the Group's corporate culture that proved to be negative in the context of the case. Demanding goals had to be fulfilled unconditionally, any questioning of their feasibility was perceived as a manifestation of incompetence or disloyalty.

An environment of extreme competition where weakness is not forgiven and where there is no "I cannot" was established. Renowned German automotive journalist Christiaan Hetzner writes about a dominant atmosphere of fear and blind obedience (Hetzner, 2015). Hans Dieter Pötsch, Chairman of the Group's Board of Directors, said in December 2015 that the failure was caused by a chain of causes, including tolerance for breach of rules (Ruddick, 2015b). Symptoms of this unfortunate development could be traced back in a number of other sources (Slovák, 2017).

The key issue was the expansion in the North American market. A dilemma occurred there: either try to comply with stringent emission standards through a very costly technical solution, or circumvent emission testing by installing fraudulent software.

Solving the dilemma through fraudulent behavior could have several reasons. Experience showed that if similar cases (although smaller) occurred in the past, car manufacturers were usually able to trivialize them, or identify them as a technical error or measurement inaccuracy. A significant role may also have played the feeling of reduced responsibility associated with the sense that the VW Group was protected by the state. The decision to install fraudulent software represented a pragmatic way out of a crisis situation, but the revealing risk and its consequences were underestimated.

Of course, our research did not seek to find the specific culprits. These can be proven only by means of a police investigation. However, the conducted analyses provide a more or less unambiguous conclusion that it was not a separate action of a few engineers. It can be reasonably assumed that the people who decided on the solution, implemented it, or at least knew about it, or could know about it, included a number of managers in relatively high positions of the Group's hierarchy.

It should also be pointed out that the formally highly rated system of corporate social responsibility of the Group, based on the Volkswagen Code of Conduct and Sustainability Report, as mentioned above, was unable to prevent the unethical conduct.

4.2 Consequences of the Group's corporate social responsibility failure

The consequences of the fraudulent behavior were analyzed for volumes of car sales of the VW Group, its share value, and its rating.

It is evident from the VW Group's car sales figures and their comparison with competing manufacturers that the situation analyzed did not have any demonstrable negative consequences on the total sales volume (Schmitt, 2016). Hence, it can be concluded that customers do not perceive the Group's fraudulent behavior as a significant problem because it does not represent a "defect" that would affect the performance of a car, its operating costs, reliability or safety.

On the other hand, the negative impact of the analyzed case on the stock market is quite clear. In 2015, the Group's shares reached the peak of €230 per share in April. Then a gradual decline associated with the first signs of the fraudulent behavior followed. On 18 September 2017, when EPA officially charged VW with falsifying tests, the stock price was just €160. After that a steep fall followed. The lowest share price was recorded on 5 October, amounting to €102, which was a drop to only 42% of the highest value in that year. In the following months, the share price slightly increased. At the beginning of 2017, it started to reach the level of €150, but it did not exceed it in the next period.

The case was clearly reflected in the Group's rating. Moody's rating agency responded immediately as it reduced its rating from grade A2 with a positive outlook to grade A3 with a negative outlook on 24 September 2015 (Moody's, 2015). Both grades are in the upper-middle rating range, but the negative outlook implies further reduction of the rating.

Standard & Poor's rating agency assessed the VW Group at the end of 2015 with grade BBB+ with a negative outlook (lower-middle quality of the rating range) whereas before the emission affair broke out, the corporation was rated with grade A (S&P, 2015). According to S&P, the reputation and perception of the VW brand deteriorated, which would negatively affect the Group's market position. In addition to lower earnings and cash flow due to lower sales and prices, the expected fines and litigation costs would also have a negative impact.

Similarly, Fitch Ratings agency also reduced its rating. According to the agency, the worse rating reflects problems in the Group's administration and management and its internal control. Inability to reveal such fraud is a serious mistake of the Group's top management (Fitch Ratings, 2015).

What wider implications of the case can be expected and what generalizations can be made?

There is no doubt that the consequences of a severe breach of corporate social responsibility are a great warning not only for the VW Group itself, but also for other companies operating in the automotive industry and other sectors. Volkswagen paid a high price for the scandal through a significant reduction in its market capitalization, a fall in investors' confidence, substantial fines and compensation, and a number of lawsuits that can take many years (Slovák, 2016, p. 54). It can therefore be expected that this experience will generally contribute to strengthening the belief that fraudulent behavior is subject to a high risk in the environment of fierce competition and strong state supervision, and hence does not pay.

The VW Group's unethical behavior also provoked an intense discussion about the current concept of CSR and the way it is evaluated. According to many authors, the emission scandal seriously disrupted this concept and caused serious damage to the social responsibility movement (Greer, 2016). There were also voices calling for a fundamental redefinition of the CSR concept (Rhodes, 2015). Leon Kaye notes that a situation such as this could be expected. The CSR evaluation was long focused on the formulation of appealing goals and aspirations instead of concrete and tangible results (Kaye, 2015). However, despite this, it cannot be expected that this case will lead to the abandonment of this concept as its real alternative does not exist; rather, it will be improved.

Conclusion

It is clear that the corporate social responsibility system is not self-sustaining and its implementation is not in itself a guarantee that a company will always act ethically. This is evidenced by the above-mentioned "Dieselgate" scandal. An analysis of this case shows that in the environment of fierce competition prevailing in global markets unethical behavior carries a high risk with the threat of great losses. It can be assumed that corporations will ensure in their own interest that the CSR system is not only a PR tool, as is often the case, but an effective means of promoting and controlling their ethical behavior.

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DOPADY (NE)KONVENČNÍCH MĚNOVÝCH POLITIK VYBRANÝCH CENTRÁLNÍCH BANK NA HDP A INFLACI

THE INFLUENCE OF (UN)CONVENTIONAL MONETARY POLICY ON THE GDP AND INFLATION

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Abstract: *The aim of this paper is to analyze the influence of monetary policy on economic indicators – if monetary aggregate M3 has influence on consumer price index (CPI) and gross domestic product (GDP) in the Czech Republic, the USA, the Eurozone and Switzerland. Cointegration this selected indicator M3 is demonstrated in relation to the development of CPI and GDP using the Engle - Granger cointegration test. Data from the years 2007–2016 are included in the analysis. We determine the optimum delay using inforamtion criterion for all-time series analyzed. Then we analyzed the presence of a unit root using the Dickey - Fuller test and we excluded time series which appear to be stationary. If the conditions are met, testing then continued with the Engle - Granger test to detect cointegration relations, which would determine a relationship between selected indicators. Based on Engle-Granger test, we found that doesn´t exist cointegration relationship between M3 and CPI and GDP in the Czech Republic and the Eurozene ((un)conventional monetary policies are ineffective). On the contrary, in the case of the USA and Switzerland, the impact of the M3 monetary aggregate on GDP and CPI was confirmed ((un)conventional monetary policies are effective).*

Keywords: *Central bank, Cointegration test, Unconventional monetary policy, M3.*

JEL Classification*: E51, E47, C32.*

Úvod

V případě, že centrální banky již použily své standardní nástroje měnové politiky k dosažení stanovených cílů (např. inflačního cíle) a tyto použité nástroje nevedly k jejich dosažení, uchylují se centrální banky k tzv. nekonvenční měnové politice. Nekonvenční měnovou politiku mohou centrální banky provádět pomocí záporných úrokových sazeb, devizových intervencí či kvantitativního uvolňování. Vybrané centrální banky v České republice, Švýcarsku, USA a zemích Eurozóny stanovily úrokové sazby velmi blízko nule, přesto nedosáhly požadovaného účinku měnových politik v jednotlivých zemích. Za účelem minimalizace dopadů finanční krize či odvrácení rizika deflace provedly nezvyklá opatření měnové politiky (tzv. nekonvenční měnovou politiku) (Borio a Disyatat, 2010). Federální rezervní systém (FED) a Evropská centrální banka (ECB) přistoupily ke kvantitativnímu uvolňování, které vede k monetární expanzi (a tím pádem dochází k růstu peněžního agregátu M3) (Černohorská a Kula, 2017).

FED prováděl kvantitativní uvolňování v letech 2008-2014 v celkové výši cca 3 940 mld. USD formou nákupu vládních dluhopisů a ostatních soukromých aktiv. ECB se naopak v roce 2015 zaměřila na nákup krytých dluhopisů (doposud provedla kvantitativní uvolňování ve výši cca 1677 mld. USD). Obě sledované centrální banky

přibližně v srpnu až říjnu 2008 navýšily objem dodávaných repo operací (nebo jím podobných nástrojů) ve snaze zmírnit napětí na mezibankovních trzích a ulehčit finančním institucím přístup ke zdrojům likvidity. Česká národní banka, spolu se Švýcarskou národní bankou, začala intervenovat na devizovém trhu s cílem zabránit posilování kurzu příslušné měny nebo odvrátit možnou deflaci (Černohorská a Flosová, 2014). Devizové intervence byly z hlediska jednotlivých zemí specifické. Švýcarská centrální banka prováděla devizové intervence v letech 2009-2015. Důvodem pro zahájení intervencí Švýcarskou centrální bankou (SNB) byla nízká inflace, snaha podpořit konkurenceschopnost exportu a silné tlaky na zhodnocení měny. SNB používá mechanismus cílování cenové hladiny. Jelikož inflace dlouhodobě klesala, s výjimkou roku 2008, kdy se inflace dostala nad úroveň 2 %, SNB se snažila této skutečnosti čelit podobně jako jiné centrální banky snižování úrokových sazeb. Ani s touto strategií ale neuspěla a trend klesající míry inflace přetrval. Výsledkem byly jen nulové úrokové sazby a přechod k nekonvenčnímu nástroji, devizovým intervencím. V září 2009 se SNB rozhodla vstoupit do intervenčního režimu s pevně definovaným kurzovým závazkem 1,2 CHF/EUR, pod který měnový kurz neměl klesnout (Gambacorta et al., 2014). Špatná hospodářská situace v roce 2008 se projevila i na ekonomice České republiky. Kromě velkého propadu HPD došlo i k nárůstu nezaměstnanosti a snížení inflace, která navíc dle předpovědí z roku 2012 měla i nadále klesat. Pro zamezení těchto tlaků Česká národní banka (ČNB) stále snižovala úrokové sazby, které se koncem roku 2012 dostaly až na 0,05 %, tedy technickou nulu. ČNB intervenovala na devizových trzích v letech 2013-2017 z důvodu hrozící deflace. V listopadu 2013 se bankovní rada rozhodla využít devizový kurz a intervenovat proti posílení CZK. Šlo o jednostranný kurzový závazek v konkrétní hodnotě 27 CZK/EUR, přičemž pod tuto hodnotu neměla koruna klesnout. ČNB zvolila, stejně jako SNB, formu kvantitativně neomezených intervencí, a to zejména z důvodu malého očekávání likviditního dopadu intervencí a nemožnosti přesného určení objemu prostředků, které bude nutné na intervence vynaložit v zájmu splnění inflačního cíle (Franta et al., 2014).

ČNB intervenovala na devizovém trhu ve výši 51,4 mld. USD, zatímco SNB vynaložila přibližně 556,6 mld. USD. Způsob ukončení devizových intervencí se v obou zemích lišil. V České republice nedošlo k výraznějšímu posílení koruny, zatímco švýcarský frank posílil o 15 %.

Cílem příspěvku je analyzovat účinnost nekonvenční měnové politiky na inflaci a HDP v České republice, zemích Eurozóny, Švýcarska a USA. Centrální banky ve zvolených zemích provádí nebo prováděly nekonvenční měnovou politiku s cílem dosáhnout požadovaného inflačního cíle či hospodářského růstu. Budeme se snažit o nalezení kointegračního vztahu mezi nekonvenční měnovou politikou (reprezentovanou peněžním agregátem M3) a vybranými ekonomickými ukazateli (HDP a inflaci).

1 Formulace problematiky

Problematice účinnosti měnové politiky na makroekonomické agregáty se věnuje celá řada vědeckých studií. Baltensperger (2001) zkoumá vztah mezi širokým peněžním agregátem M3 a inflací ve Švýcarsku. Z analýzy vyplývá, že existuje vztah mezi širokým peněžním agregátem M3 a inflací ve Švýcarsku. M3 je indikátorem budoucího vývoje inflace ve Švýcarsku. Prediktivní síla tohoto agregátu je vyšší v

dlouhodobém horizontu než v tom krátkodobém. Pokud dochází k nízkému růstu peněz v ekonomice, neznamená to, že v budoucnu nebude žádná inflace. Výsledkem je, že tento peněžní agregát je důležitým ukazatelem pro měnovou politiku. V této analýze je zkoumána kointegrace časových řád.

Dalšími autory, kteří se zabývali vztahem M3 a inflace byli Lütkepohl a Wolters (1999) či Černohorský a Kněžáčková (2013). Lütkepohl a Wolters (1999) dochází k závěru, že peněžní agregát M3 je důležitým indikátorem pro kontrolu inflace. Kaufmann a Kugler (2008) se zabývali měnovou politikou v eurozóně. V jejich analýze byl prokázán vztah mezi peněžním agregátem M3 a inflací pomocí jednotkového kořene a stacionarity časových řad. Vztah mezi zmíněným peněžním agregátem a inflací je stabilní, až na období konce 70. a počátek 80. let, kdy změny měnové politiky Federálního rezervního systému měly vliv na eurozónu (v tomto období došlo v USA ke zvýšení volatility úrokových sazeb). V Evropě ve zmiňovaném období roste míra inflace a klesá růst peněz v ekonomice. Kaufmann a Kugler (2008) zkoumali data za období od roku 1977 do roku 2006.

V 90. letech prokázal Weber (1994), že peněžní agregáty ovlivňují HDP. Analýza se nezabývala pouze jednou zemí, ale hned sedmi, a to nejvyspělejšími zeměmi světa (tzv. G7). Do této skupiny patří: Francie, Itálie, Japonsko, Kanada, Německo, Spojené státy a Velká Británie. Dalšími autory, kteří se také zabývali existencí vztahu peněžního agregátu M3 a HDP byly King a Levine (1993a, 1993b). King a Levine prokázali v letech 1960 až 1989 u 80 zemí světa, že peněžní agregát má vliv na ekonomický růst.

Wu a Xia (2016) se zabývají makroekonomickými dopady měnové politiky FEDu, kdy se hlavní úroková sazba (federal funds rate) nacházela na technické nule, a tudíž klasická měnová politika nefungovala a musela přijít ta nekonvenční. Autoři prokázali, že nekonvenční měnová politika FEDu, realizovaná prostřednictvím kvantitativního uvolňování, uspěla a přispěla ke stimulaci ekonomiky a udržení nižší míry nezaměstnanosti.

Barro (1977) tvrdí, že pouze neočekávaný růst peněz v ekonomice má vliv na ekonomickou aktivitu, respektive na nezaměstnanost. Tato analýza byla provedena pro Spojené státy v období od vstupu do druhé světové války (1941) do roku 1973. Naopak v jiných zemích vliv peněžního agregátu na nezaměstnanost nemusí být prokázána, protože velká část centrálních bank se zajímá primárně o cílování inflace, na druhou stranu pokud peněžní agregát působí pozitivně na ekonomický růst země, může sekundárně dojít i k pozitivnímu vlivu na nezaměstnanost.

S devizovými intervencemi má poměrně velké zkušenosti Japonsko, které je kromě jiných nekonvenčních nástrojů, použilo již na počátku tohoto tisíciletí. Japonsko je zemí, která se potýká s deflací s menšími přestávkami již od roku 1999. Devizové intervence primárně ovlivňují měnový kurz a sekundárně působí na ekonomické veličiny, jako je např. často zmiňovaná inflace. McCallum (2000) tvrdí, že pokud úrokové sazby v otevřené ekonomice se pohybují blízko nuly, může centrální banka použít devizové intervence ke znehodnocení domácí měny k tomu, aby zajistila růst či stabilizaci inflace a reálné ekonomiky.

Na základě provedené rešerše odborné literatury byl při analýze účinnosti nekonvenční měnové politiky vybrán peněžní agregát M3 a sledován jeho vliv na makroekonomické agregáty (inflace, HDP).

2 Použité metody a data

Vzhledem ke stanovenému cíli příspěvku je využito ke zkoumání vlivu peněžního agregátu M3 na inflaci a HDP v USA, Eurozóně, Švýcarsku a České republiky konceptu kointegrace, kterým se zabývali zejména autoři Engle a Granger (1987), či z českých autorů např. Arlt (1997).

Použitá data jsou čtvrtletního charakteru a jsou sezónně očištěna. Časové řady, které využíváme, zahrnují období prvního čtvrtletí roku 2007 až čtvrté čtvrtletí roku 2016. Jako zdroj dat byl využit FRED (Federal Reserve Economic Data – ekonomická data z The Research Division of the Federal Reserve Bank of St. Louis) a OECD (Organizace pro hospodářskou spolupráci a rozvoj). Pouze hrubý domácí produkt byl získán ze statistik FRED (2017a; 2017b; 2017c; 2017d), ostatní veličiny (M3 a inflace) byly získány ze statistik OECD (2016a; 2016b; 2016c).

Pro analýzu časových řad provedeme Engle-Grangerův test, pomocí kterého stanovíme, zda mezi zkoumanými časovými řadami existuje kointegrační vztah nebo nikoli. Před začátkem tohoto testu musí být splněny předpoklady modelu: musíme zjistit optimální řád zpoždění a zkoumaná data musí být stacionární. Optimální řád zpoždění zjistíme pomocí informačních kritérií. Vždy hledáme nejnižší hodnotu informačního kritéria, které jsou poté dále využity v dalším postupu. Stacionaritu časových řad zjistíme provedením ADF testu. Pokud nezamítneme nulovou hypotézu, jsou časové řady nestacionarní. Poté provedeme úpravu časových řad pomocí diferencování a provedeme opět ADF test. Pokud diference takto upravených časových řad jsou stacionární, přistoupíme k provedení samotného Engle-Grangerova testu.

2.1 Optimální řád zpoždění

Než přistoupíme ke kointegraci časových řad, určíme si nejprve optimální řád zpoždění u závislé proměnné. Pro určení optimálního řádu zpoždění využijeme informační kritéria: Akaikeho informační kritérium (AIC), Bayesovské informační kritérium (BIC) a Hannan-Quinnovo informační kritérium (HQC).

Akaikeho informační kritérium bylo představeno v 70. letech 20. století japonským statistikem Hirotugu Akaikem (1981).

$$AIC = n * \ln\left(\frac{RSS}{n}\right) + 2k \tag{1}$$

kde: RSS je reziduální součet čtverců;

k je počet parametrů;

n je počet měření;

RSS/n je reziduální rozptyl.

V případě Bayesovského informačního kritéria se můžeme setkat také s pojmenováním Schwarzovo informační kritérium, protože s tímto informačním kritériem přišel v roce 1978 Gideon Schwarz (1978).

$$BIC = n * \ln\left(\frac{RSS}{n}\right) + k \ln n \tag{2}$$

kde: RSS je reziduální součet čtverců;

k je počet parametrů;

n je počet měření;

RSS/n je reziduální rozptyl.

V roce 1979 přišli dva australští statistici s dalším informačním kritériem (Hannan, Quinn, 1979). Toto kritérium nese příjmení těchto australských statistiků (E. J. Hannan a B. Q. Quinn).

$$HQC = n * \ln\left(\frac{RSS}{n}\right) + 2kc\ln\ln n \tag{3}$$

kde: RSS je reziduální součet čtverců;

k je počet parametrů;

n je počet měření;

c je přidaná konstanta;

RSS/n je reziduální rozptyl.

V analýze časových řad hledáme nejnižší hodnotu u vybraných informačních kritérií. Řád zpoždění se určí podle toho, kde je nejnižší hodnota informačního kritéria. Určený řád zpoždění se využije při následném výpočtu.

2.2 Dickey-Fullerův test

Po zjištění optimálního řádu zpoždění následuje provedení rozšířeného Dickey-Fullerova testu (dále ADF test). Při ověřování hypotéz v ADF testu se zpravidla využívají tři základní druhy testů a to: bez konstanty, s konstantou, a s konstantou a trendem. Pro testování se využívá následující vzorec č. 4, který zkoumá, jestli proměnná obsahuje jednotkový kořen, tedy jestli ϕ =0.

$$\Delta y_t = \emptyset y_{t-1} + \sum_{i=1}^{p} \alpha_1 \Delta y_{t-i} + \varepsilon_t \tag{4}$$

kde: y_t je závislá proměnná;

p je zpoždění;

ε_t je reziduální složka.

Závěr o stacionaritě dat vyjadřujeme na základě *p*-hodnoty, kterou porovnáváme s α (hladinou významnosti). Obvykle se využívá hladina významnosti 0,05. Hypotézy v případě ADF testu jsou stanoveny následovně:

- H_0: časové řady jsou nestacionární
- H_1: časové řady jsou stacionární

Pokud *p*-hodnota je větší jak hladina významnosti, nulovou hypotézu nezamítáme. Ale pokud *p*-hodnota je menší než hladina významnosti, nulovou hypotézu zamítáme a můžeme tvrdit, že časové řady jsou stacionární. V případě, že časové řady jsou nestacionární, musíme původní časové řady upravit pomocí diferencování (vytvoříme první diferenci) a nová data opět testujeme na stacionaritu.

2.3 Engle-Grangerův test

Po prokázání stacionarity ADF testem, pokračujeme kointegrační analýzou. Kointegrační analýza se provádí pomocí Engle-Grangerova testu. Jedná se o metodu, kterou navrhli Engle a Granger (1987). Autoři metody vycházejí z toho, že pokud sestavíme model z proměnných, které jsou kointegrované, rezidua tohoto modelu budou stacionární. Stačí tedy otestovat tyto rezidua na stacionaritu. Testujeme rovnici 5, kde předmětem našeho zájmu je opět parametr ϕ.

$$\Delta\epsilon_t = \emptyset\epsilon_{t-1} + \sum_{i=1}^{p} \alpha_1 \Delta\epsilon_{t-i} + \varepsilon_t \tag{5}$$

kde: ϵ_t jsou odhadnutá rezidua;

p je zpoždění;

ε_t je reziduální složka.

Engle-Grangerův test zkoumá existenci jednotkového kořene. Pro tento test jsou stanoveny následující hypotézy:

- H_0: časové řady nejsou kointegrované
- H_1: časové řady jsou kointegrované

Pokud nemůžeme zamítnout nulovou hypotézu o přítomnosti jednotkového kořene, musíme konstatovat, že zde neexistuje kointegrační vztah. Pokud ale nulovou hypotézu zamítáme, znamená to, že rezidua z kointegrační rovnice jsou stacionární a můžeme tak vyvodit závěr, že sledované časové řady jsou kointegrované.

Blíže analyzovat můžeme jen vztah časových řad, které jsou kointegrované. Naopak v případě nekointegrace se časové řady vyvíjí opačně a tudíž neexistujeme mezi nimi žádný vztah.

Tak jako u posuzování stacionarity je pro nás i zde důležitá *p*-hodnota, kterou opět porovnáváme s hladinou významnosti, abychom nezamítli či naopak zamítli nulovou hypotézu. Nekointegrované časové řady obsahují jednotkový kořen a kointegrované časové řady nikoli.

3 Předpoklady a testování stacionarity časových řad

3.1 Testování optimálního řádu zpoždění

Na základě vymezené teorie nejprve musíme zjistit optimální řád zpoždění. Nezávislou proměnou je v našem případě peněžní agregát M3 a závislými proměnnými je inflace a HDP. V tabulkách č. 1 a 2 jsou uvedeny hodnoty AIC pro jednotlivé proměnné a státy na 8 řádů zpoždění. Nejnižší hodnota je vždy zvýrazněna. U všech sledovaných proměnných se nejnižší hodnota vyskytovala vždy u AIC. V tabulkách 1 a 2 jsou tedy znázorněny pouze hodnoty pro AIC, a to pro testy buď s konstantou, s trendem nebo pro testy s konstantou a trendem, podle toho u jakého testu byla nejnižší hodnota.

Tab. 1: Optimální řády zpoždění pro jednotlivé proměnné pro USA a EU

Řád zpoždění	CPIUSA	HDPUSA	CPIEU	HDPEU
	AIC, s konstantou a trendem	AIC, s konstantou a trendem	AIC, s konstantou a trendem	AIC, s konstantou a trendem
1	1,879392	**24,792718**	2,225738	22,122352
2	1,825874	24,815552	1,947394	21,601306
3	**1,483648**	24,870207	1,837767	21,632539
4	1,509566	24,929259	1,756898	21,523559
5	1,514922	24,970037	**0,775843**	21,518684
6	1,577258	24,976773	0,833809	21,443793
7	1,634397	25,006918	0,857580	21,280992
8	1,500574	25,029436	0,862177	**21,252773**

Zdroj: vlastní zpracování na základě výsledků z programu Gretl 1.9.4

Tab. 2: Optimální řády zpoždění pro jednotlivé proměnné pro Švýcarsko a Českou republiku

Řád zpoždění	CPICH	HDPCH	CPICZ	HDPCZ
	AIC, s konstantou a trendem	AIC, s konstantou a trendem	AIC, s konstantou a trendem	AIC, s konstantou
1	1,630658	16,011486	2,052734	21,073145
2	1,567208	15,782427	2,110379	**20,700177**
3	1,538928	15,689862	2,079294	20,757982
4	1,172395	15,621279	2,140598	20,806931
5	1,104165	15,611005	**1,345781**	20,793777
6	0,701918	15,557249	1,404504	20,811825
7	0,740802	**15,436265**	1,465500	20,861444
8	**0,670561**	15,486821	1,515684	20,923773

Zdroj: vlastní zpracování na základě výsledků z programu Gretl 1.9.4

3.2 Testování stacionarity

Pro další postup musíme provést test na stacionaritu časových řad. Pro ověření, jestli časové řady jsou či nejsou stacionární, musíme použít ADF test. V našem případě byl použit model s konstantou a trendem. Pro ADF test je stanovena H_0 (časová řada je nestacionární), v případě zamítnutí nulové hypotézy můžeme tvrdit, že zkoumaná časová řada je stacionární (platí alternativní hypotéza – H_1). Výsledky ADF testu pro všechny analyzované proměnné zachycuje tabulka č. 3.

Tab. 3: Výsledky ADF testu pro jednotlivé proměnné

Proměnná	*p*-hodnota	H_0
M3USA	0,7888	nezamítáme
M3EU	0,6872	nezamítáme
M3CH	0,7049	nezamítáme
M3CZ	0,9434	nezamítáme
CPIUSA	0,55	nezamítáme
CPIEU	0,6625	nezamítáme
CPICH	0,3744	nezamítáme

Proměnná	*p*-hodnota	H_0
CPICZ	0,6926	nezamítáme
GDPUSA	0,4824	nezamítáme
GDPEU	0,303	nezamítáme
GDPCH	0,09848	nezamítáme
HDPCZ	0,8601	nezamítáme

Zdroj: vlastní zpracování na základě výsledků z programu Gretl 1.9.4

Jak je z tabulky patrné, všechny *p*-hodnoty jsou větší než hladina významnosti (α=0,05), tudíž můžeme tvrdit, že časové řady jsou nestacionární, protože nezamítáme nulové hypotézy. Nestacionarita časových řad může znamenat pro případnou korelační analýzu, že by výsledky mohly být zavádějící a mohla by se zde vyskytnout zdánlivá korelace. Abychom docílili stacionarity časových řad, provedeme jejich diference. Výsledky provedených ADF testů pro diferencované proměnné znázorňuje tabulka č. 4.

Tab. 4: Výsledky ADF testu pro jednotlivé diferencované proměnné

Proměnná	*p*-hodnota	H_0
M3USA	0,01041	zamítáme
M3EU	0,04487	zamítáme
M3CH	0,04854	zamítáme
M3CZ	0,3547	**nezamítáme**
CPIUSA	3,118E-09	zamítáme
CPIEU	0,301	**nezamítáme**
CPICH	0,0002203	zamítáme
CPICZ	0,1379	**nezamítáme**
HDPUSA	0,008955	zamítáme
HDPEU	0,1005	**nezamítáme**
HDPCH	0,01606	zamítáme
HDPCZ	0,02225	zamítáme

Zdroj: vlastní zpracování na základě výsledků z programu Gretl 1.9.4

Po provedeném ADF testu pro diferencované proměnné jsme zjistili, že u pěti časových řad nezamítáme nulovou hypotézu, tudíž tyto časové řady jsou nestacionární. Proto, abychom mohli přistoupit k dalšímu kroku – provedení Engle-Grangerova testu, musí být časové řady stacionární. Nestacionární časové řady nejsou tedy zahrnuty do dalších testů, těmito časovými řadami jsou: peněžní agregát M3 (Česká republika), inflace (Eurozóna), inflace (Česká republika), HDP (Eurozóna).

4 Vyhodnocení závislosti časových řad pomocí Engle-Grangerova testu

Pomocí Engle-Grangerova testu zjišťujeme, zda mezi zkoumanými časovými řadami existuje vztah. Porovnáním *p*-hodnoty s hladinou významnosti můžeme poté rozhodnout, zda jsou časové řady kointegované či nikoli. Pro Engle-Grangerův test je stanovena H_0 (časové řady jsou nekointegrované), v případě zamítnutí nulové hypotézy můžeme tvrdit, že zkoumané časové řady jsou kointegrované (platí alternativní hypotéza – H_1). Výsledky Engle-Grangerova testu znázorňuje tabulka č. 5.

Tab. 5: Výsledky Engle-Grangerova testu

Testované vztahy	Řád zpoždění	*p*-hodnota	H_0
M3USA-CPIUSA	3	8,131E-08	zamítáme
M3USA-HDPUSA	1	0,008612	zamítáme
M3CH-CPICH	8	0,001953	zamítáme
M3CH-HDPCH	7	0,01251	zamítáme

Zdroj: vlastní zpracování na základě výsledků z programu Gretl 1.9.4

Engle-Grangerův test nabízí tři modely pro testování kointegrace, a to model bez konstanty, s konstantou nebo model s konstantou a trendem. Pro zajištění výběru správného modelu je vždy vybrán ten model, u kterého je AIC nejnižší.

Porovnáme-li výsledné *p*-hodnoty u provedených Engle-Grangerových testů s hladinou významnosti, zjistíme, že ve všech zkoumaných případech zamítáme nulovou hypotézu. Na základě zamítnutí veškerých nulových hypotéz můžeme tvrdit, že jsme nalezli kointegraci mezi danými časovými řadami (Tabulka č. 5).

Tabulka č. 6 shrnuje zjištěné výsledky statistické analýzy zkoumaného vlivu peněžního agregátu M3 na zvolené proměnné (inflace a HDP). Jelikož nebyly splněny podmínky pro Engle-Grangerův test pro Eurozónu a ČR, konstatujeme, že neexistuje vztah mezi peněžním agregátem M3 a zvolenými ekonomickými ukazateli a tím lze považovat měnovou politiku v těchto zemích za neúčinnou. Naopak v případě USA a Švýcarska byl prokázán vliv peněžního agregátu M3 na HDP a inflaci.

Tab. 6: Vliv peněžního agregátu M3 na zvolené proměnné

Proměnná	USA	Eurozóna	Švýcarsko	ČR
CPI	ANO	nesplnění požadavků pro test kointegrace	ANO	nesplnění požadavků pro test kointegrace
HDP	ANO		ANO	

Zdroj: vlastní zpracování na základě zjištěných výsledků

Závěr

V prostředí nulových úrokových sazeb přestaly být měnové politiky účinné v měnovépolitickém režimu cílování inflace. Jelikož centrální banky již nebyly schopné více snižovat klíčové úrokové sazby, musely aplikovat další nástroje měnové politiky. Proto centrální banky přistoupily k tzv. nekonvenční měnové politice, kterou centrální banky realizovaly v různých formách. Jednalo se o kvantitativní uvolňování v případě ECB a Fed a o devizové intervence u ČNB a SNB. Zvolené nekonvenční nástroje měnových politik lze ve všech sledovaných zemích považovat za adekvátní nástroj v situaci, kdy bylo zapotřebí oživit jednotlivé ekonomiky a odvrátit hrozící deflaci. Deflace ohrožující plnění inflačního cíle SNB neměla původ v domácí ekonomice. Zároveň se SNB snažila podpořit konkurenceschopnost exportu a odvrátit silné tlaky na zhodnocení měny. Švýcarský frank byl vždy vnímán jako bezpečná měna. Toto se potvrdilo i během finanční krize, kdy investoři dávali přednost právě švýcarskému franku, což se odrazilo na jeho posilování. Ihned po ukončení intervencí SNB došlo k citelnému posílení švýcarského franku. Deflace v ČR nebyla zapříčiněna celosvětovou finanční krizí, ale pozvolným poklesem cenové hladiny v důsledku narůstající konkurence na trhu mobilních operátorů, který stlačil ceny výrazným způsobem dolů a poklesem cen elektřiny, zemního plynu a vody od druhé poloviny roku 2012. Devizové intervence v ČR podpořily další růst exportu a to okamžitě po oslabení

kurzu v listopadu 2013. Export v ČR však rostl už před devizovými intervencemi a nelze tedy přesně určit příčinu jeho růstu ve vztahu k oslabení kurzu české koruny vůči euru. V obou případech lze přesto považovat dopady oslabení měnového kurzu jako velmi vhodnou alternativou měnové politiky. V Eurozóně je problematické zhodnotit působení nástrojů nekonvenční měnové politiky, jelikož došlo k jejich asymetrickému působení mezi jednotlivými členskými státy. Fed ukončil nekonvenční měnovou politiku v roce 2014, jelikož v tomto roce nastalo v USA oživení ekonomiky. Nákupy cenných papírů ze strany Fedu také pomáhaly snížit náklady na úvěry a tím došlo k opětovnému růstu americké ekonomiky. Kvantitativní uvolňování zároveň vedlo i k oslabení dolaru, což vedlo k podpoře exportu. Inflace v USA byla ovlivněna nízkými ceny energií, ale riziko toho, že by se nacházela dlouhodobě pod dvěma procenty, je mizivá. V roce 2014 došlo také k zlepšení situace, vlivem růstu ekonomiky, na trhu práce, jehož zdraví je pro Fed jeden z dalších klíčových ukazatelů.

Na základě zjištěných výsledků můžeme konstatovat, že všechny testované časové řady jsou podle ADF testu nestacionární a bylo je nutné upravit diferencováním. K Engle-Grangerově testu bylo přistoupeno pouze u těch časových řad, které byly i po diferencování časových řad stacionární. Na základě Engle-Grangerového testu kointegrace lze uvést, že časové řady jsou kointegrované a že existuje vztah mezi peněžním agregátem M3 a inflací i HDP v USA. Dále byl prokázán vztah mezi M3 ve Švýcarsku a inflací i HDP. Na základě zjištěných skutečností můžeme hodnotit měnovou politiku FEDu a SNB ve sledovaném období jako účinnou. K obdobným závěrům dochází i autoři Wu a Xia (2016), Barro (1977) či King a Levine (1993a, 1993b). Uvedené výsledky pro USA a Švýcarsko korespondují také s výsledky analýz od autorů jako je např. Baltensperger (2001) a Nelson (2003), kteří prokázali vliv peněžního agregátu M3 na inflaci. Vliv M3 na HDP prokázal Weber (1994), který mimo jiné prokázal vliv M3 právě na HDP v USA, stejně jako námi provedená statistická analýza. V případě Eurozóny a České republiky nebyl prokázán žádný vliv peněžního agregátu M3 na ekonomické ukazatele inflaci či HDP. V případě Evropské centrální banky a ČNB se jeví jejich měnová politika ve sledovaném období jako neúčinná. Autoři Kaufman a Kugler (2008) sice prokázali vliv peněžního agregátu M3 na inflaci v zemích Eurozóny, ale v jiném časovém období, kdy ECB ještě neprováděla nekonvenční měnovou politiku.

Po realizaci nekonvenční měnové politiky došlo ve všech sledovaných zemích k růstu HDP i CPI. Otázkou ovšem zůstává, zda byl růst ekonomických veličin způsoben skutečně daným nekonvenčním nástrojem nebo jiným opatřením, které centrální banky přijaly, či dalšími faktory specifickými pro jednotlivé ekonomiky. Bohužel není možné, z důvodu krátké časové řady, kdy byly vybrané nekonvenční měnové politiky realizovány, provést samostatnou analýzu časových řad v daných obdobích. Vybrané centrální banky přistoupily k nekonvenční měnové politice v různých dobách a s různou délkou, např. v České republice byla prováděna pouze necelé čtyři roky, v USA 7 let, zatímco ECB ji stále provádí od roku 2015. Příčiny rozdílných dopadů sledovaných měnových politik je důsledkem mnoha dalších faktorů, které současně působí v jednotlivých ekonomikách. Proto nelze jednoznačně prokázat kauzalitu mezi vlivem M3 na HDP a CPI ve sledovaných zemích. Zároveň tedy nelze jednoznačně hodnotit účinnosti měnových politik vybraných centrálních bank. Není možné zjistit a následně komparovat ekonomické dopady v případě použití jiných konvenčních či nekonvenčních nástrojů měnových politik. Zjištěné závěry budou dále rozpracovány v

rámci dalších analýz s časovými řadami, neboť bude jistě zajímavé sledovat ekonomické dopady (ne)konvenční měnové politiky centrálních bank v dlouhodobějším časovém horizontu. Dalším předmětem zkoumání nebude pouze testování vlivu peněžního agregátu M3 na ekonomické veličiny, ale snaha o nalezení dalších exogenních proměnných, které mohou působit na ekonomické veličiny (např. úrokové sazby či komoditního indexu).

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VYUŽITIE LOKÁLNYCH KVOCIENTOV PRI TVORBE REGIONÁLNYCH I-O TABULIEK A ODHAD REGIONÁLNYCH MULTIPLIKÁROTOV

USE OF THE LOCATION QUOTIENTS FOR REGIONAL I-O TABLES CREATION AND ESTIMATION OF REGIONAL MULTIPLIERS

Peter Džupka

Abstract: *The main purpose of this paper is to present the possibilities of using economic impact analysis on regional level with use of regional multipliers. The main limitation of economic impact analysis use on regional level is unavailability of regional multiplier in most of the EU countries. This article presents the possibility of the regional I-O table's derivation using local quotients. Different types of local quotients are critically analysed within the article with aim to find most suitable for derivation of regional I-O matrix in Slovakia. With the use of Flegg´s local quotient (FLQ) the derivation of selected regional I-O matrixes is described. The next part of the paper describes full set of regional multipliers which can be derived from regional I-O matrix and presents results for several sectors in Košice region. The last part of the paper discuss some special peculiarity of regional multipliers use in economic impact analysis and presents results of estimated regional multiplies for selected economic sectors in five Slovak regions.*

Keywords: *Economic impact analysis, Input-output analysis, Regional multipliers, Flegg´s local quotient (FLQ).*

JEL Classification*: R15.*

Úvod

Na Slovensku, podobne ako v Čechách sú analýzy ekonomických prínosov na regionálnej úrovni veľmi zriedkavé. Jedným z hlavných dôvodov je nedostupnosť regionálnych multiplikátorov. Hlavným cieľom tohto článku je preto poukázať na možnosti odvodenia regionálnych multiplikátorov a ich využitie pri tvorbe regionálnej analýzy ekonomických prínosov. Najrozšírenejším prístupom pri odvádzaní regionálnych multiplikátorov je využitie Input-Output (I-O) modelu. Na tomto prístupe je postavených niekoľko ucelených hotových modelov, napríklad IMPLAN, RIMS II atď. Multiplikátory z týchto modelov však nie sú dostupné pre krajiny strednej a východnej Európy a sú spoplatnené. Ďalšou možnosťou je použitie ekonometrických modelov REMI, alebo HERMIN. Ich použitie na regionálnej úrovni na Slovensku je však veľmi komplikované kvôli nedostatočne podrobnej štruktúre regionálnej štatistiky. Podľa (Džupka, et al., 2008) úplná aplikácia modelu HERMIN v podmienkach slovenskej regionálnej štatistiky nie je možná, kvôli nedostupnosti mnohých potrebných vstupných údajov. Ďalšou možnosťou je využitie Keynesovho multiplikátora. Jeho výpočet je náročný na kvalitné regionálne štatistické dáta a potrebný je aj detailný primárny prieskum. Hlavným problémom pri odvádzaní regionálnych multiplikátorov je nedostupnosť I-O tabuliek na regionálnej úrovni. Vo väčšine Európskych krajín sú I-O tabuľky dostupné iba na národnej úrovni.

Tento článok sa zaoberá možnosťami regionalizácie národnej I-O matice Slovenska s využitím lokalizačných kvocientov (LQ). V empirických štúdiách sa často využívajú rôzne druhy LQ, preto je jedným z cieľov tohto článku ich kritická analýza s cieľom identifikovať najvhodnejší LQ pre tvorbu regionálnych I-O matíc. Ďalším faktorom, ktorý ovplyvňuje aplikáciu analýzy ekonomických prínosov je správny výber regionálnych multiplikátorov. V článku je prezentovaný prístup k odvodeniu celej sady regionálnych multiplikátorov, tak ako to umožňuje regionálna I-O matica. Popísané teoretické východiská tvorby regionálnej I-O matice a regionálnych multiplikátorov sú prakticky aplikované na príklade vybraných regiónov Slovenska. V článku sú prezentované regionálne multiplikátory za vybrané ekonomické sektory pre päť krajov na Slovensku. Tieto budú použité v rámci projektu „UNIREG – Univerzity a ekonomický rozvoj regiónov“ pri odhade ekonomického prínosu piatich vybraných univerzít pre región v ktorom sú lokalizované.

1 Prístupy k tvorbe regionálnych I-O modelov

Základnou filozofiou tvorby regionálnych modelov sa zaoberá mnoho autorov napr. (Nijkamp, et al., 1986), (Miller, et al., 2009) a ďalší. V literatúre existujú tri základné prístupy k vytvoreniu regionálneho input-output modelu:

- Samostatný regionálny input-output model (ang. Single region input-output model - SRIOM).
- Interregionálny input-output model (ang. Interregional input-output model - IRIOM).
- Multiregionálny input-output model (ang. Multiregionaal input-output model - MRIOM).

Základný rozdiel medzi uvedenými prístupmi je v spôsobe modelovania regionálneho obchodu s vonkajším prostredím. V prípade prvého prístupu (SRIOM) je dovoz resp. vývoz modelovaný exogénne so zvyškom krajiny ako celkom. V ďalších dvoch prístupoch je regionálny obchod modelovaný pre všetky ostatné regióny samostatne. Pri kvantifikácii regionálnych multiplikátorov je však postačujúce modelovať celkový export resp. import do analyzovaného regiónu bez ohľadu na jeho zdroj alebo cieľ. Pre potreby kvantifikácie multiplikátorov je preto postačujúci samostatný regionálny input-output model SRIOM, ktorý sa bežne používa pri hodnotení ekonomických prínosov.

Najjednoduchším spôsobom pre vytvorenie regionálneho modelu I-O v podmienkach SR, je odvodiť ho z národnej I-O matice. V odbornej literatúre sú popísané dva základné prístupy pre regionalizáciu národnej I-O matice, ktorými je možné vytvoriť samostatný regionálny input-output model SRIOM. Podľa viacerých autorov (Kronenberg, 2011) (Pavlovičová, 2010) jediné prakticky využiteľné prístupy pre regionaliáciu I-O matice sú metódy založené na lokálnych kvocientoch (LQ) a metóda tovarovej bilancie. V tomto článku sa zaoberané prístupom založeným na prvej z uvedených metód.

1.1 Regionálny I-O model s využitím LQ

V súčasnosti najrozpracovanejším a zároveň najviac empiricky otestovaným prístupom pre regionalizáciu národného I-O modelu je využitie LQ. Pre potreby regionalizácie sa zvyčajne využíva LQ zamestnanosti, ktorý vyjadruje pomer medzi

podielom zamestnanosti v určitom sektore v regióne a zodpovedajúcim podielom zamestnanosti v národnej ekonomike.

Takýto LQ je možné použiť na úpravu národnej input-output matice tak, aby lepšie zohľadňovala odvetvovú štruktúru regiónu. Ak je $LQ < 1$ znamená to, že daný sektor je relatívne menej zastúpený v regionálnej ekonomike a je možné predpokladať, že nebude schopný pokryť všetok dopyt, ktorý je v danom regionálne po jeho tovaroch a službách. Ak v takom prípade prenásobíme národný koeficient vstupu vypočítaným LQ a dostaneme regionálny koeficient vstupu a zároveň odhadneme potrebu „importu" pre dané odvetvie z iných regiónov. Tento prístup bol kritizovaný, pre nadhodnotené výsledné regionálne multiplikátory napr. (Flegg, et al., 1997). Využitie klasických LQ nezohľadňuje dostatočne medziregionálny obchod a podceňuje regionálny skon k importu. Štandardný LQ taktiež nezohľadňuje veľkosť regiónu.

Reakciou na tieto nedostatky bolo zostrojenie LQ zamestnanosti (Flegg et al., 1997) tzv. FLQ, ktorý explicitne zohľadňuje veľkosť regiónu a sklon k importu z ostatných regiónov. Aj tento prístup bol podrobený kritike napr. (Brand, 1997) a následne niekoľkokrát revidovaný do jeho výslednej podoby (Flegg a Webber, 2000) ktorá zachytáva aj efekt regionálnej špecializácie na regionálne koeficienty vstupu.

Podľa (Flegg, et al., 2013) na národnej úrovni môžeme definovať I-O model nasledovne:

$$x = Ax + y = (I - A)^{-1} y \tag{1}$$

Kde A je matica $n \times n$ sektorových technických koeficientov vypočítaná z národnej symetrickej I-O matice, y je vektor konečného dopytu $n \times 1$, x – je vektor hrubej produkcie $n \times 1$ a I – je jednotková matica

Vzťah $(I-A)^{-1}$ je tzv. Leontiefová inverzná matica v ktorej suma stĺpcov dáva multiplikátor sektora ktorý je reprezentovaný daným stĺpcom.

Základným problémom pri regionalizácii I-O matice je transformácia národnej matice technických koeficientov $A = [aij]$ na regionálnu maticu technických koeficientov $R = [rij]$ tak, aby čo najlepšie reprezentovala regionálnu sektorovú štruktúru, medzi sektorové toky a zároveň medziregionálny pohyb tovarov a služieb. Práve v tom spočíva úloha LQ.

Predpokladajme:

$$r_{ij} = t_{ij} \times a_{ij} \tag{2}$$

Kde r_{ij} je regionálny koeficient vstupu, t_{ij} – je koeficient obchodu (trading koeficient) a a_{ij} - je národný koeficient vstupu.

Koeficient obchodu t_{ij} meria podiel regionálnych požiadaviek, ktoré môžu byť uspokojené regionálnymi firmami pričom musí platiť $0 \leq tij \leq 1$. Čím bude koeficient obchodu väčší, tým bude nižšia potreba uspokojovať regionálne sektorové vstupy z dovozu. Ak by bol $t_{ij} = 1$ znamenalo by to, že v danom sektore môžu byť všetky požiadavky uspokojené regionálnymi firmami a že do regiónu nie je potrebný žiadny dovoz z iných regiónov resp. zahraničia. Tu začína úloha lokálnych kvocientov a môžeme písať:

$$R_{ij} = LQ_{ij} \times a_{ij} \qquad \text{(za predpokladu že } LQ_{ij} < 1\text{)} \tag{3}$$

V prípade, že je vybraný $LQ < 1$ znamená to, že podiel významu sektora je v regionálnej ekonomike je nižší ako v národnej ekonomike a existuje predpoklad, že zvyšok potreby bude do regiónu dovezený. V prípade, že $LQ > 1$ predpokladá sa, že región je špecializovaný v danom odvetví, čo naznačuje, že regionálny dopyt môže byť pokrytý ponukou regionálnych firiem v odvetví. V tomto prípade budem $R_{ij} = a_{ij}$

Z hore uvedeného je zrejmé, že voľba typu LQ bude rozhodujúca pre správny odhad regionálnych koeficientov vstupu a následný korektný odhad regionálnych multiplikátorov regionalizovanej I-O matice. V súčasnosti sú dostupné predovšetkým nasledovné typy lokálnych kvocientov:

Jednoduchý lokálny kvocient - simple location quocient (SLQ)

Podľa (Kowalewski, 2012) môžeme SLQ priemyslu *i* vypočítať podľa nasledovného vzorca:

$$SLQ_i = \frac{E_{ir} / E_{.r}}{E_{i.} / E_{..}} \tag{4}$$

E_{ir} (E_i) je regionálna (národná) zamestnanosť v sektore *i* (i = 1, ...,n) sektorov a $E_{.r}(E_{..})$ je celková regionálna (národná) zamestnanosť. Tento jednoduchý lokálny kvocient popisuje relatívnu dôležitosť sektora *i* v regióne v porovnaní s dôležitosťou sektora v národnej ekonomike meranú zamestnanosťou.

Medzi sektorový lokálny kvocient – cross – industry location quatient (CILQ)

CILQ bol jedným z prvých vylepšení SLQ, ktorý porovnáva podiel zamestnanosti predávajúceho sektora v regióne s národným a zamestnanosť nakupujúceho regionálneho sektora s národným. Teda:

$$CILO_{ij} = \frac{E_{ir} / E_{jr}}{E_{i.} / E_{j.}} = \frac{SLQ_i}{SLQ_j} \tag{5}$$

E_{jr} (E_j) je regionálna (národná) zamestnanosť v nakupujúcom sektore. Podľa (Kowalewski, 2012) ak je sektor v regióne malý, predpokladá sa, že medziregionálny obchod bude väčší ako je národný priemer. V tomto prípade zároveň existuje možnosť, že každý sektor v regionálnej ekonomike môže importovať a zároveň exportovať svoje tovary a služby. Hlavná kritika CILQ spočíva v tom, že ignoruje veľkosť regiónu.

Fleggov lokálny kvocient – Flegg´s location quotient (FLQ)

FLQ rieši problém relatívnej veľkosti regiónu prostredníctvom λ^* pričom $(0 \leq \lambda^* < 1)$

$$\lambda^* = \left[\log_2 (1 + E_{.r} / E_{..}\right]^{\delta} \tag{6}$$

$E_{.r}(E_{..})$ je celková zamestnanosť v regióne resp. (na národnej úrovni). Podľa (Kowalewski, 2012) sa hodnota λ^* postupne zvyšuje s relatívnou veľkosťou regiónu, čo znamená výraznejšiu úpravu importu pre menšie regióny. Zvýšenie regionálneho importu predpokladá zároveň zníženie vnútroregionálneho obchodu. Základný predpoklad je, že akákoľvek metóda, ktorá dokáže korektne odhadnúť celkový import, bude zároveň schopná lepšie odhadovať koeficienty vstupu a multiplikátory výstupu. Exponent δ, pričom $(0 \leq \delta \leq 1)$, predstavuje prvok flexibility zmenou konvexnosti funkcie λ^*. Čím vyššia je hodnota δ, tým nižšia bude hodnota λ^* čo opätovne

znamená väčšiu úpravu regionálneho importu. Je nutné poznamenať, že hodnota δ je záležitosťou empirického skúmania. Samotný FLQ je možné podľa (Flegg, et al., 1997) zapísať nasledovne:

$$FLQ_{ij} \equiv CILQ_{ij} \times \lambda^{*} \tag{7}$$

Využitie FLQ pre úpravu technických koeficientov národnej I-O matice je veľmi podobné ako v prípade SLQ a môžeme ho matematicky zapísať nasledovne:

$$R_{ij} = \begin{cases} a_{ij}^{N} \text{.....} akFLQ_{ij} \geq 1 \\ FLQ_{ij} \times a_{ij}^{N} \text{.....} akFLQ_{ij} < 1 \end{cases} \tag{8}$$

Autori FLQ rozšírili tento model o predpoklad, že v určitých špecifických prípadoch môžu regionálne koeficienty vstupu prekonať národné koeficienty teda $R_{ij} > a_{ij}$. Vznikol tzv. rozšírený FLQ - augmented FLQ (AFLQ). Jeho aplikácia však v dostupných empirických štúdiách nie je častá, čo komplikuje voľbu neznámych parametrov pri výpočte.

1.2 Voľba vhodného LQ v podmienkach SR

V empirických štúdiách neexistuje jednoznačný názor na výber konkrétnej metódy. Väčšina autorov sa zhoduje na tom, že pre overenie výberu vhodného LQ je potrebné empirické porovnanie výsledkov získaných metódami odôvodenia priamou metódou. Na Slovensku sa však regionálny model priamou metódou nezostavuje. Preto je na analytikovi, aby si vybral najvhodnejší typ lokálneho kvocientu. V súčasnosti existuje viacero empirických štúdií (Kowalewski, 2012) (Flegg, et al., 2013), ktoré skúmajú ktorý z popisovaných LQ dáva najlepšie výsledky pri regionalizácii I-O matice. Empirické výskumy skúmajú schopnosť jednotlivých LQ regionalizovať národnú I-O maticu. V krajinách, kde existujú regionálne I-O matice zostavené primárnym zisťovaním (ktorý je považovaný za najpresnejšiu formu tvorby regionálnej I-O matice), sú takto získané výsledky porovnávané s regionálnymi I-O maticami odvodenými s využitím rôznych typov LQ. Podľa (Lehtonen, et al., 2014) , ktorí použili regionálne a národné dáta z Fínska z roku 2002, aby ohodnotili spoľahlivosť dostupných lokálnych kvocientov (FLQ, SLQ, a CILQ), dáva FLQ najlepšie odhady regionálnych sektorových multiplikátorov. Na druhej strane, tí istí autori zistili, že štatisticky lepšie výsledky dosahuje pri odhadovaní koeficientov vstupu. (Flegg, et al., 2013) napádajú toto tvrdenie tým, že tieto zistenia sú protichodné, a že presnosť odhadu koeficientov vstupu významne vplýva na samotný odhad multiplikátorov a je v rozpore z predchádzajúcimi empirickými štúdiami, ktoré dávali podobné výsledky pri odhade koeficientov vstupu ako pri odhade multiplikátorov. (Lehtonen, et al., 2014) uskutočnili aj korelačnú analýzu výsledkov získaných jednotlivými LQ s hodnotami špecializácie regiónov a lokalizácie regiónov (meranou vzdialenosťou od hlavného mesta). Výsledkom tejto analýzy je, že použitie SLQ je vhodnejšie ako FLQ pre viac špecializované a periférne regióny.

Komplikáciou využitia FLQ je aj správna voľba neznámeho parametra δ. Nesprávna voľba parametra δ môže významným spôsobom skresliť výsledky získané využitím FLQ. Na základe toho (Flegg, et al., 2013) prichádzajú k záveru, že neexistuje jeden LQ pre všeobecné použitie.

Voľba správneho LQ je kľúčová pre správnosť výsledkov. Z pohľadu tvorby metodológie pre hodnotenie ekonomických prínosov v podmienkach SR je

najdôležitejšia presnosť odhadu multiplikátorov, ktoré sú rozhodujúce pre správnosť odhadu výsledných indukovaných ekonomických prínosov. Z tohto pohľadu sa zdá byť najvhodnejšou voľba FLQ. Pri voľbe FLQ, je však potrebná správna voľba neznámeho parametra δ.

(Flegg, et al., 2013) uskutočnili empirickú štúdiu na Fínskych regiónoch v ktorej zistili, že najpresnejšie výsledky je možné získať pri voľbe parametra δ v intervale $0,2 \leq \delta \leq 0,3$. Najvhodnejším bola voľba $\delta = 0,25$. Iba pri veľmi malom regióne Ahvenanmaa s relatívnou veľkosťou iba 0,6% HDP Fínska boli najlepšie výsledky dosahované pri $\delta = 0,15$. Druhá empirická štúdia (Kowalewski, 2012) sa zaoberala Nemeckým regiónom Baden-Wuerttemberg. Podľa tejto empirickej štúdie najpresnejšie výsledky boli dosiahnuté pri δ v intervale $0,11 \leq \delta \leq 0,17$. Autorka to vysvetľuje, relatívne diverzifikovanou priemyselnou štruktúrou regiónu ponúkajúcou veľké množstvo rôznorodých tovarov a služieb, čo môže znižovať importnú potrebu regiónu.

Voľbu parametra δ, v prípade slovenských regiónov, môže ovplyvňovať relatívna veľkosť regiónu. Preto bola uskutočnená analýza porovnania slovenských regiónov na úrovni NUTS II vychádzajúca z podielu regiónu na celkovej zamestnanosti. Okrem Bratislavského regiónu sú všetky slovenské regióny približne rovnaké. Ako je možné vidieť (tab. 1), mimo Bratislavského regiónu sú všetky ostatné regióny približne rovnako veľké. V štruktúre slovenských regiónov neexistuje žiaden významne malý región.

Tab. 1 Relatívna veľkosť slovenských regiónov podľa zamestnanosti

Rok 2010	Počet evidovaných zamestnancov	Podiel regiónu na celkovej zamestnanosti v %
Bratislavský kraj	275070	21,82%
Trnavský kraj	122786	9,74%
Trenčiansky kraj	139558	11,07%
Nitriansky kraj	145950	11,58%
Žilinský kraj	145406	11,53%
Banskobystrický kraj	135015	10,71%
Prešovský kraj	131889	10,46%
Košický kraj	165069	13,09%
SR	1260743	100,00%

Zdroj: ŠÚ SR, vlastné spravovanie

Z pohľadu relatívnej veľkosti regiónov teda neexistuje dôvod, znižovať parameter δ a vhodným intervalom sa zdá byť interval $0,2 \leq \delta \leq 0,3$.

Podľa takto zvolených kritérií je teda možné aplikovať FLQ na regionalizáciu národnej I-O matice Slovenska.

2 Regionalizácia národnej I-O matice v podmienkach SR

Vo väčšine Európskych krajín je I-O tabuľka konštruovaná podľa metodiky ESA 10 a zverejňovaná v päť ročných intervaloch na stránkach Eurostatu. Exitujú názory (Kronenberg, 2009), že metódy založené na LQ nie sú najvhodnejšie pre regionalizáciu I-O matice v tvare v akej ju zverejňuje Eurostat. Poskytuje však dôkaz iba pre SLQ, CILQ pričom sám autor tvrdí, že pre overenie jeho tvrdení vo vzťahu k

FLQ a iným LQ sú potrebné ďalšie empirické štúdie (Kronenberg, 2011). Na druhej strane autor metódy FLQ vyvracia tieto tvrdenia (Flegg, et al., 2012), a konštatuje, že pri správnom výbere je možné využívať aj národné matice SIOT. Tvrdenia uverejnené v (Kronenberg, 2009) sa opierajú o starú metodiku tvorby národných I-O tabuliek ESA95, pričom aktuálne národné I-O tabuľky sú zostavené podľa novej metodiky ESA2010.

Pre Slovensko je najaktuálnejšia symetrická input-output tabuľka (SIOT) za rok 2010, pričom zverejnená bola začiatkom roka 2014. Z pohľadu štruktúry odvetví ekonomiky využíva NACE rev. 2 štruktúru podľa metodiky ESA2010 obsahujúcu 65 odvetví národného hospodárstva.

Z dostupnej národnej SIOT tabuľky je možné odvodiť otvorený aj zatvorený národný I-O model. Táto úprave je dôležitá kvôli tomu, aby bolo možné v ďalšom kroku odvodiť oba základné typy multiplikátorov. Ak sú v input-output modeli domácnosti klasifikované ako súčasť konečného dopytu (otvorený model), potom príjem dosiahnutý domácnosťami je považovaný za únik zdrojov z regiónu. Domácnosti v tomto prípade neprispievajú k multiplikačnému efektu a multiplikátory odvodené z tohto modelu nazývame multiplikátory Typu I. V prípade zatvoreného modelu sú domácnosti považované za sektor v rámci regiónu , výdavky domácnosti sú započítané do celkového efektu. Tieto multiplikátory voláme multiplikátory Typu II. Ďalší postup regionalizácie je pre oba modely rovnaký a ďalšom texte bude konkrétny postup demonštrovaný na zatvorenom modeli.

V prípade zatvoreného modelu je potrebné v prvom kroku odvodiť z národnej symetrickej I-O tabuľky SIOT zatvorený model. Výsledkom je matica SIOT B o rozmeroch 66x66, pričom je zložená z 65 ekonomických odvetví podľa NACE 2 rev. Posledný riadok 66 tvoria príjmy zamestnancov z národnej matice SIOT a posledný stĺpec 66 konečná spotreba domácností opäť z národnej SIOT tabuľky.

Z tejto SIOT B matice je následne potrebné vytvoriť maticu technických koeficientov B. Ak je matica SIOT B (xi,j) potom maticu technických koeficientov B (bi,j) vytvoríme nasledovne:

$$b_{ij} = \frac{x_{ij}}{x_j} \tag{10}$$

Pričom xi,j je hodnota produkcie z národnej SIOT B matice a xj je hodnota celkového produkcie z národnej SIOT matice.

Takto vytvorenú národnú maticu technických koeficientov je možné regionalizovať s využitím FLQ. Lokálny koeficient FLQij, bol kvantifikovaný podľa vzťahov 5 až 7. Pre výpočty bol využitý parameter δ=0,25. Podľa vzťahu 8, bola vypočítaná regionálna matica technických koeficientov vybraných krajov BR(Ri,j). Pre určenie matice regionálnych multiplikátorov bol využitý základný statický Leontiefov I-O model.

$$x = B^R x + y \tag{11}$$

Vektor x vyjadruje objem celkovej výroby odvetví a y je vektor konečnej spotreby.

Vzorec 11 môžeme následne zapísať takto:

$$y = (I - B^R)x \tag{12}$$

Objem celkovej produkcie potrebnej na uspokojenie určitej úrovne spotreby *y* vypočítame podľa vzťahu:

$$x = (I - B^R)^{-1} y \tag{13}$$

Matica $(I - B^R)^{-1}$ je potom maticovým multiplikátorom určená na výpočet regionálnych multiplikátorov. Analogicky je možné vypočítať matice multiplikátorov aj z otvoreného I-O modelu.

3 Regionálne multiplikátory

Podľa postupu uvedeného v kapitole 2 je možné vytvoriť otvorený a zatvorený regionálny I-O model vhodný pre odvádzanie regionálnych multiplikátorov Typu I a Typu II.

Pre oba typy je následné možné v I-O matici merať celkový efekt prostredníctvom výstupu, príjmu, pridanej hodnoty, alebo zamestnanosti, z čoho vyplýva základná charakteristika regionálnych multiplikátorov:

- Multiplikátor výstupu.
- Multiplikátor príjmu.
- Multiplikátor pridanej hodnoty.
- Multiplikátor zamestnanosti.

Konkrétny postup pre odvádzanie multiplikátorov je pomerne náročný a jeho popis je mimo rozsahu a zamerania tohto článku, ale detailný postup pre odvádzanie regionálnych multiplikátorov z otvoreného a zatvoreného modelu ako aj spôsob ich interpretácie je možné nájsť napríklad v (McLennan, 2006), alebo (Coughlin, et al., 1991).

Z takýchto modelov je možné odvodiť aj menej často používané multiplikátory (napr. počiatočný efekt, efekt prvého kola, efekt indukovaný produkciou, alebo spotrebou a pod.), ktoré ale môžu mať význam pri určitých špecifických typoch analýz. Celkovo je možné odvodiť až 11 typov multiplikátorov samostatne pre výstup, príjem, zamestnanosť a pridanú hodnotu a to pre každý sektor nachádzajúci sa v I-O matici. Týmto prístupom je teda možné odvodiť sadu 2904 regionálnych multiplikátorov. Je nutné však poznamenať, že niektoré z nich budú mať len veľmi obmedzenú vypovedaciu schopnosť a použiteľnosť.

4 Využitie regionálnych multiplikátorov pri analýze ekonomických prínosov

Analýza ekonomických dopadov je jedným z hlavných nástrojov používaných pri odhadoch celkového ekonomického vplyvu projektov a programov. Zvyčajne sa využíva na hodnotenie veľkých projektov, alebo programov s celonárodným dosahom. Ako už bolo spomínané jej aplikáciu na regionálnej úrovni obmedzuje nedostupnosť regionálnych multiplikátorov, ktoré by boli schopné merať celkový efekt dodatočných ekonomických aktivít na regionálnej úrovni. V prechádzajúcich častiach článku sme poukázali na možnosť odvodiť regionálne multiplikátory z I-O matice upravenej prostredníctvom FLQ. Uvedeným postupom je možné odvodiť relatívne širokú škálu rôznych typov multiplikátorov, čo umožňuje ich aplikáciu pri analýzach ekonomických dopadov na regionálnej úrovni pre rôzne typy projektov a programov.

Takto odvodené multiplikátory môžu regionálne vlády využívať na ex-ante aj ex-post hodnotenie verejných projektov, prípadne ako jedno z kritérií pri výbere alternatív projektu na základe celkového ekonomického prínosu pre regionálnu ekonomiku.

Praktickú aplikáciu vypočítaných regionálnych multiplikátorov je možné demonštrovať na analýze regionálnych ekonomických prínosov univerzít. Odhad ekonomických prínosov univerzít v SR je súčasťou projektu UNIREG - Univerzity a ekonomický rozvoj regiónov“, kde je jedným z cieľov preskúmať krátkodobé regionálne ekonomické vplyvy piatich vybraných slovenských univerzít. Pre naplnenie tohto cieľa sú na týchto univerzitách realizované dotazníkové prieskumy, ktorých cieľom je identifikovať bežné výdavky zamestnancov a študentov univerzity, ktoré realizujú v skúmanom regióne ako aj identifikovať bežné nákupy tovarov a služieb týchto univerzít. Vypočítané regionálne multiplikátory majú za úlohu kvantifikovať indukované vplyvy a odhadnúť tak celkový ekonomický prínos lokalizácie univerzity v regióne. Popis metodológie pre odhad krátkodobých vplyvov univerzít použitých v projekte UNIREG je uvedený v (Džupka a Szlafkaiová, 2017).

Dôležitým rozhodnutím pri aplikácii regionálnych multiplikátorov na konkrétny projekt je výber správnych typov multiplikátorov. Ako je uvedené v kapitole 2 a 3 tohto článku existujú dva základy typy multiplikátorov. V prípade projektu UNIREG, boli pri analýze univerzít identifikované významné podiely dodávateľských firiem sídliacich mimo analyzovaného regiónu. Keďže multiplikátory typu II preferujú prínos príjmov zamestnancov voči zisku firiem a ich ekonomická podstata spočíva v tom, že model vytvorený s využitím multiplikátorov typu II predpokladá, že zisk firiem nebude reinvestovaný v skúmanom regióne a naopak, že príjmy zamestnancov vytvárajú ďalšie indukované prínosy v regióne budú v tomto konkrétnom prípade použité multiplikátory typu II.

Ďalšou dôležitou voľbou je voľba multiplikátorov zo správneho sektora. V prípade analýzy vplyvu univerzít predpokladáme, že ekonomický vplyv univerzít, sa primárne prejaví vo zvýšenom dopyte v troch regionálnych sektoroch ktoré zodpovedajú výdavkom zamestnancov, študentov a univerzity na ubytovanie a stravovanie dopravu a nákupy tovarov v maloobchode v regióne. Konkrétne výsledky výpočtu regionálnych multiplikátorov za vybrané kraje SR preto demonštrujeme na týchto troch ekonomických sektoroch. Tabuľka 2 prezentuje celkový multiplikátor typu II.

Tab. 2: Vybrané regionálne multiplikátory

		Maloobchod okrem motorových vozidiel	Pozemná doprava	Ubytovacie a stravovacie služby
Bratislavský kraj	Multiplikátor výstupu	1,8892	1,9273	1,7593
	Multiplikátor príjmu	0,3627	0,2678	0,3718
	Multiplikátor zamestnanosti	19,3747	12,5607	16,8722
	Multiplikátor pridanej hodnoty	0,8269	0,6577	0,7254
Nitriansky kraj	Multiplikátor výstupu	1,7480	1,7890	2,1964
	Multiplikátor príjmu	0,3506	0,2648	0,4298
	Multiplikátor zamestnanosti	19,5710	12,8383	20,6696
	Multiplikátor pridanej hodnoty	0,7862	0,6357	0,8779
Žilinský kraj	Multiplikátor výstupu	1,7095	1,7521	1,8824
	Multiplikátor príjmu	0,3479	0,2589	0,3992
	Multiplikátor zamestnanosti	19,3239	12,3646	18,9611
	Multiplikátor pridanej hodnoty	0,7857	0,6354	0,7953
Bansko-bystrický kraj	Multiplikátor výstupu	1,5962	1,5421	1,6909
	Multiplikátor príjmu	0,3384	0,2411	0,3816
	Multiplikátor zamestnanosti	18,8809	11,4629	18,0239
	Multiplikátor pridanej hodnoty	0,7436	0,5667	0,7321
Košický kraj	Multiplikátor výstupu	1,7164	1,5302	1,6805
	Multiplikátor príjmu	0,3528	0,2397	0,3777
	Multiplikátor zamestnanosti	19,4693	11,2973	17,6842
	Multiplikátor pridanej hodnoty	0,7871	0,5663	0,7320

Zdroj: vlastné výpočty

Interpretačnú schopnosť vypočítaných regionálnych multiplikátorov je možné demonštrovať na príklade sektorového multiplikátora maloobchod v Košickom kraji. Celkový multiplikátor výstupu vyjadruje akú celkovú dodatočnú produkciu vo všetkých odvetviach v kraji, v rátane dodatočnej spotreby domácností, vyvolala celková hodnota priamych výdavkov. Dodatočný dopyt z univerzity v sektore maloobchodu na úrovni *1 €* v Košickom kraji teda indukuje zvýšenie produkcie vo všetkých sektoroch v kraji o *1,71 €.* Multiplikátor príjmu potom ukazuje celkový nárast príjmov zamestnancov v ekonomike Košického kraja z práce na tejto dodatočnej produkcii. Celkový multiplikátor zamestnanosti ukazuje, že v prípade nárastu výstupu sektora maloobchodu v Košickom kraji o *1* milión € vznikne v Košickom kraji *19* nových pracovných miest meraných plnými pracovnými úväzkami. Multiplikátor pridanej hodnoty ukazuje nárast pridanej hodnoty v ekonomike Košického kraja z produkcie dodatočnej jednotky výstupu indukovanej všetkými kolami v rátane konečnej spotreby domácností. V prípade maloobchodu Košického kraja tento multiplikátor nadobúda hodnotu približne *0,73 eura*.

Pri projekte UNIREG je o dodatočných ekonomických aktivitách uvažované ako o všetkých pravidelných výdavkoch univerzity, jej zamestnancov a študentov, ktoré zvyšujú dopyt po tovaroch a službách v analyzovanom regióne. Inými slovami cieľom

odhadu krátkodobých vplyvov je odhadnúť o aký veľký dopyt by región prišiel, keby univerzita v regióne neexistovala. Po ukončení primárnych a sekundárnych prieskumov potrebných pre korektný odhad výdavkov študentov, zamestnancov a výdavkov samotných univerzít, budú vypočítané multiplikátory použité na odhad celkového ekonomického prínosu univerzity pre región. Ukončenie primárnych výskumov sa predpokladá v roku 2017 a prezentáciu celkových výstupov projektu predpokladáme v roku 2018.

Záver a diskusia

Cieľom tohto príspevku bolo poukázať na možnosti odvodenia regionálnych multiplikátorov a ich využitie pri tvorbe regionálnej analýzy ekonomických prínosov. Hlavným obmedzením použitia analýzy ekonomických prínosov na regionálnej úrovni vo väčšine Európskych krajín je práve nedostupnosť regionálnych multiplikátorov. V článku bol prezentovaný prístup, ktorý umožňuje kvantifikáciu regionálnych multiplikátorov prostredníctvom regionalizácie I-O matice aj v krajinách, kde sú I-O matice publikované iba na národnej úrovni. Na konkrétnom príklade Slovenských regiónov boli v článku diskutované skutočnosti, ktoré sú podstatné pre správnu voľbu parametrov pri regionalizácii národnej I-O matice, ako aj pre správny výber regionálnych multiplikátorov. Z nášho pohľadu sa jedná o komplexný prístup, ktorý je aplikovateľný vo všetkých krajinách EÚ, pričom tak, ako je v článku uvedené pre správnu aplikáciu je potrebné brať do úvahy viacero kritérií pri voľbe vhodného LQ použitého pre regionalizáciu národnej I-O matice a zároveň je potrebné venovať patričnú pozornosť správnej voľbe neznámeho parametra pri ich aplikácii.

Podľa našich poznatkov sa v prípade v článku popísaného postupu, jedná na Slovensku o prvý pokus o odvodenie regionálnych multiplikátorov s využitím LQ.

Aj napriek masívnemu praktickému využívaniu metódy pre posudzovanie ekonomických prínosov s využitím multiplikátorov je potrebné upozorniť, že v literatúre exituje aj kritika používania týchto metód. Medzi hlavné argumenty kritikov patrí to, že metódy založené na I-O tabuľkách používajú nesprávne alebo nadhodnotené multiplikátory. Napríklad (Madden, 2001) upozorňuje na to, že pri analýzach s využitím multiplikátorov je potrebné brať do úvahy výhradne dodatočné príjmy, že využívanie týchto metód hodnotí striktne matematicky ekonomickú stránku a zanedbáva ďalšie dôležité prínosy ako podpora kreativity, zlepšenie kvality života obyvateľov a pod. Mnohé z týchto kritizovaných slabých stránok sú už v súčasnosti používaných metodológiách posudzovania ekonomických dopadov prekonané. Aj napriek tomu je potrebné pri používaní týchto metód poznať ich slabé miesta a počítať s nimi pri zostavovaní hodnotiaceho modelu, aj pri interpretácii získaných výsledkov.

Poďakovanie

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HODNOCENÍ FINANČNÍHO ZDRAVÍ ČESKÝCH CESTOVNÍCH KANCELÁŘÍ

ASSESSMENT OF THE FINANCIAL HEALTH OF THE CZECH TOUR OPERATORS

Veronika Hedija, Martina Kuncová

Abstract: *Tourism industry belongs to the relatively young and dynamically expanding sector of economy in post-communist countries. According to the Tourism Satellite Account data, tourism industry created on average 3 percent of gross domestic product in last ten years in the Czech Republic. The study is focused on travel agents whose main task is to mediate tourism services. The paper aims to assess the financial health of tour operators in the Czech Republic using different methods which are suitable for financial health evaluation and compare the results of these methods. The multiple criteria decision making methods (TOPSIS and WSA) based on selected financial ratios and bankruptcy models, specifically Altman Z´-Score, Z´´-Score models and index IN05 were applied. The data were taken from database Albertina CZ Gold Edition. The final sample covered data about 232 tour operators (group 79.12 according to the Statistical Classification of Economic Activities in the European Community Rev.2) for the years 2014. The findings of all applied methods show that not all companies are in good financial health and it is expected that the market of tour operators will evolve towards a reduction of the number of market players*.

Keywords: *Bancruptcy models, Altman Z-score, IN05, Multiple criteria decision making methods, Tour operators.*

JEL Classification*: C44, G33, Z33.*

Úvod

Odvětví cestovního ruchu patří k relativně mladým a dynamicky se rozvíjejícím odvětvím ekonomiky v postkomunistických zemích. Před pádem železné opony zde bylo toto odvětví silně regulováno vládou a možnosti příjezdového a výjezdového cestovního ruchu byly značně omezeny. Ekonomická transformace z centrálně plánovaného na tržní hospodářství na počátku 90. let, která byla doprovázena privatizací, liberalizací trhu a zahraničního obchodu, znamenala nové možnosti a výzvy také pro oblast cestovního ruchu. Otevření hranic přineslo významné změny v poptávce po službách cestovního ruchu, a to jak z hlediska příjezdového, tak i výjezdového cestovního ruchu. V reakci na tyto změny začal počet zprostředkovatelů v cestovním ruchu rychle růst.

Zatímco v roce 1989 působilo v České republice 11 tuzemských cestovních kanceláří, v roce 1995 jejich počet vzrostl na 1100 (Vystoupil a kol., 2010). Po dramatickém nárůstu začal jejich počet klesat. Podle údajů Eurostat (2017) klesl počet cestovních kanceláří a agentur mezi lety 2009 a 2014 o 17 procent. Pokles počtu cestovních kanceláří a agentur byl úzce spojen s finanční krizí roku 2008, která postihla i Českou republiku. Krize byla doprovázena poklesem hrubého domácího produktu o

4,8 procent v roce 2009 a prověřila flexibilitu podniků, jejich schopnost čelit poklesu poptávky a přizpůsobení se novým podmínkám (Český statistický úřad, 2017).

Na základě výše uvedeného poklesu vyvstává otázka, zda na trhu zůstaly pouze kvalitní a prosperující firmy, nebo zda lze očekávat další snižování počtu cestovních kanceláří vzhledem ke stále ještě silné konkurenci. Cílem tohoto článku je zhodnocení finančního zdraví cestovních kanceláří v České republice v roce 2014 s užitím alternativních metod hodnocení finančního zdraví podniku a srovnání výsledků jednotlivých aplikovaných metod. Vybranými metodami jsou bankrotní modely, konkrétně Altmanův Z′-skóre a Z′′-skóre model a index IN05 a dále metody vícekriteriálního hodnocení, konkrétně metody TOPSIS a WSA, postavené na 11 vybraných poměrových ukazatelích finanční analýzy.

Závěry studie poskytnou odpověď na otázku, zda se situace na trhu českých cestovních kanceláří stabilizovala, nebo zda lze v budoucnu očekávat další pokles počtu tržních hráčů. Umožní také posoudit, zda jsou závěry nezávislé na aplikovaných metodách, které ekonomická teorie nabízí k posouzení finančního zdraví podniků.

1 Formulace problematiky

Hodnocení výkonnosti a finančního zdraví podniku patří k ústředním tématům podnikových věd a je také předmětem velkého množství odborných článků a studií (pro přehled například Hult a kol., 2008; Richard a kol., 2009; Steigenberger, 2014).

Přístup jednotlivých autorů k hodnocení výkonnosti a finančnímu zdraví podniků se v jednotlivých odborných studiích liší a rozdílné jsou také metody užité k jejich kvantifikaci. Tradičním přístupem k hodnocení finančního zdraví je užití nástrojů finanční analýzy. Velké množství autorů pracuje pouze s jedním ukazatelem postihujícím zkoumaný fenomén. Nejčastěji užívanými ukazateli jsou potom vybrané ukazatele rentability, zejména rentabilita vlastního kapitálu (ROE), rentabilita aktiv (ROA) a rentabilita tržeb (ROS) (Hult a kol., 2008). Nicméně tento přístup může být problematický, protože vybraný ukazatel nemusí postihovat všechny důležité aspekty a zkoumaný vztah tak může být zkreslený.

Vhodnějším přístupem se tak jeví využití vybraného souboru poměrových finančních ukazatelů (ukazatele rentability, likvidity, aktivity a zadluženosti) (Sedláček, 2001; Kislingerová, 2010). Mezipodnikové srovnání hodnot vybraných poměrových ukazatelů, případně srovnání s odvětvovým průměrem, dokáže poskytnout obraz o postavení podniku v té které oblasti. Problematické je ovšem již hodnocení celkového finančního zdraví. Alternativu nabízí bonitní a bankrotní modely, které umožňují firmě přidělit jedinou hodnotu na základě souboru poměrových ukazatelů (Sedláček, 2001; Kislingerová, 2010). Problematice užití bankrotních modelů ke zhodnocení finančního zdraví podniků a jejich predikční schopnosti a přesnosti v českých podmínkách je věnována celá řada odborných studií. Machek (2014) prověřuje predikční schopnost vybraných bankrotních modelů (Altmanova Z′-skóre, indexů IN99 a IN05, Tafflerova modelu a Kralickova quicktestu) na vzorku českých podniků. Dospívá k závěru, že nejlepší výsledky poskytují indexy IN05, IN99 a Altmanovo Z′-skóre. Naopak spolehlivost Tajffelova modelu a Kralickova quicktestu je omezená. Režňáková a Karas (2015) se zaměřují jen na Altmanův Z′-skóre model a ověřují jeho vhodnost pro průmyslové podniky v zemích Visegrádské čtyřky (V4). Dospívají k závěru, že spolehlivost modelu je v podmínkách zkoumaných tranzitivních ekonomik nižší než

původní deklarovaná. V práci prezentují upravené verze modelu, které reflektují konkrétní podmínky jednotlivých zemí a vykazují vyšší predikční schopnost. Relativní spolehlivost a vhodnost Altmanova Z-skóre modelu pro Českou republiku potvrzuje ve své studii také Altman a kol. (2017). Autoři v článku ověřují na vzorku evropských zemí (včetně České republiky) predikční schopnost Z´´-skóre modelu, který je vhodný nejen pro průmyslové podniky, ale také pro zemědělské podniky a podniky služeb. Dospívají k závěru, že predikční přesnost tohoto modelu je ve většině zkoumaných evropských zemí dobrá, v České republice je potom ve srovnání s ostatními zkoumanými zeměmi nadprůměrná. Řada autorů také používá bankrotní modely ke zhodnocení situace ve vybraném odvětví případně u vybraných podniků, kdy nejčastěji je pracováno právě s Altmanovým Z-skóre modelem a jeho modifikacemi a indexem IN05 (například Vochozka a Rousek, 2010; Kuběnka a Králová, 2013).

Další alternativou hodnocení finančního zdraví je využití metody vícekriteriálního hodnocení, která taktéž umožní na základě zvolených poměrových ukazatelů (reprezentujících kritéria pro hodnocení) a jejich doporučených hodnot seřadit firmy od nejlepší po nejhorší. V oblasti vícekriteriálního hodnocení variant je známo mnoho metod, které jsou využívané v různorodých oblastech. Pro uspořádání hodnocených variant při kvantitativně vyjádřených kritériích lze využít některou z metod maximalizace užitku (např. WSA, AHP či UFA) či minimalizace vzdálenosti od ideální varianty (např. TOPSIS). Pro vyhodnocení finanční výkonnosti výrobních firem v Turecku užívají tyto metody například Yalcin a kol. (2012). Wang a Hsu (2004) hodnotí s pomocí metody TOPSIS finanční výkonnost podniků evidovaných na akciovém trhu v Tchaj-wanu. Metody vícekriteriálního hodnocení užívají ke zhodnocení finančního výkonnosti českých podniků například Svatoš a Chovancová (2013) nebo Kuncová, Hedija a Fiala (2016), kteří svou pozornost zaměřují na zemědělské podniky. Gavurova a kol. (2017) užívají vybrané metody vícekriteriálního hodnocení ke zhodnocení finanční výkonnost vybraných českých a slovenských bank a srovnávají jejich výsledky. Dospívají k závěru, že výsledky získané pomocí jednotlivých metod se zásadně neliší.

A právě bankrotní modely a metody více kriteriálního hodnocení jsou užity v tomto článku jako nástroj pro zhodnocení finančního zdraví cestovních kanceláří v České republice.

2 Data a metody

2.1 Data

K hodnocení finančního zdraví vybraných podniků jsou užita data z databáze Albertina CZ Gold Edition. Databáze Albertina obsahuje vybrané údaje o všech podnicích, kterým bylo přiděleno identifikační číslo. V současnosti obsahuje tato databáze informace o více než 2,7 milionu firem. Vybrána byla data pro rok 2014, a to těch firem, které jako svou hlavní činnost dle klasifikace ekonomických činností (CZ-NACE) vykázaly činnost cestovních kanceláří (CZ-NACE skupina 79.12).

Vzorek byl dále zúžen na firmy, které dosahovaly ve zkoumaném období tržby a vykazovaly všechny potřebné údaje pro zhodnocení finančního zdraví. Potřebné údaje ke zhodnocení finančního zdraví jsou obsaženy v účetních závěrkách firem. Databáze Albertina neobsahuje údaje z účetních závěrek všech firem, ale pouze firem, které jsou zapsané ve veřejném rejstříku a mají tak ze zákona povinnost zakládat účetní závěrku

do sbírky listin, a dále firem, které tato data do sbírky listin vložily dobrovolně. Databáze tak obsahuje v převážné většině potřebná data jen pro firmy vedené jako právnické osoby. Získané výsledky jsou tak platné zejména pro ty cestovní kanceláře, které podnikají jako právnické osoby.

Finální vzorek zahrnuje data 232 cestovních kanceláří. Dle podrobných údajů Českého statistického úřadu, jež nám byla na požádání poskytnuta, se jednalo přibližně o 13 procent všech registrovaných cestovních kanceláří v České republice.

2.2 Bankrotní modely

První metodou, která bude použita k posouzení finančního zdraví českých cestovních kanceláří, jsou vybrané bankrotní modely. Tyto modely umožňují rozlišit mezi firmami, které vykazují dobré finanční zdraví, a firmami, které jsou ohroženy bankrotem. V tomto článku budou užity tři bankrotní modely: dvě varianty Altmanova Z-skóre, konkrétně Altmanovo Z´-skóre a Z´´-skóre a index IN05 (Altman, 1968; Altman, 1983; Neumaierová a Neumaier, 2005). Dle empirických studií testujících spolehlivost modelů se právě tyto modely ukazují v českých podmínkách jako nejspolehlivější (Machek, 2014; Altman a kol., 2017).

2.2.1 Altmanovo Z-skóre

Altmanův Z´-skóre model lze zapsat takto (Altman, 1983):

$$Z' = 0{,}717.X_1 + 0{,}847.X_2 + 3{,}107.X_3 + 0{,}420.X_4 + 0{,}998.X_5, \quad (1)$$

kde X_1 je pracovní kapitál/celková aktiva, X_2 značí zadržený zisk/celková aktiva, X_3 je EBIT/celková aktiva, X_4 značí základní kapitál/cizí zdroje, X_5 jsou tržby/celková aktiva a Z´ je hodnota indexu. EBIT je vypočítán jako výsledek hospodaření před zdaněním + nákladové úroky.

Na základě vypočítané hodnoty Z´-skóre je možno zařadit podniky do tří skupin. Pokud $Z \leq 1{,}23$, podnik je náchylný k bankrotu. Tato zóna bývá označována jako bankrotní zóna (Distress zone). Pokud platí $1{,}23 < Z \leq 2{,}90$, neexistuje žádná statisticky průkazná prognóza o bankrotu. Tato zóna bývá označovaná jako šedá zóna (Grey zone). Konečně v případě, že $Z > 2{,}90$, je pravděpodobnost bankrotu minimální a podnik vykazuje dobré finanční zdraví. Tato zóna je označována jako bezpečná zóna (Safe zone).

Altman a kol. (2017) uvádí, že výše popsaný model je vhodný zejména pro soukromé průmyslové firmy neobchodované na kapitálovém trhu. Pro firmy služeb je vhodnější užít jinou verzi modelu a model Z´´-skóre. Jedná se o modifikaci původního modelu, kdy dochází k odstranění proměnné X_5, která je citlivá na posuzované odvětví. Altmanův Z´´-skóre model lze zapsat takto (Altman, 1983):

$$Z'' = 3{,}25 + 6{,}56.X_1 + 3{,}26.X_2 + 6{,}72.X_3 + 1{,}05.X_4. \quad (2)$$

Proměnné X_1-X_4 jsou stejné jako v modelu Z´- skóre (rovnice 1). Z´´ je výsledná hodnota indexu. Také zde lze na základě vypočítané hodnoty Z´´ rozdělit firmy do tří zón. Pokud platí, že $Z'' \leq 1{,}1$, je firma v bankrotní zóně, pokud je $1{,}1 < Z'' \leq 2{,}6$, je v šedé zóně a konečně, pokud platí, že $Z'' > 2{,}6$, je firma finančně zdravá a spadá do bezpečné zóny.

Ve studii jsou užity obě varianty Altmanova Z-skóre. Důvodem je fakt, že Altmanův Z´-skóre model patří k nejčastěji zmiňovaným a užívaným modelům bez ohledu na

zkoumané odvětví. Zajímavé je také srovnání výsledků obou modelů v případě cestovního ruchu.

2.2.2 Index IN05

Posledním aplikovaným bankrotním modelem je index IN05, který je též označován jako index Neumaierových. Jedná se o obdobu Altmanova Z-skóre odvozenou pro české podmínky.

Index lze vypočítat takto (Neumaierová a Neumaier, 2005):

$$IN05 = 0{,}13.P_1 + 0{,}04.P_2 + 3{,}97.P_3 + 0{,}21.P_4 + 0{,}09.P_5, \quad (3)$$

kde P_1 jsou celková aktiva/cizí zdroje, P_2 představuje EBIT/úrokové náklady, P_3 je EBIT/celková aktiva, P_4 jsou celkové výnosy/celková aktiva a P_5 jsou oběžná aktiva/krátkodobé cizí zdroje. EBIT je vypočítán jako výsledek hospodaření před zdaněním + nákladové úroky. IN05 je potom hodnota indexu. Dle doporučení autorů indexu je hodnota složky P_2 omezena na maximální hodnotu 9, aby se předešlo problémům v případě velmi nízkých či nulových nákladových úroků.

I zde jsou firmy rozděleny dle dosažených hodnot indexu do tří zón. Pokud je IN05 ≤ 0,9, podnik je ohrožen vážnými finančními problémy a spadá do bankrotní zóny. V případě, že platí 0,9 < IN05 ≤ 1,6, jedná se o šedou zónu nevyhraněných výsledků. V případě, že IN05 > 1,6, lze předvídat uspokojivou finanční situaci a podnik spadá do bezpečné zóny.

2.3 Metody vícekriteriálního hodnocení

K posouzení finančního zdraví podniků budou dále užity vybrané metody vícekriteriálního hodnocení variant. Tyto metody lze použít pro srovnání většího množství variant na základě vybraných kritérií tak, aby výsledkem bylo nalezení nejlepší varianty nebo uspořádání variant, případně rozdělení variant na dobré a špatné (podrobně například Figueira a kol., 2005; Fiala, 2008).

Cílem v tomto článku je získat jednu hodnotu pro každou firmu, která umožní zhodnotit její finanční zdraví. K tomuto účelu se nabízí více metod z oblasti maximalizace funkce užitku či minimalizace vzdálenosti od ideální varianty. Vzhledem k charakteru dat včetně velké variability se jako vhodné jevilo využít metodu TOPSIS patřící mezi metody minimalizace vzdálenosti od ideální varianty a metodu WSA, která se řadí mezi metody maximalizace užitku. Tyto metody patří k hojně užívaným metodám při hodnocení finanční výkonnosti podniků s užitím metod vícekriteriálního rozhodování (Wang a Hsu, 2004, Yalcin a kol., 2012, Svatoš a Chovancová, 2013; Kuncová, Hedija a Fiala, 2016).

2.3.1 TOPSIS

TOPSIS (Technique for Order Preference by Similarity to Ideal Solution) patří mezi metody, které se snaží měřit vzdálenost od tzv. ideální a bazální varianty. Předpokladem je, že nejlepší varianta má nejmenší vzdálenost od ideální (obvykle hypotetické) varianty a největší od bazální (taktéž obvykle hypotetické) varianty. Ideální varianta je varianta, která dosahuje nejlepších hodnot podle všech kritérií, bazální varianta je pak jejím opakem, dosahuje tedy nejhorších hodnot dle všech kritérií. Na základě indexu relativních vzdáleností lze varianty uspořádat do pořadí – čím vyšší relativní index, tím lépe se varianta umístila. Tato metoda vyžaduje váhy kritérií, tj. procento důležitosti daného kritéria. Jelikož je dále pracováno se shodnými vahami pro všechna kritéria, je zbytečné zde popisovat metody určení vah. Více o nich například Fiala (2008).

Prvním krokem metody je převod minimalizačních kritérií na kritéria maximalizační, následuje normalizace dat, tj. převedení všech kritérií na stejnou škálu (0;1). Normovanou kriteriální matici lze tedy konstruovat podle vztahu

$$r_{ij} = \frac{y_{ij}}{\sqrt{\left(\sum_{i=1}^{p}\left(y_{ij}\right)^2\right)}}, \quad i = 1, 2, \ldots, p, \;\; j = 1, 2, \ldots, k, \tag{4}$$

kde r_{ij} označuje normovanou hodnotu pro *i*-tou variantu a *j*-té kritérium a y_{ij} je původní kriteriální hodnota pro *i*-tou variantu a *j*-té kritérium po převodu kritérií na maximalizační.

V dalším kroku je třeba sestavit váženou kriteriální matici **W** = (w_{ij}) podle vztahu

$$w_{ij} = v_j \cdot r_{ij}, \tag{5}$$

kde v_j označuje váhu kritéria *j* (v našem případě je v_j = 1/11 pro $j = 1, 2, \ldots, k$). Z matice **W** následně určíme teoretickou ideální (H) a bazální (D) variantu, kde $H_j = max_i\, w_{ij}, \;\; j = 1, 2, \ldots, k$ (k udává počet kritérií, v našem případě 11) a $D_j = min_i\, w_{ij}, \;\; j = 1, 2, \ldots, k$.

Pro každou variantu následuje výpočet vzdálenosti od ideální varianty $d_i^+ = \sqrt{\sum_{j=1}^{n}\left(w_{ij} - H_j\right)^2}$ a od bazální varianty $d_i^- = \sqrt{\sum_{j=1}^{n}\left(w_{ij} - D_j\right)^2}$. Z těchto vzdáleností je pak v posledním kroku vypočten tzv. relativní ukazatel vzdálenosti od bazální varianty $c_i = \frac{d_i^-}{d_i^+ + d_i^-}$

Varianty jsou poté uspořádány podle klesající hodnoty c_i.

2.3.2 WSA

WSA (Weighted Sum Approach, metoda váženého součtu) je jednou z metod založených na principu maximalizace užitku. Tato metoda vychází z předpokladů linearity a maximalizace všech dílčích funkcí užitku, které jsou získány normalizací původních vstupních dat Y (převodem na interval 0-1):

$$r_{ij} = \frac{(y_{ij} - D_j)}{(H_j - D_j)}, \qquad r_{ij} \in \langle 0; 1\rangle, \qquad i = 1, 2, \ldots, p, \qquad j = 1, 2, \ldots, k. \tag{6}$$

Normalizovanou matici označíme R a její prvky r_{ij}, kde r_{ij} označuje normovanou hodnotu pro *i*-tou variantu a *j*-té kritérium, D_j je bazální hodnotou, tj. nejhorší možnou hodnotou dle *j*-tého kritéria, H_j je ideální hodnotou, tj.nejlepší možnou hodnotou dle *j*-tého kritéria.

Je zřejmé, že r_{ij} = 0 pro bazální variantu a r_{ij} = 1 pro ideální variantu. Následným zohledněním vah jednotlivých kritérií a sečtením hodnot za všechna kritéria získáme výsledné užitky u_i srovnávaných variant *i* (obdobně jako u metody TOPSIS hodnoty w_{ij}), a na jejich základě pak konečné pořadí variant (čím vyšší užitek, tím lépe). Více například Fiala (2008).

2.3.3 Poměrové ukazatele finanční analýzy

Finanční zdraví cestovních kanceláří bude hodnoceno s užitím souboru poměrových finančních ukazatelů, které jsou používány k hodnocení finančního zdraví podniku v rámci finanční analýzy (Sedláček, 2001; Kislingerová, 2010; Knápková a kol., 2013). Konkrétně bylo vybráno 11 poměrových ukazatelů tradičně užívaných v rámci finanční

analýzy podniku a spadajících do kategorie ukazatelů hodnotících likviditu, rentabilitu, aktivitu a zadluženost. Vybrané ukazatele jsou popsány v tabulce 1.

Tab. 1: Užité ukazatele finanční analýzy

Hodnocené kritérium	**Označení**	**Poměrový ukazatel**	**Doporučené hodnoty**
Rentabilita	K_1	Rentabilita vlastního kapitálu (ROE) = EAT/vlastní kapitál	Maximum
	K_2	Rentabilita aktiv = EBIT/celková aktiva	Maximum
	K_3	Rentabilita tržeb (ROS) = EBIT/tržby	Maximum
Likvidity	K_4	Běžná likvidita = oběžná aktiva/krátkodobé cizí zdroje	Vyšší než 1
	K_5	Pohotová likvidita = (krátkodobý finanční majetek + krátkodobé pohledávky)/krátkodobé cizí zdroje	0,4 – 1,5
	K_6	Okamžitá likvidita = krátkodobý finanční majetek/krátkodobé cizí zdroje	0,2 – 0,5
Aktivita	K_7	Doba obratu aktiv = celková aktiva/(tržby/360)	Minimum
	K_8	Doba inkasa pohledávek = krátkodobé pohledávky/(tržby/360)	Minimum
	K_9	Doba úhrady krátkodobých závazků = krátkodobé závazky/(tržby/360)	Maximum
Zadluženost	K_{10}	Celková zadluženost = cizí zdroje/celková aktiva	Nižší než 0,7
	K_{11}	Úrokové krytí = EBIT/nákladové úroky	Vyšší než 3

Poznámky: Tržby = Tržby za prodané zboží + Tržby za vlastní výrobky a služby, EAT = výsledek hospodaření po zdanění, EBIT = výsledek hospodaření před zdaněním + nákladové úroky.

Zdroj: Vlastní konstrukce na základě (Kislingerová, 2010 a Sedláček, 2001)

Tyto ukazatele potom vystupují jako kritéria pro vícekriteriální hodnocení s označením K_i. Následně jsou s pomocí vybraných metod vícekriteriálního hodnocení firmám přiřazeny celkové užitky či relativní vzdálenosti od ideální varianty, které umožní uspořádat firmy a zhodnotit jejich finanční zdraví.

Problematičtější než výběr samotných ukazatelů je volba mezí či doporučených hodnot, kterých by měl konkrétní ukazatel dosahovat, aby bylo možné sledované kritérium označit za uspokojivě naplněné. Výklad jednotlivých autorů se ohledně doporučených hodnot ukazatelů finanční analýzy liší, a to zejména u ukazatelů likvidity a zadluženosti. Při stanovení „optimálních hodnot" je vycházeno z doporučení Sedláčka (2001) a Kislingerové (2010). Také doporučené hodnoty jsou pro přehlednost prezentovány v tabulce 1.

Pro většinu kritérií byla nutná úprava vstupních dat, aby byla použitelná pro metodu WSA i TOPSIS. Jednak je nutné, aby ideální situace byla u každého z kritérií

maximalizace hodnot, zároveň by se v datech neměly vyskytovat záporné hodnoty. Vzhledem k výše uvedeným požadavkům (Tabulka 1) bylo přistoupeno k těmto korekcím: Kritéria K_1, K_2, K_3 jsou maximalizační, pro vyhnutí se záporným hodnotám byly všechny hodnoty zvýšeny o absolutní hodnotu nejvíce záporného ukazatele (tj. minimum se dostává na nulu). U kritéria K_4 jsou preferovány hodnoty vyšší než 1. Hodnota 1 tedy byla přičtena ke všem ukazatelům v tomto kritériu, a následně již lze kritérium maximalizovat. Nejsložitější situace je u kritérií K_5 a K_6, kde jsou doporučovány ideální hodnoty v určitém rozmezí. V dané situaci bylo přistoupeno k těmto úpravám: Kritérium K_5: pokud je hodnota $x_{i5}<0,4$ (i=1,2,..,232), bude nahrazena podílem $x_{i5}/0,4$. Jestliže je hodnota x_{i5} v rozmezí <0,4-1,5>, pak je nahrazena hodnotou 1. V případě, kdy je ukazatel $x_{i5}>1,5$, bude nahrazen podílem $1,5/x_{i5}$. Tímto byly upraveny všechny hodnoty na škálu (0;1> a ukazatel již lze maximalizovat. Kritérium K_6: úprava je obdobná jako u K_5. Pokud je hodnota $x_{i6}<0,2$, je nahrazena podílem $x_{i6}/0,2$. Ideální hodnoty x_{i6} z rozpětí <0,2;0,5> byly nahrazeny hodnotou 1. V případě, kdy bylo $x_{i6}>0,5$, byly hodnoty x_{i6} nahrazeny podílem $0,5/x_{i6}$. V této situaci se ještě vyskytla jedna záporná hodnota, všechny přepočtené ukazatele byly tedy navýšeny o tuto položku (v absolutní hodnotě). Následně již hodnoty splňovaly předpoklad maximalizace. Kritéria K_7 a K_8 jsou původně minimalizační, všechny hodnoty menší než 365 (doba obratu by neměla přesahovat 1 rok) byly odečteny od 365. Hodnoty vyšší než 365 byly pro maximalizaci nastaveny na nulu, stejně jako nežádoucí záporné hodnoty. Kritérium K_9 nebylo potřeba měnit, ale i zde byla provedena korekce vysokých čísel – všechny hodnoty vyšší než 365 byly změněny na nulu (neboť ani u doby inkasa není žádoucí, aby byla delší než 1 rok). U kritéria K_{10} se nabízelo více možností úprav. Nakonec pro zachování variability dat bylo přistoupeno k vydělení všech hodnot x_{i7} číslem 0,7, čímž se stávají nežádoucí vysoké hodnoty nízkými a naopak žádoucí hodnoty převyšují číslo 1. Tím je již ukazatel možno maximalizovat. Poslední ukazatel K_{11} bylo nutné jednak posunout ze záporných hodnot a dále posunout do žádoucí meze. Zde byly změněny všechny hodnoty menší než 3 na nulu. Tím bylo splněno dosažení žádoucích hodnot a zároveň splněna podmínka maximalizace. Výše uvedené úpravy nejsou jedinými možnými, nicméně po několika testováních se ukázaly jako vhodné pro danou situaci, a to zejména pro eliminaci nežádoucích koeficientů resp. odlehlých hodnot.

Pro účely posouzení závislosti mezi výsledky, které poskytují jednotlivé aplikované metody, je užit Spearmanův koeficient pořadové korelace (de Vaus, 2002). Pro posuzování síly vzájemného vztahu mezi výsledky jednotlivých aplikovaných metod jsou potom použity meze, které doporučuje de Vaus (2002) pro hodnocení závislosti ve společenských vědách. Výpočty jsou prováděny v programu MS Excel a programu STATA.

3 Rozbor problému a diskuze

Ke zhodnocení finančního zdraví českých cestovních kanceláří jsou nejdříve použity výsledky tři bankrotní modelů: Altmanovo Z´-skóre (rovnice 1), Altmanovo Z´´- skóre (rovnice 2) a Index IN05 (rovnice 3). Získané výsledky jsou uvedeny v tabulce 2. Tabulka zachycuje počet cestovních kanceláří, které dle jednotlivých modelů spadají do bankrotní, šedé nebo bezpečné zóny.

Výsledky jednotlivých modelů se liší zejména v počtu firem, které spadají do bankrotní a šedé zóny. V případě užití Altmanova Z´-skóre modelu bylo přibližně 13 procent zkoumaných cestovních kanceláří ohroženo bankrotem (hodnota Z´- skóre byla

u těchto nižší nebo rovno 1,23). V případě Altmanova Z´´-skóre modelu byl počet ohrožených firem vyšší, dosahoval 24 procent (hodnota Z´´- skóre byla u těchto nižší nebo rovno 1,1). V případě užití Indexu IN05 jsou závěry podobné a do bankrotní zóny spadalo 21 procent zkoumaných cestovních kanceláří (hodnota IN05 nižší nebo rovna 0,9). Rozdílně široká byla také u jednotlivých modelů šedá zóna, tedy počet firem, u kterých nelze jejich ohrožení bankrotem jednoznačně stanovit. Tato je výrazně užší při použití Altmanova Z´´-skóre modelu, který na rozdíl od zbylých dvou modelů nepracuje s ukazatelem obratu aktiv.

Tab. 2: Výsledky bankrotních modelů (počet firem)

	Z´- skóre	**Z´´- skóre**	**IN05**
Bankrotní zóna	31 (13 %)	56 (24 %)	48 (21 %)
Šedá zóna	54 (23 %)	21 (9 %)	56 (24 %)
Bezpečná zóna	147 (63 %)	155 (67 %)	128 (55 %)
Celkem	232 (100 %)	232 (100 %)	232 (100 %)

Zdroj: Vlastní výpočty

Naopak v případě bezpečné zóny jsou závěry všech tří modelů velmi podobné. Všechny modely indikují, že přibližně 60 procent cestovních kanceláří se těší dobrému finančnímu zdraví a pravděpodobnost jejich bankrotu je nízká.

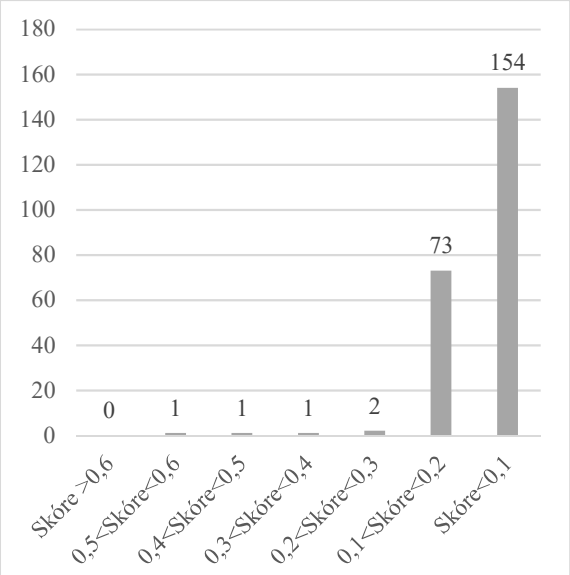
Metody vícekriteriálního hodnocení variant na rozdíl od bankrotních modelů nenabízejí hranici, kdy by bylo možno říci, že finanční zdraví firmy je špatné a ona je vážně ohrožena bankrotem. Na druhou stranu umožňují určit pořadí firem a poskládat je od nejlepší po nejhorší dle získaného skóre, které v našem případě odráží finančního zdraví.

Výsledné skóre metody TOPSIS a WSA se teoreticky může pohybovat v rozmezí <0;1>. Čím vyšší hodnota je dosažena, tím se firma více blíží ideální variantě a více se vzdaluje od bazální varianty.

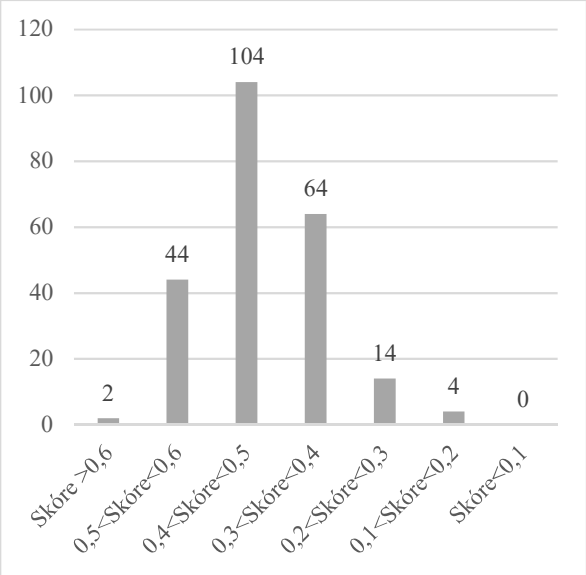
V případě aplikace metody TOPSIS se skóre sledovaných firem pohybovalo v rozmezí <0,058;0,6>. Průměrná hodnota dosahovala pouze hodnoty 0,103 a medián byl 0,095. Obrázek 1 ukazuje rozložení firem dle dosaženého skóre. Skóre vyšší než 0,5 dosahovala pouze 1 firma, další 4 se pohybovaly v rozmezí 0,2-0,5 a všechny ostatní byly pod hodnotou 0,2. Výsledky také ukazují, že skóre 66 procent firem je pod hodnotou 0,1 a skóre již zmíněných 50 procent firem (medián) dosahuje nižší hodnoty než 0,095.

Výsledné užitky u metody WSA se také mohou pohybovat v rozmezí <0;1>, v dané situaci bylo dosaženo hodnot <0,17;0,695> s průměrným užitkem 0,424 a mediánem 0,429. Rozložení firem dle dosaženého užitku ukazuje obrázek 2. V této situaci není rozložení firem tak jednostranné, jako v případě metody TOPSIS, kde se ve výpočtu projevily jak velká variabilita hodnot, tak obecně přítomnost extrémů (i po korekci), která měla dopad na normalizaci dat.

Obr. 1: Hodnocení firem metoda TOPSIS (počet firem)



Obr. 2: Hodnocení firem metoda WSA (počet firem)



Zdroj: Vlastní výpočty

Z obrázků 1 a 2 je zřejmé, že zjištěné výsledky se značně liší a jsou tak závislé na aplikované metodě. V případě metody TOPSIS dosahovala skóre vyšší než 0,5 (50 procent možného maximálního skóre) pouze 1 firma, v případě metody WSA to bylo 46 firem, což představovalo 20 procent zkoumaných cestovních kanceláří. Pokud by byla hranice posunuta na hodnotu skóre 0,4, dosahovalo by hodnot 0,4 a vyšších v případě metody WSA 150 firem, což představuje přibližně 65 procent cestovních kanceláří. V tomto případě by výsledky korespondovaly se závěry bankrotních modelů, kde v závislosti na užitém modelu 55 – 67 procent firem spadalo do bezpečné zóny.

Metoda TOPSIS díky dosaženým velmi nízkým hodnotám indikuje špatné finanční zdraví českých cestovních kanceláří. Na druhou stranu s užitím metody WSA již závěry nejsou tak jednoznačné, ale i ona indikuje možné finanční problémy mnoha cestovních kanceláří. Závěry je ovšem nutno interpretovat s určitou obezřetností a to zvláště u metody TOPSIS, která je velmi citlivá na vysokou variabilitu v datech, a také vzhledem k použitým úpravám při transformaci dat. Z tohoto pohledu se jeví vhodnější užití metody WSA. Pokud jde o faktory, které stojí v pozadí špatného finančního zdraví českých cestovních kanceláří, významnou roli hraje zejména jejich nízká likvidita a relativně nízká rentabilita.

Všechny zde aplikované metody, tedy bankrotní modely i metody TOPSIS a WSA, umožňují stanovit pořadí firem a srovnat je z hlediska finančního zdraví od nejlepší po nejhorší. Ve všech případech vyšší hodnota ukazatele značí lepší finanční zdraví. Z tohoto pohledu jsou užité metody rovnocenné. Zatímco bankrotní mody pracují s vybranými 4 až 5 poměrovými ukazateli, v případě vícekriteriálního hodnocení bylo užito 11 poměrových ukazatelů finanční analýzy. K ověření vzájemného vztahu mezi výsledky jednotlivých aplikovaných metod je užit Spearmanův koeficient pořadové korelace. Zjištěné výsledky zachycuje tabulka 3.

Tab. 3: Spearmanův korelační koeficient

	Z´- skóre	Z´´- skóre	IN05	WSA	TOPSIS
Z´- skóre	1				
Z´´- skóre	0,1891***				
IN05	0,7083***	0,3970***	1		
WSA	0,5915***	0,0640	0,4398***	1	
TOPSIS	0,4615***	0,1320**	0,5071***	0,8005***	1

*Poznámka: *** statistiky významné na hladině významnosti 1 %, ** statistiky významné na hladině významnosti 5 %, * statistiky významné na hladině významnosti 10 %,*

Zdroj: Vlastní výpočty

V rámci pořadí firem byla velmi silná závislost identifikována mezi výsledky modelů IN05 a Z´- skóre, kde dosahoval korelační koeficient hodnoty 0,7, a také mezi výsledky modelů WSA a TOPSIS, kde dosahoval korelační koeficient hodnoty 0,8. Podstatná závislost byla identifikována také mezi výsledky modelu Z´-skóre a modely WSA a TOPSIS a modelem IN05 a výsledky metod vícekriteriálního hodnocení variant. Na druhou stranu z řady vybočovaly výsledky získané z modelu Z´´-skóre. Zde byla identifikována střední síla vztahu pouze v případě ukazatele IN05. V ostatních případech byla závislost nízká či statisticky nevýznamná (metoda WSA).

Zjištěné závěry jsou velmi zajímavé, ukazuje se tak, že vyřazení ukazatele aktivity v tomto případě výrazně ovlivnilo nejen výsledky pro odvětví jako takové (Tabulka 2), ale také pořadí zkoumaných firem. Identifikována byla také střední až silná závislost mezi závěry (pořadím firem) při hodnocení finančního zdraví metodami vícekriteriálního hodnocení a s pomocí Altmanova Z´- skóre a Indexem IN05. Užití široké palety ukazatelů finanční analýzy (v našem případě 11 poměrových ukazatelů) tak z hlediska pořadí firem nedává zcela totožné výsledky, což se nedalo ani očekávat, nicméně získané výsledky jsou velmi podobné.

Závěr

Dle údajů ze Satelitního účtu cestovního ruchu se cestovní ruch v České republice podílel v posledních deseti letech přibližně 3 procenty na tvorbě hrubého domácího produktu a jeho podíl na celkové zaměstnanosti představoval přibližně 4,5 procenta (Ministerstvo pro místní rozvoj, 2017). Z tohoto pohledu nepatří mezi klíčová odvětví českého hospodářství, nicméně jeho význam nelze bagatelizovat. Finanční situace podniků v tomto odvětví je velmi důležitá s ohledem na fakt, že tyto podniky jsou v mnoha případech spojeny s trávením volného času a relaxací a poskytují služby koncovému spotřebiteli. Jejich úpadek se tak koncového spotřebitele bezprostředně dotýká. Tento fakt nabývá na významu v případě cestovních kanceláří, které byly předmětem této studie.

Cílem článku bylo zhodnotit finanční zdraví vybraných cestovních kanceláří, které působí v České republice, s užitím bankrotních modelů, a také vybraných metod vícekriteriálního rozhodování (TOPSIS a WSA). V případě bankrotních modelů bylo finanční zdraví posuzováno s užitím 4 až 5 poměrových ukazatelů finanční analýzy, v rámci vícekriteriálního hodnocení bylo zvoleno tradičních 11 poměrových ukazatelů finanční analýzy, které tvořily vstupní data metod vícekriteriálního rozhodování.

Všechny aplikované metody umožnily každému posuzovanému podniku přiřadit jednu souhrnnou hodnotu, která umožnila rámcově posoudit jeho finanční zdraví a určit jeho pořadí v rámci ostatní konkurentů na trhu.

Bankrotní modely indikují, že přibližně 13 – 24 procent firem je ohroženo bankrotem a přibližně 60 procent českých cestovních kanceláří se těší dobrému finančnímu zdraví. Jako rizikový faktor, který stojí za špatným finančním zdravím cestovních kanceláří, se ukázala zejména jejich nízká likvidita a nízká rentabilita. Zde lze spatřovat největší rezervy, na kterých je potřeba zapracovat. Je potřeba přijmout opatření v podobě obezřetnějšího řízení čistého pracovního kapitálu a peněžních toků, úsporných opatření na straně nákladů včetně optimalizace majetkové základny a rozumných opatření vedoucí k růstu tržeb.

Pokud jde o zhodnocení pořadí srovnávaných firem od nejlepšího dosaženého skóre po nejhorší, ukázalo se, že jednotlivé bankrotní modely nedávají zcela totožné výsledky, nicméně bylo zjištěno, že pokud je použito k hodnocení finančního zdraví českých cestovních kanceláří Altmanovo Z´- skóre nebo index IN05, jsou závěry velmi podobné.

Při aplikaci metod vícekriteriálního hodnocení a užití široké palety tradičně užívaných poměrových ukazatelů finanční analýzy (11 ukazatelů) bylo zjištěno, že vhledem k vysoké variabilitě dat je pro zhodnocení finančního zdraví cestovních kanceláří vhodnější využít metodu WSA. Zjištěné výsledky indikovaly spíše neuspokojivou finanční situaci firem, kdy u metody WSA se skóre dosahované jednotlivými firmami pohybovalo v rozmezí 17 - 70 procent maximální možné hodnoty a hodnoty vyšší než 0,5 dosáhlo jen 20 procent firem. U velkého počtu firem se skóre pohybovalo v rozmezí 0,3 – 0,4 (30 – 40 procent možného skóre). Při použití metod vícekriteriálního hodnocení bylo nutné přizpůsobit původní data požadavkům metod, tj. nastavit všechna kritéria na tzv. maximalizační typ. Danou situaci by bylo možné řešit i jiným způsobem, což by mělo vliv na výsledné ukazatele (analýza dopadu převodů dat na výsledky použitých metod by byla jistě zajímavá, nicméně přesahuje zaměření tohoto článku).

Závěrem lze konstatovat, že na českém trhu působí velké množství cestovních kanceláří a v přepočtu na jednoho obyvatele tato hodnota patří k nejvyšší v Evropské unii (Eurostat, 2017). Všechny užité metody hodnocení finančního zdraví potvrdily, že finanční zdraví části zkoumaných českých cestovních kanceláří není příliš uspokojivé a že v budoucnu lze očekávat určitou redukci počtu cestovních kanceláří na českém trhu.

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FINANČNÁ ZÁVISLOSŤ ÚZEMNEJ SAMOSPRÁVY NA SLOVENSKU

FINANCIAL DEPENDENCY OF TERRITORIAL SELF-GOVERNMENT IN SLOVAKIA

Peter Horváth, Lukáš Cíbik, Martin Švikruha

Abstract: *The aim of the paper is to find out the degree of financial dependence of local and regional self-government from the state in Slovakia in years 2005-2016. Financial dependency will be analyzed for eight regional capital cities (local level) and eight self-governing regions (regional level). This type of research conveys a number of important results, it also provides the scope for analyzing and comparing the partial results of individual self-governing units and their average rates over a twelve-year period. Here is also an option to monitor the value development of the financial dependency of regional and local self-government budgets for the years 2005-2016. In the processing of this issue, we arose from a modified formula for calculation the financial independence. We determined the dependence of a selected sample of territorial self-governments on foreign/transfer revenues. They cannot directly affect the amount of these revenues. We have clearly presented the results in the tables and the graph on the basis of the analysis, comparison and synthesis of the obtained information. In the end, we have summarized the knowledge about the financial dependence of the territorial self-government in Slovakia in the time period under review.*

Keywords: *Financial dependence, Territorial self-government, Budget, City, self-governing region, Budget revenue, Slovakia*

JEL Classification*: H27, H71, L38.*

Úvod

Dôležitý element v komplexnom ponímaní funkčnosti územnej samosprávy predstavuje spôsob jej financovania. V podmienkach Slovenskej republiky prešiel finančný rámec územnej samosprávy mnohými zmenami. V tomto kontexte predstavuje významný medzník decentralizácia verejnej správy a s ňou spojená fiškálna decentralizácia, ktorá mala zaistiť väčšiu finančnú samostatnosť územných samospráv a efektívnejšie spravovanie verejných finančných prostriedkov (Machyniak, Brix, 2015). Proces fiškálnej decentralizácie predstavuje prenos zodpovednosti a právomoci na nižšie jednotky vládneho mechanizmu v oblasti výdavkovej a rovnako aj v oblasti príjmovej. Na Slovensku tento proces neprebiehal simultánne, na čo upozorňuje Fabiánová (2010). V prvej fáze v rokoch 2001 až 2004, nastal presun pôsobnosti územných samospráv vo výdavkovej sfére. Následne, začiatkom roka 2005 začala prebiehať druhá fáza, ktorá predznamenala konverziu v príjmovej sfére rozpočtov oboch zložiek územnej samosprávy (Adamkovičová, 2013). Jej cieľom bolo zvýšiť vlastné príjmy územných samospráv, čoho dôsledkom mal byť nárast ich finančnej samostatnosti. Práve touto oblasťou financovania územnej samosprávy sa budeme zaoberať v nasledujúcich častiach tohto článku. Poukážeme na

to, či sa tento postulát naplnil a do akej miery po fiškálnej decentralizácii zostala územná samospráva na Slovensku závislou od štátnych zdrojov.

1 Formulácia problematiky

V medzinárodnom meradle existuje veľké množstvo prístupov ako zistiť, analyzovať a porovnať decentralizačné pomery v jednotlivých krajinách. Pri kvantifikovaní fiškálnej decentralizácie sa môže vychádzať z niekoľkých základných okruhov, ktoré sledujú vybrané aspekty rozpočtu územnej samosprávy na ktorejkoľvek úrovni. Pri výbere vhodných ukazovateľ sa najčastejšie objavuje analýza zameraná na decentralizačné pomery alebo na špecifické finančné ukazovatele. Výsledkom analýzy decentralizačných pomerov je buď detailný pohľad na príjmové, alebo výdavkové decentralizačné pomery konkrétnej územnej samosprávy. Bližším pohľadom zistíme, že tak príjmové, ako aj výdavkové decentralizačné pomery sa dajú skúmať prostredníctvom širokej palety ukazovateľov. V oblasti príjmov jednotlivých úrovní, ako aj jednotiek územnej samosprávy sa môžeme stretnúť s ukazovateľom príjmovej decentralizácie, daňovej decentralizácie, daňovej autonómie alebo úrovne finančnej autonómie.

Z vyššie uvedených, najčastejšie sa objavujúcich ukazovateľov, ktoré slúžia na prieskum a analýzu príjmovej zložky rozpočtov decentralizovaných vládnych úrovní je zrejmé, že sa výskum zameriava primárne na finančnú a daňovú samostatnosť, resp. autonómnosť. Z tohto pohľadu je táto oblasť výskumu veľmi dominantnou, na úkor druhej možnosti ako analyzovať rozpočet územnej samosprávy, teda všímať si závislosť príjmov územnej samosprávy. Finančná závislosť územnej samosprávy predstavuje antagonistickú veličinu k finančnej autonómii/nezávislosti rozpočtu územnej samosprávy. Finančná nezávislosť decentralizovanej vládnej úrovne (územnej samosprávy) vyjadruje rozsah vlastných príjmov, ktoré pokrývajú významné časti výdavkov (Jílek, 2008). Tieto vlastné zdroje by mali byť podľa odporučenia Rady Európy dostatočne vysoké na to, aby podporili aktivitu a zodpovednosť územnej samosprávy za realizáciu výdavkových rozhodnutí. Vychádzajúc z toho, zobrazuje ukazovateľ finančnej závislosti rozsah/podiel nevlastných alebo cudzích príjmov v rozpočtoch decentralizovaných vládnych úrovniach. Na rozdiel od ukazovateľov hodnotiacich autonómnosť príjmových zdrojov sa ukazovateľ finančnej závislosti zameriava na určenie miery naviazanosti na „neautonómne“ príjmové oblasti. V tomto smere je fundamentálnou otázkou, ako je možné kvantifikovať podobu finančnej závislosti rozpočtov obcí, miest a samosprávnych krajov?

Pri hľadaní odpovede na túto základnú otázku sme primárne vychádzali z toho, že ukazovateľ finančnej autonómnosti a ukazovateľ finančnej závislosti predstavujú protipóly. Preto v zásade predstavujú antagonistické pojmy, no spôsob ich určenia je veľmi podobný a odlišuje sa len v použití iných veličín. Ak určujeme mieru finančnej autonómnosti územnej samosprávy, tak stanovujeme úroveň, ako je daná územná samospráva nezávislá v príjmovej oblasti svojho rozpočtu a akú časť vlastných príjmov dokáže ovplyvniť svojou aktivitou. Vzhľadom k tomu pri analyzovaní miery finančnej závislosti sa výskum zameriava na tie príjmové oblasti rozpočtu územnej samosprávy, ktoré svojou činnosťou nemôže daná samosprávna jednotka ovplyvniť. Tieto závislé príjmy pritečú do rozpočtu územnej samosprávy a ich výšku územná samospráva nedokáže svojou aktivitou ovplyvniť.

2 Metódy

V odbornej literatúre (napr. Loehr, Manasan, 1999; Castellucci, 2000; Peková, 2011; Provazníková, 2015) sa stretneme viac menej s totožným postupom pre určenie finančnej autonómnosti územnej samosprávy. Pre nás je dôležité poznať metodiku určenia finančnej autonómie, pretože dosadením vhodných premenných do základného vzorca na zistenie finančnej autonómnosti môžeme tiež zistiť mieru finančnej závislosti územnosprávnych jednotiek tak na miestnej, ako aj regionálnej úrovni. V základnej podobe sa úroveň finančnej autonómie zistí ako podiel súčtu daňových príjmov, bežných nedaňových príjmov, kapitálových príjmov decentralizovanej vládnej úrovne a celkových príjmov decentralizovanej vládnej úrovne. Zásadou je teda zisťovanie podielu vlastných príjmov (ovplyvniteľných decentralizovanou vládnou úrovňou) na celkových príjmoch a vďaka tomu môžeme stanoviť mieru finančnej autonómnosti.

Daný výpočet finančnej autonómnosti má s menšími úpravami potenciál byť modifikovaný na zistenie úrovne finančnej závislosti územnej samosprávy. Ak do vzorca na výpočet finančnej autonómie namiesto vlastných príjmov v čitateli, dosadíme príjmy, ktorých výšku územná samospráva nedokáže ovplyvniť, zistíme ich podiel na celkových príjmoch decentralizovanej vládnej úrovne. Výsledkom, teda bude určenie podielu príjmov, ktorých výška je zo strany územnej samosprávy „neovplyvniteľná“. Ak pri výpočte finančnej autonómnosti využívame vlastné príjmy územnej samosprávy, tak pri určení finančnej závislosti do vzorca dosadíme hodnotu cudzích alebo externých príjmov, ktoré tvoria opak vlastných príjmov. Na záver tejto časti uvádzame samotný vzorec, vďaka ktorému zisťujeme úroveň finančnej závislosti v prípade miestnej i regionálnej samosprávnej úrovne na Slovensku.

$$Finančná\ závislosť = \frac{Cudzie\ (transferové)\ príjmy}{Celkové\ príjmy}\ x\ 100 \quad (1)$$

Na výslednú mieru finančnej závislosti majú vplyv dve veličiny: výška cudzích (transferových) príjmov a výška celkových príjmov. Konštrukcia ukazovateľa na meranie finančnej závislosti v relatívnej podobe v sebe zahŕňa možnosť nárastu alebo poklesu závislosti vplyvom rozdielneho vývoja jednej z dvoch premenných. Preto ak sa zvýšia celkové príjmy oproti predchádzajúcemu obdobiu a výška cudzích (transferových) príjmov ostala v oboch obdobiach približne totožná, miera finančnej závislosti poklesne. Tento pokles primárne nespôsobil úbytok cudzích príjmov, ale nárast celkových príjmov sledovanej jednotky. Druhým hypotetickým príkladom, ktorý treba mať na pamäti, je situácia, keď je výška cudzích príjmov v dvoch sledovaných rokoch približne rovnaká, ale v tomto období dochádza k znižovaniu celkových príjmov. V takejto situácii dochádza k zvyšovaniu relatívnej miery finančnej závislosti bez toho, aby sa reálne zvýšil príjem z cudzích (transferových) zdrojov. Z tohto dôvodu, treba veľmi citlivo vnímať vývoj a dôvod zmeny finančnej závislosti jednotlivých subjektov.

Pri zisťovaní finančnej závislosti vychádzame na začiatku z ukazovateľa finančnej autonómie, ktorý sme modifikovali pre naše potreby. Ak sa pri výpočte finančnej nezávislosti sústredíme na pomer bežných vlastných príjmov na celkových príjmov, v prípade finančnej závislosti sme sa rozhodli skúmať hodnotu antagonistickej veličiny – bežných cudzích/externých príjmov. Niektorí autori, ako napríklad Jílek (2008) alebo Medveď a Nemec (2007) nazývajú tieto cudzie/externé príjmy aj ako transferové príjmy. Transferové príjmy môžu mať rozličnú formu (fiškálne/nefiškálne,

výlučnú/zdieľané, proporcionálne/neproporcionálne) a ich výdatnosť je závislá od rozhodnutia centrálnej vládnej úrovne.

Hamerníková a Maaytová (2010) následným detailným rozporom striktne stanovujú príjmové zdroje patriace do cudzích alebo transferových príjmov rozpočtov územnosprávnych jednotiek. Vychádzajú pri tom z toho, že výšku finančných prostriedkov z týchto oblastí neovplyvňuje aktivita decentralizovaných vládnych úrovní. Na rozdiel od vlastných príjmov nemajú transferové príjmy vzťah k územiu danej územnosprávnej jednotky, pretože tam nevznikajú a neexistuje ich geografické prepojenie. Zároveň sa transferové príjmy vyznačujú neosobnosťou vo vzťahu medzi územnou samosprávou a občanmi, pretože medzi nimi neexistuje priama väzba. Medzi cudzie/transferové príjmy následne môžeme zaradiť :

- Dotácie a transfery.
- Podielové dane.

Dotácie a transfery od centrálnej vládnej úrovne poskytujú decentralizovaným vládnym úrovniam dodatočné finančné prostriedky a vyrovnávajú rozdiely medzi vlastnými príjmami a objektívnymi potřebami (Blöchliger, Petzold, 2009). Existencia viacerých spôsobov prerozdelenia výnosu podielovej dane spôsobuje, že v niektorých prípadoch sa môžu výnosy z podielovej dane radiť k vlastným príjmom[1], no častejšie sú svojou podstatou priraďované k cudzím/transferovým príjmom.

Náš výpočet finančnej závislosti územnej samosprávy na Slovensku vychádza zo základného rozdelenia príjmov rozpočtu obcí, miest a samosprávnych krajov na dve zložky – vlastné príjmy (finančná autonómia) a cudzie/transferové príjmy (finančná závislosť). Na úvod je potrebné vymedziť presný okruh príjmov miest a samosprávnych krajov, ktorý patrí do kategórie cudzích/transferových príjmov ich rozpočtov. Vychádzame pri tom zo zákona č. 583/2004 o rozpočtových pravidlách územnej samosprávy. Podľa tohto zákona medzi príjmy rozpočtu obcí a miest na jednej strane a samosprávnych krajov na strane druhej patria tak vlastné príjmy, ako aj cudzie/transferové príjmy. Detailný pohľad na štruktúru príjmov zachytáva tabuľka 1.

Samotný zákon o rozpočtových pravidlách určuje skupinu príjmov, ktoré sú charakterizované ako vlastné. Tým nepriamo vymedzuje všetky ostatné príjmy ako cudzie/transferové, kam patria primárne dotácie zo štátneho rozpočtu na úhradu nákladov preneseného výkonu štátnej správy v súlade so zákonom o štátnom rozpočte na príslušný rozpočtový rok a dotácie zo štátnych fondov, dotácie zo štátneho rozpočtu v súlade so zákonom o štátnom rozpočte na príslušný rozpočtový rok,účelové dotácie z rozpočtu obce alebo z rozpočtu iného vyššieho územného celku na realizáciu zmlúv a prostriedky z Európskej únie a iné prostriedky zo zahraničia poskytnuté na konkrétny účel.

Okrem toho medzi cudzie/transferové príjmy, ktorých výšku nemôže územná samosprávna jednotka ovplyvniť radíme tiež podielovú daň. Pri výpočte finančnej závislosti zaraďujeme medzi bežné transfery v rámci verejnej správy aj podiel miest a samosprávnych krajov na výnose z dane z príjmov fyzických osôb. Dôvodom je naše presvedčenie, že jej nastavenie v takej podobe ako v súčasnosti existuje ju radí skôr k neúčelovým dotáciám, pretože decentralizovaná vládna úroveň neurčuje prerozdeľovací podiel, slobodne nestanovuje prirážku k podielovej dani, samotný

[1] Pokiaľ decentralizovaná vládna úroveň určuje podiel prerozdelenia alebo pokiaľ sa dá tento podiel zmeniť výlučne len so súhlasom decentralizovanej vládnej úrovne.

výnos dane nevyberá a nespravuje. Vychádzame z toho, že pri hodnotení daňovej autonómie by sme podielovú daň na Slovensku nemohli spájať s kategóriou vlastných daňových príjmov, ktoré tvoria jadro bežných vlastných príjmov. Táto skutočnosť vyplýva z taxonómie jednotlivých daní podľa Blöchligera a Kinga (2006) a jej čiastočnej úpravy z roku 2015 (Blöchliger, Nettley, 2015).

Tab. 1: Príjmy rozpočtov obcí, miest a samosprávnych krajov v SR

OBEC, MESTO	SAMOSPRÁVNY KRAJ
a) *výnosy miestnych daní a poplatkov;* ***b)*** *nedaňové príjmy z vlastníctva a z prevodu vlastníctva majetku obce a z činnosti obce a jej rozpočtových organizácií;* ***c)*** *úroky a iné príjmy z finančných prostriedkov obce;* ***d)*** *sankcie za porušenie finančnej disciplíny uložené obcou;* ***e)*** *dary a výnosy dobrovoľných zbierok v prospech obce;* ***f)*** *podiely na daniach v správe štátu;* ***g)*** *dotácie zo štátneho rozpočtu na úhradu nákladov preneseného výkonu štátnej správy a dotácie zo štátnych fondov;* ***h)*** *ďalšie dotácie zo štátneho rozpočtu v súlade so zákonom o štátnom rozpočte;* ***i)*** *účelové dotácie z rozpočtu vyššieho územného celku alebo z rozpočtu inej obce na realizáciu zmlúv podľa osobitných predpisov;* ***j)*** *prostriedky z Európskej únie a iné prostriedky zo zahraničia poskytnuté na konkrétny účel;* ***k)*** *iné príjmy ustanovené osobitnými predpismi;*	***a)*** *nedaňové príjmy z vlastníctva a z prevodu vlastníctva majetku vyššieho územného celku a z činnosti vyššieho územného celku a jeho rozpočtových organizácií;* ***b)*** *úroky a iné príjmy z finančných prostriedkov vyššieho územného celku;* ***c)*** *sankcie za porušenie finančnej disciplíny uložené vyšším územným celkom;* ***d)*** *dary a výnosy dobrovoľných zbierok v prospech vyššieho územného celku;* ***e)*** *podiely na iných daniach v správe štátu;* ***f)*** *dotácie zo štátneho rozpočtu na úhradu nákladov preneseného výkonu štátnej správy a dotácie zo štátnych fondov;* ***g)*** *ďalšie dotácie zo štátneho rozpočtu;* ***h)*** *účelové dotácie z rozpočtu obce alebo z rozpočtu iného vyššieho územného celku na realizáciu zmlúv podľa osobitných predpisov;* ***i)*** *prostriedky z Európskej únie a iné prostriedky zo zahraničia poskytnuté na konkrétny účel;* ***j)*** *iné príjmy ustanovené osobitnými predpismi.*
Za vlastné príjmy rozpočtu obce alebo mesta sa považujú príjmy a) až f).	**Za vlastné príjmy rozpočtu vyššieho územného celku sa považujú príjmy a) až e).**

Zdroj: vlastné spracovanie podľa zákona č.583/ 2004 o rozpočtových pravidlách územnej samosprávy

Podľa opatrenia Ministerstva financií SR č. MF/010175/2004-42 sa ustanovuje ekonomická klasifikácia rozpočtovej klasifikácie na základe, ktorej môžeme sekundárne určiť príslušnosť jednotlivých príjmových zdrojov k skupine cudzích/transferových príjmov. K cudzím/transferovým príjmom následne patria príjmy číslo 111 (Daň z príjmov fyzickej osôb) a 310 (Tuzemské bežné granty a transfery), kam spadajú najmä granty a transfery v rámci verejnej správy zo štátneho rozpočtu a na úhradu nákladov preneseného výkonu štátnej správy.

Finančnú závislosť sme sa rozhodli skúmať tak na regionálnej, ako aj miestnej úrovni územnej samosprávy na Slovensku. Aby mohli byť výsledky čo najrelevantnejšie, zvolili sme si ako výskumnú vzorku rozpočty všetkých samosprávnych krajov (8) a ich krajských miest (8). Tým sa nám vytvoril zodpovedajúci zrkadlový obraz, kde každá regionálna územnosprávna jednotka dostala

náprotivok v podobe konkrétneho krajského mesta, ktoré reprezentuje miestny stupeň územnej samosprávy. Zároveň týmto krokom môžeme zachytiť vývoj finančnej závislosti tak na regionálnej, ako aj miestnej úrovni v čase. Náš výskum sa zaoberal úrovňou finančnej závislosti krajských miest a samosprávnych krajov počas rokov 2005-2016. Potrebné údaje pochádzajú zo Záverečných účtov alebo Viacročných rozpočtov dotknutých samosprávnych krajov a krajských miest.

3 Rozbor problému

Na základe pomeru cudzích/transferových príjmov a celkových príjmov sme zistili úroveň finančnej závislosti, najprv v prípade regionálnej samosprávy. Samotné percentuálne vyjadrenie finančnej závislosti odráža naviazanosť rozpočtov samosprávnych krajov na príjmové zdroje, ktorých výšku nemôžu regionálne samosprávy ovplyvniť. Stávajú sa tak závislé od finančných prostriedkov, najmä z dotácií a transferov zo štátneho rozpočtu a veľmi významne zvyšuje ich závislosť aj súčasný systém podielovej dane (Foremny, 2014). Vďaka údajom zo záverečných účtov a viacročných rozpočtov samosprávnych krajov sme zistili výšku finančnej závislosti konkrétnych samosprávnych krajov, ich priemernú hodnotu za obdobie rokov 2005-2016 a súčasne aj priemerné hodnoty za celú skupinu regionálnych samospráv, ktoré sú zachytené v tabuľke 2.

Tab. 2: Miera finančnej závislosti samosprávnych krajov v rokoch 2005-2016 v percentách (%)

ROK	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Priemer
BSK	64,6	65,2	64,9	60,2	58,3	69,2	59,2	61,1	58,8	63,2	88,1	87,9	**66,7**
BBSK	79,4	77,1	76,8	73,4	75,7	73,8	72,9	73,2	68,7	71,9	86,4	85,3	**76,2**
KSK	84,3	94,8	73,4	68,7	71,3	69,9	67,1	69,9	70,0	69,2	76,2	73,9	**74,0**
NSK	74,4	73,8	76,4	71,4	68,2	68,9	57,6	67,7	69,1	67,2	79,9	85,5	**71,6**
PSK	85,7	84,5	83,8	86,2	74,3	67,9	64,1	71,5	73,1	71,2	77,1	86,4	**77,1**
TSK	84,9	82,8	81,5	84,4	63,8	80,6	79,8	72,7	76,8	78,2	89,8	92,5	**80,6**
TTSK	74,8	75,4	51,1	53,3	67,7	72,5	48,8	66,2	70,9	72,6	84,3	82,8	**68,3**
ZSK	72,1	72,9	79,3	71,3	82,1	62,7	71,1	70,6	68,6	57,9	83,8	72,1	**72,0**
Priemer	**77,5**	**78,3**	**73,4**	**71,1**	**70,1**	**70,6**	**65,0**	**69,1**	**69,4**	**68,9**	**83,2**	**83,3**	**73,3**

Legenda: BSK – Bratislavský samosprávny kraj, **BBSK –** Banskobystrický samosprávny kraj, **KSK –** Košický samosprávny kraj, **NSK –** Nitriansky samosprávny kraj, **PSK –** Prešovský samosprávny kraj, **TSK –** Trenčiansky samosprávny kraj, **TTSK –** Trnavský samosprávny kraj, **ŽSK –** Žilinský samosprávny kraj.

Zdroj: vlastné spracovanie na základe dát zo záverečných účtov a viacročných rozpočtov všetkých samosprávnych krajov z rokov 2005-2016

Jednotlivé hodnoty v tabuľke 2 reprezentujú ako veľmi sú rozpočty jednotlivých samosprávnych krajov závislé od bežných dotácií, grantov, transferov a príjmu z podielovej dane. Počas sledovaného obdobia od vzniku samosprávnych krajov až po rok 2016 sme zistili, že priemerná hodnota miery finančnej závislosti celého segmentu ôsmich samosprávnych krajov dosiahla úroveň 73,3 %.

Vývoj ukazovateľa finančnej závislosti nemal jednoznačný priebeh, pretože sme zaznamenali výraznejšie poklesy aj nárasty. Aj pri komparácii hodnôt finančnej závislosti medzi jednotlivými regionálnymi samosprávami sme identifikovali pomerne značné rozdiely. Tieto rozdiely sa týkajú tak čiastkových výsledkov v konkrétnom roku,ako aj výsledných priemerných hodnôt za celé sledované obdobie dvanástich

rokov. Pri pohľade na čiastkové výsledky finančnej závislosti vidíme výrazné výkyvy vo výške závislosti rozpočtov samosprávnych krajov od cudzích/transferových príjmov. Celkovo najnižšiu hodnotu finančnej závislosti sme zaznamenali v prípade TTSK v roku 2011. Oproti tomu bola najvyššia nameraná úroveň finančnej závislosti zistená v roku 2006 v KSK. Rozdiel medzi týmito hraničnými hodnotami predstavuje presne 46 %, čo je veľmi enormná diferencia. V prípade čiastkových výsledkov za posledné dva skúmané roky 2015 a 2016 došlo u všetkých samosprávnych krajov k výraznému skokovému navýšeniu finančnej závislosti. Dôvod vidíme v zmene prerozdeľovacieho koeficientu podielovej dane, ktorý zapríčinil, že z dane z príjmu fyzických osôb (ďalej len „DPFO“) získali samosprávne kraje po najnovšej zmene viac finančných prostriedkov, čo súčasne zvyšuje ich mieru finančnej závislosti.

Tab. 3: Miera finančnej závislosti krajských miest v rokoch 2005-2016 v percentách

ROK	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Priemer
BA	42,7	21,1	41,0	37,5	42,5	40,6	43,8	59,9	56,5	43,5	42,4	55,1	**43,8**
BB	55,5	62,8	60,3	59,1	60,1	58,1	64,3	51,3	58,7	56,6	62,6	63,8	**59,4**
KE	60,9	49,6	57,5	58,5	59,0	48,5	52,5	54,1	43,2	50,7	40,5	64,9	**53,3**
NR	36,9	42,7	44,7	44,2	48,7	37,3	46,4	50,1	45,4	47,0	49,7	54,0	**45,5**
PO	72,3	64,1	62,9	55,7	56,9	55,2	56,2	66,1	68,9	58,3	63,3	67,6	**62,2**
TN	50,5	41,4	36,2	53,5	56,8	59,1	46,9	58,2	56,1	56,2	55,1	58,6	**52,3**
TT	39,1	36,1	44,4	57,1	53,4	53,3	56,0	54,3	53,4	49,2	53,2	53,7	**50,2**
ZA	12,7	32,7	29,2	53,8	54,4	55,8	40,9	61,3	60,1	59,1	55,9	51,3	**47,2**
Priemer	**46,3**	**43,8**	**47,0**	**52,4**	**53,9**	**50,9**	**50,8**	**56,9**	**55,2**	**52,5**	**52,8**	**58,6**	**51,8**

Legenda: BA – Bratislava, **BB** – Banská Bystrica, **KE** – Košice, **NR** – Nitra, **PO** – Prešov, **TN** – Trenčín, **TT** – Trnava, **ZA-** Žilina.

Zdroj: vlastné spracovanie na základe dát zo záverečných účtov a viacročných rozpočtov všetkých krajských miest z rokov 2005-2016

Pri komparácii priemerných hodnôt finančnej závislosti jednotlivých samosprávnych krajov za celé sledované obdobie 2005-2016 sme zistili, že najnižšiu závislosť od cudzích/transferových príjmov mal BSK. Ďalším samosprávnym krajom, ktorý mal mieru finančnej závislosti nižšiu ako 70 % bol už len TTSK s hodnotou závislosti na úrovni 68,3 %. Najvyššiu priemernú mieru finančnej závislosti sme zistili u TSK, ktorého hodnota finančnej závislosti tesne prekročila 80 %. Samosprávny kraj s druhou najvyššou priemernou hodnotou finančnej závislosti bol PSK tesne nasledovaným BBSK a KSK. Pri komparácii hraničných priemerných hodnôt finančnej závislosti sme zistili, že rozdiel medzi priemernou maximálnou (TSK) a minimálnou (BSK) výškou finančnej závislosti je takmer 14 %.

Po tom, čo sme zistili čiastkové a priemerné výsledky miery finančnej závislosti samosprávnych krajov, zamerali sme sa na obdobný výskum aj na miestnej úrovni. Tu sme zisťovali mieru finančnej závislosti v prípade ôsmich krajských miest v rovnakom období (2005-2016). Nami zistené čiastkové a priemerné hodnoty finančnej závislosti rozpočtov krajských miest sú zachytené v tabuľke 3.

Čiastkové, ako aj priemerné hodnoty v tabuľke 3 ilustrujú to, ako veľmi sú mestské rozpočty naviazané a závislé od finančných tokov, ktorých výšku nemôžu priamo ovplyvňovať. V skúmanom období 12 rokov sme zistili, že priemerná miera finančnej

závislosti všetkých skúmaných krajských miest je na úrovni 51,8 %. Už prvý pohľad na čiastkové výsledky jednotlivých krajských miest predpovedal, že miera finančnej závislosti skúmanej vzorky miestnych samospráv (krajských miest) je nižšia ako obdobné hodnoty v prípade regionálnej samosprávy. Komparáciou priemernej hodnoty finančnej závislosti skúmanej vzorky miestnych a regionálnych samospráv sme zistili, že miestna úroveň (krajské mestá) vykazujú nižšiu mieru finančnej závislosti, teda naviazania na dotácie, granty, transfery a prostriedky z podielovej dane ako regionálna samosprávna úroveň. Výsledkom porovnania celkových priemerných hodnôt finančnej závislosti oboch samosprávnych úrovní je zistenie, že miera finančnej závislosti miestnej samosprávnej úrovne je počas rokov 2005-2016 v priemere o 21,5 % nižšia, ako priemerná miera finančnej závislosti regionálnej samosprávnej úrovne.

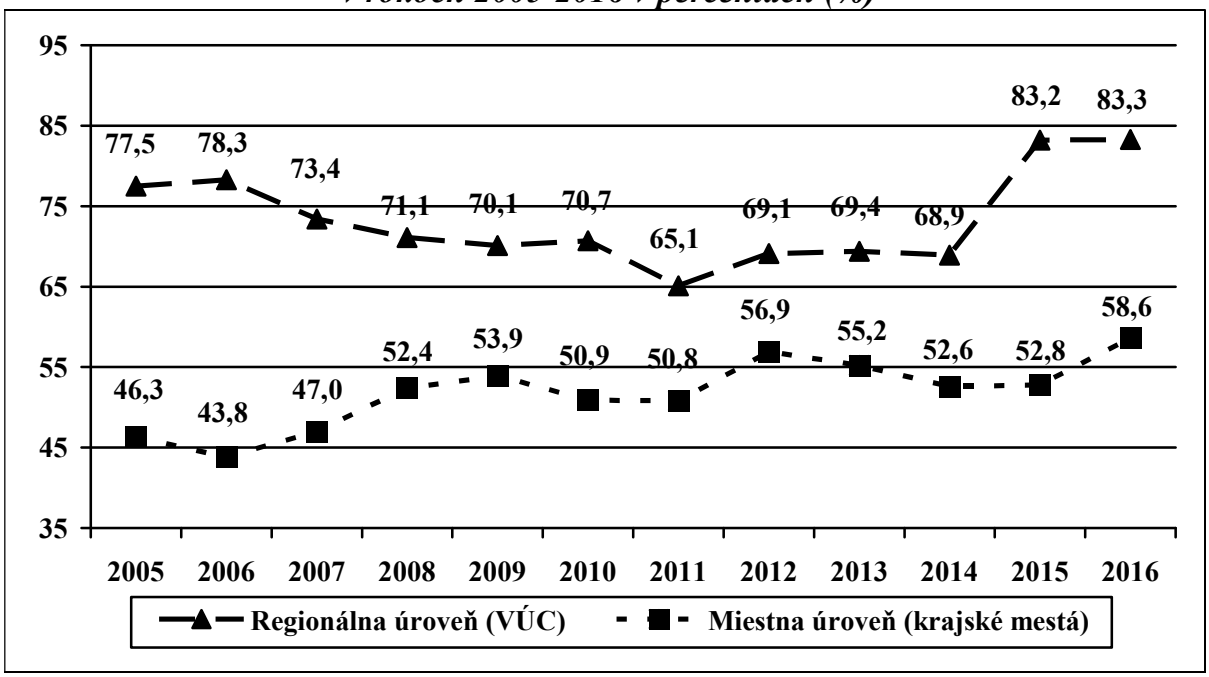
Ani v prípade vývoja ukazovateľa finančnej závislosti rozpočtov krajských miest sa nedajú určiť jednotné vývojové tendencie, pretože sa objavujú kladné aj záporné výkyvy. Tento stav je zapríčinený veľkými výkyvmi čiastkových hodnôt miery finančnej závislosti rozpočtov krajských miest v konkrétnych rokoch. Paradoxná situácia nastala napríklad v sledovanom roku 2005, kedy sme zistili tak najvyššiu (PO – 72,3 %), ako aj najnižšiu (ZA – 12,7 %) čiastkovú hodnotu finančnej závislosti počas výskumného obdobia dvanástich rokov. Rozdiel medzi týmito hraničnými hodnotami predstavuje takmer 60 %, čo je veľmi markantná odlišnosť. Tento rozdiel je dokonca vyšší ako v prípade čiastkových hodnôt finančnej závislosti u regionálnych samospráv.

Najnižšiu priemernú mieru finančnej závislosti v rokoch 2005-2016 vykazoval rozpočet Bratislavy (43,8 %). V priemere druhú najnižšiu závislosť od cudzích/transferových príjmoch sme zaznamenali v prípade miest Nitra (45,5 %) a Žilina (47,2 %). Na druhej strane sa umiestnilo mesto Prešov, ktorého rozpočet vykazoval najvyššiu priemernú mieru finančnej závislosti v sledovanom období na úrovni 62,2 %. Ďalšími krajskými mestami s najvyššou priemernou finančnou závislosťou boli Banská Bystrica (59,4 %) a Košice (53,3 %). Porovnaním priemerných hodnôt finančnej závislosti všetkých krajských miest v sledovanom období dvanástich rokov sme zistili, že rozdiel medzi maximálnou (62,2 %) a minimálnou hodnotou (43,8 %) je 18,4 %. Tento rozdiel je v prípade miestnej samosprávnej úrovne vyšší ako v prípade porovnania s rovnakým ukazovateľom regionálnej samosprávy.

4 Diskusia

Zistenie čiastkových a priemerných výsledkov miery finančnej závislosti krajských miest a samosprávnych krajov nám následne poslúži na konečnú komparáciu miery finančnej závislosti. Výsledkom je graf 1, ktorý zachytáva a kombinuje priemernú mieru finančnej závislosti v jednotlivých rokoch na miestnej (krajské mestá) a regionálnej (samosprávne kraje) samosprávnej úrovni na Slovensku.

Obr. 1: Vývoj priemernej miery finančnej závislosti na regionálnej a miestnej úrovni v rokoch 2005-2016 v percentách (%)



Zdroj: vlastný výpočet na základe dát zo záverečných účtov a viacročných rozpočtov všetkých krajských miest a samosprávnych krajov z rokov 2005-2016

Vývoj miery finančnej závislosti regionálnej samosprávy by sme mohli rozdeliť do troch etáp. Prvotné obdobie rokov 2005-2006 je charakteristické najmä stabilizáciou pomerov po vzniku a začatí faktickej činnosti VÚC. V tomto období bola miera finančnej závislosti stabilná a udržiavala na približne totožnej úrovni, bez výrazných výkyvov. Výška prostriedkov z bežných transferov, dotácií a grantov ako aj prostriedkov z DPFO sa zvyšovala rovnakým tempom ako rástli celkové príjmy regionálnej samosprávnej úrovne.

Druhá etapa vývoja miery finančnej závislosti v prípade VÚC je ohraničená rokmi 2007-2014. V týchto rokoch je typickým znakom výrazný pokles miery finančnej závislosti v porovnaní s prvou etapou. V rokoch 2007 a 2008 klesala miera finančnej závislosti regionálnej samosprávy na Slovensku vplyvom prudkého nárastu celkových príjmov. Nárast celkových príjmov VÚC bol vyšší ako zvyšovanie príjmov z cudzích (transferových) zdrojov, čo spôsobilo zníženie miery závislosti regionálnych rozpočtov. Od roku 2009 do roku 2010 sa vývoj finančnej závislosti mierne stabilizoval, kedy vplyvom ekonomickej a hospodárskej krízy poklesla suma celkových prímov VÚC a súčasne sme zaznamenali aj pokles celoštátneho výnosu z podielovej dane. Keďže sa obe sledované veličiny znížili v približne totožnom pomere, miera finančnej závislosti sa stabilizovala. Veľmi výrazné zníženie miery finančnej závislosti zaznamenávame v roku 2011, kedy sa prepadla o viac ako päť percent. Dôvod môžeme nájsť v zmene prerozdeľovacieho koeficientu z DPFO v neprospech územnej samosprávy. Tým sa znížil príjem VÚC z dominantného cudzieho príjmového zdroja – podielovej dane a dôsledkom bol pokles finančnej závislosti regionálnej územnej samosprávy na historické minimum. Druhým dôvodom takéhoto výrazného zníženia finančnej závislosti v roku 2011 bol značný nárast celkových príjmov regionálnej samosprávy. V posledných troch rokoch (2012-2014) druhej etapy vývoja miery finančnej závislosti VÚC sme oproti roku 2011 spozorovali mierny nárast finančnej závislosti a jej stabilizáciu na úrovni približne 69 %. Tento

vývoj finančnej závislosti spôsobil každoročne sa mierne zvyšujúci objem cudzích (transferových) finančných prostriedkov v rozpočtoch VÚC a súčasne aj mierny nárast celkových príjmov regionálnej samosprávy.

Posledná etapa vývoja ukazovateľa finančnej závislosti regionálnej samosprávy sa odohrávala v rokoch 2015-2016. Pre tieto roky je príznačný enormný nárast prostriedkov pre VÚC z podielovej dane. Na jednej strane sa zvyšuje celoštátny výnos z DPFO a súčasne regionálna samospráva na tomto výnose participuje v stále vyššej miere v dôsledku zvyšovania podielu v prerozdeľovacom vzorci. Vyšší podiel VÚC na výnose z podielovej dane predstavuje kompenzáciu pre regionálnu samosprávu, pretože v roku 2015 jej bola odobraná jediná vlastná miestna daň – daň z motorových vozidiel (tzv. cestná daň).

Vývoj finančnej závislosti miestnej územnej samosprávy na Slovensku reprezentovanej krajskými mestami, sme tiež skúmali v rokoch 2005-2016. Grafické vyjadrenie jej vývoja by sme mohli s určitou mierou zovšeobecnenia prirovnať k mierne naklonenému písanému písmenu „u“. Od roku 2006 do roku 2009 zaznamenávame na jednej strane nárast cudzích (transferových) príjmov v rozpočtoch krajských miest ako aj každoročné zvyšovanie ich celkových príjmov. Príjmy krajských miest najmä z podielovej dane sa každoročne výrazne zvyšujú a svojím nárastom prevyšujú nárast celkových príjmov. Preto v tomto období rastie finančná závislosť rozpočtov krajských miest. Postupne sa však prírastok z podielovej dane znižuje a v roku 2010 a 2011 zaznamenávame zmenu vývojového trendu. V oboch rokoch sa znižuje miera finančnej závislosti miestnej územnej samosprávy. Dôvodom je v roku 2010 výrazný prepad celoštátneho výnosu DPFO a v roku 2011 to čiastočne bolo spôsobené aj výrazným znížením podielu, ktorým mestá participujú na výnose z podielovej dane. Zníženie príjmov krajských miest z podielovej dane malo v oboch prípadoch rovnaký dopad aj na hodnotu cudzích (transferových) príjmov. To spolu so stagnáciou celkových príjmov v konečnom dôsledku viedlo ku zníženiu finančnej závislosti.

Finančná závislosť miestnej samosprávy (krajských miest)v ďalšom roku zaznamenala najvýraznejší medziročný nárast o viac ako šesť percent. V roku 2012 do rozpočtov miest plynulo viac finančných prostriedkov z podielovej dane, pretože sa zvýšil jej celoštátny výnos a tým sa automaticky zvýšila výška prostriedkov z cudzích zdrojov. Zároveň v roku 2012 výrazne klesli celkové príjmy skúmaných krajských miest, čo ešte viac umocnilo nárast finančnej závislosti ich rozpočtov.

V nasledujúcich rokoch 2013, 2014 a čiastočne aj 2015 miera finančnej závislosti krajských miest klesala. Ako hlavnú príčinu môžeme označiť nárast celkových príjmov krajských miest. V danom období zaznamenávame i mierny nárast cudzích (transferových) príjmov spôsobených najmä zvyšovaním celoštátneho výnosu z DPFO a postupným navyšovaním podielu miest na podielovej dani. Nárast príjmov z cudzích zdrojov však nebol taký výrazný ako prírastok sumy celkových príjmov. Tým sa nám pri výpočte finančnej závislosti vo vzorci výrazne zvyšoval menovateľ a len mierne vzrástol čitateľ. Výsledkom je znižovanie miery finančnej závislosti miestnej územnej samosprávy, ktorú v našom príspevku reprezentujú krajské mestá.

Posledný rok nášho výskumu priniesol nárast finančnej závislosti rozpočtov krajských miest. Za primárny dôvod môžeme označiť pokles celkových príjmov miestnych samospráv. Okrem toho sa na zvýšení miery finančnej závislosti krajských miest podpísalo aj zvýšenie cudzích (transferových) príjmov v ich rozpočtoch. V tomto

smere zohráva dôležitú úlohu nárast výberu DPFO na celoštátnej úrovni ako aj navyšovanie podielu, ktorým na tomto výnose participuje miestna územná samospráva.

Z komparácie miery priemernej finančnej závislosti oboch úrovní územnej samosprávy na Slovensku v období rokov 2005-2016 na obrázku 1 je zrejmé, že počas celého skúmaného obdobia bola miera finančnej závislosti rozpočtov krajských miest výrazne nižšia ako v prípade rozpočtov samosprávnych krajov. V oboch prípadoch je vývoj pomerne nestály a zaznamenávame tak nárast finančnej závislosti v určitom období, ako aj znižovanie závislosti počas niektorých rokov. V niektorých obdobiach však môžeme identifikovať zhodné vývojové tendencie tak na regionálnej, ako aj miestnej samosprávnej úrovni. Za hlavné katalyzátory zmien finančnej závislosti tak regionálnej ako aj miestnej územnej samosprávy môžeme považovať výšku celkových príjmov, výšku celoštátneho výnosu z DPFO a prerozdeľovací koeficient podielovej dane.

Záver

Cieľom príspevku bolo komplexnejšie zhodnotiť mieru finančnej závislosti územnej samosprávy na Slovensku v rokoch 2005-2016. V skúmanej skupine územných samospráv reprezentovali miestnu územnú samosprávu krajské mestá a regionálny stupeň územnej samosprávy tvorili samosprávne kraje. Vďaka čiastkovým výsledkom sme určili, že miera finančnej závislosti miestnej samosprávnej úrovne bola v období rokov 2005-2016 na úrovni 51,8 % a rozpočty samosprávnych krajov vykazovali mieru finančnej závislosti od dotácií, grantov, transferov a prostriedkov z podielovej dane na úrovni 73,3 %. Samotný vývoj a čiastkové výsledky za jednotlivé samosprávne jednotky a úrovne vykazovali výrazné rozdiely. S miernou mierou zovšeobecnenia by sme mohli identifikovať dlhodobú tendenciu vývoja finančnej závislosti krajských miest, ktorá sa postupne zvyšuje. Dlhodobá miera finančnej závislosti samosprávnych krajov v dlhodobom výhľade do roku 2014 naopak klesala, čo sa však výrazne zmenilo v roku 2015, kedy došlo k zmene prerozdeľovacieho vzorca prostriedkov z podielovej dane, a s tým súvisel aj značný nárast finančnej závislosti regionálnej samosprávnej úrovne.

V zásade môžeme konštatovať, že na výslednú hodnotu finančnej závislosti slovenskej územnej samosprávy vplýva niekoľko faktorov. Prvým je výška celkových príjmov, ktorá je veľmi variabilná a závisí vo veľkej miere (najmä kapitálová zložka a výška príjmových finančných operácií) od schopností a potrieb jednotlivých samosprávnych jednotiek. Druhým faktorom, ktorý vplýva na výslednú mieru finančnej závislosti, je fáza ekonomického cyklu národnej (resp. v súčasne dobe aj medzinárodnej) ekonomiky. V prípade slovenskej územnej samosprávy pretrváva jej silné naviazanie na podielovú daň - daň z príjmu fyzických osôb. Jej celoštátny výnos je však závislý od výsledkov národného hospodárstva a ekonomickej situácie na Slovensku. Posledným dôležitým determinantom finančnej závislosti obcí, miest a VÚC je miera participácie územnej samosprávy na výnose z podielovej dane. Zmena prerozdeľovacieho koeficientu z DPFO je určujúcim faktorom toho, koľko finančných prostriedkov získa miestna a regionálna samosprávna úroveň z podielovej dane. A keďže práve finančné prostriedky pochádzajúce z tohto zdroja sú dominantným cudzím (transferovým) príjmom samospráv, ich výška ovplyvňuje mieru závislosti územnej samosprávy na Slovensku.

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THE CONCEPTUAL MODEL OF COLLABORATIVE ECONOMY

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Abstract: *Sharing economy is a phenomenon which it is currently paid too much attention, both in positive and negative point of view. This concept is a relatively young in the economics, but the historical context of sharing principles can be observed from the beginning of the human community. The definition of a sharing economy requires a multidisciplinary approach for the complexity of the concept.*

The aim of the article is to introduce a new conceptual model of a sharing economy, which can be used in regulating of a part of sharing economy, which by its nature, causes unfair competition in the business environment, since traditional business models for the provision of the same services must bear the additional costs associated with the certification of services, safety training, etc.

Keywords: *Collaborative economy, Sharing economy, New business models.*

JEL Classification: *J46, O17, R21, O33, O35, O38, P41, K20.*

Introduction

Sharing economy is a phenomenon which is currently paid too much attention, both in a positive perspective (development of new forms of business using ICT) and negative (unfair competition when competition with standard services, which carry additional costs resulting from the regulations of the country e.g., sanitary and technical standards, safety regulations, etc.). The concept of a sharing economy is relatively very young in economics, but the historical context can be observed from the beginning of human community. In the article it is used a multidisciplinary approach that is required by the complexity of this concept, therefore, it is necessary to include a definition of economics and sociology and even a part of anthropology in addition as well.

The aim of the article is to introduce a new conceptual model of a sharing economy, which can be used in regulating of a part of sharing economy, which by its nature, causes unfair competition in the business environment, since traditional business models for the provision of the same services must bear the additional costs associated with the certification of services, safety training, etc. This model will be applied on the example of Airbnb and standard accommodation services in Prague.

1 Literature review

The principle of ***"sharing" and "sharing economy"*** [sharing economy], was completely overgrown with the everyday life of natural nations (Lévi-Strauss, 1996). Also in traditional societies, i.e. in Europe in the late 18th century and 19th century, sharing was strongly represented.

With the transition[1] to a modern society, with the disintegration of large families, and the forms of farming households have changed, the sharing is starting to have a closed character especially in the area of family relations (Keller, 2007). Also currently the society has clearly been transformed. For the causes of changes of the social structure of the population; it can be considered the development of communication and information technologies, population ageing, shifting the employees into the service sector, changes in organizational structures. Sociologists are trying to describe the new character of the society through a variety of attributes, which indicate certain features of acquiring importance. For example, it is the post-industrial society (Bell, 1973), where the services sector has a key importance[2], or the networks society (Castells, 1996). As even the principle of sharing, this is increasing the importance of the use of networks of relatives, friends and acquaintances[3].

The concept of **a sharing economy** appears until after 2000, when Prof. Yochai Benkler, Harvard Law School, who is a strong supporter of the free sharing a priori in the field of information technology and as well as in the economy, used this concept in the publication "The wealth of networks" (Benkler, 2006). In the 1970s Marcus Felson and Joe l. Spaeth, established up with the concept of **Collaborative consumption**. A prerequisite for Collaborative Consumption is the existence of assets (or the potential capacity of the service), the willingness of the assets or service to provide to another user from the part of the owner (either that it is not able to take advantage of the period of their life, or even with the intent to do so), the existence of the subject (in particular, natural persons) that has the interest to take advantage of such assets or service, free of charge or for a fee (Felson, Spaeth, 1978).

Oxford Dictionaries **defines a sharing economy** as a „*An economic system in which assets or services are shared between private individuals, either free or for a fee, typically by means of the Internet*." (OUP, 2017).

According to Eckhardt and Bardhi (2015) more accurate than the sharing economy is a concept of the **access economy**. The authors of the above mentioned article argue that for a business model where there are things and services traded on the basis of the approach is the defining moment of access than just ownership. *"They perceive the sharing as a form of social exchange, which takes place between people (e.g. within the family, neighbours, friends) without any profit"*.

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[1] Sociologists have focused on the analysis of the process of moving the traditional society into the modern one. It is reported the four basic characteristics of modern society: individualisation, abstraction and generalization of social relations, the process of functional differentiation and process of subsystems. The transformation in the area of ownership — a generalization of the market, buying and selling formally free labour, the sale of land and resources, which had been outside of sale, a change in the area of production. (Keller, 2005, 16) Transformed and the principle of sharing, i.e.. on the basis of the individualization of the reduction range shared goods and services.

[2] Services such as economic goods have a special character, for example they cannot be stored. For traditional services of personal needs may have been just in the places of consumption to personalized and in time to concerned, when the recipient meets with the of the service provider (Kovář, 1999, p. 107).

[3] The first major publication is an essay by American sociologist Mark Granovettera of 1973 The Strength of Weak Ties applied to getting work. The strength of the ties is determined by the amount of time that the people concerned are in contact, the emotional intensity of this contact, the degree of mutual trust and services that members provide each other with the relationship. Granovetter distinguishes the ties on the strong and weak. An example of strong ties is ties that connect family members and relatives, but also the relationships between good friends. The weak ties by contrast link a man with his more or less random acquaintances, such as people with whom he once studied former colleagues from work. The strength of the weak relations is reflected in the fact that a person with a different and distant social environment, which can, if necessary, help more than support from his closest, even though they are to such assistance much more motivated. (Granovetter, 1973)

In a similar context there is used and the concept of the "*GiG economy*", which is the transition from the full time fixed jobs that are permanent to a particular place and time towards their time and local flexibilisation and the fragmentation into short-term contracts. (Benda, 2016).

This article contains the generic term "collaborative economy", while "the sharing economy" or the "peer-to peer economy" are considered synonymous. „*The collaborative economy is a relatively new economic system approach based on peer-to-peer transactions. It includes the shared creation, production and consumption of goods and services accessible for all through online platforms and smartphone applications*." (Beaumont, 2016:6)

In comparison with traditional models of distribution and use of goods and services are for many people the modern approaches of sharing more acceptable, the distribution system is, more transparent, more open for them, faster, freer, and often cheaper. You cannot overlook the fact that in order to meet a range of needs, it needs less material goods, which saves the consumption of materials and energy. On the other side; the transaction and the use of products or services through the sharing economy are much less regulated, which providers like, and the beneficiaries as well (ibid).

As mentioned above, the activities on the basis of the sharing economy in the world, and with some time delay even with us, have begun to appear in the last ten years. You cannot ignore, however, although it is a relatively new economic activity, it is developing extremely dynamically in terms of both scale and diversity of the offer.

Tab. 1: Segments of sharing economy

Travelling ▪ *accommodation* ▪ *sightseeing* ▪ *guiding*	***Home*** ▪ *art crafts* ▪ *furniture* ▪ *tools* ▪ *Freecycling* */	***Money*** ▪ *loans* ▪ *insurance* ▪ *investment*
Equipment ▪ *machinery* ▪ *tools* ▪ *sport accessories*	***Luxury goods*** ▪ *clothes* ▪ *sports* ▪ *weddings*	***Fashion*** ▪ *clothes* ▪ *accessories* ▪ *make-up*
Electronics ▪ *appliances* ▪ *cameras* ▪ *computers* ▪ *hi-fi*	***Culture*** ▪ *books* ▪ *games* ▪ *films* ▪ *music*	***Transport*** ▪ *cars* ▪ *bicycles, scooters,* ▪ *motorbikes* ▪ *share drives*
Pets ▪ *pets-sitting* ▪ *hotel* ▪ *services*	***Leisure time*** ▪ *camping* ▪ *winter sports* ▪ *summer sports*	***Children*** ▪ *babysitting* ▪ *clothes* ▪ *toys*
Food ▪ *supplies* ▪ *services* ▪ *cleaning and washing* ▪ *garden parties*	***Rent space*** ▪ *office* ▪ *shops* ▪ *warehouses* ▪ *parking*	***Services*** ▪ *messengers* ▪ *walking* ▪ *street cleaning* ▪ *repairs*
Education ▪ *languages* ▪ *textbooks* ▪ *tutoring*	***Labour*** ▪ *odd jobs* ▪ *LET System*** / ▪ *consulting*	***Agriculture*** ▪ *exchanging,* ▪ *garden sharing**** /

Source: (Authors with Collaborative Consumption (2017), the directory for 1 300 cases and you can get in touch with an operator for the sharing.)

Note:

***/ Freecycling** – giving away unneeded items from the home, furniture, electrical appliances, clothes, who is yet to be used, the place of their disposal as waste.*

****/Local Exchange trading system** – LET System (the local labour exchange) –it is the local community of people to each other assistants in various services, in particular related to repairs or reconstruction of flats. They do not pay each other's performances, but they register in the work units, you are recorded (having the character of credit), and that is paid for the work, when it is the other member of the community needs.*

*****/Garden sharing** - It is the activity that we did not spread, but in the US and the UK is extended, the owner of the garden, or the adjacent plot of land (crofts) already does not want to cultivate this land, he shall agree with the people from the surrounding area, they will cultivate and from the proceeds of this growing activity of the owner gets a specific piece (in kind).*

In the context of the regulation of the sharing economy, there are two opposite approaches. The first one is not to regulate, for example Allen, Berg, (2014:28) recommend:

- *Encourage bottom up self-regulation rather than top-down government control.*
- *Reduce occupational licensing.*
- *Reduce industry specific controls that entrench business structure.*
- *Provide an environment for platforms to develop private solutions.*
- *Reduce regulations to encourage entrepreneurship and flexible work practices*.

The second one focuses on the demarcation of the sharing economy section of the economy where a regulation is needed, for example Veber, Krajčík, Hruška, (2016). Also, the European agenda for collaborative economy notes that these new models may contribute significantly to employment growth in the EU, if they are supported and developed responsibly. The rapid development of the sharing economy elicits a response of national and regional authorities on this trend by a series of regulatory measures (EC, 2016). Follow the instructions to the European agenda for collaborative economy, the member countries should distinguish between citizens providing services occasionally, and professional service providers, such as by setting thresholds based on the level of activity. Professional service providers should be required to obtain a commercial permit or licence, if it is absolutely necessary to meet the objectives of public interest. The platform should not be subject to the permit or licence where it acts only as an intermediary between consumers. Absolute bans of the activities should only be a last resort measure.

2 Research methodology

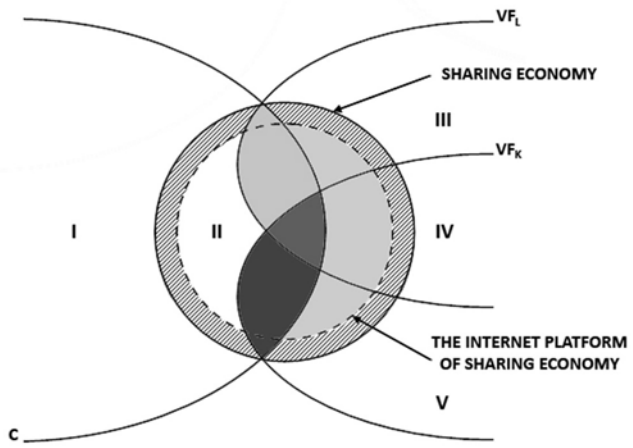
In the framework of article, there are applied theoretical procedures based on logical methods of induction for the creation of "The conceptual model of collaborative economy", which is then applied to the concrete example. In the context of the application of the model is chosen the mixed research strategy, which combines quantitative data analysis with qualitative methods of research in the form of semi structured interviews, to supplement the quantitative analysis of secondary data, and provide interpretation in the context of a qualitative dimension. The aim of the mixed research strategy is based on the principle of complementarities to remove shortcomings of particular approaches, which, if used separately, they were not able to reveal some aspects of the researching of the subject.

3 Description of the cases

3.1 The conceptual model of collaborative economy (CMCE)

This is a generic model of behaviour and relationships of economic entities, which is based on the theory of economic subjects and describes the relationships of these bodies in the sharing environment of the economy. At the same time it gives a recommendation for regulatory measures in the context of the theory of public interest and promotes socially effective behaviour (including reducing the impact of negative externalities). The basic scheme is in the figure below.

Fig. 1: Model of CMCE



Legend	
C *- Homes (ownership for personal consumption, leisure time).*	
VF_K- *Production factor of capital*	
VF_L *–Production factor of labour*	
	The original classic sharing economy without the involvement of the Internet (digital) platforms such as virtual shared tools
	Only production factor of labour shared
	Sharing of production factor of labour and capital – ownership and own labour
	Sharing of production factor of capital - own
	Fuzzy sharing use of production factors. Governing system needed

Source: Authors, 2016

Fundamental interaction in the model is the interaction between households and businesses. In the left part of the chart is personal household made up of consumption environment and the available free time, in the right part is a business environment. Home is characterized by private ownership, for example when a natural person is buying a car for his or her personal use and in principle he or she does not consider that part of this means of transport or to let out to co-consuming (sharing) to other entities. Similarly, in this part the households have free time to its free use. Firstly they do not think about sharing it with other objects (entities) in that system. On the right side of the model you can see a major effect of the theory of entrepreneurship and business. Here we have an enterprise that maximizes its benefits and uses of all factors of production, in order to maximise the benefits. Therefore, it involves all the factors of production to the business process (hires employees, uses its own capital in the process of production and service provision). For example, hotels are buying real estate as commercial used objects (for accommodation) and employ a workforce in the positions as receptionists, chambermaids, etc. This right part is already regulated by the government and its essence of laws of commercial business (commercial code, labour code, etc.).

The basis of the model is the largest concentric circle - custom sharing economy. The sharing economy and its description is based on the shared consumption, participation, community thinking. That means the economic model is based on sharing or renting products, in contrast to their exclusive and indivisible ownership.

Sharing economy is based on the sharing of information. Information can be shared either:

- In the same physical space, in which experiencing to the direct physical interaction between co-consumers. This is described in the model by the outer

circle (neighbours´ assistance in working together in the garden, the share drive of the car on the way, to rent books on the streets). The outer circle is completed by the Internet platform complements (better e-platforms) of the sharing economy.

- In the different physical space. The inner concentric smaller circle (the Internet platform of the sharing economy is based on a different area of information sharing). Most often it comes to the use of the virtual space of an intermediary linking the supply and demand of goods and services of the sharing economy. This means that all Internet platforms are based on the fact that shares information, without the use of the same physical space (the direct interaction between two groups of people) who offers and who consumes a particular goods or service.

The Internet platform is trendy in time series of ever increasing circle that slowly begin to come on to the ring size of the original sharing economy. Fewer and fewer products and services that are provided and offered are located in the same physical space.

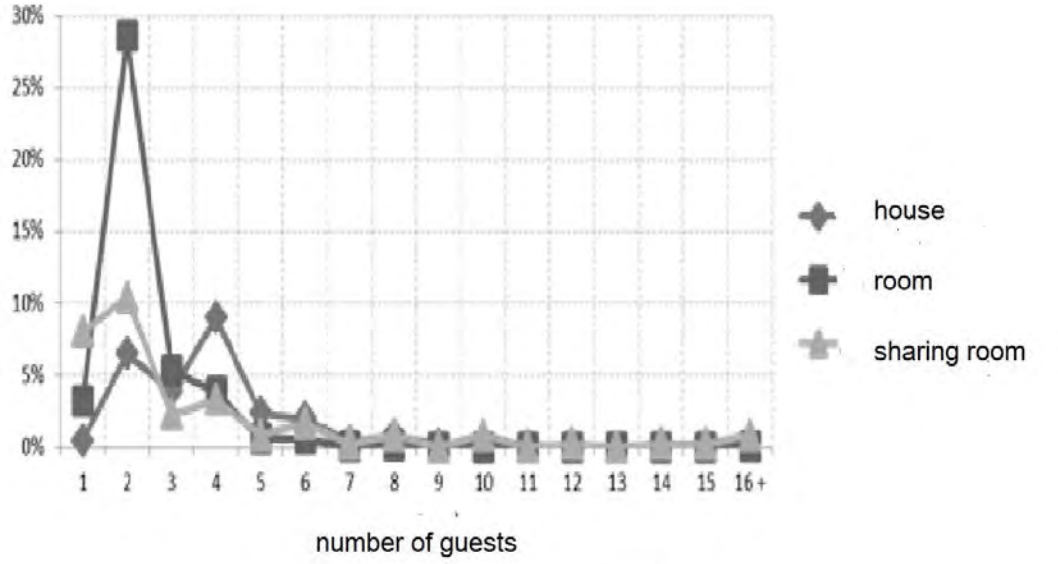
In the description of the behaviour of the model, it is worth mentioning two possible approaches of the operators of the Internet platform (model context). The first approach is concerned to upgrade the product or service. It comes to optimize purchasing behaviour, social efficiency. These are open platforms that do not have a reason to cover the information in some way, do not share them with other market participants, including government institutions. It is the innovative product development process, which is helped by the social order. For example; the company of Liftago, is the company operates in the sharing economy, but basically it has its service based on innovation of the product. Its customers are both operators of taxi services (trading business licence), and consumers who are searching for this service. The second approach is measured to control the market. From the theory of public interest in this concept occurs to significant limitations, as these platforms produce negative externalities. Classic hotels charge for accommodation (a local tax), that Airbnb do not charge. These fees are directed to the municipal budget, which typically subsidize local public activities and contribute to the attractiveness of the site and increase the interest and quality of the accommodation.

3.2 Application of the model

The model is applied to the accommodation property in Prague, i.e., there are compared the capacity and occupancy in mass establishments offering and occupancy of Airbnb. Based on the Czech Statistical Office database of „The mass accommodation facilities in the Czech Republic“ was in the year 2015 in the territory of the capital city of Prague, 91 059 beds in 41 854 rooms, which are located in 797 mass accommodation facilities. Since 2012, the overall decrease has occurred of 48 properties, especially in the category of Pension (Guesthouse) (a decrease of 30), Hotel, motel, boatel ** (decrease of 5 hotels), on the contrary, the increase shows the category of Hotel, motel, boatel **** (an increase of 19 hotels). It is evident the trend of decline in the number of beds, especially in other mass accommodation facilities (dormitories, hostels for workers) see annex. However, we can see a clear increase in superior quality. The largest concentration of bed places in tourist accommodation establishments is in Prague 1, and subsequently in Prague 2.

On the basis of the data available till 22. 10.2016 in the online platform https://www.Airbnb.cz/, it was analyzed the accommodation offer according to the number of guests for Prague as a whole and for each part separately. If the number of quotes for districts is greater than 300, it shows only an indication of 300+. On the basis of the analysis there has been shown a cumulative counting of properties, i.e. if someone offers a property for two people, so the same property is offered for one person, therefore, the cumulative effects are subtracted and the result is shown in the following chart.

Fig. 2: Offer of Airbnb without the cumulative effects



Source: Airbnb, accommodation offer, figuring by authors. 2016

The differences are shown in different types of offers. In the category of shared rooms is the most preferred accommodation for two persons, the other preference is a room for one person. For private rooms significantly outweighs the preferences to accommodate 2 people (29%) followed by the preferences of 3 people. When you rent an apartment or house is preferred accommodation for 4 people and then two people. Logicality of distribution of these preferences confirms the validity of outputs.

3.3 Comparison of conventional model and sharing economy model

Based on the information of CSO about mass accommodation facilities and above estimates of Airbnb; it can be done comparing the physical capacity of the two models according to number of beds. There is not evaluated the quality of the offered services as well as there are not taken into account for Airbnb the beds in dormitories and private rooms, that have rather the character of a share.

Tab. 2: The number of beds

Number of beds	Shared room	Private room	Flat/house	Ratio
Airbnb	1 079	7 018	95 502	51%
Mass facilities			91 059	49%
Total			186 561	100%

Source: CSO, Airbnb, accommodation offer, figuring by authors, 2016

The ratio of current offer of Airbnb is 51% within the total capacity of the mass accommodation facilities in 2015. This comparison should be supplemented with an analysis of the use of these capacities. For this purpose, it is typically used in an existing bed capacity utilisation rate (i.e. bed occupancy rate of hotels and other accommodation facilities), which is calculated as follows: $= \frac{P}{L*D} * 100$, where O is the average bed occupancy rate; P – the number of overnight stays; L - number of beds; D – number of days in the year. In the table below there are the results of the mass accommodation facilities on the territory of the city of Prague. From the results, it is clear that the average bed occupancy rate is growing, but it is still below 50% of the annual capacity.

Tab. 3: The number of beds

Year	Number of overnights	Number of beds	Days per year	Average bed occupancy rate
2012	14 443 143	92 246	366	43%
2013	14 654 282	92 052	365	44%
2014	14 750 287	87 961	365	46%
2015	15 917 265	91 059	365	48%

Source: CSO, Statistics of mass accommodation facilities, 2016

For Airbnb, it could not be exercised in the same way as we do not have data for an entire year. Therefore, in each type of accommodation there has been chosen a random selection of 40 offers and the bed occupancy was calculated on the basis of the average the given date. It should be noted that some of the offers, and it was not the details, were occupied by long-term leases until the end of the year 2018, it was both shared and private rooms, this contributes to a hypothesis about the long-term rents.

Tab. 4: Estimate of average bed occupancy rate in Airbnb

	Till the end 2016	14 days	7 days	2 days
Share room	45%	45%	53%	59%
Private room	48%	58%	57%	64%
Flat/house	56%	72%	81%	88%

Source: Airbnb, accommodation offer, figuring by authors, 2016

Note: The calculation on the basis of offers in that category to 15. 10.2016 analysed until 31 December 31.12.2018.

On the basis of a comparison of the average results of the mass accommodation facilities and in view of the declining number of tourists in October, that can be estimated in terms of the availability of capacity is the accommodation in the form of Airbnb more successful than a traditional accommodation facilities.

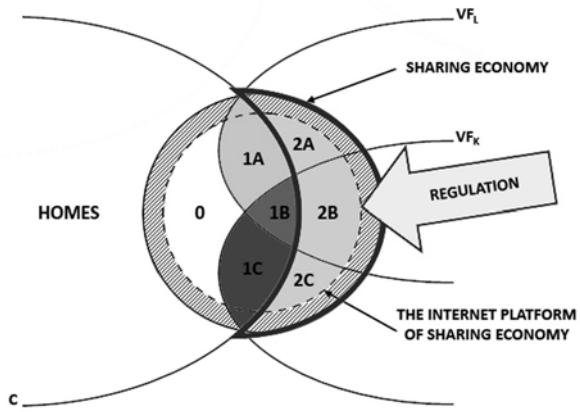
4 Findings

Based on the above mentioned analyses of Airbnb, it is important in the regulation focusing on the largest sector, which consists of flats/houses. This sector is most closely to the business (i.e., area 2b in the chart below), although the ownership of the object is used for the private purposes i.e. the characters of the business are not completed. There are two options of regulation:

1/ variant is similar to Berlin to disable areal rent of the entire facilities (apartments or houses) under the threat of high penalties, including exemplary retribution that will be sufficiently publicized.

2/ variant that are necessary to establish the intent of the business for each offer, including the regularity of the income, and this will populate the merits of entrepreneurship, i.e. business de facto.

Fig. 4: Application of CMCE model to Airbnb in Prague



***Legend**:*

Homes (C) - ownership for personal consumption, leisure time de jure but also de facto;
***VF$_K$** – production factor of capital; **VF$_L$** – production factor of labour.*

Numbering

0 – an area which is free of charge for sharing, for example accommodation a friend, a classmate.

1- the area where sharing is provided for payment, the factors of production are not incurred by intentionally for the purpose of profit,

2 – the area when the sharing is provided for payment, the factors of production are de facto incurred by intentionally for the purpose of profit, typical here is regularity. Governing system needed. Financial regulation within the meaning of the statutory administration of registration of hosts and records of guests (tax control) and the additional levy for the negative externalities (noise from guests, quality housing decline).

Lettering

A - sharing of only the production factor of labour (in the area of accommodation is not used)

B – sharing of production factor of labour and capital – personal property (apartment/house) as well as personal work (preparation and cleaning of the room)

C – sharing of production factor of capital – personal property (apartment/house), the work is delegated to another body for hiring services (preparation and cleaning of the room)

Source: Authors, 2016

Conclusions and implications

The sharing economy is a reality that we cannot bury our heads in the sand, we could identify:

- to perceive the activity associated with the sharing economy as an alternative model for service offering, the use of free capacity in the use of the products, etc.; do not prevent of these activities by government or regional level, even if they prove their meaning as well as to encourage them;
- at the level of the national economy to create clear rules for differentiate, whether it is a casual sharing or a professional sharing, including the determination of the threshold limits for granting the income from this activity, and thus their taxation (e.g., amount to 6 thousand CZK as is currently case, or that amount increased to 12 thousand CZK per year);
- no need to create a new accounting or tax tools for the purpose of capturing the sharing economy, the existing tools are adequate, it's just a willingness to admit all the sharing revenues;
- wherever the risk of non-compliance with the safety, endanger the hygiene or any other problem of consumer protection

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ÚLOHA AGLOMERAČNÝCH ÚSPOR PRE RAST ZAMESTNANOSTI V ODVETVÍ ZNALOSTNE INTENZÍVNYCH SLUŽIEB

THE ROLE OF AGGLOMERATION ECONOMIES IN THE EMPLOYMENT GROWTH IN THE KNOWLEDGE INTENSIVE SERVICES

Slávka Klasová

Abstract: *The paper investigates the impact of agglomeration economies on the regional employment growth in the knowledge intensive services (KIS) in Slovakia over the period 1998 to 2014 by estimating spatial econometric models. Assuming that knowledge spillovers and externalities are stronger between industries with shared knowledge bases and complementarities, we analyse the role of different forms of sectoral variety at the district level in Slovakia. Results indicate that localization economies has a generally negative impact on the employment growth in the KIS sector, however the results show a strong evidence of the beneficial effect of related variety, while no role is played by unrelated variety. When looking at knowledge spillover between KIS and manufacturing, the KIS industry is affected by related variety in manufacturing industry, while no evidence of externalities is found from the tertiary sectors to manufacturing. The results question the merits of interventions promoting regional specialisation and emphasise that diversity into the related industries should be one of the policy issue areas.*

Keywords: *Agglomeration economies, Employment growth, Slovakia, Knowledge intensive services, Spatial distribution.*

JEL Classification*: D62, O18, O52, R12.*

Úvod

Aglomeračné úspory predstavujú externé úspory z rozsahu, ktoré pozitívne vplývajú na produkčné podmienky v príslušnom odvetví a regióne (Sobotková a Sobotka, 2013). Zastávajú podstatnú úlohu v procese urbánneho rastu a sú významným komponentom rastu produktivity (Žížalová, 2010). Viacerí autori sa preto zaoberajú otázkou vplyvu jednotlivých aglomeračných úspor na regionálny ekonomický rast (Beaudry a Schiffauerova, 2009). Kým Marshall (1890) zdôrazňoval, že regionálna odvetvová špecializácia a s tým súvisiace lokalizačné úspory podnecujú medzifiremné učenie, čo následné vedie k inováciám, Jacobs (1969) začala zdôrazňovať regionálnu odvetvovú diverzitu, a s tým spojené urbanizačné úspory, ako hnaciu silu interaktívneho učenia sa a inovácií (Boschma a Frenken, 2006; Glaeser a kol., 1992). Najnovšie práce rozšírili koncept urbanizačných úspor o evolučný ekonomický aspekt zdôrazňujúc, že úspory, inovácie a prelievanie znalostí sa efektívne realizujú len vtedy, ak medzi odvetviami existuje komplementarita v zmysle spoločnej znalostnej bázy a spoločných kompetencií. Takáto komplementarita je zachytená konceptom vnútroodvetvovej variability (Frenken a kol., 2007).

Cieľom článku je na základe zostavenia ekonometrických modelov zistiť ako rozdielne formy aglomeračných úspor ovplyvňujú rast regionálnej zamestnanosti

v odvetví znalostne intenzívnych služieb (ZIS) na Slovensku. Nasledujúc práce Frenken a kol. (2007), Bishop a Gripaios (2009), Boschma a kol. (2011) sú skúmanými aglomeračnými úsporami lokalizačné úspory, vnútoroodvetvová a medziodvetvová variabilita. Hlavným dôvodom užšieho zamerania na odvetvie služieb vychádza zo skutočnosti, že v rámci ekonomického rastu a produktivity je podľa Maroto-Sánchez (2012) nutné odkloniť sa od tradičného zamerania na priemyselný výskum a vývoj smerom k službám, konkrétne smerom k odvetviu znalostne intenzívnych služieb (ZIS), ktoré sa stávajú najrýchlejšie sa rozvíjajúcim segmentom ekonomiky. V kontexte znalostne založenej ekonomiky sa akcentuje ich úloha v súvislosti s tvorbou inovácií v ekonomike a transferom znalostí v procese subdodávateľských inovačných aktivít (Hertog 2000; Müller a Zenker 2001). Dopyt po ZIS sa neustále zvyšuje aj z dôvodu rastúceho úsilia európskych ekonomík budovať znalostnú ekonomiku a poslniť tak regionálnu konkurencieschopnosť. Iniciatívy sa samozrejme odrážajú v priaznivých číslach zamestnanosti. Kým zamestnanosť v EÚ vzrástla v priemere medziročne o 1,4% medzi rokmi 2002 až 2007, zamestnanosť v odvetví ZIS vzrástla až o 3,8% (Schricke a kol., 2012).

Aj na Slovensku je možné pozorovať rastúci význam služieb, ktorých podiel na pridanej hodnote sa na Slovensku zvýšil o viac ako 20% v poslednom desaťročí (Baláž, 2004). Z pohľadu podnikov pôsobiacich v odvetví služieb je nutné kriticky poznamenať, že najväčšia časť, až 72%, je tvorená podnikmi z odvetvia znalostne menej intenzívnych služieb (ZMIS) (Lattová, 2011). Proces tertiarizácie má totiž na Slovensku odlišné charakteristiky. Kým v rozvinutých krajinách má charakter tradičnej lineárnej transformácie, sprevádzanej postupnou desindturalizáciou a následnou terciarizáciou, na Slovensku je proces vo veľkej miere ovplyvnený neustále prebiehajúcimi štruktúrnymi zmenami industrializácie a terciarizácie (Zhang, 2015). Aby regionálna inovačná politika implementovala vhodné nástroje na podporu ZIS a bola adresnejšia je kľúčové zohľadniť špecifické charakteristiky odvetvia ZIS a zistiť, aký typ aglomeračných úspor je dôležitý v súvislosti s generovaním zamestnanosti v odvetví. Následne je tak možné vybrať vhodné nástroje, ktoré uchopia inovačný potenciál ZIS a cielene ho posilnia (Blažek a kol., 2013). Z tohto dôvodu Slovensko predstavuje dobrý príklad na zhodnotenie vplyvu aglomeračných úspor na rast zamestnanosti, nakoľko sa mu doposiaľ nevenovali žiadny autori. Preto je ambíciou predkladaného článku túto medzeru vyplniť.

1 Formulácia problematiky

Klasické dichotomické delenie aglomeračných úspor na lokalizačné a urbanizačné je dodnes sprevádzané diskusiou zo strany ekonómov, ktorí hľadajú odpoveď na otázku, aký typ externalít podnecuje proces tvorby znalostí v odvetví a vplýva tak pozitívne na rast odvetvia (von Hofe a Chen, 2006) a rast regiónu (Boschma a Frenken, 2006). V kontexte názorových rozdielov Noteboom (2000) prichádza so záverom, že klasické dichotomické rozdelenie nie je najvhodnejšie nakoľko nerešpektuje kognitívnu vzdialenosť medzi sektormi. Inými slovami, nezohľadňuje sa vzájomne pôsobenie medzi odvetviami, ich technológiou a geografickou lokalitou (Iammarino a McCann, 2006). Nový pohľad na klasické dichotomické rozdelenie tak priniesli Frenken a kol. (2007) zdôraznením úlohy medziodvetvovej a vnútroodvetvovej variability. Vnútroodvetvová variabilita je definovaná ako diverzita (variabilita) medzi príbuznými odvetviami v regióne, t. j. odvetviami, ktoré sú technologicky a kognitívne príbuzné. Je evidentné, že k znalostnému prelievaniu dôjde s väčšou pravdepodobnosťou v interakcii

firiem spadajúcich do technologicky príbuzných odvetví, v porovnaní s technologicky nepríbuznými odvetviami (Frenken a kol., 2007). Región s vyššou prítomnosťou vnútroodvetvovej variability má vyšší rast zamestnanosti, lebo poskytuje viac príležitosti pre efektívnu komunikáciu a interaktívne učenie, čo predstavuje dôležitý stimul pre rast regiónu (Boschma a Frenken, 2006). Medziodvetvová variabilita je definovaná ako diverzita (variabilita) medzi nepríbuznými odvetviami v regióne. Je možné predpokladať, že čím je vyšší stupeň medziodvetvovej variability, tým je vyššia schopnosť regiónu absorbovať náhle odvetvovo špecifické šoky, čo má pozitívny vplyv na pokles nezamestnanosti a na samotnú odolnosť regiónu (Svoboda, 2014).

V súvislosti s vplyvom medziodvetvovej variability na regionálnou zamestnanosť autori zistili, že síce pozitívny vplyv existuje, ale ten sa prejavuje až pri dezagregovanom hľadisku na odvetvovú štruktúru. Koncept príbuznosti tak poskytuje užitočný základ pre teoretizovanie o odvetvových rozdieloch v znalostnom prelievaní (Bishop a Gripaios, 2009). Napríklad Combes a kol. (2008) zdôrazňujú, že odvetvie služieb je rozmanité z hľadiska zákazníkov a požadovaných vstupov a preto ťaží skôr z diverzifikovaného prostredia a s tým spojenými urbanizačnými úsporami, ktoré sú výsledkom vysokej hustoty a diverzity ekonomických aktivít v danom mieste (Isaksen, 2004; Kanó a Vás, 2013). Pre viacero služieb sú typické prevažne neštandardizované znalosti, skúsenosti a zručnosti, ktoré sú zakorenené v zamestnancoch (Ženka a kol., 2017). Vysoko kvalifikovaná pracovná sila požadovaná pre poskytovanie takýchto služieb sa priestorovo koncentruje zväčša vo veľkých mestách, ktoré uspokoja jej ekonomické a sociálne požiadavky. Autori však bližšie nešpecifikujú, či je diverzita založená na odvetviach technologicky príbuzných alebo technologicky nepríbuzných. Inými slovami nezohľadnila sa vnútroodvetvová a medziodvetvová variabilita. Zohľadnenie tohto aspektu je však kľúčové pre posilnenie adresnosti nástrojov regionálnej inovačnej politiky a preto je daný aspekt zohľadnený v modeloch.

Vyššie zmienené teoretické východiska viedli k potrebe formulácie nasledovných výskumných otázok:

Aká je priestorová distribúcia odvetvia ZIS na okresnej úrovni na Slovensku?

Aký je vplyv vnútroodvetvovej, medziodvetvovej variability a lokalizačných úspor na rast zamestnanosti v odvetví ZIS?

2 Metódy

Analýzy prezentované v článku vychádzali z dát zo Štatistického registra subjektov poskytnutých Štatistickým úradom Slovenskej republiky. Údaje o počte zamestnaných v odvetví ZIS boli dostupné za obdobie rokov 1998-2014. Súčasťou znalostne intenzívnych služieb sú odvetvia, ktorých príslušné kódy štatistickej odvetvovej klasifikácie NACE Rev. 2 sú uvedené v nasledujúcej tabuľke (Tab. 1).

Tab. 1: Znalostne intenzívne služby (ZIS) – vybrané kódy NACE Rev. 2 klasifikácie

NACE Rev. 2 kódy	Popis
50, 51	Vodná a letecká doprava
58-60	Nakladateľské činnosti, Výroba filmov, videozáznamov a televíznych programov, príprava a zverejňovanie zvukových nahrávok, Činnosti pre rozhlasové a televízne vysielanie
61-63	Telekomunikácie, Počítačové programovanie, poradenstvo a súvisiace služby, Informačné služby
64-66	Finančné a poistné služby
69	Právne a účtovnícke činnosti
70	Vedenie firiem; poradenstvo v oblasti riadenia
71	Architektonické a inžinierske činnosti; technické testovanie a analýzy
72	Vedecký výskum a vývoj
73	Reklama a prieskum trhu
74	Ostatné odborné, vedecké a technické činnosti
75	Veterinárne činnosti
78	Sprostredkovanie práce
80	Bezpečnostné a pátracie služby
84-93	Verejná správa a obrana; povinné sociálne zabezpečenie (sekcia O), Vzdelávanie (sekcia P), Zdravotníctvo a sociálna pomoc (sekcia Q), Umenie, zábava a rekreácia (sekcia R)

Zdroj: Eurostat, 2016

2.1 Analýza priestorovej distribúcie

Analýza priestorovej distribúcie ZIS je realizovaná na úrovni okresov Slovenska. Pri analýze priestorovej distribúcie ZIS predpokladáme, že okresy nie sú izolované jednotky v priestore. Považujeme preto za dôležité merať priestorovú aglomeráciu cez prizmu priestorovej závislosti (priestorovej autokorelácie) medzi okresmi. Najčastejším spôsobom merania priestorovej autokorelácie je Moranov index. Vzorec na výpočet indexu má nasledovný tvar:

$$I = \frac{N}{\sum_i \sum_j w_{ij}} \frac{\sum_i \sum_j w_{ij} \left(x_i - \bar{x}\right)\left(x_j - \bar{x}\right)}{\sum_i \left(x_i - \bar{x}\right)^2} \tag{1}$$

N je počet okresov, w_{ij} matica priestorových váh, x_i hodnota skúmaného javu v okrese i, x_j hodnota skúmaného javu v okrese j a $\bar{x}$ je aritmetický priemer premennej x.

Pri výpočte Moranovho indexu sme vychádzali z hodnôt lokalizačného kvocientu (LK) vyčísleného pre každý okres. Lokalizačný kvocient sme vyčíslili podľa nasledujúceho vzorca:

$$LK = \frac{E_{ij} / E_i}{E_j / E} \tag{2}$$

E_{ij} je zamestnanosť v odvetví j v okrese i, E_i je celková zamestnanosť v okrese i, E_j je zamestnanosť v odvetví j na Slovensku a E je celková zamestnanosť na Slovensku.

Hodnota Moranovho indexu je v intervale -1 až 1. Pozitívna (negatívna) autokorelácia znamená, že okresy s podobnými (odlišnými) hodnotami LK sa v priestore zhlukujú. V prípade nulovej hodnoty hovoríme o náhodnom usporiadaní. Na

vyčíslenie p-hodnoty Moranovej štatistiky sme využili Monte Carlo simuláciu s počtom opakovaní (n = 99999).

2.2 Zostavenie ekonometrických modelov

Na základe teoretického zdôvodnenia dôležitosti skúmania aglomeračných úspor v súvislosti s rastom zamestnanosti sme testovali vplyv rôznych foriem aglomeračných úspor na rast zamestnanosti v odvetví ZIS zostavením ekonometrických modelov. Sledované dvadsaťročné obdobie bolo rozdelené na štyri obdobia nasledovne: 1998-2002; 2002-2006; 2006-2010; 2010-2014. Každé nové obdobie v sebe nesie aj informáciu z predošlého obdobia. Zostavenie ekonometrických modelov sa realizovalo v programe R. V prvom kroku sme zostavili klasický lineárny regresný model – OLS. Nakoľko sme vyčíslením Moranovho koeficientu zistili prítomnosť priestorovej autokorelácie, pristúpili sme k rozšíreniu OLS modelu o priestorový aspekt. Langrangeovými multiplikátormi (LM) sme zistili, či je vhodný model s priestorovými chybami (LM error) alebo model s priestorovým posunom (LM lag). Vhodnosť modelov sa posudzovala podľa hodnôt troch kritérií: Schwarzovho kritéria (SCHK), Akaikeho kritéria (AKK) a logaritmu vierohodnosti funkcie Log likelihood (LL). Vo všetkých prípadoch bol vhodnejší model s priestorovými chybami (SEM – spatial error model), ktorého výsledky sú uvedené vo výstupných tabuľkách.

2.3 Vysvetľovaná premenná

Do modelu vstupujúca vysvetľovaná premenná je vyjadrená ako priemerný ročný rast zamestnanosti v odvetví ZIS v okresoch (r = 1, 2, ..., 79) v každom zo štyroch období. Pre obdobie rokov 1998-2002 má vzorec nasledovný tvar:

$$Rast\ zamestnanosti = \frac{zamestnanosť_{r,02} - zamestnanosť_{r,98}}{zamestnanosť_{r,98}} * \frac{1}{4} \tag{3}$$

Pre zvyšné tri obdobia sa priemerný ročný rast zamestnanosti vyčíslili analogicky.

2.4 Vysvetľujúce premenné

Vysvetľujúcimi premennými v modeli sú tri typy aglomeračných úspor: lokalizačné úspory, vnútroodvetvová a medziodvetvová variabilita. Všetky vysvetľujúce premenné vstupujú do modelu v logaritmovanej podobe. Vysvetľujúce premenné sú podľa prístupu autorov Mameli a kol. (2012) vyčíslené vždy pre začiatočný rok každého obdobia (1998, 2002, 2006, 2010). Týmto postupom zistíme, aký je vzťah medzi hodnotou vysvetľovanej premennej v počiatočnom roku obdobia (napr. rok 1998) a priemerným ročným rastom zamestnanosti za celé obdobie (napr. obdobie 1998-2001). Kvantifikácia lokalizačných úspor vychádza z prístupu autorov (Paci a Usai, 2008). Lokalizačné úspory (LÚ) pre počiatočné roky 1998, 2002, 2006, 2010 sa vyčíslili podľa vzorca:

$$LÚ = \frac{E_{rj} / E_r}{E_{rj} / E_k} \tag{4}$$

E_{rj} je celková zamestnanosť v okrese r v odvetví j na piatom stupni NACE Rev. 2 klasifikácie, E_r je celková zamestnanosť v okrese r, E_{rj} je celková zamestnanosť v okrese r v odvetví j na druhom stupni NACE Rev. 2 klasifikácie a E_k je celková zamestnanosť v krajine.

Vnútroodvetvová variabilita (VV) a medziodvetvová variabilita (MV) sa vyčíslili podľa prístupu autorov Frenken a kol. (2007). Ak platí predpoklad, že každé odvetvia *i*

v okrese na piatom stupni rozdelenia NACE Rev. 2 klasifikácie spadá pod odvetvie na druhom stupni rozdelenia S_g, kde g =1, 2, ..., G, tak je možné kvantifikovať podiel zamestnanosti v odvetviach na druhom stupni rozdelenia NACE Rev.2 klasifikácie podľa nasledujúceho vzorca:

$$P_g = \sum_{i \in S_g} p_i \tag{5}$$

p_i je podiel zamestnanosti v odvetviach na piatom stupni NACE Rev. 2 klasifikácie na celkovej zamestnanosti v okrese.

Medziodvetvová variabilita je definovaná ako entropia na druhom stupni rozdelenia NACE Rev.2 klasifikácie. Index môže nadobúdať hodnotu od 0 (všetci zamestnanci sú koncentrovaní v jednom odvetví) až po hodnotu $\log_2 n$ (zamestnanci sú rovnomerne rozložení medzi odvetviami). Medziodvetvová variabilita sa kvantifikovala pre roky 1998, 2002, 2006, 2010 na základe vzorca:

$$MV = \sum_{g=1}^{G} P_g . \log_2 \left(\frac{1}{P_g} \right) \tag{6}$$

Vnútroodvetvová variabilita je definovaná ako vážená entropia na piatom stupni rozdelenia NACE Rev. 2 klasifikácie v rámci každého druhého stupňa rozdelenia (Frenken a kol., 2007). Vyššia hodnota variability predstavuje väčšie možnosti vzniku znalostného prelievania medzi odvetviami. Vnútroodvetvovú variabilitu sme vyčíslili na základe vzorca:

$$VV = \sum_{g=1}^{G} P_g . H_g \tag{7}$$

$$H_g = \sum_{i \in S_g} \frac{p_i}{p_g} . log_2 \left(\frac{1}{p_i / p_g} \right) \tag{8}$$

Okrem základných vysvetľujúcich premenných do modelu vstupovala aj kontrolná premenná hustota obyvateľstva (logHUS) (počet obyvateľov okresu na km^2). Do modelu vstupuje aj kategorická (faktorová) premenná, ktorá vyjadruje príslušnosť okresu ku kraju. Cieľom je zachytenie možnej priestorovej heterogenity. Referenčným krajom je Košický kraj (KO).

3 Rozbor problému

Analýza priestorovej distribúcie odvetvia ZIS na základe hodnôt Moranovho koeficientu ukazuje, že existuje štatisticky významná pozitívna priestorová autokorelácia, t.j. okresy s podobnými hodnotami lokalizačného kvocientu sa v priestore koncentrujú (Tab. 2). Geografická blízkosť a dynamika vzájomného učenia a interakcií medzi priestorovo blízkymi firmami sú stále dôležitým faktorom pre odvetvie ZIS, aj napriek skutočnosti, že s nástupom pokročilých informačno-komunikačných technológií je väčšia tendencia smerom k decentralizácií.

Tab. 2: Moranov koeficient priestorovej autokorelácie

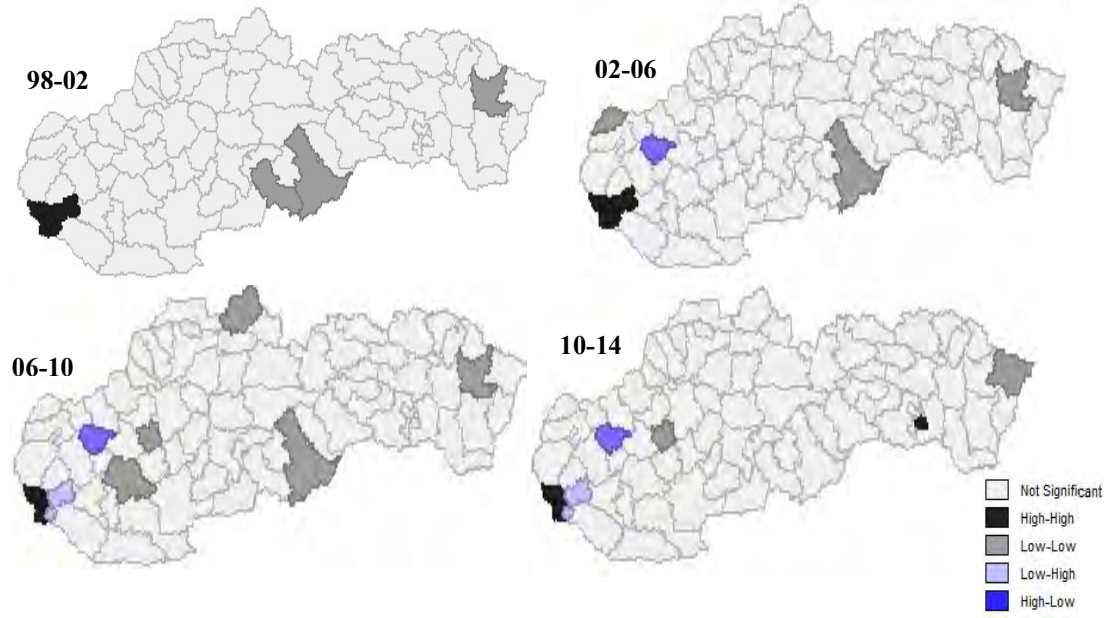
	98-02	**02-06**	**06-10**	**10-14**
ZIS	0.5270***	0.5421***	0.5163***	0.6173***

Signifikantnosť: ***p<0.01

Zdroj: vlastné spracovanie

S cieľom zistiť, ktoré okresy sú významnými zhlukmi s nadpriemernými a podpriemernými hodnotami lokalizačného kvocientu sme vyčíslili lokálnu štatistiku priestorovej autokorelácie. Vývoj lokálnej štatistiky na úrovni okresov Slovenska je zobrazený na nasledujúcich mapách (Obr.1).

Obr. 1: Vývoj lokálneho indikátora priestorovej autokorelácie v odvetví ZIS (signifikantnosť na hladine p<0,05)



Zdroj: vlastné spracovanie

Aj napriek tomu, že väčšia časť lokálnej štatistiky nie je významná, signifikantné okresy na mapách predstavujú najvýznamnejšie jadrá klastrov. Z výsledkov môžeme konštatovať, že v priestorovom rozmiestnení ZIS dominuje západný gradient, nakoľko mesto Bratislava a jej okresy majú výrazné zastúpenie ZIS na celkovej zamestnanosti (Schricke, 2012). Do veľkej miery je to dané jej pozíciou ako hlavného mesta, mierou urbanizácie, ekonomickou silou, technologickou vyspelosťou, umiestnením zásadných inštitúcií, mzdovou atraktívnosťou a kúpyschopnosťou. Významná kolokácia ZIS sa tiež prejavila v okrese Košice III v poslednom zo sledovaných období. Rastúca špecializácia na ZIS sa začala v Košiciach výraznejšie prejavovať po roku 2006. Dôvodom bol príchod zahraničných IT firiem napr. Ness KDC (2005), T-Systems Slovakia (2006), Ness Slovakia (2007), GlobalLogic (2013) a i., čím sa postupne Košice vyprofilovali na centrum informačných a telekomunikačných technológií.

Je tak zjavné, že tvorba a šírenie znalostí v odvetví ZIS sú obzvlášť efektívne vo väčších mestských regiónoch, kde je komunikácia a interakcia medzi aktérmi prenikavejšia. Koncentrácia v mestách zároveň prináša firmám viac príležitosti pre interaktívne učenie s inými firmami, či už v rámci alebo mimo odvetvia, čo následne vedie k vyššej produktivite a zamestnanosti. V tomto smere sa preto javí ako kľúčové zistiť, či k vzájomnému prelievaniu znalostí dochádza medzi odvetviami technologicky a kognitívne príbuznými alebo naopak. Inými slovami je dôležité zistiť, aký typ aglomeračných úspor je dôležitý v súvislosti s rastom zamestnanosti. V ďalšej časti preto pristupujeme k odhadu ekonometrických modelov. Nasledujúca tabuľka (Tab. 3) prezentuje výsledky zostavených ekonometrických modelov.

Tab. 3: Vplyv aglomeračných úspor na zamestnanosť v odvetví ZIS

	98-02	02-06	06-10	10-14
	SEM	**SEM**	**SEM**	**SEM**
logLU	-2,253** (0,997)	-0,712** (0,339)	-2,912*** (0,505)	-2,275*** (0,316)
logVV	2,472** (1,033)	2,485** (1,197)	2,085*** (0,215)	2,023*** (0,279)
logMV	1,011 (1,534)	0,902 (1,848)	1,245 (6,092)	1,408 (3,359)
logHUS	1,632** (0,766)	0,370** (0,158)	3,322** (1,291)	2,452*** (0,625)
faktor (BA)	1,311* (0,691)	1,177** (0,487)	2,594** (0,479)	2,09*** (0,382)
faktor (PO)	-1,329 (1,567)	-0,079 (1,379)	-2,244 (2,019)	-0,305 (1,122)
faktor (TN)	-1,994 (1,592)	-1,480 (1,535)	0,744 (1,955)	-0,541 (1,208)
faktor (TC)	-1,070 (1,502)	-1,305 (1,372)	-2,321 (1,931)	-1,796 (1,049)
faktor (NI)	-1,759 (1.557)	-1,012 (1,384)	1,416 (1,953)	1,974 (1,157)
faktor (ZI)	-1,014 (1,500)	-1,542 (1,335)	-1,048 (1,967)	-1,759 (1,034)
faktor (BB)	0,137 (1,517)	-0,982** (0,492)	-0,088 (1,258)	-0,574 (1,115)
R^2	0,322	0,343	0,378	0,396
AKK	319,70	309,20	302,99	298,32
SCHK	358,13	345,27	321,05	315,75
LL	-147,85	-128,60	-101,49	-98,66

Bratislavský kraj (BA), Prešovský kraj (PO, Trnavský kraj (TN), Trenčiansky kraj (TC), Nitriansky kraj (NI), Žilinský kraj (ZI), Banskobystrický kraj (BB), Košický kraj (KO) – referenčný kraj.
Model s priestorovými chybami (SEM – spatial error model). Huber-White štand. odchýlky sú uvedené zátvorke. Signifikantnosť: *p<0.10, **p<0.05, ***p<0.01

Zdroj: vlastné spracovanie

Na základe výsledkov môžeme konštatovať, že pre odvetvie ZIS mala špecializácia okresov negatívny vplyv na rast zamestnanosti. Inými slovami, v okresoch s vyšším podielom lokálnych firiem v rámci rovnakého odvetvia nevplývali lokalizačné úspory pozitívne na rast zamestnanosti v odvetví ZIS. Pozitívny vplyv na rast zamestnanosti v odvetví ZIS sa preukázal v okresoch, ktoré mali vyššiu vnútroodvetvovú variabilitu. Pre podporu rozvoja ZIS je tak dôležitá diverzifikácia okresu prerastajúca do nových, ale zároveň kognitívne a technologicky príbuzných odvetví. Naopak, vplyv medziodvetvovej variability sa neprejavil ako signifikantný faktor v žiadnom zo sledovaných období. Vplyv vnútroodvetvovej a medziodvetvovej variability bol robustný vzhľadom na rôzne obdobia, i keď mierne zníženie vplyvov pozorujeme v období 2006-2010, čo bolo ovplyvnené externým vplyvom krízy. Analýza preukázala, že priemerný ročný rast zamestnanosti v ZIS bol tiež pozitívne ovplyvnený hustotou obyvateľstva. Výsledok odzrkadľuje skutočnosť, že ZIS sú koncentrované v mestských okresoch s vyššou hustotou zaľudnenia, kde sú väčšie možnosti interakcie a znalostného prelievania medzi príbuznými firmami, čo sa typicky prejavuje vo vyššom raste zamestnanosti.

Faktor Bratislavský kraj sa prejavil ako významný faktor s pozitívnym vplyvom na rast zamestnanosti v odvetví ZIS. Okresy patriace do tohto kraja tak mali, v porovnaní

s referenčným Košickým krajom, vyšší rast zamestnanosti v odvetví ZIS. Výsledok len potvrdzuje, že pre rast odvetvia ZIS je dôležitá koncentrácia v inštitucionálne hustých okresoch. Vplyv faktora sa zachoval počas všetkých štyroch období. Avšak v krízovom období 2006-2010 je evidentné, že okresy patriace do Bratislavského kraja ťažili aj z hustoty zaľudnenia, ktorej vplyv bol v období 2006-2010 výrazne vyšší v porovnaní s ostatnými obdobiami.

Odvetvie ZIS je vysoko diverzifikované v zmysle rôznorodosti zákazníkov a vstupov. Dopyt po znalostných službách sa prejavuje najmä zo strany priemyselných podnikov (Zhang, 2015). Práve z tohto dôvodu sme model rozšírili a testovali existenciu možného prelievania znalostí medzi odvetvím ZIS a priemyslom. Nasledujúca tabuľka (Tab. 4) prezentuje výsledky zostavených ekonometrických modelov.

Tab. 4: Vplyv aglomeračných úspor na zamestnanosť v odvetví ZIS

	98-02	**02-06**	**06-10**	**10-14**
	SEM	**SEM**	**SEM**	**SEM**
logVV (priemysel)	0,562** (0,244)	0,293** (0,135)	3,272 (3,660)	1,228 (1,570)
logMV (priemysel)	-0,396 (1,642)	-3,912*** (0,580)	-2,534*** (0,630)	-2,812 (3,080)
R^2	0,308	0,321	0,398	0,284
AKK	382,20	349,27	329,61	407,01
SCHK	408,27	375,34	346,20	430,70
LL	-180,10	-163,63	-107,80	-193,50

Model s priestorovými chybami (SEM – spatial error model). Huber-White štand. odchýlky sú uvedené zátvorke. Signifikantnosť: *p<0.10, **p<0.05, ***p<0.01

Zdroj: vlastné spracovanie

Z výsledkov vyplýva, že pozitívne externality sa prejavili, t. j. rast zamestnanosti v odvetví ZIS bol pozitívne ovplyvnený znalostným prelievaním medzi technologicky a kognitívne príbuznými firmami v priemyselnom odvetví. Narastajúca komplexita organizácií v priemyselnej produkcii ma za následok outsourcovanie určitých činností a zavádzanie nových technológií, čím sa dopyt po ZIS zvyšuje (Gadrey a Gallouj, 1998). Z výsledkov tak môžeme konštatovať, že priemyselné firmy svojimi činnosťami vytvárajú priestor pre kreovanie nových rozvojových trajektórií v odvetví ZIS.

4 Diskusia

Príspevok zmapovaním odvetvia ZIS a konceptom aglomeračných úspor umožňuje formulovať odpoveď na prvú výskumnú otázku. Priestorová distribúcia odvetvia ZIS vykazuje významnú pozitívnu priestorovú autokoreláciu. Inými slovami okresy s vyššou špecializáciou na odvetvie ZIS sa majú tendenciu zoskupovať a ťažiť tak z aglomeračných úspor. Geografická blízkosť tak zohráva podstatnú úlohu pre odvetvie, čo môže byť odôvodnené povahou znalostí, s ktorými firmy v danom odvetví operujú. Znalostne intenzívne služby totiž nevyvíjajú hmotné tovary, ale ich primárna činnosť pozostáva z akumulácie, tvorby a diseminácie znalostí s cieľom vyvinúť individualizovanú službu alebo produktové riešenie a uspokojiť tak klientove požiadavky. Poskytnutie služieb si tak vyžaduje pravidelný priamy kontakt so zákazníkom a tieto úzke vzťahy so zákazníkmi podčiarkujú dôležitosť priestorovej blízkosti. Silná koncentrácia odvetvia ZIS sa prejavila v mestských okresoch Bratislavy a v okrese Košice III. Odvetvia ZIS tak ťažia z rozmanitej hustej siete aktérov, ktorá podporuje vzájomný transfer znalostí a v neposlednom rade vedie k vzniku inovácií. Na druhej strane, prílišné úzke zameranie na odvetvie ZIS, môže viesť k nedostatočnému

prerastaniu iných odvetví. Pričom práve politika metropolitných regiónov, by mala identifikovať nové vznikajúce odvetvia založené na silnej lokálnej znalostnej báze a následne podporiť ich diverzifikáciu a rast. V tomto kontexte je dôležitá diverzifikácia do kognitívne a technologicky príbuzných odvetví, nakoľko vnútroodvetvová variabilita sa prejavila ako signifikantný faktor rastu zamestnanosti v odvetví. Výsledky ekonometrických modelov tak umožňujú formulovať odpoveď na druhú výskumnú otázku a to, že medziodvetvová variabilita a lokalizačné úspory nepredstavujú signifikantný faktor rastu zamestnanosti v odvetví ZIS, kým vnútroodvetvová variabilita sa ako signifikantný faktor prejavila v každom zo sledovaných období. Výsledky ďalej preukázali, že znalostne intenzívne služby sú dôležitými partnermi pre priemyselné podniky, čím prispievajú k formovaniu špecifických charakteristík inovačného systému. Synergický potenciál medzi oboma odvetviami, by sa mal ďalej podporiť pritiahnutím inovatívnych firiem a lídrov globálnych spoločností. Je preto kľúčové, aby regionálna inovačná politika bola systémovo orientovaná, proaktívna a založená na špecifickosti miestnych odvetví.

Záver

Cieľom príspevku bolo zmapovať priestorovú distribúciu odvetvia ZIS na okresnej úrovni na Slovensku a zistiť, aký je vplyv aglomeračných úspor na rast zamestnanosti v danom odvetví. Na základe dosiahnutých výsledkov je možné konštatovať, že potenciálne synergie vedúce k rastu zamestnanosti v odvetví ZIS sa prejavujú hlavne v okresoch diverzifikovaných do kognitívne a technologicky príbuzných odvetví. Výsledky zároveň nepreukázali signifikantnosť lokalizačných úspor pre rast zamestnanosti v ZIS. Výsledky taktiež preukázali, že silne inštitucionálne okresy charakteristické hustou sieťou aktérov vytvárajú priaznivejšie podhubie pre znalostné prelievanie a rast zamestnanosti v odvetví ZIS. Je nutné poznamenať, že aktivity, ktoré sú založené na kodifikovaných znalostiach a nevyžadujú si priamy kontakt s klientom (napr. back-office služby) môžu byť naopak charakteristické silnou priestorovou decentralizáciou. Tieto aktivity môžu byť lokalizované do miest, ktoré ponúkajú firmám iné špecifické výhody napr. kde sú náklady súvisiace s prenájmom a mzdami výrazne nižšie. Tieto miesta nemusia byť inštitucionálne husté, ale môžu byť skôr periférne. V tomto smere, by bolo preto vhodné výskum ďalej rozšíriť o dezagregovaný pohľad na odvetvie ZIS a analyzovať priestorovú distribúciu a úlohu aglomeračných úspor pre jednotlivé odvetvia ZIS osobitne.

Poďakovanie

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HOW DO REGIONS USE INDIRECT R&D SUPPORT FOR THEIR INNOVATION ACTIVITIES?

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Abstract: *It is broadly accepted that innovation is an important source of competitiveness in developed regions and that research and development brings new knowledge that can be utilized for the development of new innovations. This paper deals with indirect support for research and development that is used for promotion of innovation activities in the Czech Republic. The aim of the article is to provide new empirical evidence on using of indirect support of research development for financing of innovation activities in Czech regions. The statistical data are analysed through descriptive statistics, cluster analysis and correlation analysis. It was observed that indirect R&D support is strongly concentrated in Prague and the Central Bohemian Region. The situation in the South Moravian Region is different, although this region has many common features with the former regions. The cluster analysis also revealed a group of regions with quite a high level of indirect support. These regions are not the innovation leaders, but they can be characterized by a strong industrial base.*

Keywords: *Indirect support, Tax incentives, Research and development, Innovation, Region*

JEL Classification: *R12, H25.*

Introduction

If developed countries and regions want to be successful in the global market and reach sustainable economic and social development they have to build their competitive advantage on innovations, quality, and uniqueness. Innovations bring economic prosperity, social development, new jobs, better quality of life, and international competitiveness. Although successful companies have to be able to operate in international markets nowadays, innovations are considered of territorial matters. Outstanding innovations arise in regions due to their specific features and unique environments. The main regional competitive advantages include the presence of research organizations, the availability of skilled workforce, the presence of innovative firms, formal and informal relations among innovation actors, mutual learning, networking, and a favourable innovation atmosphere. Research and development (R&D) is one of the most important sources for innovations (Kraftová, Miháliková, 2011; Barge-Gil, A., López, A., 2014). R&D creates new knowledge and enables companies to create radical innovations with high value added.

Research and development can be financed from public or private resources. Public expenditures on research and development are paid by governments and universities and this type of source is particularly important for financing of basic research. On the other hand, private sources are invested by innovative companies and are dedicated especially for conducting of applied research. The most developed countries (innovation leaders) invest more than 3 per cent of gross domestic product (GDP) in R&D and a significant part of it is financed by business. It is generally accepted that

private sector finances a large proportion of R&D expenditures in top-performing countries (Crespi et al., 2016). For example, the most developed countries in the EU invest more than 3% of GDP in R&D, out of which more than 50% is financed by business sector. Just for comparison, the Czech Republic invested 1.95% of GDP in the same period and the share of business sector was less than 50% (Eurostat, 2016).

Research projects in businesses can be supported in a direct or an indirect way (Kraftová, Miháliková, 2011). The direct way is based on providing subsidies to companies in public tenders. The indirect support of research and development usually lies in some type of tax incentives. In general, the following main kinds of indirect support can be used: tax deduction (allowance) and discount (credit), discounts (of benefits) for social insurance, progressive financial depreciation for long-term assets, and customs regulations (e.g. Janeček et al., 2012; OECD, 2016).

1 Support of research and development

1.1 Theoretical background

The scientific literature on innovation emphasizes that market failures discourage companies from investing in R&D. Results of R&D have a character of a public good, because knowledge is regarded as a nonrival and nonexcludable good (Arrow, 1962). New knowledge cannot be fully appropriated and due to knowledge spillovers the firm's rivals may be able to free-ride on its investment (Aerts, Schmidt, 2008; Crespi et al., 2016). This imperfect appropriability causes underinvestment in R&D activities, which means that the level of R&D expenditures is below the socially desirable optimum (Weber, Rohracher, 2012; Brown et al., 2017). In other words, knowledge spillovers cause a tension between social and private returns to innovation. Furthermore, results of research projects are uncertain and come in long-term perspective. It means that profits from innovations are uncertain and long-term too. This market imperfection is perceived as a rationale for policy intervention (McCann, P., Ortega-Argilés, R., 2013). Public funding reduces the R&D costs for companies to a level at which the research projects become profitable for investors (Aerts, Schmidt, 2008).

Another strand of scientific literature stresses the importance of place for development of innovations. It is obvious that neither innovation nor research activity is equally distributed in regions (Žítek, 2016). The role of place in development of innovation is also broadly discussed in the framework of the regional innovation systems (Autio, 1998; Doloreux, 2002; Hudec, Urbančíková, 2009). This concept investigates individual elements of innovation systems and mutual relations among them. Protagonists of this concept analyse for instance R&D intensity or presence of research organizations and they give recommendations for research and innovation policy (Fritsch, Stephan, 2005; Borrás, Edquist, 2013).

This article focuses on the indirect support for research and the development, which is provided in the form of tax incentives. This type of support is characterized by several specifics and has several advantages and disadvantages for governments as well as companies. Czarnitzki et al. (2011) pointed out the government failure that is usually connected with direct support. In the case of indirect support, this risk is minimized. They also stressed that indirect support is considered to be a neutral form of encouragement to R&D as all companies, irrespective of the industry, size and

innovation activity, can claim it. In other words, this type of support is not selective and is compatible with economic competition. Tax incentives are market-based and thus they are considered more neutral than direct support. On the other hand, it means that government cannot influence structure of research and choice of R&D projects (Elscher et al., 2011). Many researchers discuss the problem of crowding-out effect (e.g. David et al., 2000; Gonzáles, Pazó, 2008; Crespi et al., 2016), i.e., if public subsidies replace private investments or not. Most of these studies state that the crowding-out effect was not confirmed (or is lower than in the case of direct support). Some authors argue that private companies use indirect support to implement projects with high private returns inducing investments with a short-term horizon that would have been implemented in any case, i.e., without public aid, as well (Crespi, et al., 2016). The main disadvantage for companies is the fact that indirect support can be used only after they have been able to generate taxable profit.

1.2 Support of research and development in the Czech Republic

Direct support of research and development has quite a long tradition in the Czech Republic. Basic research is funded by the Czech Science Foundation (GACR), but this type of support is not focused on business. The main recipients are universities and public research institutes. Applied research is sponsored by the Technology Agency of the Czech Republic (TACR). Furthermore, various types of applied research are also sponsored by individual ministries in compliance with their competences. Research activities in business are also supported by operational programmes, in particular OP Enterprise and Innovation (2007–2013) and OP Enterprise and Innovation for Competitiveness (2014–2020). Guidelines for direct public aid are given by the European Union regulations.

Indirect support for research and development has been provided in the Czech Republic since 2005 in the form of expenses as deductible items from the tax base of income tax. It means that the taxpayer can deduct the expenditures on research and development from the tax base and in reality, these expenses are deducted twice. They are first deducted within the tax base calculation (i.e., revenues minus expenses, in a simplified way) and for the second time they are deducted from the calculated tax base. Tax rate for corporate income tax is 19%; therefore, the taxpayer can save up to 19% of the R&D costs. The main tax-deductible expenses are labour costs, depreciation for long-term assets, overhead costs, and contracted research with public research organizations. The basic condition for using this type of support is that the same research project (and the same expenses) cannot be subsidized by any type of direct public aid. The innovative company has to decide whether it prefers direct or indirect form of support.

2 Data and methods

The aim of the paper is to provide new empirical evidence on using indirect research and development support for financing of innovation activities in Czech regions. Previous research studies did not pay attention to spatial distribution of the indirect R&D support. The carried out research can contribute to proper policy targeting.

Statistical data about the indirect support for research and development are published by the Czech Statistical Office (CSO) which uses income tax returns for their collecting. The methodical principles are based on the Frascati manual (OECD, 2015) and therefore the statistics are comparable internationally. The Czech data have been collected since 2005, but detailed regional data are available from 2007. Three basic indicators are monitored, namely number of enterprises with indirect support, volume of deducted expenses on R&D, and amount of indirect support. The research in this paper comes out from this statistical source (CSO, 2017b) and completes it with other statistical resources (CSO, 2016a, 2016b, 2017a). The paper analyses Czech regions at the NUTS3 level (14 regions). The conducted research looks for answers to the three basic research questions:

- How do Czech regions differ in characteristics of indirect support for R&D?
- What public aid do Czech regions use for financing of their research activities?
- Does the exploitation of indirect support depend on some economic indicators?

2.1 Characteristics of indirect support in Czech regions

Characteristics of indirect support in Czech regions are investigated on the basis of the above-mentioned statistical resources. To avoid an incorrectness caused by an extreme value of an indicator in certain period, the average value for the period 2013–2015 is used in the analyses. Examining the regional characteristics and specifics, the following indicators have been chosen:

- total amount of indirect R&D support (in mil. CZK) – IND
- amount of indirect R&D support per inhabitant (in CZK) – INC
- share (in %) of deductible expenses on BERD (regional business expenditures on R&D) – EXP
- number of enterprises that used the indirect support (number) – ENT
- share of enterprises with indirect support among all R&D workplaces in business sector (in %) – EWP

All the indicators are assumed to reach high values ("more is better" principle). With regard to the nature of the indicators, which are expressed in different units and gain different values, it seems appropriate to use the point method. However, as its results are to a large extent affected by potential major differences in the values of one or more indicators, it can be further combined with the cluster analysis.

The point method is based on finding the region that, in the analysed indicator, reaches the maximum or minimum value. In this research, all the indicators are assumed to reach high values ("more is better" principle). In other words, the maximum value is relevant if the indicator's increase is considered positive. The point value of the specific indicator in the case of the maximum is set as follows:

$$B_{ij} = \frac{x_{ij}}{x_{i\,max}} \tag{1}$$

where B_{ij} is the point value of the i_{th} indicator for the j_{th} region, x_{ij} is the value of the i_{th} indicator for the j_{th} region, $x_{i\ max}$ represents the maximum value of the i_{th} indicator.

The region with the maximum value of the indicator is assigned with a certain number of points within the point evaluation of each (100 in the calculations carried out here); other regions are rated according to their indicator values (0–100). The main advantage of this method is that it allows expressing the original indicators in different units as dimensionless figures.

The point values of the individual parameters can further be used as data for the cluster analysis. By means of the cluster analysis, regions can be grouped into clusters based on their resemblances (Melecký, Poledníková, 2012). Non-hierarchical clustering is used, specifically, the method of k-means with Euclidean distances is appropriate for this purpose. Using the cluster analysis, the regions were divided into five clusters (k = 5). First the regions are divided into five groups and initial centroids of single clusters are calculated. Subsequently, the Euclidean distance between the value of particular region and the centroid of its own cluster and other clusters is calculated. If the value of the region is relatively near to the centroid of its own cluster, the region remains in the same cluster. If the value is closer to another cluster, the region is moved to this cluster. The procedure is repeated as long as movements come.

2.2 Public aid for financing of research activities in Czech regions

This part of the article evaluates whether enterprises in Czech regions use some type of R&D support and which type. The size of projects with indirect support is examined too. This partial analysis uses methods of descriptive statistics. As mentioned above, companies can use direct or indirect support to finance of their research activities. Nevertheless, they cannot use both forms at the same time (or more precisely, to finance the same costs). It means that they have to choose one of the public aid types. When deciding, they usually contemplate intensity of support, administrative requirements and probability of success in public tenders. The public aid never covers all eligible costs. The intensity of direct support depends on the enterprise size and the type of research. In the case of applied research the intensity usually varies between 25% (big enterprises) and 45% (small enterprises). The intensity of indirect support is 19% (all types of research, all types of enterprises). The following three indicators expressed as the average value for the period 2013–2015 have been chosen as the characteristics of public aid for financing of research activities:

- Share of indirect support in the total public aid (in %).
- Share of indirect and direct support in business expenditures on R&D (in %).
- Deductible expenses per one supported enterprise (in CZK).

2.3 Relation between indirect support and selected economic indicators

Employment of the indirect support for financing of business research activities is related to economic environment in regions. We can expect that exploitation of this type of support is dependent on some economic features of regions. Therefore, we can expect a close relation between indirect support and regions' economic and research characteristics. The Pearson correlation coefficient is used for its validation:

$$r = \frac{\sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^{n}(x_i - \bar{x})^2 \sum_{i=1}^{n}(y_i - \bar{y})^2}}. \quad (2)$$

The coefficient can take a range of values from +1 to -1, positive correlation being anticipated. The values of the correlation coefficient can be interpreted as follows: 0.10–0.39 weak correlation; 0.40–0.69 medium correlation; 0.70–0.89 strong correlation; 0.90–1.00 very strong correlation (Bajgar et al., 2012). The correlation analysis works with the average values of all indicators for the period 2013–2015 and these indicators are explained in section 3.3.

3 Results and discussion

This section shows results of indirect support analysis in Czech regions. The attention is paid to characteristics of regions, utilization of public aid for research activities, development of indirect support for R&D, and relations between indirect support and selected economic indicators.

3.1 Characteristics of indirect support in Czech regions

Table 1 shows characteristics of Czech regions with respect to indirect support for R&D. For a better informative value the analysis works with three-year average values of all indicators. The highest amount of indirect support (IND) is allocated to Prague and the Central Bohemian Region. The remaining regions follow at a huge distance. When we convert the total amount of support to relative value (per capita), the position of Prague and the Central Bohemian Region stays dominant (INC). Comparing the deductible expenses on R&D to the total amount of business expenditures on R&D (EXP) in regions, the highest share can be observed in the Karlovy Vary Region. Nevertheless, this result is influenced by the very low value of indirect support and BERD at the same time. In Prague, the share of deductible expenses in BERD is 34 % and 69% of business R&D workplaces (EWP) use indirect support for financing of their research and innovation activities. On the other hand, it is necessary to say that the extraordinary results of Prague can be caused by the fact that Prague has limited access to the direct public aid, because it is not eligible for drawing subsidies from some operational programmes.

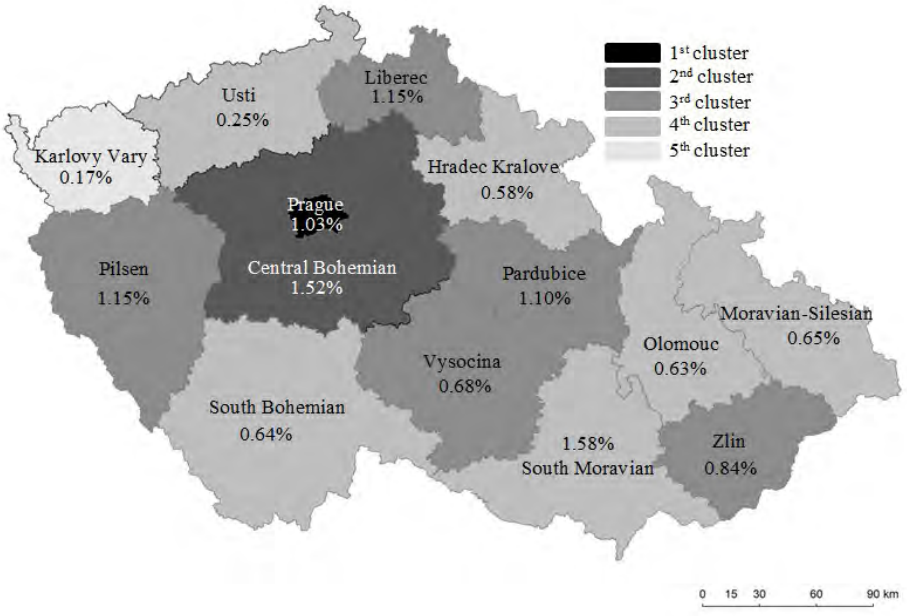
As mentioned above, in section 2.1, the indicators were recalculated to dimensionless figures by the point method and similarities among regions were assessed through the cluster analysis. Fig. 1 shows distributing the regions into five groups. The clusters are arranged in top-down order. The regions in the first cluster use the indirect support more intensively and vice versa, regions in the fifth cluster use the indirect support with the lowest intensity. For the sake of completeness, information about share of BERD in regional gross domestic product has been added to the map. The comparison of the South Moravian and Central Bohemian Regions is quite interesting. These regions have the highest shares of BERD in their gross domestic product, but they differ significantly in exploitation of the indirect R&D support.

Tab. 1: Indirect R&D support in Czech regions (average values for 2013–2015)

Region		IND (mil. CZK)	INC (CZK)	EXP (%)	ENT (number)	EWP (%)
CZ010	Prague	713	567	34.20	321	68.96
CZ020	Central Bohemian	554	422	39.27	106	44.62
CZ031	South Bohemian	29	45	10.59	42	49.27
CZ032	Pilsen	174	303	36.19	45	50.20
CZ041	Karlovy Vary	18	59	69.79	11	54.54
CZ042	Usti	28	34	22.66	35	38.74
CZ051	Liberec	122	277	39.96	39	40.91
CZ052	Hradec Kralove	56	101	25.71	58	46.60
CZ053	Pardubice	103	199	28.69	69	54.09
CZ063	Vysocina	93	182	42.16	46	48.19
CZ064	South Moravian	188	160	13.28	177	45.03
CZ071	Olomouc	44	70	18.65	60	46.74
CZ072	Zlin	120	205	35.57	109	64.15
CZ080	Moravian-Silesian	122	100	23.81	113	48.89
Czech Republic		2,362	224	29.54	1,230	52.27

Source: author's own processing based on (CSO, 2016b, 2017a, 2017b)

Fig. 1: Results of cluster analysis and share of BERD in GDP



Note: The percentage values express the share of BERD in GDP (this indicator is not included in the cluster analysis).

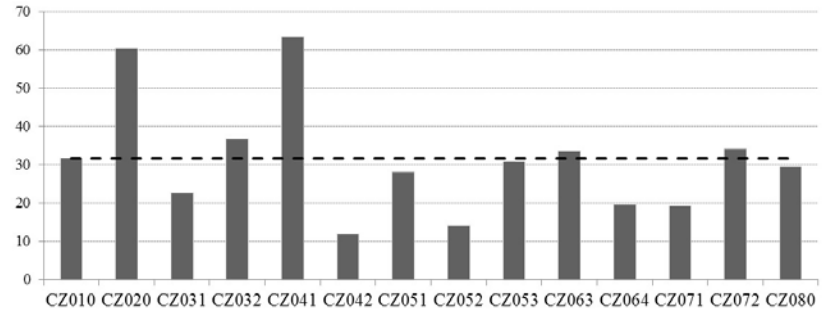
Source: author's own processing and (CSO, 2016b)

3.2 Public aid for financing of research activities in Czech regions

In this section, usage of direct and indirect support for business research activities is analysed. Average values for period 2013–2015 have been used in all cases. Figure 2 shows the share of indirect support in total amount of support. We can see that indirect support is preferred in the Central Bohemian (CZ020) and Karlovy Vary (CZ041) Regions (more than 50%). Because the research features of both regions are

very different, we can suppose that reasons for these results are different too. Whereas enterprises in the Central Bohemian Region use indirect support to a large extent, usage of indirect support in the Karlovy Vary Region is poor. Furthermore, companies in the Karlovy Vary Region may be less successful in public tenders for direct support.

Fig. 2: Share of indirect support in the total public aid (in %)

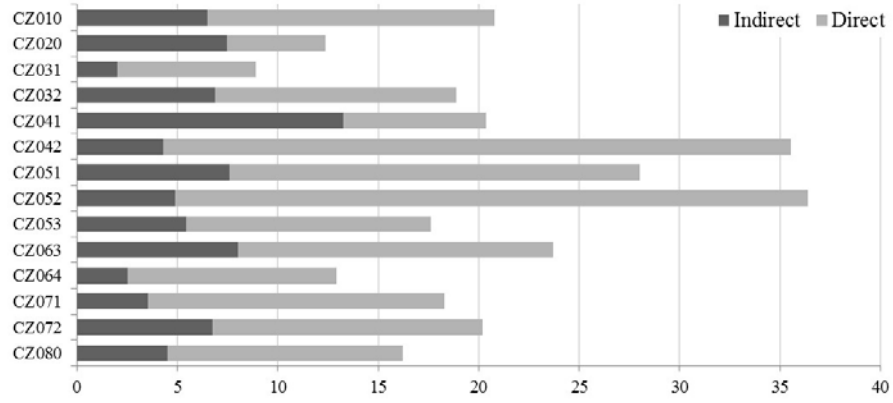


Note: The dashed line shows the average for the entire Czech Republic.

Source: author's own processing based on (CSO, 2017b)

Fig. 3 shows what aid intensity has been granted to actors in individual regions. It represents the share of direct and indirect support in BERD. It can be supposed that a significant part of business research activities is subsidized by some type of public aid in some regions and that these regions are strongly dependent on the public aid. From this point of view the most dependent regions are the Hradec Kralove (CZ052), Usti (CZ042) and Liberec (CZ051) Regions. On the other hand, the less dependent regions are the South Bohemian (CZ031), Central Bohemian (CZ020), and South Moravian (CZ064) Regions. The comparison of the Central Bohemian and South Moravian Regions brings some interesting results, the latter is more dependent on the direct type of support.

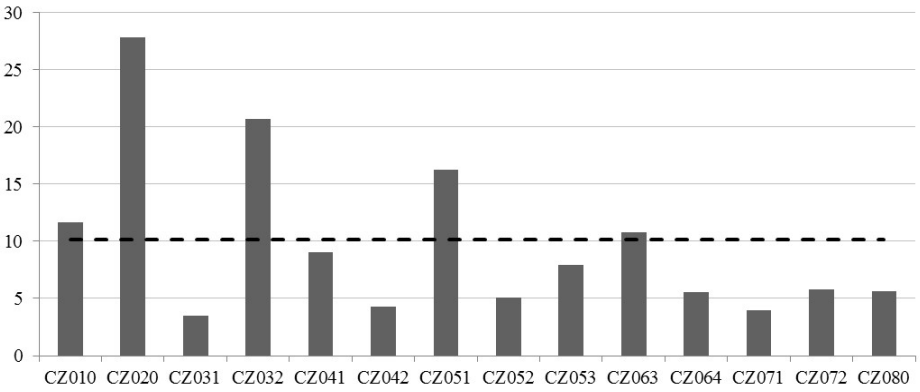
Fig. 3: Share of direct and indirect support in BERD (in %)



Source: author's own processing based on (CSO, 2016b, 2017b)

Fig. 4 shows average deductible expenses on R&D per supported company. In a figurative sense, it can mean an average size of research projects in individual regions. We can see that the highest indirect support per company has been allocated to the Central Bohemian (CZ020) and Pilsen (CZ032) Regions. In some regions, enterprises use the indirect support for quite small research projects.

Fig. 4: Indirect support - deductible expenses on R&D per a supported enterprise (in mil. CZK)



Note: The dashed line shows the average for the entire Czech Republic.

Source: author's own processing based on (CSO, 2017b)

3.3 Relation between indirect support and selected economic indicators

It is possible to expect that usage of indirect R&D support for financing of innovation activities relies on economic and research characteristics of regions. We can observe quite big differences in research and innovation activities among the regions. Innovations are considered to be a territorial matter and they are strongly concentrated in some regions. Therefore, this article deals with the relation between indirect support and selected indicators. In all cases, average values for the period 2013–2015 have been taken into consideration. As was mentioned above, the Pearson correlation coefficient is used for the validation of the relations.

Firstly, the total amount of indirect support for R&D was analysed with respect to these indicators: total gross domestic product (GDP), business expenditures on R&D (BERD), direct support of R&D, number of researches (expressed as full-time equivalent units, FTE), share of companies with technical innovations (reference period 2012–2014).

Tab. 2: Pearson correlation coefficient - absolute values of examined indicators

	GDP (CZK)	**BERD (CZK)**	**Direct support (CZK)**	**FTE (number)**	**Technical innovations (%)**
Indirect support (CZK)	0.88	0.91	0.80	0.84	0.11

Source: author's own processing based on (CSO, 2016a, 2016b, 2017a, 2017b)

The results of the correlation analysis are presented in Tab. 2. We can see a very strong correlation between indirect support and BERD (which cannot be surprising) and a strong correlation between indirect support and GDP and number of researches. The strong correlation with direct support was not expected, because using indirect support excludes using direct support. It is apparent that regions with a high amount of the indirect support use the direct support to a large extent too. The relation between indirect support and share of firms with technical innovations is very disputable. This weak correlation may be partially explained by a different way of statistical data collecting (sample survey) and quite low differences among regions.

Secondly, the amount of indirect support for R&D per capita was analysed with respect to these indicators: gross domestic product per capita (GDP), business expenditures on R&D per capita (BERD), direct support of R&D per capita, number of researches (expressed as full-time equivalent units, FTE) per capita, share of companies with technical innovations (reference period 2012–2014).

The results of the correlation analysis are presented in Tab. 3. We can see strong correlation between indirect support and BERD, GDP, FTE and direct support, but the correlations are not as strong as in the first case. The relation between indirect support and share of firms with technical innovations is the same as in the first correlation analysis.

Tab. 3: Pearson correlation coefficient - converted values of examined indicators

	GDP (p.c., CZK)	**BERD (p.c., CZK)**	**Direct support (p.c., CZK)**	**FTE (p.c., number)**	**Technical innovations (%)**
Indirect support (p.c., CZK)	0.75	0.86	0.71	0.74	0.11

Source: author's own processing based on (CSO, 2016a, 2016b, 2017a, 2017b)

Conclusion

The main advantage of the indirect support for R&D is that this type of support is not selective and each company that meets the legal requirements can use it for financing of its research and innovation activities. Therefore, this support is compatible with economic competition.

Indirect support for R&D is strongly concentrated in Prague and the Central Bohemian Region. Both regions have a high share of business expenditures on R&D in gross domestic product and many companies are settled there, therefore resemblances in their indirect support for R&D have been expected. Nevertheless, we can also observe some differences between them. In spite of the fact that Prague has limited access to some types of direct support, its enterprises are more dependent on it (Fig. 3). In the Central Bohemian Region, a higher share of indirect support in BERD has been observed. On the other hand, a higher share of enterprises in Prague (69%) use the indirect support for financing of innovation activities compared to the Central Bohemian Region (45%). The analysis proved that enterprises in the Central Bohemian Region use the indirect support for larger research projects (Fig. 4).

The situation in the South Moravian Region is different, although this region has many common characteristics with Prague and the Central Bohemian Region. This region also has a high share of BERD in GDP and is well-known for its research and innovation performance. However, companies settled in this region do not use the indirect support so much. Its dependence on public aid is comparable to the Central Bohemian Region (Fig. 3), but the direct support is of greater importance. The indirect support is used for financing of smaller projects. Usage of indirect support in the South Moravian Region is similar to the situation in regions with significantly lower research and innovation performance (e.g. the South Bohemian, Usti, Olomouc, or Liberec Regions, see Fig. 1).

The cluster analysis identified a group of regions with quite a high level of indirect support usage. These regions have been classified into the 3rd cluster and they are represented by the Pilsen, Liberec, Vysocina, Pardubice, and Zlin Regions. It seems that these regions are not the innovation leaders but they have a strong industrial base. These regions have good preconditions for future exploitation of indirect support.

The presented research proved that some regions have quite a low level of research and innovation activity and they do not use the offered public aid for research projects at the same time (particularly the South Bohemian Region). The results of the study can be applied in adjustment and better targeting of innovation policy. Further research should focus on explaining why some regions do not use the indirect support sufficiently. It is possible to expect that importance of indirect support for R&D will grow as the direct support financed from the European Structural and Investment Funds will decline.

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EARLY WARNING IN TRAFFIC: POSSIBILITIES AND USER PERCEPTION IN THE CZECH REPUBLIC

David Kubát

Abstract**:** *This paper focuses on the situation in traffic. It describes currently used telematics systems in traffic and suggests possible extensions and improvements with using both already used technologies and concepts. Firstly it introduces Radio-HELP system that could help to decrease reaction time in case of traffic accident even during blackout and secondly there is a concept of incorporating a social GPS navigation WAZE into the warning system. Both advantages and disadvantages of this connection compared to the current system are discussed in the paper. Results of a targeted survey are presented in the last part of the paper. The survey is aimed to find out how potential users perceive the new approach and if they are afraid of a potential misuse of their data. The paper concludes that people do not consider eCall and other telematics systems as sufficiently safe from personal data leaks. There are some more detailed findings too.*

Keywords: *Traffic, Radio-HELP, eCall, WAZE, Road safety*

JEL Classification**:** D80, O33

Introduction

Traffic accidents and problems accompany us through our everyday life. Timely distribution of relevant information is a key factor for reducing economic and human losses in these situations.

This paper aims to assess the current situation of the information collection and distribution and to identify weaknesses and influence of planned or proposed solutions. The financial aspects will be a subject of further research. Furthermore, the paper describes possible system improvements. For instance, an extension based on the use of a social GPS application, which already works and helps drivers. But it works separately and independently on a NTIC (National Traffic Information Centre) (NTIC, 2012), and therefore this paper outlines how it could be implemented into the already described system.

When presenting our proposal of connecting currently used telematics systems we meet many opinions and we found out that this topic is quite controversial. Therefore we decided to undertake a survey consisting of a survey covering this area.

1 Methods

It is a comprehensive article with several new improvements. The methods of work applied in particular are analysis and comparison. The third chapter contains a comparative analysis of the work. It identifies the strengths and weaknesses of the existing transport telematics system solutions. The possible inter-connection of the existing concepts for better delivery of information to drivers is outlined at the end of the third chapter.

The fourth chapter describes the results of quantitative survey on perceptions of telematics applications by potential users. The main question asks whether the potential users are for any reason afraid of using the eCall. Related objective was to identify potential reasons of their concerns.

2 Background and literature review

Today the information about a traffic accident is reported verbally to the emergency operations centres via mobile phones, either by those involved in the accident or by the witnesses. However, this is associated with problems when the person calling is attempting to explain the given situation and determining adequate intervention (the exact position and direction of the vehicle, the scope of damage, elimination of repeated reports of the same accident, etc.). Speed of intervention is a key factor for its success, whereby any possible delays influence negatively the outcome of the entire rescue operation.

Currently, there are several projects in various stages of development aiming to solve the current traffic problems in order to reduce damage to property and to protect health and lives of road users.

2.1 Smart Road Restraint Systems

The project aims - in addition to addressing timely reporting of accidents – to eliminate a loss of life and property through timely preventive distribution of warning information. The system collects data about the current situation using existing visual and sensory infrastructures (highway camera systems, radar systems and weather condition monitors) and distributes the data to the drivers. It also seeks to find opportunities for new materials in order to decrease safety hazards (such as better energy absorption through deformation zones). This project is one of three priorities of the EU on the issue of transport in 2020 and is also co-financed from the EU funds. (SMART Road Restraint Systems, 2010)

2.2 Variable information boards

Information displayed on the boards is transmitted from the unified traffic information system, a joint project of the Ministry of Transport, Directorate of Roads and Highways and several other bodies and organisations.

Currently, there are about one hundred of these variable information boards installed along the motorways and expressways in the Czech Republic, representing coverage of approximately one board per 20 kilometres of highway (Ředitelství silnic a dálnic ČR, 2012), which is not sufficient.

2.3 RDS – TMC

RDS-TMC (Radio Data System - Traffic Message Channel) is a service that provides the drivers with traffic and travel information before and during their journey. This service integrates all relevant information and gives the driver a possibility to optimise the journey. The aim of the RDS-TMC is to disseminate traffic information within the FM broadcast band using RDS technology. Information is encoded using an independent ALERT-C protocol and subsequently transmitted to the users as a silent part of the FM broadcasting and further processed by the navigation device. According to national and

international studies, the main system benefits encompass significant improvement in traffic continuity and lower environmental impacts.

The disadvantage of this system is that a warning symbol appears in case a traffic problem occurs anywhere on the preselected route. For more information, the driver must operate the navigation device, which diverts his attention. In addition, further traffic incidents occurring later on the given route do not trigger any change of the warning icon, even though this newer incident may have occurred closer to the car position compared to the originally reported one.

2.4 FCD

Floating Car Data (also Floating Cellular Data) is one of the methods for obtaining data about traffic. It uses data networks (i.e. CDMA, GSM, UMTS, GPRS) and requires no special software or equipment. Each active telephone becomes an anonymous source of information. Location of a mobile device is determined by a triangulation in the cellular mobile network. Since the GSM localisation is less accurate than systems based on geographic coordinates, for ensuring data reliability it is necessary to monitor multiple devices and to use complex algorithms.

2.5 Cooperative systems

Cooperative systems were developed to transfer information among different elements of the traffic. Three basic types are used for dissemination of information of wireless communication (Pípa, 2015):

- Car - Car

Communication Car - Car (C2C) allows vehicles to communicate directly with each other. This type of communication is particularly suitable for safety applications when every second counts. Additionally, it can be applied in situations where there is no functional access point available (e.g. physically missing, inoperable or overloaded with information). C2C communication is decentralised; it does not depend on the backbone network. It is important to equip enough vehicles with the OBU (On Board Units) to make this type of communication effective and successful (i.e. sufficient market penetration). A minimum penetration rate of 10% is stated as an effective threshold.

- Car – Infrastructure

Communication Car - Infrastructure (C2I) connects cars with vehicle access nodes located along the roads and thus provides the connection to the backbone and to the internet network. This communication is primarily used for an efficient management of traffic flow, typically a warning about a traffic congestion or an accident ahead or weather on the route etc. The largest limitation of the C2I communication is the costly infrastructure along the road.

- Car – X

Communication Car - X (C2X), where X is a different type of communication device other than the vehicle or communication element of the infrastructure. It connects vehicle with e.g. mobile phones or tablets. There is a huge potential for security and entertainment sector. However, this kind of communication is not yet well tested and researched, compared to the two mentioned above.

Two types of messages are used for communication. The first is a single message. It informs the driver about the events resulting from dangerous situations, such as critical braking of the vehicle in front of the driver or warning of an obstacle on the road. The second message type is a repetitive message. This type of message informs the driver about the less dynamic events that unfold in front of him. A typical example can be generated by traffic jams or restrictions on the road due to road reconstruction. The spread of this type of reporting uses in most cases C2I communication.

Cooperative systems allow communication with the vehicles in close proximity, but there may be such a critical distance that has no C2C communication, but the driver still does not have time to receive information via the NTIC.

2.6 eCall

A project co-funded by the European Union aims to create a system that enables automated reporting on accidents to the European-wide emergency line 112, including accurate location information. When the eCall device installed in a car detects an accident by means of sensors, it automatically sends a message to the nearest emergency centre, indicating the exact geographical location of the accident as well as other data. This system can be activated either manually by pressing a button on the dashboard by the vehicle passengers or triggered automatically by the vehicle sensors during an accident. After the system is activated, a connection with the nearest emergency call centre is established transmitting both sound and data flows. At first, the data message (MSD – Minimal Set of Data) is transmitted. Then sound connection enables vehicle passengers to communicate with professionally trained emergency call operators. Each message contains details about the accident, such as time, exact location, car identification, eCall system status (whether the eCall was activated manually or automatically) and information about possible service providers. Based on this information, the operator will liaise with the integrated emergency services to direct them to the exact accident location as well as provide them with an exact description of the accident's severity and the number of injured. (Vávra, J., 2010)

A manual use of the system can be useful when a traffic accident is witnessed (European Commission, 2010). The eCall system should be installed in all new cars sold after January 2018 and possibly also installed in older cars.

Although this system brings a clear improvement of the current situation by facilitating rapid and potentially life-saving emergency service, it does not address the distribution of information about the accident to the drivers approaching the place of accident, i.e. who are potentially in danger. When using existing information channels, the acquired accident data could be made available in about 5-10 minutes via variable information boards, RDS-TMC messaging and radio travel news. However, each of these distribution channels has specific limitations and based on current traffic density the above-mentioned reporting times are clearly insufficient.

Given the extent of collected data, personal data safety may be a concern, even though the official stand claims there is no way how the eCall can spy on its users. An official document called „SfC" advises the responsible officials on how to introduce the eCall to the citizens. In this document there is clearly stated that other advantages of the system are following:

- Less traffic jams caused by traffic accidents.

- More effective control of traffic after traffic accidents.
- The system could be used for other purposes – electronic road-toll, monitoring of dangerous wares, more modern models of insurance etc.
- Via this system automotive industry and telecommunication companies could provide new services.

This view tries to prove that implementing the eCall is going to be to have next stages and their assertion may result in the real possibility of online tracking of our vehicles. The eCall system on its own cannot serve for the people tracking. But its components possibly can.

Unfortunately, the document was withdrawn in the course of working on this paper so the link is not valid. The original document may be requested by email from the authors of the paper.

2.7 Radio HELP

For better and particularly early distribution of warning information, a system called System for Automated Forewarning of Vehicle Crashes (the System) could help. The system has a data connection to the receiver systems-vehicle emergency call (e.g. the eCall). The principle consists of full automation of generation and transmission of all relevant information about an accident to vehicles moving in its vicinity.

The process of warning is initiated by the crashed vehicle, which sends the information about the accident using eCall immediately after the collision happens together with the exact location of the accident. Information is received by the central office of the System which immediately generates data and/or voice information about the accident, including a positional code of the accident. Data will be sent via radio session and to car receivers as well. (Brunclík & Skrbek, 2010)

System receivers (mobile phones, navigation devices) must be equipped with the positional code comparator. If the comparator evaluates that the position code of an accident coincides with position code of the receiver and vehicle movement is evaluated as being directed to the scene of the accident, it is forced to activate the data reception and/or voice session. In practice, we may be able to automatically inform road users according to their current position and direction of the danger which is coming, almost immediately.

This principle implies that it is possible to simultaneously transmit separate sessions to more areas. In this case, it would suffice to cover the whole ČR by only one central longwave transmitter.

Due to the development of technologies, whereby most of the new mobile phones are now equipped with the circuits for terrestrial broadcasting and GPS positioning, it should not be technically demanding to use it for these purposes. Also, upgrading domestic appliances (radio, TV ...) with the reception of Radio-HELP would not be a major technological problem.

This solution also has a distinct advantage in case of a complete power outage, a risk which we are often confronted with. Using this technology offers the possibility of permanent information sharing with the population about the current situation.

2.8 WAZE method

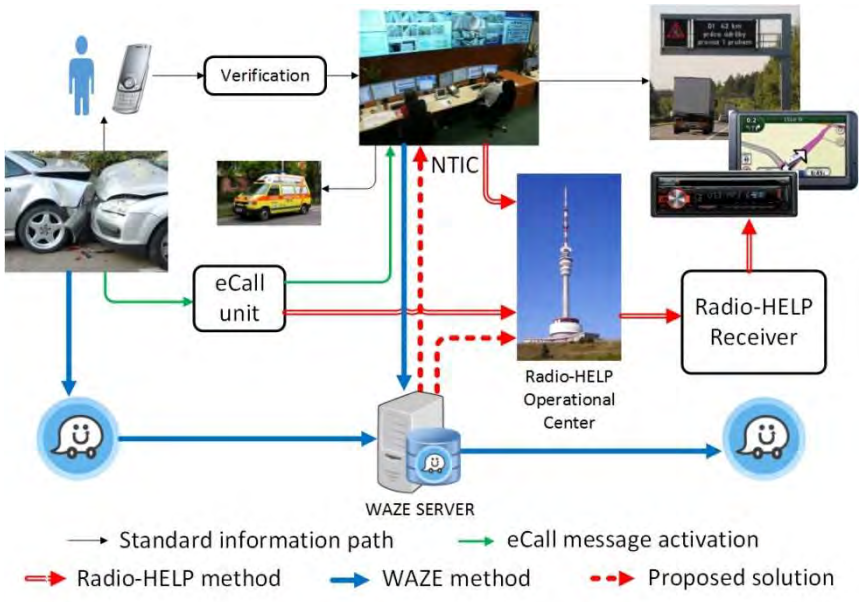
2.8.1 Generally about WAZE

WAZE is a free social GPS application featuring turn-by-turn navigation. WAZE is supported by Android, iOS, Symbian, Windows Mobile. WAZE differs from traditional GPS navigation software as it is a community-driven application and learns from users' driving times to provide routeing and real-time traffic updates. It gathers map data and other information from users who use the service. Additionally, people can report accidents, traffic jams, speed traps and police patrols.

For the purpose of early warning, we are going to deal only with the alerts. The routeing and navigating is not important for this paper. WAZE can be used for warning in both cases – car accidents and traffic problems. It will inform other users the fastest way (compared to previously described methods). On the other hand, it has some disadvantages. A sufficient penetration is required. A smartphone is necessary (Operating systems: iOS, Android, Windows Mobile) and a data plan is needed (to eliminate expenses for mobile data). But even with a data plan, there are areas with no signal. In case of an accident, there is a delay described in the next chapter.

WAZE does not get information only from its users but from the NTIC as well. The reverse flow of information is not possible at the moment. Reports from drivers are verified by other drivers but WAZE is still not a reliable information source for the NTIC. Of course, even a WAZE user has a duty to report an accident on line 112. In which case the other WAZE users are informed twice.

Fig. 1: Transmission and acquisition of information in the event of an accident with the use of the eCall, Radio HELP and WAZE)



Source: author

2.8.2 Implementing WAZE

The idea was to allow information from WAZE report flow into the National Traffic Information Centre (NTIC) that would then deal with it like with information from any

other source (Kubát, 2013). The data format of the information would have to be standardised. After the standardisation the information could be processed flawlessly. It would ensure better awareness on the input. If the information is properly verified it could be processed by the Radio HELP system immediately without causing delay in the NTIC. WAZE implementation would take effect in case of traffic problems that are not life-threatening. In those cases, the eCall is not activated and drivers are not obliged to inform NTIC about the problem.Comparing separate segments of each method.

We could divide the entire process into three parts: input, processing data and output. We can group them together and compare their advantages and disadvantages. In the following summary, good data coverage for WAZE is assumed.

The situations on **input** can be the following:

- A participant or a witness will call an emergency line (112) and announces the accident/traffic problem. Then NTIC will have to verify the message by sending police unit or fire department unit to check coordinates of the accident. A disadvantage of this method is an inevitable delay caused by the necessity of physical verification. The calls could also be compared to other calls. It would request waiting for further people to call the NTIC.
- The eCall unit will automatically open a communication canal with an operator in the emergency centre (only in case of an accident). This method is the quickest one but it is switched on only in case of an accident and its implementation is not finished yet.
- WAZE user inputs information about an accident or a problem to the application. After the accident is reported the information is promptly forwarded to other users. Besides disadvantages mentioned earlier, there is a delay in special cases, such as a chain crash. There is no time to input the event so approaching drivers have no chance to be informed. Even in usual (not chain) car accident the third driver will be warned (first driver crashes, second driver reports the accident and third driver get a notice).

There is no absolute winner. The best choice consists of combination of all three methods.

Data processing:

- NTIC – quick response due to the number of reports. But there is a human factor leading to delays.
- Radio-HELP – automated processing, but it requests standard data format on input, which is possible only in case of the eCall or WAZE input (or other automated solution).
- WAZE server – no delay, a verification is done by other drivers (WAZE units).

After comparing the fastest input (eCall) and fastest data processing (Radio-HELP and WAZE), it was concluded that a combination of those two methods is not possible. The eCall is automatic, but in current circumstances, it needs a human worker to process information about an accident. On the contrary, Radio-Help and WAZE methods are processed automatically, but they need a human user to input the event.

Output – message for drivers:

- Output via standard methods (Variable information boards, RDS-TMC...) strongly depends on the quality and speed of the previous two segments (input and data processing). There are exceptions (i.e. variable information boards in strong snowfall) but in general, this claim is correct.
- Radio-HELP receiver provides immediate information about the traffic problem. But at the moment it is only in a conceptual stage, and further work has to be done.
- WAZE interface (smartphone) provides voice alert and it is quick as well, especially for traffic problems without the eCall activation.

Security issues of the application are equal to security issues of any other application that can send positional data. And using the application is a personal choice as opposed to the obligatory eCall. When asking people about their opinions and feelings regarding the eCall, there were some comments about personal security and information leaks. Therefore, we decided to make a survey covering this area (Kubát, Weinlich & Semerádová, 2014). The survey is described in the fourth chapter.

2.9 Google Traffic

Google Traffic is a feature of Google Maps that shows the traffic situation in real time in more than 50 countries. Google Traffic can view the Google Maps website, or using Google Maps on a mobile device. Google Traffic works on the analysis of GPS - determines placement based on information transmitted to Google's servers for a large number of mobile phone users. Google handles incoming raw data on the location of mobile devices and eventually excludes anomalies, such as postal vehicles frequently stopping. If a threshold is reached in a certain area the overlap layer on the Google Maps changes colour.

3 Survey

When presenting the idea of connection of WAZE with the NTIC, many doubts about user data security and other personal data issues were encountered. It was therefore decided to conduct a survey about this topic and to find out how people perceive the data security concerns and how they feel about possible data misuse. This part of the paper introduces results of the survey.

The questionnaire was created with emphasis on the fact that each respondent is different. Therefore the questionnaire was branched so that we can get useful information even from a respondent who does not own a car or a mobile device. For example, if he or she does not use a mobile device for navigation, there was a question: "*Why do you think other people find using mobile devices for navigation useful?*"

For the best variety of respondents, the questionnaire was disseminated in many different ways. Via e-mail (friends and family members), Facebook, iDNES.cz blog, car section on news server (garaz.autorevue.cz) and 1.9% of questionnaires was filled in directly on the server where the questionnaire was created. We avoided asking students because it would influence a diversity of results.

3.1 Composition of respondents

Total number of returned valid questionnaires was 210 out of 250, 62.9% were men and 37.1% women. Most respondents were from three age groups - 18 – 25 years old

(25.2%), 26 – 30 years old (20%) and 31 – 35 years old (19%). The education of respondents was mainly *high school* (43.8%) and *university* (46.7%). A response rate cannot be established because this questionnaire was online. Therefore when a potential respondent decided not to attend the research, authors would not know it. All respondents were from the Czech Republic.

3.2 Evaluation

3.2.1 Groups of users

In the first step, basic groups of users were identified. Almost three-quarters of the respondents (74.3%) respondents own a car, 73.1% car owners use a smartphone and 68.4%, e.g. 73 both respondents and smartphone owners use it for navigation. People who do not use it for navigation have following reasons: 58.3% users have dedicated navigation, 13.9% use paper maps, 25.0% do not need a navigation and 2.8% have other reasons.

The question „*Would you like to have the eCall installed in your older car?*“ showed also interesting responses. 40.6% respondents would agree if it cost less than 150 €. 10.1% would install it if it cost less than 300 € and 52.2% respondents would not install it at all.

3.2.2 Concerns about eCall data misusing

In the next step, the fear of data misuse when using the eCall was evaluated. From the total of 210 valid respondents, 25.7% was anxious about a data misuse. One of the aims of this paper was to find out what affects such privacy concerns. If it is gender, income of the family, age or education. Respondents were not told about any misuse possibilities in advance but an open question was used to gather opinions (no options were suggested).

Hypothesis claimed that there is no dependency of concerns on observed property (age, income etc.). For finding out the dependency a Pearson contingency coefficient was used. The coefficient can reach values $0 \leq P < 1$, whereas value 1 cannot be reached. Calculations showed that the dependency in all investigated characteristics is very low. The strongest dependency is on age and the weakest on gender. Hypothesis was rejected.

$$P_{age}(0{,}254) > P_{education}(0{,}19) > P_{income}(0{,}125) > P_{gender}(0{,}039)$$

3.2.3 Privacy concerns of social network users

After comparing answers to questions: “*Are you afraid of misusing your personal data while using smartphone for navigation?*” and “*Do you use social networks?*” it was found out that from 35 respondents who are afraid of misusing their personal data 26 use social networks. This brings another question: How justified are these concerns? People may think that Facebook or Google+ are safe because these social networks are widespread. But they are suspicious about the eCall and the social navigation software. This contradiction is very interesting.

3.2.4 Categorising concerns

In the questionnaire, there were included some open questions For more detailed overview of respondents' concerns. Among them was the question: "*How could be the data misused?*" This question was answered by smartphone users and their replies are in the table 1.

Tab. 1: Categorising concerns – smartphone users

concern	% of phone users
Position tracking	26.5%
Marketing issues	23.5%
Stealing money, property	17.6%
Various ways	14.7%
Voice monitoring	5.9%
Identity theft	5.9%
I don't know	2.9%
Speeding tickets	2.9%

Source: author

From users' replies is easily readable that the position tracking is not the only issue. Misuse for marketing purposes or stealing money is a privacy concern of many users as well. Unfortunately, there were not more respondents so the results are not very indicative.

Next important question was: "Why are you afraid of implementing the eCall since 2015?" There are two main groups of respondent that have similar replies. Most respondents were worried of *Misusing with no detailed description* (34.6%) and *Permanent position tracking* (32.1%). Some replies correspond with facts discussed above, e.g. electronic road-toll is not only pointless fear but taking into account the official document it has some real foundations.

4 Discussion

The method combining WAZE and Radio-HELP system could work but there are non-technical problems that prevent the system from application. There would be a need for a strategic decision to support implementing the system on national basis. But the support is very uncertain.

Thus there are efforts to develop a concept of warning based on the same principle – non-addressed warning. But the means would be different. Instead of using Radio-HELP based on radio waves the more common methods will be used. The change consists of using SMS messages and Internet of Things (IoT). Those already used technologies could be incorporated into the original design of the system instead of using radio waves. IoT technology has its risks that need to be taken into account. But it is also increasingly widespread, more used and offers many benefits to its users. Risks are mainly security. In contrast, the inclusion of SMS messages to the proposed system should be risk-free, as current phones already have with these reports trouble-free long-term work. This solution is possible even after the transition to digital broadcasting.

The concept of using the Internet of Things would work with the already used sensors in vehicles for sharing data about road and weather conditions, etc. Those data would be stored in a cloud, where they can be accessed by vehicles possessing internet access and adapt the ride according to newly acquired information. These two methods should complement each other.

Conclusion

Warnings and information methods given in the previous chapters are not, of course, an exhaustive list. Almost every carmaker develops its means of warning more or less compatible with each other. Nevertheless, the proposed improvements are not dependent on the make or type of vehicle, and therefore should be universal.

There is no doubt that implementing new technologies can improve reaction time in case of an emergency situation. But in the contrary, there are facts that are not officially communicated to the public. And after evaluating the questionnaire it can be concluded that citizens are not unconcerned about their privacy. There are some ideas how to improve the safety. For example to make the eCall firmware open-source code. But the question is, if this would be acceptable by the authorities.

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WHAT MACROECONOMIC VARIABLES DRIVE THE STOCK RETURNS OF AUSTRIAN FINANCIAL INSTITUTIONS?

Marie Ligocká, Daniel Stavárek

Abstract: *The stock prices of companies are influenced by many variables; the predominant ones are macroeconomic factors. The objective of this paper is to analyze the existence of a relationship between select macroeconomic variables and the stock returns of financial sector companies listed on the Vienna Stock Exchange. The institutions that were chosen are CA Immobilien Anlagen, Erste Group Bank AG, Immofinanz AG, Raiffeisen Bank International AG, Uniqa Insurance Group AG and Vienna Insurance Group AG. The focus is on Austria due to the lack of empirical literature on stock prices, stock returns and the indicators that influence them. A time series with a quarterly frequency is used to examine the occurrence of long term and short-term relationship links using the Johansen cointegration test and the Vector Error Correction Model (VECM). The empirical estimates are calculated for the 2005 – 2015 period, which includes the global financial crisis. Our main finding is that the macroeconomic factors used have a primarily negative impact on the stock returns of the select institutions.*

Keywords: *Financial sector, Macroeconomic variables, Austria, Cointegration, Global financial crisis.*

JEL Classification: *G01, O52, F41, E000, C58.*

Introduction

Company stock prices are influenced by many variables. There are two basic categories of factors that affect stock prices as follows; macroeconomic factors and microeconomic factors. This study is focused on stock prices and identifying the factors that affect the stock returns of financial institutions in Austria. We selected the financial sector because it is an important component of every national economy and contributes a significant portion of the GDP. We focus on the Vienna Stock Exchange because it is one of the oldest stock exchanges in the world and is a driving force that contributes substantially to the development of the Austrian market. The market capitalization of the Vienna Stock Exchange is approximately 105.23 billion EUR. The capitalization has improved in recent years through a combination of higher capital and reduced risk-weighted assets. In the third quarter of 2015, the banking system in Austria had a common equity tier-1 ratio of 12.1 %, a tier-1 capital ratio of 12.2 % and a total capital adequacy ratio of 15.9 %. The net profits of Austrian banks improved in the third quarter of 2015 to 4.5 billion EUR. Net interest income, a major income component of the business model of Austrian banks, continued to decrease from 19.3 billion EUR at the end of 2014 to approximately 13.8 billion EUR in 2015Q3.

The objective of our paper is to analyze the existence of the relationship between several macroeconomic variables and the stock returns of financial sector companies listed on the Vienna Stock Exchange. Therefore, certain institutions are considered,

including CA Immobilien Anlagen, Erste Group Bank AG, Immofinanz AG, Raiffeisen Bank International AG, Uniqa Insurance Group AG and Vienna Insurance Group AG. All financial institutions are included in the ATX Financials. The ATX Financials (ATX FIN) is one of five capitalization-weighted price indexes, and is composed of 11 financial sector stocks. The capitalization of ATX FIN is approximately 13.34 billion EUR in 2016Q4. We chose only 6 financial institutions due to the significance of their market shares and the attainment of the required time series.

Erste Group Bank AG is the leading bank in Central and Eastern Europe for advising and servicing private clients. This bank operates in Serbia, Croatia, Romania, Hungary, Slovakia, Austria and the Czech Republic. Erste Group Bank AG is the owner of Česká spořitelna and Slovenská sporiteľňa. The total assets of Česká spořitelna were 1 037.3 billion CZK, Slovenská sporiteľňa had 14 billion EUR in assets in 2015. The total assets of Erste Group Bank AG increased to 204.5 billion EUR in 2015.

With a premium volume of approximately 9 billion EUR in 2015, Vienna Insurance Group is one of the leading insurance groups in Austria and Central and Eastern Europe. The Vienna Insurance Group now operates in 25 markets; the core markets are Austria, the Czech Republic, Slovakia, Poland, Romania, Bulgaria, Croatia, Hungary, Serbia and the Ukraine. The Vienna Insurance Group has a market share of approximately 24 %, which makes it the largest insurance group in Austria. The VIG is currently represented by three insurance companies in the Czech Republic: Kooperativa (market share, 21 %), Česká podnikatelská pojišťovna (market share, 5 %) and Pojišťovna České spořitelny (market share, 15 %).

The home market of Raiffeisen Bank International is Austria and Central and Eastern Europe. Raiffeisen is a leading commercial and investment bank in Austria with an internet market share of 42 percent. Raiffeisen Bank International AG has 21.7 % market share in Albania, a 16.3 % share in Slovakia, and a 15.8 % share in Bosnia and Herzegovina, an 8.3 % share in Romania, a 4.5 % share in the Czech Republic, and a share of other Central and Eastern European country markets.

The UNIQA Group is one of the leading insurance groups in its core markets of Austria and Central and Eastern Europe. The group operates 19 countries and with Raiffeisen Versicherung has the two strongest insurance brands in Austria. The year 2016 was important for the UNIQA Group in Austria because the four primary insurers previously operating in Austria were merged into one company. Versicherungsgesellschaften FinanceLife Lebensversicherung AG, Raiffeisen Versicherung AG and Salzburger Landes-Versicherung AG merged with UNIQA Österreich Versicherungen AG, the acquiring entity. UNIQA Österreich, which is the largest insurer operating in Austria, achieved a market share of over 22 % in 2015.

Immofinanz AG is a commercial real estate company that is focused on the retail and office segments in European markets . The company’s core business includes the management and development of properties; the company has a real estate portfolio of approximately 5.4 billion EUR. Additionally, the last company, CA Immobilien Anlagen, is a real estate company that operates in Central European markets; its core business involves leasing, managing and developing high-quality office buildings. The company controls property assets of approximately 3.7 billion EUR in Germany, Austria and Eastern Europe.

Macroeconomic variables include the interest rates, the inflation, the gross domestic product, the money supply M3 and the unemployment rate. The problem is that the body of available empirical literature focuses on many stock markets; however, our research focuses on Central European countries. The published empirical literature on Austria is focused on linkages between stock prices or stock returns and macroeconomic variables or on the interdependence of Central and Eastern European stock markets. We reference these two bodies of literature in our study.

The paper is divided into four sections. The method section follows the introduction. The next section, findings, discusses the results of the tests. The last section concludes.

1 Review of the Literature

Much empirical research has been conducted to examine the relationship between macroeconomic factors and stock prices or stock returns. The relationship can be determined using select macroeconomic variables, through the development of the stock market or using particular methodologies. We solely considered literature that is relevant. We cite relevant papers on macroeconomic variables; we also citate papers that discuss the Central and Eastern European markets in general but that do not directly address the relationship between macroeconomic factors and stock prices or stock returns.

Errunza and Hogan (1998) researched European stock returns from 1959 – 1993 using the VAR model. The researchers found that money supply volatility Granger caused equity volatility in Germany and France, and the volatility of industrial production Granger caused equity volatility in Italy and the Netherlands. The results demonstrate that macroeconomic factors did not affect equity returns in the United Kingdom, Switzerland, Belgium and in United States.

Hanousek and Filer (2000) investigated the possibility that newly emerging equity markets in Central Europe exhibit semi-strong form efficiency such that no relationship exists between the lagged values of changes in economic factors and the changes in equity prices. They found that there are connections between the real economy and equity market returns in Poland and Hungary.

Nasseh and Strauss (2000) confirmed the existence of significant long- run relationships between stock market prices and domestic and international economic activity in six countries (France, Germany, Italy, Netherlands, Switzerland and the UK). The researchers found that stock price levels are significantly related to industrial production, business surveys of manufacturing orders, short- and long-term interest rates, short-term interest rates, and production.

Hess (2003) calculated the importance of various macroeconomic shocks for Swiss stock market sector indices. In accordance with the VECM approach, Hess analyzed the variance decompositions derived from models that were estimated in closed and open economies. The researcher used three main macroeconomic indicators (GDP, CPI and exports) not only from Switzerland but also from the G7 countries. The results showed important divergences in the stock sub-index sensitivities to innovations in various fundamental variables. Export oriented sectors reacted as expected to foreign shocks; other sectors appeared to be largely unaffected.

Kulhánek (2011) analyzed the relationship between macroeconomic variables and stock prices in the Czech Republic, Poland, Slovak Republic, Austria, Germany and the United Kingdom. Kulhánek discovered that there is a long-run co-integration relationship between the money supply, stock prices and output. In addition, the researcher determined that the money supply and the stock market development are predictive of real economic activity.

Kulhánek (2012) researched the causal relationship between stock prices, output and the money supply development in Austria, the Czech Republic, Hungary, Poland, and the Slovak Republic. The researcher used the Vector Autoregressive and Vector Error Correction models to test long-run equilibrium and short-run dynamics between macroeconomic factors and stock prices. The researcher discovered the long-run relationships among variables in all cases.

Stoica et al. (2014) provided empirical evidence of the impact of domestic and international short-term interest rate shocks on Central and Eastern Europeans capital markets movements. The results showed that effect of the international interest rate had a noticeable effect on the stock market indexes ofin the case of the Czech Republic, Hungary, Poland and Romania.

Martínez et al. (2015) examined the relationship between changes in interest rates and the Spanish stock market. The empirical results indicate that Spanish industries exhibit, in general, a significant interest rate sensitivity. The linkage between movements in interest rates and industry equity returns is strong. This finding is consistent with the idea that investors with long-term horizons are more likely to follow macroeconomic fundamentals, such as interest rates, in their investment decisions.

Gajdka and Pietraszewski (2016) examined the cross-country correlation between long-term stock rate of return and real GDP growth. The result show that the correlation coefficients were slightly positive in the period before financial crises and slightly negative after financial crises.

Österholm (2016) investigated the long-run relationship between stock prices and GDP in Sweden. The findings suggest that the two variables are cointegrated and, hence, that there exists a long-run equilibrium relationship between them.

Peirö (2016) analyzed the dependence of stock prices on macroeconomic variables (industiral production, long-term interest rates) in France, Germany and the United Kingdom. The findings revail that both factors are important, but the weight of these factors has clearly moved from interest rates to production.

2 Methods

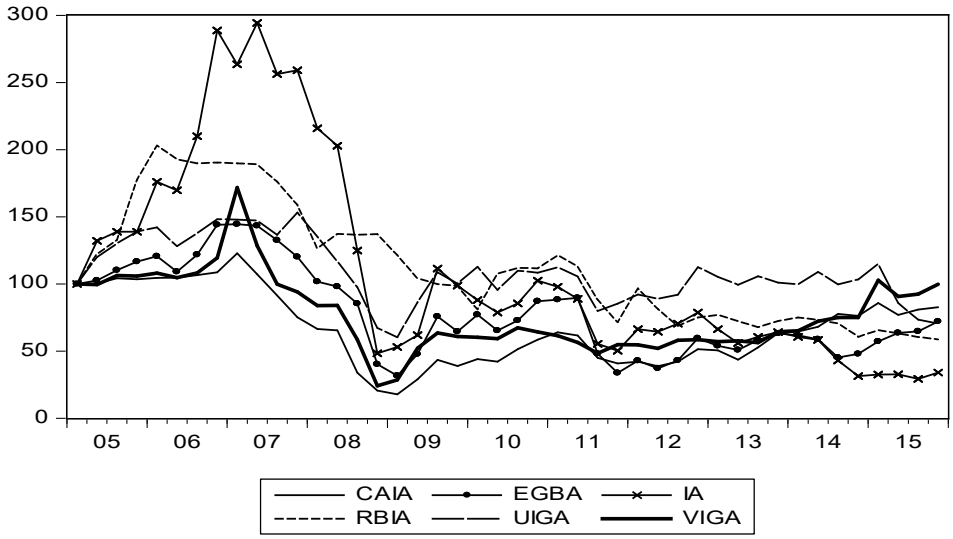
We used six financial institutions that are listed on the Vienna Stock Exchange: CA Immobilien Anlagen (CAIA), Erste Group Bank AG (EGBA), Immofinanz AG (IA), Raiffeisen Bank International AG (RBIA), Uniqa Insurance Group AG (UIGA) and Vienna Insurance Group AG (VIGA). Quarterly data from the 2005 – 2015 period in EUR are used. The stock price data are from the Vienna Stock Exchange database.

The macroeconomic variables studied are as follows: short-term interest rates in percent per annum (IR); inflation measured by the Harmonized Index of Consumer Prices (HICP) in percent (INF); the unemployment rate in percent per annum (UNE); the gross domestic product (GDP) in billion EUR; and the money supply M3 (M3) in

billion EUR. The gross domestic product is in market prices and represents the expenditure on final goods and services less imports. These time series are from the OECD statistical database.

Before calculating the empirical estimations, we utilized charts that show the behaviour of stock prices and macroeconomic variables; thus, we could find descriptive statistics. Fig. 1 shows the behaviour of the stock prices of CAIA, EGBA, IA, RBIA, UIGA and VIGA from 2005 – 2015; the values are quarter end, and all data are in EUR. Fig. 1 shows that the fluctuation of stock prices in the RBIA, CAIA and VIGA were very similar. The development of EGBA and UIGA were nearly identical. The development of stock price of the IA stock price has the most pronounced changes, mainly a sharp decline at the beginning of 2009. All stock prices decreased in 2009; however, IA decreased the most. A decrease in stock prices in 2009 may have been caused by the beginning of the global financial crisis and fears regarding the economic development in Central and Eastern European countries. This finding mean lower capital and lower capital quality, higher risk exposure, problems with loan repayments, underpricing of risks, higher volatility, and lower profitability; all these represent potential losses for the financial sector.

Fig. 1: Development of stock prices in % (2005Q1=100 %)



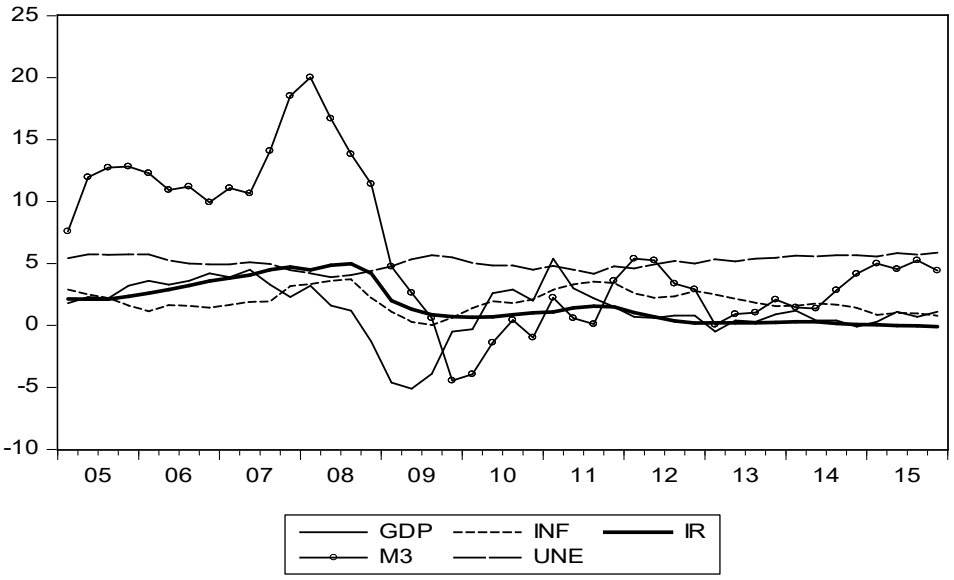
Source: Vienna Stock Exchange, 2016

Fig. 2 shows, the development of the GDP growth, the inflation, the interest rate, the money supply M3 growth and the unemployment rate. We demonstrate the GDP and the money supply as quarterly growth because they are better indicators to illustrate the macroeconomic environment. The GDP and the money supply M3 have a typical similar development trend. The decrease of the GDP and the money supply is evident at the beginning of and during the global financial crisis. The inflation and unemployment rate were not typical, experiencing high fluctuations. The last macroeconomic variable, the interest rate decreased at the beginning of the global financial crisis in Europe and the debt crisis in 2012.

According to the Austrian National Bank the Austrian economy is currently influenced by the very gradual growth in the euro area and the decreasing demand for imports from Austria and other countries. The Austrian economy nearly stagnated in 2014 and 2015; it was the lowest, since the crisis years of 2008 and 2009, as shown in Fig. 2. Austria's economy is suffering from rising unemployment and a negative

business climate. The unemployment rate remains low (5.7 %) compared to Europe; however, is has been rising for the third year in a row, and the number of long-term unemployed has doubled primarily due to adverse wage impacts and rising unemployment. Since the launch of the euro in 1999, HICP inflation has averaged 1.9 % in the euro area and Austria, thus in accordance with the ECB's price stability target. However, since September 2012, Austria has experienced higher inflation rates.

Fig. 2: Behavior of macroeconomic variables over time (in %)



Source: OECD database, 2016

As regards to the methodology, we checked the stationarity of the time series. Then, data were subjected to correlation analyses to determine the linear relationship between the stock returns and the macroeconomic variables.

Thereafter, we examined the long-term equilibrium relationships using the Johansen test to determine the presence of cointegrating vectors, VAR. The equation used for the VAR model is (Johansen and Juselius, 1990):

$$\Delta Y_t = C_0 + \sum_{i=1}^{p-1} \Gamma_i \Delta Y_{t-1} + \Pi Y_{t-1} + \eta_t \qquad (1)$$

where Y_t is a vector of non-stationary variables, C_0 is a constant, p is an order of autoregressive polynomial, i is a number of the periods, and η_t is the white noise term. u_t denotes a n×1 vector of unobservable error terms, Δ is a difference operator, ΔY_t and Δy_t means rate of growth or changes. The information on the coefficient matrix between the levels of the Π is decomposed as $\Pi = \alpha\beta'$ where the relevant elements of the α matrix are adjustment coefficients, and the β matrix contains the cointegrating vectors. The variables Π and Γ in the matrix contain the value of the cointegrating vectors. The first likelihood ratio statistics for the null hypothesis of the precise r cointegrating vectors against the alternative $r + 1$ vector is the maximum eigenvalue statistic. The second statistic for the hypothesis of at most r cointegrating vectors against the alternative is the trace statistic.

If the factors are non-stationary and are cointegrated, the method to investigate the issue of causation is the Vector Error Correction Model (VECM), which is a Vector Autoregressive Model (VAR) in first differences with the addition of a vector of

cointegrating residuals. Therefore, this VAR system does not lose long-run information. We apply the following VECM specification:

$$\Delta y_t = \Pi y_{t-k} + \Gamma_1 \Delta y_{t-1} + \Gamma_2 \Delta y_{t-2} + \mathrm{K} + \Gamma_{k-1} \Delta y_{t-(k-1)} + u_t \quad (2)$$

Furthermore the analysis of the short-term causality of the relationship between stock returns and macroeconomic variables is performed using the Granger test; the causal model in the mathematical equation is in accordance with Granger (1969):

$$\Delta Y_t = \beta_0 + \sum_{i=1}^{q} \beta_{1i} \Delta Y_{t-i} + \sum_{i=1}^{q} \beta_{2i} \Delta X_{t-i} + \varepsilon_{1t} \quad (3)$$

$$\Delta X_t = \varphi_0 + \sum_{i=1}^{r} \varphi_{1i} \Delta X_{t-i} + \sum_{i=1}^{r} \varphi_{2i} \Delta Y_{t-i} + \varepsilon_{2t} \quad (4)$$

where Y_t and X_t represent stock returns and macroeconomic variables, respectively. Coefficient t symbolizes the time period, and are uncorrelated stationary random variables. ε_{1t} and ε_{2t} denote potentially autocorrelated and cross-correlated stationary time series. β_0 and φ_0 are constants, β and φ are estimated coefficients for stock returns and macroeconomic variables, q and r are the order of moving-average polynomial. The objective of this test is to reject the H_0: $\beta_{21} = \beta_{22} = ... = \beta_{2q} = 0$. This hypothesis implies that macroeconomic variables do not Granger cause stock returns. Similarly, failing to reject H_0: $\varphi_{11} = \varphi_{12} = ... = \varphi_{1r} = 0$ suggests that stock returns do not Granger cause macroeconomic factors.

3 Findings

At the beginning, we calculated correlation coefficients between the stock returns and the macroeconomic variables and identified the lag used in the cointegration tests. The resulting correlation matrix is provided in Tab. 1.

The correlation coefficients between the stock returns and the interest rate are negative in all cases, while the correlation coefficients between the stock returns and the other macroeconomic variables are negative or positive. The results are not absolutely in accordance with theoretical assumptions. The increasing GDP, the money supply and the price level should be accompanied by rising stock prices, and the increasing interest and unemployment rates are likely to exist with the decreasing stock prices. The sole macroeconomic variable that displays significant correlation coefficients in nearly all cases is the interest rate. The coefficients of the other macroeconomic variables are frequently insignificant; this indicates that the co-movements with stock returns are not sufficiently strong. Then, there are differences between the returns of the institutions analyzed. While RBIA and VIGA show a statistically insignificant coefficient with all macroeconomic factors, the stock returns of UIGA display a statistically significant correlation with all fundamentals except for the unemployment rate. Additionally, the stock returns of CAIA, EGBA and IA demonstrate statistically significant coefficients with only one or two fundamentals.

Tab. 1: Correlation Matrix

	CAIA	EGBA	IA	RBIA	UIGA	VIGA
IR	-0.4195*	-0.6025*	-0.2870***	-0.0934	-0.4312*	-0.1401
GDP	-0.1337	-0.3216**	0.0448	0.0911	-0.2774***	0.1711
INF	-0.1483	-0.2027	-0.1600	-0.2151	-0.2564***	0.0696
UNE	0.8637	0.2140	0.0930	-0.0499	0.2012	-0.2350
M3	-0.3239**	-0.1882	-0.1219	0.1794	-0.2867***	0.0495

Source: (Authors'calculations)

*Note: *, ** and *** denote significance at the 1 %, 5 % and 10 % levels*

In Tab. 2, we found that macroeconomic factors and stock returns proved to be cointegrated in all six cases. Both statistics are important for our conclusion because both provide a similar outcome. For five of the six models, we revealed one cointegrating vector; thereafter, the cointegrating equations could be constructed. These results show a negative relationship between stock returns and macroeconomic factors. Certain macroeconomic factors have no negative influence in the models. Although the results are not the same for all estimations, in four of the six equations, the gross domestic product and the unemployment rate are negatively cointegrated. Conversely, in four cases, the money supply M3 has a positive influence on the macroeconomic variables. We must also note that the inflation and interest rate results do not provide an obvious conclusion.

Tab. 2: Results of Johansen test

	r=0	r ≤1	r ≤2	r ≤3	r ≤4	r ≤5
CAIA / IR, GDP, INF, UNE, M3						
Trace Statistics	153.2993*	101.4688*	67.9653*	47.1872*	27.8981*	12.6821**
Max-Eigen Statistics	51.8304*	33.5035***	20.7780	19.2891	15.2159***	122.6821**
Equation	CAIA = -7.7028 - 0.1367 GDP – 1.5734 INF + 1.4465 IR + 0.0029 M3 + 0.3738 UNE (38.3509) (0.8171) (2.3371) (1.6424) (0.0051) (5.0299)					
EGBA / IR, GDP, INF, UNE, M3						
Trace Statistics	154.2264*	94.8071*	66.9193*	43.7472*	23.4646**	9.7821**
Max-Eigen Statistics	59.4192*	27.8878	23.1720	20.2855***	13.6825	9.7821**
Equation	EGBA = -48.3659 - 0.6127 GDP + 3.4072 INF + 0.3582 IR + 0.0073 M3 + 5.3916 UNE (30.9481) (0.7220) (1.9128) (1.3336) (0.0045) (4.0824)					
IA / IR, GDP, INF, UNE, M3						
Trace Statistics	145.8475*	95.3578*	65.3455*	43.9365*	25.7385*	10.4999**
Max-Eigen Statistics	50.4897*	30.0122	21.4090	18.1979	15.2386***	10.4999**
Equation	IA = 37.9027 – 2.7555 GDP + 1.4429 INF – 3.1431 IR + 0.0210 M3 – 1.3894 UNE (56.3042) (1.2247) (3.4081) (2.4287) (0.0076) (7.3386)					
RBIA / IR, GDP, INF, UNE, M3						
Trace Statistics	131.2931*	90.9078*	62.8593*	42.3170*	24.2902**	9.7957**
Max-Eigen Statistics	40.3853***	28.0485	20.5422	18.0268	14.4947***	9.7954**
Equation	RBIA = 157.9899 – 2.7555 GDP + 1.4429 INF – 3.1431 IR + 0.0210 M3 – 1.3894 UNE (61.6947) (1.2247) (3.4081) (2.4287) (0.0076) (7.3386)					

UIGA / IR, GDP, INF, UNE, M3						
Trace Statistics	141.4492*	92.7533*	66.5419*	42.8185*	22.9914**	8.1568***
Max-Eigen Statistics	48.6958*	26.2114	23.7233	19.8271	14.8346***	8.1568***
Equation	UIGA = 47.7336 + 2.6569 GDP – 12.7436 INF – 4.6163 IR – 0.0179 M3 – 27.5666 UNE (37.3844) (1.3078) (3.7601) (2.6369) (0.0081) (8.0968)					
VIGA / IR, GDP, INF, UNE, M3						
Trace Statistics	140.3333*	91.7069*	62.5389*	41.4560*	23.8259**	10.1902**
Max-Eigen Statistics	48.6263*	29.1679	21.08291	17.6300	13.6357	10.1902**
Equation	VIGA = -19.1307 + 0.3240 GDP – 0.7977 INF + 1.9529 IR – 0.0003 M3 – 0.9973 UNE (28.3494) (0.6365) (1.7519) (1.2117) (0.0040) (3.7611)					

Source: (Authors'calculations)

*Note: *, ** and *** denote significance at the 1 %, 5 % and 10 % levels.*

Given the VEC mechanism that is inserted in the Johansen procedure, the deviation from the long-run equilibrium is corrected through a series of partial short-run adjustments. The number of lags is set to one for all models, similar to prior estimations; the optimal number was set in accordance with the Akaike information criterion. Tab. 3 shows the estimates of the VECM for each model.

The significance of each model is computed using the F-statistics coefficient, the coefficient R-squared (R2) explains a proportion of the total variability managed through a created VECM.

Tab. 3: Results of the Vector Error Correction Models

	CAIA	**EGBA**	**IA**	**RBIA**	**UIGA**	**VIGA**
CointEq1	-0.5831 (0.2175) [-2.6801]	-1.3745 (0.24155) [-5.6907]	-0.4742 (0.2142) [-2.2139]	-0.1820 (0.1294) [-1.4067]	-0.3559 (0.1977) [-1.7995]	-0.7168 (0.2362) [-3.0341]
Stock Return (-1)	0.0766 (0.2019) [0.3794]	0.0408 (0.1441) [0.2836]	-0.3229 (0.1664) [-1.9395]	-0.3865 (0.1378) [-2.8040]	-0.2895 (0.1987) [-1.4573]	-0.1126 (0.1877) [-0.6000]
GDP (-1)	6.2643 (3.7914) [1.6522]	6.0734 (3.1706) [1.9155]	4.7339 (5.1230) [0.9240]	1.5117 (3.2573) [0.4641]	1.1497 (3.4504) [0.3332]	4.8719 (2.8938) [1.6835]
INF (-1)	-5.7391 (4.8698) [-1.1785]	-2.2931 (5.0647) [-0.4527]	-11.1817 (6.7434) [-1.6581]	2.6866 (3.9467) [0.6807]	-4.5552 (3.9627) [-1.1495]	-8.7405 (3.5803) [-2.4412]
IR (-1)	-0.0947 (6.2771) [-0.0151]	-23.6526 (7.3831) [-3.2036]	-4.6965 (9.4735) [-0.4957]	0.6975 (4.3967) [0.1586]	-1.3734 (5.5994) [-0.2452]	-4.6800 (4.2175) [-1.1096]
M3 (-1)	0.0021 (0.0174) [0.1203]	0.0316 (0.0181) [1.7430]	0.0067 (0.0242) [0.2780]	0.0129 (0.0140) [0.9197]	0.0080 (0.0147) [0.5446]	0.0121 (0.0142) [0.8506]
UNE (-1)	6.2763 (8.0603) [0.7786]	5.0738 (8.0563) [0.6298]	1.2390 (10.9603) [0.1130]	11.1240 (6.2781) [1.7718]	-0.5457 (6.5170) [-0.0837]	-8.4928 (6.2468) [-1.3595]
R2	0.3184	0.6309	0.4146	0.3965	0.3305	0.4828
Adj. R2	0.2015	0.5676	0.3142	0.2930	0.2157	0.3941
F-statistics	2.7250**	9.9721	4.1319	3.8332	2.8802**	5.4453

Source: (Authors' calculations)

Note: Standard errors are in round brackets, and t-statistics are in square brackets. All variables used in the VECM are first differenced.

The results of the VECM show that two models meet the criterion of significance (F-statistics) at the 5 % level of significance. The VECM coefficients of the cointegration equation (CointEq1) are statistically significant in five models (CAIA, EGBA, IA, UIGA, VIGA). The sign of the coefficient is, negative in all cases; this indicates that an increase in macroeconomic fundamentals has a negative impact on stock prices. The highest adjustment coefficients of the statistically significant models were VIGA (72 %) and CAIA (58 %).

The short-term relationship between the stock returns and macroeconomic fundamentals were also analyzed using the Granger causality test. We detected examples in which Granger causes stock returns. We determined the causality between the CAIA stock returns and the money supply M3, the EGBA stock returns and both the inflation and interest rates. Then, we determined the relationship between the IA stock returns and inflation, the UIGA stock returns and inflation and the causality between the VIGA stock returns and inflation. We also detected causality in the opposite direction from the stock returns to the interest rates, the gross domestic product for CAIA, the interest rates for EGBA, the interest rates, the gross domestic product and the inflation for IA, the gross domestic product for UIGA and the interest rate and the gross domestic product for VIGA.

Conclusion

The objective of this study was to analyze the existence of the relationship between select macroeconomic variables and the financial sector stock returns of stocks listed on the Vienna Stock Exchange. In the 2005 – 2015 period examined, there was a volatile increase in GDP growth; however, the Austrian economy outperformed the euro area in the 2006 to 2013 period. The financial sector was influenced by both the global financial crisis and the Eurozone crises.

We used the Johansen cointegration test to investigate long-run equilibrium relationships between the stock returns of Austrian financial institutions and macroeconomic variables. We detected a significant relationship to all variables for the Trace statistics, however; only certain macroeconomic variables are cointegrated with macroeconomic variables using the Max-Eigen Statistics. Since the results of the cointegration tests differ among financial institutions it is difficult to provide a general conclusion and confirm our findings with studies of Martínez et al. (2015) and Peirö (2016) who confirmed the existnce of the linkage between interest rates and stock prices (returns). And with study of Österholm (2016), his findings suggest that there exists a long-run equilibrium relationship between stock prices and GDP. Thus, we can summarize that the macroeconomic factors used have a primarily negative impact on the stock returns of the select institutions. The most important indicator of the development of the Austrian financial stock returns is the money supply M3; this has a positive impact. This finding is in accordance with theory, with Kulhánek (2012) who found long-run relationship between stock prices and the money supply, and with our expectations.

We supplemented the long-run equilibrium relationship results with the results of the short-run dynamics between the stock returns of Austrian financial institutions and the macroeconomic factors using Granger causality tests and using VECM estimations. We found very rare examples of macroeconomic variables that explain changes in stock prices using VECM estimations. The highest adjustment coefficients

of statistically significant models occurred for VIGA and CAIA. Mixed results with significant role of interest rates and gross domestic product in determining in the Granger sense the stock return was revealed for several stocks. Kulhánek (2012) has similar findings, he also detected short-run dynamics between macroeconomic factors and stock prices in several cases.

In general, our main finding is that we discovered the existence of certain linkages. However, for certain financial institutions, the relationship between the macroeconomic variables and the stock returns have not been confirmed as in the study by Errunza and Hogan (1998). This paper's conclusion shows whether investors can find opportunities in the Austrian financial sector to profit from trading in stock market shares using the transfer and absorption of information from the macroeconomic environment. The results show that the opportunity to invest capital and make a profit has been created.

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SOCIAL NETWORKS AS A TOOL FOR JOB SEARCH

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Abstract: *The information technology has caused an absolute revolution. Therefore, searching job through social networks is highlighted as it is perspective way how to find a job. At the global level, social networks are used by more than 90% of companies in process of recruitment. Nowadays, social networks are beginning to be applied by Czech and Slovak companies as well. The objective of the research is to identify the differences in the using of social networks in job search in Czech and Slovak Republic. Findings indicate that, only 2% of Czech respondents preferred social networks as a significant way of finding a job. Following the results, social networks were identified less credible by Slovak respondents, but on the other hand more then 4% of Slovak respondents preferred social networks as a toll for job search. Despite the fact that the employees in the Czech Republic and Slovakia do not really use social networks to find employment, this situation can change as respondents express the opinion acoording which social networks have potential for the future. If social networks are used more by employers as well as by potential candidates, both parties will be satisfied.*

Keywords: *HRM, Seeking employment, Recruitment, Head hunting, Social networks.*

JEL Classification: *J20, O15.*

Introduction

Since its creation, social networks have recorded higher popularity (Hitka et al., 2015). Social media has quickly become an integral part of people's personal and professional lives (Tufts et al., 2014). Creating social networks such as Facebook and MySpace has attracted millions of users around the world. People integrate them into their daily lives (Kulhánková et al., 2010; Monas, 2006). Evidence of this is the increase in new users, not only in the category of teenagers but also among the members of the middle generation and seniors (Burian, 2014). But it is well known that social networks are a phenomenon of today's youth especially, but the truth is that they are also used more and more by adults (Sedláček, 2012).

1 Statement of a Problem

Traditional in-person recruitment methods often involve visiting schools and others but recruiting employees using modern tools of information and communication technologies is not exceptional these days (Moreno et al., 2017). The main driver of enterprises is becoming a competitive business therefore social network sites are used more and more not only in private but also in working life (Čierna et al., 2013; Grladinović et al., 2007; Hornungová et al., 2016; Smolková et al., 2016). In order to achieve competitiveness, profiles on social networks are not created only by young people but also by enterprises. Businesses want to make themselves more visible and attract suitable candidates in this way because every company constists of human resources (Hitka et al., 2005; Kampf et al., 2014; Nigel, 2011). More frequently, social networks are used in the process of recruitment and selection of employees. It is

confirmed by Aguado, Rico, Rubio, and Fernández (2016) that human resource professionals are using Social Networking Websites for personnel recruitment and selection processes increasingly. International social networking services like Facebook, Twitter and LinkedIn, turn social network recruitment from a fashion trend into normalization (Li et al., 2015). Many human resource recruiters and jobseekers consider social networks an innovative way to mediate employment. A wide variety of studies has already been conducted using Facebook as a platform for recruitment (Rife et al., 2016). From the perspective of seeking and obtaining employment, social network Facebook is designed more for temporary employment, or recruiting graduates. On the contrary, LinkedIn is focused primarily on building business contacts as is searching employment, career development or creating professional contacts. Therefore, it is a good choice especially for professionals and managers, but it can also be used in finding the first job (Sedláček, 2012). The aim of this work is to identify differences in the utilization of social networking sites in search of employment in the Czech Republic and Slovakia.

2 Methods

The questionnaire survey was conducted in the area of the Czech and Slovak Republic. To create it, Google Docs was used. The method of random selection was used. For distribution of the questionnaires, Facebook and the information systems of colleges, universities and social networking site were used. Through open and closed questions, respondents answered questions related to the use of social networking sites in the search of employment. To evaluate the questionnaires, the statistical program Statistics 12.0 software was used (Dell, Oklahoma City, Oklahoma). By the Pearson Chi-square test of independence, we verified null hypothesis H_0 at the significance level of 5% applicable when the expected and the received frequencies are equal in the sample, i.e. two nominal variables are independent. If the p-value falls below a determined level of significance ($p < 0.05$), then the null hypothesis H_0 is rejected and the alternative hypothesis H_1 is accepted. In case of rejection of the null hypothesis, the difference in actual and expected frequencies is so great that it cannot be random; i.e. there is a correlation between the nominal variables. Dependence or independence of nominal variables was verified through the Chi-square test (χ^2). Results are presented through the absolute frequency and relative frequency, the Chi-square test (χ^2), degree of freedom (υ) and p-value (p).

Minimum sample size (n) was based on Mason et al. (1990) and calculated with the 95 % confidence ($z_{\alpha/2}$), desired accuracy ($\Delta\bar{x}$) 0.2 and response variability specified by variance (δ_x^2) 0.6. The minimum sample size of respondents was expected at level of 58 respondents from Czech Republic and 58 respondents from Slovakia. Finaly, the research sample consisted of 1,772 respondents. In the sample, there were 950 respondents from the Czech Republic and 822 respondents from Slovakia. Differences in the proportion of men and women are minimal in both countries ($p = 0.491$). A group of women from the Czech Republic dominated in the survey sample (418 men, 532 women), while the Slovak research sample consisted mainly of male respondents (438 men, 384 women). The sample consisted of participants aged 21-25 years, of which 893 respondents were from the Czech Republic, and 552 respondents were from Slovakia. Within the comparison of the views of respondents from the Czech and Slovak Republics, the age structure is significantly different ($p = 0.001$). However,

based on a refined statistical verification, we can conclude that the differences between the respondents are not influenced by their age. In terms of education level, the most represented parts in both surveys were respondents with a university degree (551 respondents from the Czech Republic and 219 respondents from Slovakia).

3 Results and Discussion

In the questionnaire survey, we have investigated the usefulness of social networks (Tab. 1, Tab. 2). Based on the findings, we can conclude that the best-known social networks such as Facebook and YouTube are used in the Czech Republic and in Slovakia. Conversely, networks such as LinkedIn and Twoo (Netlog) have not been preferred yet in any of these countries. Respondents agreed that they do not use these networks. Twitter is a social networking site on the border of statistical significance, given that only 18% of the Czech respondents use it. Slovaks usually do not use Twitter. Significant differences appeared in social networks of Google+ ($p = 0.000$), MySpace ($p = 0.000$), ICQ ($p = 0.001$), Pokec ($p = 0.001$) and Skype ($p = 0.021$). Social Networks Google+, MySpace, ICQ, Skype are used by more Czechs than Slovaks. On the contrary, Pokec is more popular among the Slovak respondents than among the Czech respondents.

Tab. 1: Social networks used by Czech and Slovak respondents *(part 1)*

Facebook	Country	I use	I do not use	Sum	χ^2
Absolute frequency	CR	912	38	950	0.015
Relative frequency		96.00%	4.00%		υ
Absolute frequency	SR	786	36	822	1
Relative frequency		95.62%	4.38%		p
Sum		1,698	74	1,772	**0.903**
Google+	Country	I use	I do not use	Sum	χ^2
Absolute frequency	CR	665	285	950	**16.451**
Relative frequency		70.00%	30.00%		υ
Absolute frequency	SR	321	501	822	1
Relative frequency		39.05%	60.95%		p
Sum		986	786	1,772	**0.000**
ICQ	Country	I use	I do not use	Sum	χ^2
Absolute frequency	CR	171	779	950	**11.739**
Relative frequency		18.00%	82.00%		υ
Absolute frequency	SR	39	783	822	1
Relative frequency		4.74%	95.26%		p
Sum		210	1,562	1,772	**0.001**
LinkedIn	Country	I use	I do not use	Sum	χ^2
Absolute frequency	CR	76	874	950	0.489
Relative frequency		8.00%	92.00%		υ
Absolute frequency	SR	45	777	822	1
Relative frequency		5.47%	94.53%		p
Sum		121	1,651	1,772	**0.485**

Source: (Own research)

Tab. 2: Social networks used by Czech and Slovak respondents *(part 2)*

MySpace	Country	I use	I do not use	Sum	χ^2
Absolute frequency	CR	114	836	950	27.08
Relative frequency		12.00%	88.00%		υ
Absolute frequency	SR	3	819	822	1
Relative frequency		0.36%	99.64%		p
Sum		117	1,655	1,772	**0.000**
Pokec	Country	I use	I do not use	Sum	χ^2
Absolute frequency	CR	19	931	950	12.301
Relative frequency		2.00%	98.00%		υ
Absolute frequency	SR	195	627	822	1
Relative frequency		23.72%	76.28%		p
Sum		214	1,558	1,772	**0.001**
Skype	Country	I use	I do not use	Sum	χ^2
Absolute frequency	CR	722	228	950	5.304
Relative frequency		76.00%	24.00%		υ
Absolute frequency	SR	483	339	822	1
Relative frequency		58.76%	41.24%		p
Sum		1,205	567	1,772	**0.021**
Twitter	Country	I use	I do not use	Sum	χ^2
Absolute frequency	CR	171	779	950	3.547
Relative frequency		18.00%	82.00%		υ
Absolute frequency	SR	75	747	822	1
Relative frequency		9.12%	90.88%		p
Sum		246	1,526	1,772	**0.060**
Twoo (Netlog)	Country	I use	I do not use	Sum	χ^2
Absolute frequency	CR	0	950	950	1.689
Relative frequency		0.00%	100.00%		υ
Absolute frequency	SR	27	795	822	1
Relative frequency		3.28%	96.72%		p
Sum		27	1,745	1,772	**0.194**
Youtube	Country	I use	I do not use	Sum	χ^2
Absolute frequency	CR	760	190	950	0.217
Relative frequency		80.00%	20.00%		υ
Absolute frequency	SR	633	189	822	1
Relative frequency		77.01%	22.99%		p
Sum		1,393	379	1772	**0.641**

Source: (Own research)

Furthermore, we were interested in how strongly respondents use social networks in job searching (Tab. 3). Options were evaluated in degrees of significance - significantly, averagely, exceptionally and not at all. Based on the statistical calculation, we can see that the p-value is low ($p = 0.000$) and Chi-square is high ($\chi^2 = 19.817$), what is a clear significance sign of differences in an answer. Czech respondents use social networks exceptionally in job search. On the other hand, the Slovak respondents do not use social networks in job searching at all.

Tab. 3: The intensity of social networks used in job searching

	Country	Significantly	Averagely	Exceptionally	Not at all	Sum	χ^2
Absolute frequency	CR	19	228	570	133	950	19,817
Relative frequency		2.00%	24.00%	60.00%	14.00%		υ
Absolute frequency	SR	39	114	297	372	822	3
Relative frequency		4.74%	13.87%	36.13%	45.26%		p
Sum		58	342	867	505	1,772	**0.000**

Source: (Own research)

There are different ways to search for employment; therefore, the respondents had to choose one of seven options. Through p-values, the occurrence of significant differences among the respondents was verified. The use of special applications and search for website of enterprises is not a popular form of a job search among the respondents surveyed (Tab. 4, Tab. 5). Fan Sites are located on the border of statistical significance (p = 0.054). Searching for employment through recruiters profiles has a lower difference (p = 0.090). Most respondents do not incline to this option. The possibility of using the recommendations of friends points to significant differences (p = 0.000) because the Czech respondents use this form of job search more often than the Slovak respondents do.

Tab. 4: The way how social networks are used in job search *(part 1)*

Through fan site	Country	Yes	No	Sum	χ^2
Absolute frequency	CR	19	931	950	3.708
Relative frequency		2.00%	98.00%		υ
Absolute frequency	SR	87	735	822	1
Relative frequency		10.58%	89.42%		p
Sum		106	1,666	1,772	**0.054**
Through profile of recruiters	Country	Yes	No	Sum	χ^2
Absolute frequency	CR	0	950	950	2.870
Relative frequency		0.00%	100.00%		υ
Absolute frequency	SR	45	777	822	1
Relative frequency		5.47%	94.53%		p
Sum		45	1,727	1,772	**0.090**
Through special applications	Country	Yes	No	Sum	χ^2
Absolute frequency	CR	38	912	950	0.165
Relative frequency		4.00%	96.00%		υ
Absolute frequency	SR	24	798	822	1
Relative frequency		2.92%	97.08%		p
Sum		62	1,710	1,772	**0.685**

Source: (Own research)

***Tab. 5: The way how social networks are used in job search** (part 2)*

Through website of enterprises	Country	Yes	No	Sum	χ^2
Absolute frequency	CR	342	608	950	1.833
Relative frequency		36.00%	64.00%		υ
Absolute frequency	SR	219	603	822	1
Relative frequency		26.64%	73.36%		p
Sum		561	1,211	1,772	**0.176**
By recommendations by friends	Country	Yes	No	Sum	χ^2
Absolute frequency	CR	646	304	950	21.596
Relative frequency		68.00%	32.00%		υ
Absolute frequency	SR	273	549	822	1
Relative frequency		33.21%	66.79%		p
Sum		919	853	1,772	**0.000**
Using advertising banners	Country	Yes	No	Sum	χ^2
Absolute frequency	CR	19	931	950	4.541
Relative frequency		2.00%	98.00%		υ
Absolute frequency	SR	99	723	822	1
Relative frequency		12.04%	87.96%		p
Sum		118	1,654	1,772	**0.033**

Source: (Own research)

We identified other statistically significant differences (p = 0.005) in the evaluation of social networks as a tool for job searching (Tab. 6). The Czech respondents were not able to comment the issue, while the Slovak respondents identified social networks as less credible to a greater extent.

Tab. 6: The assess of social networks in job search

	Country	Trustworthy	Less trustworthy	Untrustworthy	I do not know	Sum	χ^2
Absolute frequency	CR	114	247	0	589	950	13.019
Relative frequency		12.00%	26.00%	0.00%	62.00%		υ
Absolute frequency	SR	87	345	75	315	822	3
Relative frequency		10.58%	41.97%	9.12%	38.32%		p
Sum		201	592	75	904	1,772	**0.005**

Source: (Own research)

Based on the opinion of the respondents from both countries (Tab. 7), social networks have potential for the future. At the same time, there are significant differences between respondents (p = 0.040). The option "*yes"* was selected by more Czechs than the Slovaks, while a larger percentage of the Slovak respondents indicated the option *"no"*. It clearly shows that the Czech respondents are more confident about the potential of using social networking sites in job searching in the future as the Slovak respondents.

Tab. 7: The potential of social networks in future job searching

	Country	Yes	No	I do not know	Sum	χ^2
Absolute frequency	CR	703	38	209	950	6.425
Relative frequency		74.00%	4.00%	22.00%		υ
Absolute frequency	SR	471	126	225	822	2
Relative frequency		57.30%	15.33%	27.37%		p
Sum		1,174	164	434	1,772	**0.040**

Source: (Own research)

The last area of research is the perception of respondents about seeking a job after graduation or during their studies (Tab. 8, Tab. 9). Both the Slovak and Czech respondents think that the use of the Internet and recommendations of friends can help in search for employment. Conversely, they cannot imagine this through newspapers, or other means. These options were given by a minimum of respondents. The significant differences occurred in other options. Compared to the respondents from Slovakia, the Czech respondents would rather search for employment through the employment offices. Social networks and recruitment agencies are popular neither in the Czech Republic nor in Slovakia. On the other hand, more Slovak respondents can imagine job search in these ways than the Czech respondents. The respondents from both countries can imagine searching for employment through personal contacts to the employer. The Czech respondents preferred this option most frequently.

Tab. 8: The preferred way of job searching *(part 1)*

Through social networks	Country	Yes	No	Sum	χ^2
Absolute frequency	CR	76	874	950	6.689
Relative frequency		8.00%	92.00%		υ
Absolute frequency	SR	201	621	822	1
Relative frequency		24.45%	75.55%		p
Sum		277	1,495	1,772	**0.010**
Through recruitment agencies	Country	Yes	No	Sum	χ^2
Absolute frequency	CR	57	893	950	5.266
Relative frequency		6.00%	94.00%		υ
Absolute frequency	SR	159	663	822	1
Relative frequency		19.34%	80.66%		p
Sum		216	1,556	1,772	**0.022**
Through personal contact	Country	Yes	No	Sum	χ^2
Absolute frequency	CR	684	266	950	5.149
Relative frequency		72.00%	28.00%		υ
Absolute frequency	SR	450	372	822	1
Relative frequency		54.74%	45.26%		p
Sum		1,134	638	1,772	**0.023**
Through employment offices	Country	Yes	No	Sum	χ^2
Absolute frequency	CR	589	361	950	23.033
Relative frequency		62.00%	38.00%		υ
Absolute frequency	SR	225	597	822	1
Relative frequency		27.37%	72.63%		p
Sum		814	958	1,772	**0.000**

Source: (Own research)

***Tab. 9: The preferred way of job searching** (part 2)*

Using job fairs	Country	Yes	No	Sum	χ^2
Absolute frequency	CR	380	570	950	5.789
Relative frequency		40.00%	60.00%		υ
Absolute frequency	SR	195	627	822	1
Relative frequency		23.72%	76.28%		p
Sum		575	1,197	1,772	**0.016**
Through recommendations of friends	Country	Yes	No	Sum	χ^2
Absolute frequency	CR	570	380	950	1.425
Relative frequency		60.00%	40.00%		υ
Absolute frequency	SR	564	258	822	1
Relative frequency		68.61%	31.39%		p
Sum		1,134	638	1,772	**0.233**
Through newspapers	Country	Yes	No	Sum	χ^2
Absolute frequency	CR	114	836	950	2.554
Relative frequency		12.00%	88.00%		υ
Absolute frequency	SR	180	642	822	1
Relative frequency		21.90%	78.10%		p
Sum		294	1,478	1,772	**0.110**
Using Internet	Country	Yes	No	Sum	χ^2
Absolute frequency	CR	817	133	950	0.240
Relative frequency		86.00%	14.00%		υ
Absolute frequency	SR	684	138	822	1
Relative frequency		83.21%	16.79%		p
Sum		1,501	271	1,772	**0.624**
Otherwise	Country	Yes	No	Sum	χ^2
Absolute frequency	CR	0	950	950	1.116
Relative frequency		0.00%	100.00%		υ
Absolute frequency	SR	18	804	822	1
Relative frequency		2.19%	97.81%		p
Sum		18	1,754	1,772	**0.291**

Source: (Own research)

A similar survey was carried out in Romania. The object of the research was the use and development of social networks in the area of recruitment. The respondents were mostly employees of personnel departments and others involved in the process of recruitment. The results show that Romanian companies are open to developing a strategy to use the Internet in the process of recruitment. In addition, more and more people create profiles on social networks and use them more often. Employers recognize this fact and adapt to modern times. Therefore, they most often prefer using social networks for recruitment of new employees for leadership positions. The advantage is not only in easier access to potential employees but also lower costs associated with the process of recruitment, which is confirmed by the survey (Mitran, 2010). A survey carried out in the United States and Europe on a sample of experts in the field of recruitment including 218 students shows that job seekers trust the information on the company's website and when they apply for a job, they will find

necessary information on a particular site of enterprises. Enterprises without a website or without offers on social networks have little chance to obtain the suitable staff because online offer is attractive for applicants. On this basis, it is confirmed that people increasingly seek information about future employment on websites and social networks. Therefore, companies should pay extra attention to online advertising and contact with potential employees on social networks (Bermúdez et al., 2010). The research carried by Pajtinková Bartáková et al. (2017) shows that only 3.32% of Slovak respondents use social networks in a job search significantly. The majority of respondents asked used social networks for this purpose only occasionally. The research of the Jobvite enterprise shows that 89% of the surveyed companies in USA are going to use or are planning to use social networking to promote the acquisition of staff and 80.2% of enterprises are using social networks and media for promotion of recruitment, now. This trend has increased significantly by more than 12% since 2009 (Jobvite, 2011).

For the enterprise, human capital is one of the factors that dispose of ideas, thoughts and knowledge (Kucharčíková et al., 2016). Young people can benefit from new experience and skills acquired during their studies by working in all areas of the company (Hrehová et al., 2015). Therefore, for the enterprise, employees are becoming a key resource for development (Stacho et al., 2013). An employing student or fresh graduate is an advantage in terms of lower labour costs for enterprises. Technological progress, access to the Internet, new trends and techniques cause that young people use new methods of job search (Čierna et al., 2016; Sudzina et al., 2014). Therefore, in addition to established methods such as advertising in mass media, brochures, questionnaires, posters, recruitment agencies, employment offices, and more, for recruiting employees, enterprises need to use modern information and communication technologies that allow them to look for a suitable candidate for the job. These are social networks used by more and more people, especially the younger generation. Social Networks are influencing the way human resource professionals recruit, hire and terminate employees to obtain the competitive advantage (Brown et al., 2011; Davison et al., 2011; Duffy, 2011; Kluemper et al., 2009; Nagendra, 2014; Norazah et al., 2011; Shea et al., 2006; Shrm, 2015; Shrm, 2007; Soumi, 2012; Stoughton et al., 2013).

Conclusion

Seeking and getting a job position, with which the employees identify themselves and achieve success in their life, is a significant milestone. For the company it is very important to obtain applicants that an enterprise needs. Due to the fact that labour market is full of people seeking employment, employers and potential employees have the option to choose. Technological advances, access to the Internet and the creation of social network sites has caused an absolute revolution, therefore, different methods can be used in recruitment process. The selected methods depend on the situation at the labour market, as well as on the company's financial situation and other factors. Nowadays, social networks are used abroad more and more often in searching for a job. In our research we focused on the using of social networks in job search in Czech Republic and in Slovakia. The differences between selected countries were identified. The results of our research show that respondents of both countries used social networks such as Facebook and Youtube frequently. Significant differences between

Czech and Slovak respondents appeared in the intensity of use of social networks in job searching. Czech respondents used social networks in seeking employment exceptionally. Slovak respondents did not use the social networks in a job search, at all. It can be caused by the fact that social networks were evaluated less trustworthy. Nevertheless, the differences were confirmed between Czech Republic and Slovakia, we appreciate that information technology was the most preferred way how to search for a job for respondents from both countries. Moreover, findings indicate that job searching by using social networks has a potential for the future. It verified our assumption according to which social networks represent perspective way how to find a job. Placing more job offers to social networks can help to achieve the potential of social networks.

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BENCHMARKING SMART E-GOVERNMENT DEVELOPMENT: INSIGHTS FROM A NATIONAL PERSPECTIVE

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Abstract: *The concept of smartness has become a priority area for many governments, driven by the effort to enhance their ability to provide more attractive and user-focused public services. This approach has also influence on the set of indicators that are used to evaluate these efforts. In contrast to the previous studies to benchmark e-government development, the society is now more advanced in using ICT and consuming online public services. There is a need to reshape traditional view on e-government development and introduce a new set of indicators that would better capture the full range of smarter e-government. This paper provides insights on this issue from a national perspective. A two-step validation process was applied to evaluate the capabilities of the new set of indicators to assess and benchmark smart e-government development. The results indicate that the newly proposed index provides a robust measure to benchmark smart e-government development.*

Keywords: *E-government development, Smartness, Expert panel, Benchmarking framework, Composite index.*

JEL Classification: *C43, H11, H83, L86.*

Introduction

The diffusion and use of Information and Communication Technologies (ICT) among citizens and businesses is increasing rapidly and public sector needs to be prepared for these challenges. Therefore, multiple concepts regarding ICT are being introduced and utilized by governments worldwide to address these emerging trends. The term "*e-government*" covers most of them since it establishes the connection between the use of ICT and public services.

According to one of the most recent definitions given by Bogdanoska-Jovanovska (2016), e-government is "*a process of introducing ICT in the public sector for the purpose of creating a flawless, responsive, and citizen-focused government by transforming the process of delivering online public services and by introducing a fundamental re-thinking of the way government departments and agencies work.*" In dealing with the evolution of this term, see United Nations (2016), smartness has recently emerged as a desirable characteristic of governments, cities, communities, infrastructures, and devices (Awoleye et al., 2014; Gil-Garcia et al., 2016). There are many different views and perspectives on smartness and smart governments. As reported by Gil-Garcia et al. (2014), being a smarter government requires having a forward-thinking approach to the use and integration of information, technology, and innovation in the activities of governing. Scholl and Scholl (2014) then claimed that "*actionable and omnipresent information along with its underlying technologies are substantial prerequisites and backbones for developing models of smart (democratic) governance, which foster smart, open, and agile governmental institutions as well as*

stakeholder participation and collaboration on all levels and in all branches of the governing process." As noted by Maheshwari and Janssen (2014), it is crucial to establish smart e-government ecosystems that enable successful delivery of public services and benchmarking of these efforts. The importance of these ecosystems for the identification, development, experimentation and adoption of innovative solutions is also emphasized by other authors, such as Fioroni et al. (2014). Therefore, smart e-government development must focus on the larger ecosystem's environment, including dimensions like legal framework, ICT infrastructure, security and privacy, capabilities of involved stakeholders, and especially related indicators that represent these efforts.

An indicator is a quantitative or a qualitative measure derived from a series of observed facts that can reveal relative positions (e.g. of a country) in a given area (Nardo et al., 2008). Benchmarking is one of the general techniques that can be used for comparing the development of e-government using a set of indicators. Such indicators are used to calculate some kind of index (Berntzen and Olsen, 2009). E-government benchmarks are used to assess the progress made by an individual country over a period of time, and to compare its growth against other nations (Rorissa et al., 2011). As reported by Gil-Garcia et al. (2014), there is no consensus in terms of what the term smart e-government includes and how it is related to emergent technologies and innovation in the public sector. In addition, indicators that are suitable for benchmarking smart e-government have not yet been established (United Nations, 2016), and the existing e-government benchmarks could not be applied. This situation has occurred because there is a difference in the type of data sources used in the previous benchmarks and in the government model (framework) characteristics (Veljković et al., 2014).

In regard of this issue, this paper provides contribution to research in the field of e-government research. It aims to identify the key components and indicators of smart e-government development on the national level. The main assumption is based on accepting the importance of the smartness concept for the public sector. However, in contrast to ongoing research stream that examines this concept on the local level of districts, cities and municipalities, authors of this paper argue that the preparedness of governments as well as citizens should be at first explored from the national perspective. In particular, the ICT infrastructure together with computing resources and their security and legal aspects are defined on this level. This approach provides the insights that can be used to more precisely define (target) the boundaries of smart ecosystems on the local level. In addition, the findings can provide a valuable tool for decision support and targeting and planning of smart policies and investments.

1 Research Methodology and Methods

The methodology of this research follows systematic online searches in order to derive suitable indicators for benchmarking smart e-government development. For this purpose, it follows the set of steps defined by Zahran et al. (2015). A cross-search among several databases was employed to retrieve related articles. The review spanned the broad spectrum of journals and reports specifically focused on e-government development assessment and benchmarking. As noted by Berntzen and Olsen (2009), the use of widely referenced indicators is recommended to benchmark e-government development. Thus, this research will not address local measures and indicators that are

not published by well-established institutions. Also, it is beyond the scope of this research to consider the effects and impacts of e-government.

Since there are various aspects and data quality assumptions of e-government development benchmarks, Rorissa et al. (2011) and Zahran et al. (2015) argued that the conceptualization of e-government development into stages is doubtful. At similar lines, Yildiz (2007) criticized this approach based on stages and complained that there is no agreement on the number of stages and requirements. These authors suggest that the outcomes of benchmarking frameworks should be presented as components rather than stages. Thus, this paper discusses this issue in the context of smart e-government components. Such a structure improves the stakeholder's understanding of the driving forces behind the concept. Finally, since composite indices are much easier to interpret than trying to find a common trend in many separate indicators (Nardo et al., 2008), this paper presents the results of benchmarking smart e-government development in the form of a composite index. As stated by Hudrliková (2013), this approach is very tempting for all users of statistical information (policymakers, academics, experts, journalists, public, etc.) because they can operate with only one figure.

First, based on the literature review, a list of potential indicators that are widely recognised as having significant impacts on a nation's e-government development was gathered. Then, these indicators were discussed and classified into components, their weights were determined, and mathematical models were established to incorporate them into a single composite index. Following this approach, an expert panel was established, engaging experts on e-government development, to validate the relevance of these components and indicators and then define their weights. The expert panel is one of the participatory methods of weighting (Nardo et al., 2008). For this purpose, a five-point Likert scale (from 1 = extremely unimportant to 5 = extremely important) was utilized to determine the suitability of selected indicators for each component. Each expert was first asked to evaluate them. The following discussion revealed the list of indicators. These were weighted based on their importance for each component.

After that, a benchmarking framework with the most important indicators was developed and the weights for each component and its indicators were selected. In addition, a range of weights for sensitivity analysis was gathered from the expert panel. The validity of the new index scoring and respective ranking was assessed by evaluating how sensitive the country ranks are to the assumptions made on the index structure and weighting of the indicators. In the second step of the validation process, Spearman's and Kendall's rank correlation coefficients were used to compare the new index to the already existing indices to validate the conformity of the rank methods.

2 Literature Review and Theoretical Background

2.1 Importance of Assessment and Benchmarking of E-government Efforts

There is a fundamental shift in benchmarking e-government due to the ability to use a large variety of data sources and virtually anybody can be involved (Maheshwari and Janssen, 2014). The impact of using ICT by governments has been discussed by several authors who reported what are the key benefits, challenges, and limitations of e-government. The literature pointed out that modern ICT enable improvements of

internal operations in public agencies and institutions as well as delivery of public services and engagement among stakeholders.

The assessment and benchmarking of these efforts is crucial to measure the effectiveness of invested resources and get information for strategic planning of future e-government development projects (Kao, 2015; Máchová and Lněnička, 2015; Rorissa et al., 2011; Siskos et al., 2014). In this regard, different benchmark techniques are used for comparing e-government development based on indicators that yield some sort of score (Siskos et al., 2014; Yildiz, 2007; Zahran et al., 2015). Reliable, relevant and valid benchmarking frameworks can offer notices to point policy makers and practitioners in the right direction (Nardo et al., 2008; Saisana and Saltelli, 2011). Some of them are based on measurable characteristics of the entities, other use one or more subjective measures, a few employ a combination of both (Rorissa et al., 2011). Various benchmarking frameworks have been developed and used in practice over the past decades. In general, most of these frameworks tend to measure e-government development a country according to how it is capable to deal with infrastructure and technology, people and human skills, accessibility and connectivity, and transparency (Rorissa et al., 2011; Siskos et al., 2014; Yildiz, 2007). For more information about the field of e-government assessment, see Bogdanoska-Jovanovska (2016).

The measurable outcomes of these frameworks are usually presented in the form of indices and rankings (Máchová and Lněnička, 2015). The basic idea is first to find the criteria that reflect e-government development and then design a scoring system based on the weights for each of these criteria to transform the data collected into numbers (Berntzen and Olsen, 2009; Kao, 2015). The criticism towards the current benchmarks is directed at their rigidity since they did not respect the influence of technological, social and demographic evolution together, where new concepts in e-government began to appear (Bannister, 2007; Máchová and Lněnička, 2015; Rorissa et al., 2011).

2.2 Towards using Emerging Technologies for Smart E-government Development

Various inter (national) organizations have taken actions to address the importance of these technologies by preparing guidelines, recommendations or exemplary legislation. For example, according to the United Nations (2016) report, the global trends of e-government development should support the implementation of the sustainable development goals. The Information Society Report of International Telecommunication Union (2016) highlights the importance of big data analytics, mobile broadband, and cybersecurity in the context of sustainable economic and social development. Cross-border data flows, digital innovation, big data and analytics, cloud and mobile computing, open data initiatives and engagement of stakeholders are the new trends of ICT according to World Economic Forum (2016). With the increasing importance of these trends, new indicators and approaches need to be introduced in the measuring of e-government development, and the existing indices should to be updated, redefined and restructured. In this regard, Máchová and Lněnička (2015) proposed a benchmarking framework to evaluate e-government development using the new trends in ICT, but they did not take into account the concept of smartness.

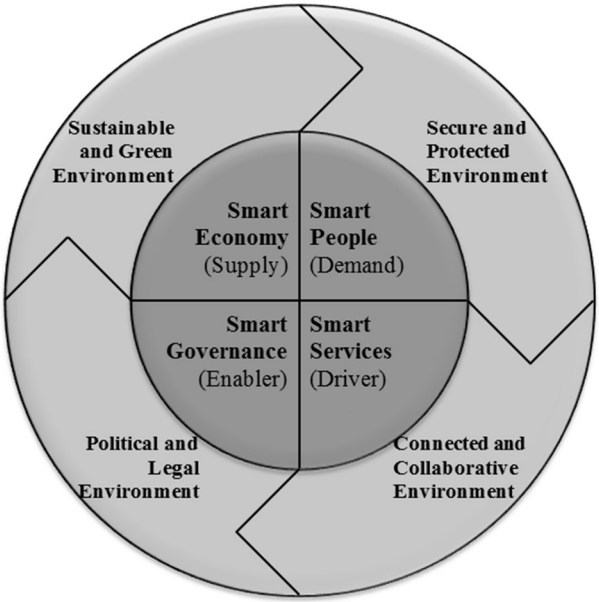
Smart e-government is used to characterize activities that creatively invest in emergent technologies coupled with innovative strategies to achieve more agile and resilient government structures and governance infrastructures (Gil-Garcia et al., 2014).

They see it as the deployment of a creative mix of emerging technologies and innovation in the public sector, which is based on specific contexts and problems. This concept is characterised by putting greater emphasis on external relationships with citizens and other stakeholders through websites, mobile devices, and other digital channels than internal government operations (Gil-Garcia et al., 2016). Another important trend is the accelerated development and transformation of cross-boundary information integration in government efforts. Scholl and Scholl (2014) outlined the smartness of governance in the context of openness and decision-making, information sharing and use, stakeholder participation and collaboration, etc.

3 Defining Benchmarking Framework and Composite Index

The benchmarking framework should clearly define the issue to be measured and its components, selecting individual indicators and weights that reflect their relative importance (Nardo et al., 2008; Saisana and Saltelli, 2011). The eight components established through the expert panel are shown in Fig. 1.

Fig. 1: The components of smart e-government development



Source: Authors

The environment supporting smart e-government development must be sustainable and green, secure and protected, connected and collaborative, and meet political and legal aspects. The intersection of e-government for sustainable development was explored by Estevez and Janowski (2013). Efforts should be made to ensure privacy and security of personal data due to hacking and other malicious activities, which are closely linked with cybersecurity (United Nations, 2016). In this regard, Awoleye et al. (2014) discussed the importance of secure smart e-government for public services, participation and communication. According to Fioroni et al. (2014), the promotion of a strong participation, adoption of open platforms, and engagement of stakeholders in the online service development process are the key prerequisites. Interoperability measurement, benchmarking and improvement in the context of big and open data was reconceptualised by Maheshwari and Janssen (2014). Among others, they emphasized laws and regulations, constitutional restrains, political commitment, jurisdictional regulations, change management, environment and ethics, and financial constraints.

Smart governance holds the promise of a more transparent, efficient, and resilient government for citizens (Gil-Garcia et al., 2014). Transparency and accountability of institutions can be enhanced by opening up government data (United Nations, 2016). In this regard, this component is characterized as an enabler of smart e-government development. Selected areas that have been put into focus and are likely candidates for smart governance initiatives were identified by Scholl and Scholl (2014). Gil-Garcia et al. (2016) identified fourteen components of smartness that can be applied to different branches and levels of government. Smart services are drivers of value generation for all the stakeholders. According to Fioroni et al. (2014), the number of available online services, their effectiveness and usage level and their level of interaction are important indicators of the smartness level of e-government. Gil-Garcia et al. (2014) provided perspectives on the nature of smart governments and illustrate exemplar practices and initiatives on how governments are opening up and transforming service delivery to become smarter. Smart economy provides a platform that facilitates the supply of smart services. Smart people represent a demand for smart services. This component requires taking into account various indicators focused on human capital and skills (Scholl and Scholl, 2014).

Tab. 1 lists the indicators of the benchmarking framework, their data sources and year, and particularly their local and global weights identified by the expert panel. The table contains 30 indicators, which were selected from 46 indicators identified through the literature review. All of them were gathered from publicly available data sources and international reports published by International Telecommunication Union (ITU), Transparency International (TI), United Nations (UN), World Economic Forum (WEF), or World Wide Web Foundation (W3F).

Tab. 1: Components and indicators of the benchmarking framework

Component and its indicators	Data source / Year	Weights	
		Local	Global
1. Sustainable and Green Environment		**0.100**	
Energy architecture performance index	WEF / 2016	0.300	0.030
Environmental performance index	Yale University / 2016	0.350	0.035
Use of ICT to increase environmental awareness and behavioural change	W3F / 2014	0.350	0.035
2. Secure and Protected Environment		**0.125**	
Global cybersecurity index	ITU / 2014	0.300	0.038
Effective legal protection from cybercrime	W3F / 2014	0.325	0.041
Personal data protection laws/regulations	W3F / 2014	0.375	0.047
3. Connected and Collaborative Environment		**0.100**	
Accessibility of digital content	WEF / 2014	0.275	0.028
Wireless broadband subscriptions per 100 inhabitants	ITU / 2015	0.200	0.020
International Internet bandwidth (bit/s) per Internet user	ITU / 2015	0.225	0.023
E-participation index	UN / 2015	0.300	0.030
4. Political and Legal Environment		**0.100**	
Effectiveness of law-making bodies	WEF / 2016	0.300	0.030
Laws relating to the ICTs	WEF / 2016	0.350	0.035
Government success in ICT promotion	WEF / 2016	0.350	0.035

5. Smart Economy (Supply)		**0.125**	
Global competitiveness index	WEF / 2016	0.225	0.028
Time required to start a business (days)	World Bank / 2016	0.225	0.028
Capacity for innovation	WEF / 2016	0.275	0.034
Gross domestic expenditure on R&D (total, % of GDP)	UNESCO / 2014	0.275	0.034
6. Smart People (Demand)		**0.150**	
Tertiary education gross enrollment rate	UNESCO / 2014	0.275	0.041
Mean years of schooling (of adults) (years)	UNESCO / 2014	0.250	0.038
Quality of education system	WEF / 2016	0.275	0.041
Use of web-powered ICT to improve education outcomes	W3F / 2014	0.200	0.030
7. Smart Governance (Enabler)		**0.125**	
Importance of ICTs to government vision of the future	WEF / 2016	0.275	0.034
Corruption perceptions index	TI / 2016	0.225	0.028
Open data barometer	W3F / 2015	0.275	0.034
Impact of open data on transparency and accountability	W3F / 2014	0.225	0.028
8. Smart Services (Driver)		**0.175**	
Online service index	UN / 2015	0.225	0.039
Impact of ICTs on access to basic services	WEF / 2016	0.175	0.031
Availability of latest technologies	WEF / 2016	0.200	0.035
Impact of ICTs on new services and products	WEF / 2015	0.200	0.035
Cost of mobile broadband (prepaid 500 MB) (USD)	ITU / 2015	0.200	0.035

Source: Authors

According to Nardo et al. (2008), the most widespread linear aggregation is the summation of weighted and normalised individual indicators. The following formula was proposed in computing a composite index for a given country:

$$\text{SmartEgov}_i = \sum_{j=1}^{n} w_{ij} * v_{ij} \quad (1)$$

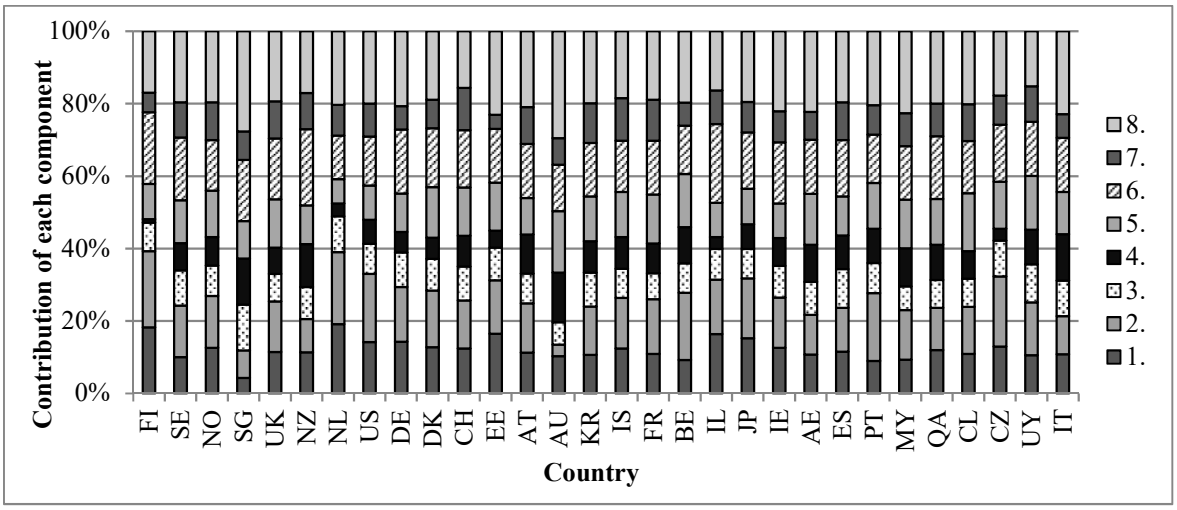
where *SmartEgov* is the overall value for a country (*i*), *j* is each of the indicators, *n* is total number of indicators, w_{ij} is a global weight assigned to the each indicator (*j*), v_{ij} is an individual value for each indicator on a normalized scale of 0 to 1. The sum of all weights equals 1.

4 Computing and Validating the Composite Index

The number of countries for which data are available varies across indicators. Nardo et al. (2008) suggested different imputation methods based on case deletion, single imputation or multiple imputations. Since the benchmarking framework was approved by the expert panel, and hence cannot be changed, countries with at least one value missing were deleted. The next step was the finding of outliers. For univariate data, Hudrliková (2013) recommended to apply the rules about simultaneous values of skewness and kurtosis, i.e. the skewness greater than 1 and the kurtosis greater than 3.5 are problematic. In accordance with this rule, no indicator for any of the compared countries showed these problems. In this regard, the final number of countries included in the study was 63.

The indicators are not measured in the same units and some of them also do not have the same direction. These indicators were transformed prior to the next analysis. First, the scale for selected indicators was reversed so that higher values always reflect better performance. Second, the Z-score standardization procedure was applied for each indicator to ensure that the overall index is equally decided by its components. After that, the normalisation converted data in order to have the same range. Then, weights gained from experts were applied to calculate the index using the formula (1). The results are in Tab. 2 as a set of values on a scale from zero to one. The index was calculated at the two level of aggregation, i.e. also for each component, see Fig. 2.

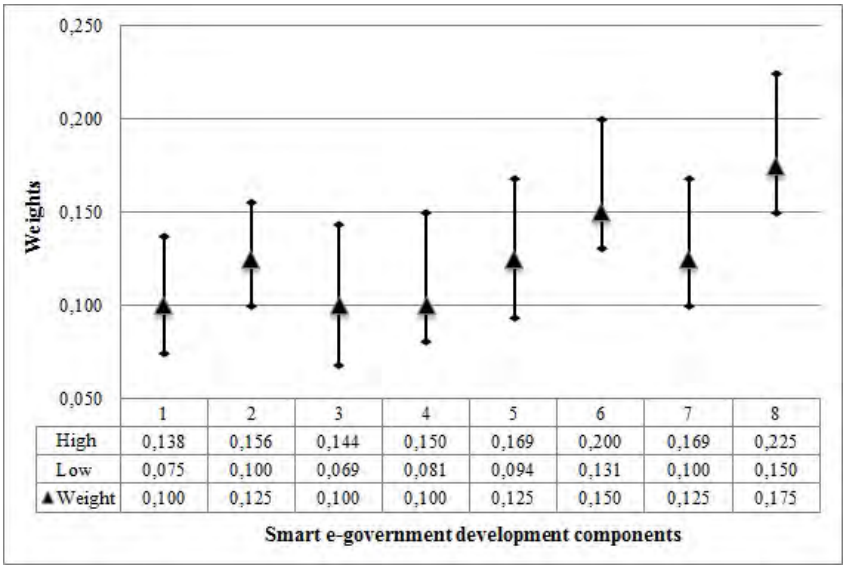
Fig. 2: Contribution of each component to overall index



Source: Authors

Sensitivity analysis aims to analyse the robustness of composite indices. It assesses the contribution of the individual source of uncertainty to the output variance. The results of the analysis are generally reported as country rankings with their related uncertainty bounds (Nardo et al., 2008). The experts were asked to define a sensitivity range of weights for each component. Fig. 3 provides a graphical presentation of the average low and high weights for components. It is a conservative weighting scheme.

Fig. 3: Sensitivity range of weights from the experts



	1	2	3	4	5	6	7	8
High	0,138	0,156	0,144	0,150	0,169	0,200	0,169	0,225
Low	0,075	0,100	0,069	0,081	0,094	0,131	0,100	0,150
▲Weight	0,100	0,125	0,100	0,100	0,125	0,150	0,125	0,175

Source: Authors

Then, three alternative weighting schemes were defined as the most representative in the literature of composite indicators and worth being tested in the sensitivity analysis (Saisana and Saltelli, 2011). These scenarios were taken into account: expert weighting vs. factor analysis derived weights at the component level (S1), where each component is weighted according to its contribution to the overall variance in the data; expert weighting vs. equal weighting at the component level (S2); and then expert weighting vs. equal weighting at the indicator level (S3). The sensitivity analysis of the new index ranking to the different weighting schemes implied a reasonably high degree of robustness of the index for those countries, see Tab. 2.

Tab. 2: Ranking based on the expert weights and the sensitivity analysis

Country	Expert weights		S1		S2		S3	
	Value	Rank	Value	Rank	Value	Rank	Value	Rank
Finland	0.829	1	0.831	1	0.821	1	0.823	1
Sweden	0.817	2	0.820	2	0.813	3	0.817	3
Norway	0.813	3	0.809	5	0.808	4	0.806	5
Singapore	0.812	4	0.818	3	0.814	2	0.818	2
United Kingdom	0.808	5	0.817	4	0.803	5	0.810	4
New Zealand	0.778	6	0.769	9	0.772	6	0.767	8
Netherlands	0.776	7	0.777	7	0.766	7	0.769	7
United States	0.774	8	0.787	6	0.762	9	0.769	6
Germany	0.763	9	0.754	11	0.753	10	0.748	10
Denmark	0.760	10	0.769	8	0.764	8	0.760	9
Switzerland	0.751	11	0.754	10	0.748	11	0.744	11
Estonia	0.743	12	0.733	12	0.736	12	0.731	12
Austria	0.733	13	0.726	15	0.728	13	0.722	15
Australia	0.733	14	0.729	13	0.720	15	0.724	14
South Korea	0.727	15	0.716	16	0.714	17	0.716	16
Iceland	0.725	16	0.726	14	0.723	14	0.727	13
France	0.719	17	0.712	17	0.716	16	0.710	17
Belgium	0.704	18	0.695	19	0.691	19	0.693	18
Israel	0.698	19	0.692	20	0.687	20	0.687	20
Japan	0.694	20	0.711	18	0.700	18	0.690	19
Average change to the expert weights			1.2 rank		0.7 rank		0.8 rank	

Source: Authors

Finally, Spearman rank order correlations and Kendall tau correlations between the new index and the already existing e-government development indices revealed that the SmartEgov index has very high correlation with the Networked Readiness Index (NRI) by WEF as well as the E-government Development Index (EGDI) by UN and the ICT Development Index (IDI) by ITU on the significance level 0.05. These results, shown in Tab. 3, indicate that the existing e-government development indices can be considered as smart in the context delimited by the benchmarking framework. Thus, this implies that most of the countries are prepared for providing smart services.

Tab. 3: Degree of correspondence between the new index and other indices

	Rank correlation coefficient	EGDI	IDI	NRI
SmartGov index	Spearman	0.926	0.926	0.964
	Kendall	0.772	0.761	0.847

Source: Authors

5 Discussion and Limitations

Benchmarking of e-government services is an important mechanism for helping in setting policy priorities and a source for identifying best practices (Berntzen and Olsen, 2009). Thus, among the best performing countries, North European countries, namely Finland, Sweden, and Norway, may provide useful insights on how to make e-government development smarter. In this regard, the recommendations should be linked to improvements in the delivery of smart services. These services should be designed in the context of the sustainable and green environment. On the other hand, benchmarking frameworks may send misleading policy messages if poorly constructed or misinterpreted (Nardo et al., 2008). Furthermore, the outcomes of benchmarks need to be interpreted sensibly and it is always necessary to be aware of the risks of their politicization (Bannister, 2007). According to Siskos et al. (2014), rankings should be based on transparent computational procedures to maximize their acceptability by both governments and the scientific community, leading to frameworks and indices that achieve wide consensus. Therefore, the expert panel established for the purpose of this study provided the initial insights into the discussion on indicators that can be used to measure the impact of the smartness concept in the public sector.

As stated by Hudrliková (2013), there is not only one correct method how to develop a composite index. Saisana and Saltelli (2011) reviewed some good and bad practices from the literature and argued in favour of a multi-modelling approach to represent different scenarios in the construction of an aggregate measure. Rorissa et al. (2011) argued that the methods become more problematic when include calculated indices and subjective indicators. On the other hand, several authors are opposed to the use of quantitative approaches to calculate rankings since these are concentrated only on the aspects that are measurable and do not take into account the perspective of various stakeholders (Bannister, 2007; Veljković et al., 2014). Another weakness of this type of benchmark is that the indicators do not show the target value that each indicator needs to reach. To solve this issue, Kao (2015) applied the idea of non-dominance to find Pareto-optimal, or efficient, countries on e-government, and calculate the target value of each indicator for the dominated, or inefficient, countries.

Another problem is that, in practice, many services are the responsibility of lower levels of government (Berntzen and Olsen, 2009). A further limitation of this study comes from the use of secondary data. In addition, a longitudinal benchmarking, rather than a one-time look, should provide a better sense of the progress being made by countries (Rorissa et al., 2011). Finally, in contrast to similar research conducted by Hudrliková (2013) who dealt with the comparison of performance of the European Union Member States using the composite indicator principles, this paper provided a larger sample of indicators as well as countries that were assessed and benchmarked. In addition, the results presented in this paper are based on the consensus of the expert panel. It is, however, questionable if it is desired to have tens of indicators for measuring all the details about this issue.

Conclusions and Further Research Directions

This research attempted to contribute to the e-government development body of knowledge by identifying and validating the components and indicators characterizing the concept of smartness in e-government development. The national perspective was

chosen for this aim since the governments must at first fully understand the ICT infrastructure together with computing resources and their security and legal aspects as well as capabilities of involved stakeholders they face in order to more precisely define the boundaries of smart ecosystems on the local level. The methodology presented in this paper provided the approach for including or excluding specific indicators into components and also to create the composite index based on the relative weights of these indicators towards the constitution of this index. For this purpose, the expert panel was established in order to take into account multiple viewpoints and to increase the robustness of the benchmarking framework. The utilization of this panel proved to be a useful part of the process, as this provided the opportunity to gain in-depth insights with limited resources. In addition, the limitations of this approach were discussed to overcome the shortcomings of benchmarking and dispute over the outcomes. The new index was validated using three weighting schemes to gauge the robustness of the results, to increase its transparency, and to identify the countries whose rank improves or deteriorates under certain assumptions.

The benchmarking framework represented by the smart e-government development index summarized the multi-component view on smart e-government, and hence, provides a support tool for decision-makers as well as facilitates communication with general public. The number of indicators that were used can be also easily extended or reduced and more experts or other stakeholders can be involved in their identification and validation. The future research should be directed towards discovering, proposing, and validating frameworks for benchmarking smart cities on the local level.

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CUSTOMERS OF COMMON FASHION BRANDS IN THE CZECH REPUBLIC: INNOVATORS AND OPINION LEADERS

Jitka Novotová

Abstract: *This article concentrates on the identification of special customer categories known as innovators and opinion leaders, also collectively called Fashion Leaders. The article focuses only on customers buying clothing of medium price and quality, known as Common Brands clothing. The categories of Innovators and Opinion Leaders in this article were measured on the basis of rating scales from renowned international authors. Confirmation factor analysis confirmed that the rating scales belong to latent variables and also sufficiently explain them. The result of the correlation analysis proved that the Innovator and Opinion Leader categories strongly correlate and therefore may be measured jointly in subsequent research, as one shared category of Fashion Leaders. Differences between demographic characteristics of Fashion Leaders and Fashion Non-Leaders were identified using the two-sample t-test. It was particularly found that women with lower education who shop very often are Fashion Leaders. The results of this research may be used as a basis for further customer surveys of Common Brands in the Czech Republic. The practical contribution of this article is the identification and description of the Fashion Leaders customer segment that can help fashion producers in promoting new collections or raising awareness in the fashion field.*

Keywords: *Fashion, Customer, Fashion leaders, Innovators, Opinion leader, Common Fashion Brands*

JEL Classification: *C38, M31*

Introduction

Fashion is a field that continually attracts great attention from marketing specialists (Bakewell et al., 2006). It is an exciting, dynamic and creative global business that blends aesthetics, technology and trade. Fashion is about self-expression, emotion and the identity of the wearer and defining cultural and social divides in the wider context (Hines and Bruce, 2007). According to a number of authors, the fashion industry can be segmented into various categories, most often according to the group of customers who buy fashion, but also based on price and quality (Bruce, Daly, 2006; Priest, 2005). This article focuses on the medium category in terms of price and quality, a category intended for the general public. In foreign publications this category is often referred to as High Street Fashion or Mass Market (Sorensen, 1995). In 2003, Lee introduced the term McFashion. These are international chains characterized by chic fashion that is very cheap. In our previous research of the fashion market in the Czech Republic, we referred to this category as Common Fashion. For example brands such as H&M, Lindex, C&A and Orsay may be included in this category (Novotová, 2016). This article continues our previous research and focuses on customers of common fashion brands, meaning mainly younger people. The main goal of this article is to identify the category of customers known as Innovators and Opinion Leaders, often described in professional publications and to determine by which percentage they are represented in the Czech population.

Innovators are people who are actively interested in fashion and shop for latest clothing collections. *Opinion Leaders* are those who influence their surroundings with their fashion opinions and advise friends on what to wear (Sproles, 1979 in Martinez a Kim, 2012). Both of these categories are very interesting from the marketing point of view. These people will buy the new collections first, they are interested in fashion and know exactly what to wear for which occasion. Companies can use these fashion enthusiasts in their marketing campaigns, for example through social media and blogging. Particularly opinion leaders often spread positive WOM through social media or discussion forums (Bertrandias and Goldsmith, 2006). It is proven that customers are far more willing to let themselves be influenced by opinion leaders than by traditional advertising campaigns (Flynn, Goldsmith and Eastman, 1996). It is therefore very important to identify these customers and learn as much about them as possible. Aside from determining the percentage of Innovators and Opinion Leaders, this article attempts to verify a number of hypotheses regarding the demographic characteristics of Innovators and Opinion Leaders.

1 Statement of a problem

In the 1980's and 1990's, fashion customers were very often the subject of professional articles. The individual authors attempted to divide customers into groups according to various characteristics. For example, Behling (1992) divided customers according to their motivation for shopping and emotional connection to fashion leaders, innovators, followers and rejecters. Another customer segmentation was based on the premise that those interested in fashion buy new collections faster. Customers were therefore divided into innovators, early adopters, early majority, late majority and laggards according to the period of time since the introduction of a new collection to purchase (Rogers, 1962). However, this segmentation presented a number of flaws, including poor validity and reliability of scales used in the questionnaires that measured the customer categories (Midgley and Dowling, 1978). Another concept that could be seen as one of the most frequently used in the fashion industry is Fashion Leadership. The group of Fashion Leadership customers is divided according to fashion innovativeness and fashion opinion leadership. Fashion innovativeness was defined by Sproles to be represented by a person who purchases a new product ahead of others (Sproles, 1979 in Martinez a Kim, 2012). Fashion opinion leadership could be defined as the *"ability or tendency to convey information regarding a new fashion in a way that influences successive purchasers to accept or reject it"* (Workman and Johnson, 1993, p. 64). Both those categories include individuals who are involved in fashion and have very positive feelings toward it.

Due to the need for easy identification of Innovators, Goldsmith and Hofacker (1991) created rating scales usable for identification in questionnaire-based research. In their work, both authors focused on the shortcomings of the precious rating scales that were used at the time. To determine an Innovator, they used rating scales previously used by Churchill (1979). The goal was to modify them in such a way as to make them suitable for all categories of product, not only from the fashion industry, and that they would meet the requirements for sufficient reliability and validity. Two versions of the rating scales were created – a positive scale (I purchase new collections before my friends.) and a negative scale (I am the last person to buy a new collection.). The researchers wanted to identify only the statements that with greatest descriptive value and also to determine whether it is better to use a positive or a negative scale. Each statement was measured in

a 7-point scale. The research was first performed to determine the Innovator in the area of rock albums. According to the researchers, this is a product category in which it is very easy to determine whether a customer shows signs of innovation. Subsequently the statements were modified to suit the fashion clothing segment. The results of both versions have shown three best positive and three best negative statements that can be used for both product categories. Flynn, Goldsmith and Eastman (1996) similarly created evaluation scales for measuring fashion Opinion Leaders. According to previous findings by Rogers and Cartano (1962) their created a set of rating scales that were tested in the same manner as in the previous example. This resulted in six statements that can be used for various categories of products including fashion. Three positive statements from Goldsmith and Hofacker were selected for determining an Innovator (1 I'm aware of new trends ahead of my friends. 2 If I learn that a shop has a new collection of goods, I would be interested enough to immediately go buy it. 3 I would purchase a new collection of clothing even without trying it on) and three from Flynn, Goldsmith and Eastman for determining the Opinion Leader (1 I often influence the opinions of other people regarding clothing. 2 I often persuade people to buy clothing that I like. 3 My friends and acquaintances buy clothing based on my advice.).

Although Innovators and Opinion Leaders are defined as separate customer categories, Goldsmith and Hofacker (1991) and subsequently also Martinez and Kim (2012) proved that there is a strong positive correlation between them. It can be concluded that Opinion Leaders are very often also Innovators. Despite these findings, many authors continue to use both terms and measure customers according to two sets of items. This approach is also used in this article. However, based on this information, we can formulate the following hypothesis:

H1: Customers who are Innovators are also Opinion Leaders.

Some authors do not only focus on identification of the Fashion Leadership category of customers, but also try to find out what type of people belong to it. For example, Summers (1971) studied Fashion Leaders and their demographic characteristics, finding that Fashion Leaders are young people. The research performed by Goldsmith and Stith (1993) has shown that the Fashion Leaders group were mostly younger customers (average age is 40 years) than the Fashion Non-Leaders (average 46 years). Authors Horridge and Richards (1984) conclude that the group of customers between 25-34 years old is primarily most interested in fashion. Based on this knowledge and in regard to the fact that there is a relation between Innovators and Opinion Leaders, we were able to establish both the hypothesis H2, as well as its partial hypotheses H2a and H2b:

H2: Fashion leaders are people in the age group between 25-40 years.
H2a: Innovators are people in the age group between 25-40 years.
H2b: Opinion leaders are people in the age group between 25-40 years.

It is generally presumed that women are more interested in fashion. This fact was confirmed in research by Summers (1970) and O'Cass (2000). Masson and Bellenger (1973-1974) add that the greatest interest in fashion is among unmarried young women. Hypothesis H3 and partial hypotheses H3a and H3b are based on these findings:

H3: Fashion Leaders are most often women.
H3a: Innovators are most often women.
H3b: Opinion Leaders are most often women.

Despite the number of studies that identified various demographic factors for the Fashion Leaders group, there are also studies that fail to correspond with these results. In 1992, Goldsmith and Flynn stated that the Fashion Leaders group cannot be defined beyond the general age and gender specification using other demographic characteristics. In their opinion, this group of customers is mostly identifiable through their buying habits, such as purchase-frequency and amount spent per purchase. In 2004, Phau and Lo actually came to the conclusion that not gender, age, profession, education and marital status, nor even income levels are different between Fashion Leaders and other customers. Based on these findings, the demographic factors for Fashion Leaders and Non-Fashion Leaders were tested for the purposes of this article. The following hypotheses were tested:

H4: Demographic factors are not statistically significantly different for Fashion Leaders and Non-Fashion Leaders.
H4a: Demographic factors are not statistically significantly different for Innovators and Non-Innovators.
H4b: Demographic factors are not statistically significantly different for Opinion Leaders and Non-Opinion Leaders.

As mentioned above, Goldsmith and Flynn (1992), as well as Michon et al. (2007) and Goldsmith et al. (1991) state that Fashion Leaders may be characterized particularly through their buying habits, among those more frequent purchases or higher spending per purchase. Only customer purchase frequency was tested for the purposes of this article:

H5: Fashion leaders buy more frequently than Non-Fashion Leaders.
H5a: Innovators buy more frequently than Non-Innovators.
H5b: Opinion Leaders buy more frequently than Non-Opinion Leaders.

2 Methods

Quantitative research by electronic questionnaire was selected as the most suitable method for verifying the stipulated hypotheses. A Google – Disk electronic questionnaire was used. The questionnaire was distributed via the Facebook social network. This method was chosen for its quick and free distribution of the questionnaire. The collection of data took place from April 11 to May 20, 2016. The basic set of respondents was targeted at all citizens of the Czech Republic of more than 18 years of age who shop for Common Fashion brands at least occasionally. Thanks to this basic set we were not able to use random methods of sample due to the absence of a sampling frame. Judgmental selection method was chosen as the most suitable method. According to this author's previous research, the category of young people up to 30 years old, with high-school or university education was identified as the largest group shopping for Common Fashion brands and was therefore also most represented in this research.

2.1 Respondents Sample

A total of 794 respondents participated in the research, fulfilling the main condition of being buyers of Common Fashion brands. Mostly women who have awareness of which brands they buy participated in the research (55.5%). Men (44.5%) were often unable to properly fill out the questionnaire and were disqualified from the sample. According to original expectations, the older age groups, over 55 years, shop for

Common Brands very seldom and therefore are not significantly represented in this sample (Table 1).

Tab. 1: Segmentation of Respondents According to Age

Class	Age	Frequency	%
1	18 - 24	251	31.6
2	25 - 34	281	35.4
3	35 - 44	160	20.2
4	45 - 54	92	11.6
5	55 - 64	10	1.3

Source: Author

Primarily people with university education and also those with high-school education with completed final exams participated in the research (Table 2).

Tab. 2: Segmentation of Respondents According to Education

Class	Education	Frequency	%
1	primary	7	0.88
2	secondary without diploma	69	8.7
3	secondary with diploma	319	40.2
4	colledge	399	50.3

Source: Author

Respondents were also asked about the net income of their household. Income is shown in Table 3, both in Czech Crowns and transposed to Euros.

Tab. 3: Segmentation of Respondents According to Income

Class	Income CZ/Euro	Frequency	%
1	up to 9 999/370	34	4.4
2	10 000 - 19 999 /371-741	85	11.1
3	20 000 - 29 999 /742-1111	168	22
4	30 000 - 39 999/1112-1482	160	20.9
5	40 000 - 49 999/1483-1852	120	15.7
6	50 000 - 59 999/1853-2222	95	12.4
7	60 000 and more/ 2223 and more	103	13.5

Source: Author

The last demographic characteristic was the size of their hometown according to its population. The distribution of respondents was quite even here. Respondents from villages represented the smallest group (11%), the largest group was from smaller cities (Table 4).

Tab. 4: Segmentation of Respondents According to Size of Their Home Location – Population

Class	size of hometown	Frequency	%
1	up to 999	99	11.7
2	1 000 – 9 999	171	20.9
3	10 000 – 49 999	212	26.2
4	50 000 – 100 000	119	14.4
5	over 100 000	193	23.8

Source: Author

The respondents were asked a question regarding the frequency of their purchases of Common Fashion clothing in order to identify their buying habits. Respondents most often shop several times per year, to the contrary, only 1.5% of respondents shop extremely frequently (Table 5).

Tab. 5: Segmentation of Respondents According to Purchase Frequency

Class	Frequence of purchase	Frequency	%
1	Every week	11	1.4
2	Several times per month	132	16.6
3	Once a month	182	22.9
4	Several times per quarter	150	18.9
5	Several times per year	277	34.9
6	Maximum once a year	42	5.3

Source: Author

3 Problem solving

The data analysis took place in several phases. First the reliability and validity of the rating scales were reviewed. Subsequently a confirmatory factor analysis took place, intending to identify whether the rating scale questions are among the measured latent variables. In the next phase, the percentage of Innovators and Opinion Leaders was established using descriptive statistics. The hypotheses were tested using Two-sample t-tests.

3.1 Reliability and Validity Analyses

Three items developed by Goldsmith and Hofacker (1991) were used to identify the Innovators and three items developed by Flynn, Goldsmith and Eastman (1996) were used for measuring the Opinion Leaders. Both constructs were found to be reliable as their individual Composite Reliability (CR) values are greater than the floor estimate of 0.7 (Fornell and Larcker, 1981), specifically Innovators CR=0.73 and Opinion Leaders CR=0.84. Subsequently their validity was measured. Validity may be divided into two basic types, *Content Validity* and *Construct Validity* that is further composed of *Convergent Validity* and *Discriminant Validity* (Campbell and Fiske, 1959). Content validity represents the relevance requirement between the research goal and achieved results. All statements used in this research were adopted from professional publications and therefore their content validity is ensured. The Construct validity involves the assessment of the degree to which an operationalization correctly measures its targeted variables (O'Leary-Kelly and Vokurka, 1998). According to them, this validity includes the empiric calculation of unidimensionality, reliability and validity. For the purpose of this article, unidimensionality was identified for the entire model using Comparative Fit Index (CFI). CFI (Table 6) reached 0.999, signifying strong unidimensionality. Convergent validity identifies to which degree various methods of measuring variability provide identical results (O'Leary-Kelly and Vokurka, 1998). Convergent validity can be measured using Cronbach Alpha (CR) (Cronbach, 1951) and Average Variance Explained (AVE) (Bagozzi a Yi, 1988). According to Hair et al (2010) the mutual ratio of CR > 0.7, CR > AVE and AVE > 0.5 must be met. CR for the latent variable Innovator reached CR= 0.73 and AVE = 0.52. As apparent from these results, these conditions were met near the limits. This was primarily caused by the lower correlation of rating scale number 3. Despite that, we can consider the result as satisfactory. The latent variables of Opinion Leaders reached better convergent validity, where CR = 0.84 and AVE = 0.64. In this case the validity conditions are very well satisfied. Discriminant validity is only measured in situations, where the model includes more latent variables than two and this it is not stated here.

3.2 Confirmatory Factor Analysis

Confirmatory factor analysis was implemented in the second step. This analysis is used in situations where, based on the theory, we have established two sets of items intended to measure latent (unmeasurable) variables, in this case Innovators and Opinion Leaders. Confirmation analysis verifies whether the individual items belong to the latent variable and whether they sufficiently explain it (Hendl, 2004). This analysis was performed using the AMOS software specifically designed for measuring latent variables. The program is able to predict the created model according a number of indexes and calculates the individual regression scales between the measured variables. In this case the model was predicted using Comparative Fit Index (CFI), using classic P-value, normal chi-square CMIN/df, Goodness of Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI), Root Mean Square Error of Approximation (RMSEA) and P close. Table 6 shows all measured indexed and their recommended values, as well as the results of the model. The given recommended values are generally recognized and commonly stated in a number of marketing-oriented publications. As apparent from the table, all calculated indexes are sufficient and the model was therefore estimated correctly.

Table 6: Measured Indexes, Recommended Values and Model Results

Indices	Recommended value	Model fit indices
GFI	> 0.95	0.977
P-value	>0.05	0.257
CFI	> 0.95	0.999
CMIN/df	< 3	1.291
AGFI	> 0.80	0.988
RMSEA	< 0.05	0.020
P close	> 0.05	0.912

Source: Original output from the AMOS software

Table 7 shows all 6 measured variables loaded significantly on their respective constructs with markedly high estimates as inferred from the AMOS output. The table shows estimate non-standardized as well as estimate standardized regressive scales, standard errors (C.R) for both latent variables and the P-value in the 99% level of significance.

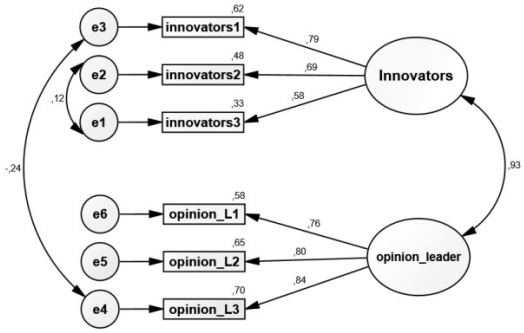
Tab. 7: Regression Weights

Items	Path	Construct	Estimate Unstdzd.	Estimate Stdzd.	C.R.	P-value
Innovators 1	←	Innovators	1.000	0.786	11.291	
Innovators 2	←	Innovators	0.813	0.690		***
Innovators 3	←	Innovators	0.792	0.575		***
opinion leaders 1	←	Opinion leaders	1.000	0.760	11.487	
opinion leaders 2	←	Opinion leaders	1.042	0.805		***
opinion leaders 3	←	Opinion leaders	1.073	0.836		***

(***: P-value < 0.01) *Source: Original output from the AMOS software*

The following Figure 1 depicts the entire model fit including estimated regressive standardized scales. Also two covariances were added to the model. Those covariances offer suggested remedies to discrepancies between the proposed and estimated model. Generally, we should not covary error terms with other error terms that are not part of the same factor. In this model we covary error terms 1 and 2 and also 3 and 4. Error terms 3 and 4 are part of the two diferent factors, however both factors are very similar. The correlation between both latent factors (the Innovators and the Opinion Leaders) reached 0.928, signifying an extremely strong dependency. Therefore we can add error terms 3 and 4 together.

Figure 1: Confirmatory Factor Analysis – Model fit



Source: Original output from the AMOS software

3.3 Establishing Innovators and Opinion Leaders

Confirmatory factor analysis confirmed that the individual rating scales do relate to the Innovator and Opinion Leader categories. The next step was to determine the percentage of Innovators and Opinion Leaders found in the Czech population. The questionnaire used three scales for each, evaluated in a Likert scale from 1 – absolutely agree to 7 – absolutely disagree. The median (neutral) was therefore number 4, the values 1, 2, 3 were positive (I agree) and the values 5, 6, 7 were negative (I disagree). To uncover the Innovators and Opinion Leaders, the results of the three items of the respective category were summed up for each respondent. Only a respondent who reached a maximum 9 point evaluation was identified as Innovator or Opinion Leader, meaning that they responded to each item in maximum with 3 points.

A characteristic position, specifically percentiles, was calculated from the final sums of all the respondents. The value of 9 corresponds to the percentiles 8%, 9% and 10% for the Innovators and the percentiles 9% and 10% for the opinion leaders. We can therefore say that in the Czech population that buys Common Fashion brands, 10% are Innovators and 10% are Opinion Leaders.

3.4 T-test for Verification of Relations

The individual respondents were divided into two groups, Innovators and Non-Innovators, as well as Opinion Leaders and Non- Opinion Leaders, respectively, in order to verify the hypotheses. The differences in the individual demographic factors of gender, age, education, household income and size of hometown, were identified between these two groups. The difference in fashion purchase frequency was also identified between the individual groups of customers. Each demographic factor, as well as purchase frequency were answered using closed questions with predetermined answer options (see the Sample of Respondents chapter).

Each answer was subsequently assigned a number and the average was calculated both for the group of Innovators/Opinion Leaders and for group of Non-Innovators/Non-Opinion Leaders. The resulting averages were tested using a Two-sample t-test (Hendl, 2004), where the hypothesis H0 stated that differences between means in Innovators and Non-Innovators, as well as Opinion Leaders and Non-Opinion Leaders, does not exist. Hypothesis H1: non H0. All hypotheses were tested on the level of 95% significance.

Table 8: T-Test in Innovators and Non-Innovators

Demographic characteristics and purchasing frequency	Innovators			Non- innovators			t-statistic	P-value
	observation counts	Mean scores	Standard deviation	observation counts	Mean scores	Standard deviation		
gender	87	1.76	0.4304	638	1.53	0.4995	4.072	**0.001**
age	87	2.09	1.0414	638	2.17	1.0125	0.693	0.488
education	87	2.15	0.7076	638	2.43	0.6466	3.746	**0.001**
income	82	4.4	1.6126	612	4.19	1.705	1.098	0.272
size of hometown	87	3.18	1.3428	638	3.23	1.3562	0.311	0.756
Frequence of purchase	87	2.05	1.088	638	3.01	1.1946	7.095	**0.000**

Source: Original output from the Statgraphics software

Table 8 presents the results of the Two-sample t-test for the group of Innovators and Non-Innovators and also observation counts and standard deviation for each group. As is apparent from the results, there are statistically significantly different averages in case of gender (men – 1, women – 2), where Innovators have a higher average and therefore are mostly represented by women. Also the difference in averages was statistically confirmed in the factor of education (basic education – 1 up to university – 4). Innovators are therefore people with lower education. The largest significant difference in averages was recorded in the purchase frequency factor (from weekly – 1 up to maximally once per year – 6), where Innovators shop much more often than Non-Innovators.

Table 9: T- Test in Opinion Leaders and Non-Opinion Leaders

Demographic characteristics and purchasing frequency	Opinion leader			Non- opinion leader			t-statistic	P-value
	observation counts	Mean scores	Standard deviation	observation counts	Mean scores	Standard deviation		
gender	114	1.77	0.4214	680	1.52	0.5	5.03	**0.000**
age	114	2.12	1.1062	680	2.16	1.0237	0.358	0.721
education	114	2.25	0.7355	678	2.43	0.6413	2.811	**0.005**
income	111	4.31	1.6722	654	4.22	1.7017	0.486	0.627
size of hometown	114	3.18	1.3119	680	3.25	1.3647	0.521	0.602
Frequence of purchase	114	3.25	1.2868	680	3.95	1.2139	5.707	**0.000**

Source: Original output from the Statgraphics software

Results very similar to Innovators were also found in Opinion Leaders (Table 9). The statistically significant difference between the Opinion Leaders and Non-Opinion Leaders was also found in the factors of gender and education. Again, the largest difference in averages was identified in purchase frequency. Opinion Leaders are therefore mostly women and those with lower education, who purchase Common Fashion more frequently than Non-Opinion Leaders.

4 Discussion

The goal of this article was to identify a group of Innovators and Opinion Leaders among Czech customers who buy Common Fashion brands. Rating scales from authors Goldsmith and Hofacker (1991) were used to identify Innovators, while rating scales from Flynn, Goldsmith and Eastman (1996) were used to identify Opinion Leaders. The research proved that, in the Czech Republic, 10% of the population could be jointly identified as Innovators and Opinion Leaders. This result corresponds with research results by Goldsmith et al. (1999) but it is 6 % lower compared to Phau and Lo (2004). Therefore, we can assume differences in the percentage of Innovators and Opinion Leaders in various countries.

The article also formulated five hypotheses. The first hypothesis, H1, verified whether there is a mutual relationship between the group of Innovators and Opinion Leaders. A very strong correlation was proven (correlation coefficient = 0.928),

indicating that both these groups could be considered practically identical. We can therefore state that in the Czech Republic, Innovators are simultaneously Opinion Leaders. In other words, those who most frequently buy latest trends also provide information about these trends to others around them and advise their friends in selecting fashion and accessories. We therefore recommend a focus on the joint category of Fashion Leaders in future research without the need to divide customers to Innovators and Opinion Leaders.

Further hypotheses focused on demographic factors typical for Fashion Leaders, specifically for Innovators and Opinion Leaders. Hypotheses H2, H2a and H2b, focusing on the age of Fashion Leaders were not possible to prove. We cannot therefore state that only people younger than 40 years are Fashion Leaders.

On the other hand, hypotheses H3, H3a and H3b confirm that Fashion Leaders are primarily women, which is consistent with the generally acknowledged presumption that women feel more strongly about fashion than men (Cho and Workman, 2011; Hansen and Jensen, 2009). However, some research indicates that the Fashion Leaders category cannot be defined according to any demographic factors (Huddleston, et al., 1993; Phau and Lo, 2004). Hypothesis H4 that was based on this premise must be rejected.

Not only did the research prove that women are more often Fashion Leaders, also the existence of a statistically significant difference in the level of education between Fashion Leaders and Non-Fashion Leaders was found. Fashion leaders are people with lower education than Non-Fashion Leaders. Hypothesis H5, focusing on purchase frequency, was confirmed. It is purchase frequency that specifically represents the greatest difference between the category of Fashion Leaders and Non-Fashion Leaders. This fact was confirmed by Workman (2010).

Conclusion

We conclude that Fashion Leaders (covering Innovators and Opinion Leaders) are mostly women, people with lower education and customers who shop very often. It is precisely the Fashion Leaders category that marketing managers working in the fashion industry can approach to help them promote new fashion collections and spread general fashion awareness. Many of them already utilize this opportunity by collaborating with Bloggers and Youtubers, who could certainly be included in the Fashion Leaders category.

It can be assumed that this collaboration will be very beneficial in the future for both the actual companies in terms of gaining new customers and in terms of the overall awareness regarding fashion in the Czech Republic.

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MODELLING CORPORATE INCOME TAX REVENUES IN LATVIA

Velga Ozolina, Astra Auzina-Emsina

Abstract: *The article is devoted to the issues of modelling and forecasting corporate income tax revenues in Latvia. Analysis of legal aspects and data shows that it is necessary to distinguish between advance payments (usually monthly payments) and final tax payments made in March, April or May. Following the usual practice, both identities and econometric equations are estimated for forecasting the corporate income tax revenues. Such factors as profit, private consumption price index, exports, wages, private consumption and investment are used as the factors along the tax rate. It is possible to use estimated monthly econometric equation for the short-term forecasting as it provides reasonably precise results and demands less assumptions as the other proposed models, but forecasts should be evaluated together with the results of identities. Estimated equations have to be applied together with the reliable models of influencing factors. The research findings are valuable for other countries as corporate income tax is a standard tax in fiscal system in all EU and other countries.*

Keywords: *Corporate income tax revenues, Tax revenues modelling, Tax revenues forecasting, Factors, Latvia.*

JEL Classification: *C51, C52, H25, H68.*

Introduction

Government budget planning process in Latvia as in any other country implies the estimation of the government expenditures and revenues, which are balanced with the respect of a particular budget surplus or deficit, usually expressed as % of GDP. Thus it is very important to get plausible estimates of the revenues, because otherwise expenditures would turn out to be too high and would not allow reaching the budget deficit target, or expenditures would turn out to be too low, hindering economic growth.

The main taxes in Latvia from the point of view of government revenues are social contributions, value added tax, personal income tax, excise taxes and corporate income tax. Payments of most of the main taxes are calculated when the value of tax base is clear. Depending on the status of tax payers, these taxes are usually paid on monthly or quarterly basis as final tax payments, although advance payments are also possible.

On the other hand, corporate income tax payments are mostly advance payments and actual tax base is used only for calculation of the final tax payment after the annual report of the company is filed in the State Revenue Service. Advance payments are calculated, taking into account previous tax payments and changes in price level, however, adjustments are also possible, if a company becomes more profitable or faces difficulties in its operation. Therefore it is not easy to make plausible monthly corporate income tax revenues forecasts.

Literature review shows that the research related to the corporate income tax is more often related to the effects of the tax rate on the economic growth (see (Macek

2015) for more details) and capital structure (Kedzior 2012) or the effects of tax competition (Griffith et al. 2014), unification of tax base in the EU (Oestreicher & Koch 2011) and the activities of multinational enterprises (Haufler et al. 2008; Hong & Smart 2010; Eichner & Runkel 2011; Keuschnigg & Devereux 2013). There are also studies that focus on changes in tax legislation showing the positive impact of actual or potential tax reforms (Masso et al. 2013; Azacis & Gillman 2010). There are even studies like (Acosta-González et al. 2014), which use taxes, including the corporate income tax, to determine the level of the shadow economy. Less attention is paid to the modelling of tax revenues as such. Interesting conclusion can be found in (Buettner & Kauder 2010), which states that the revenue forecasts are more accurate, if they are independent from the government manipulation.

The aim of the article is to evaluate several models of the corporate income tax revenues and their possible use for short-term forecasting. Monthly data of January 1995-December 2016 provided by the Treasury of Latvia (Treasury 2017) are used to develop monthly and quarterly models. Annual data of 1995-2015 provided by the Central Statistical Bureau (CSB) of Latvia (CSB 2017) together with the data of the Treasury are used for the annual model. The same samples are used for factors needed in the models unless smaller dataset is available in the CSB database.

1 Statement of a problem

The system of taxes and duties in Latvia is regulated by the law On Taxes and Duties and laws related to particular types of taxes (Ministry of Finance 2017). The main laws regulating corporate income tax are law On Corporate (Enterprise) Income Tax and Micro-enterprise Tax Law. These laws include also significant information for modelling and forecasting tax revenues such as tax base, tax rates, dates of payments etc. Also the changes in legal acts can be significant and thus also influence the modelling process.

Corporate income tax is paid by all the enterprises in Latvia, except several charities. Tax base is profit, which is calculated according to the law. For residents the tax base includes all income received both domestic and abroad, for non-residents it includes only particular income types or income from commercial activities. Profit stated in the annual report of enterprises is raised by several groups of expenditures like representation, operations in stock market etc. Profit is lowered by other tax payments, specific charity, research expenditures etc. Income for selling fixed assets can be deducted from the profit, if the money is invested in new fixed assets. To facilitate investments, since 2006 additional coefficient of amortization is used, this results in a smaller taxable income. Before 2006 tax relieves on investment were used. Till 2013 additional coefficients on amortization were used also to facilitate regional development. Investment activities are facilitated also by tax relieves on initial investment in particular projects (once in 10 years), which can be used in 16 years, if tax payment is smaller than tax relief. Taxable income can also be used to cover losses from the previous years.

Corporate income tax rate is 15% and it is stable since the 2004, when it replaced the previous rate of 25%. For non-residents tax rate varies between 2% and 30% depending on the income type. Taxes on income paid in other countries are deducted from the tax payments to the extent to which they would be paid in Latvia. Tax is paid

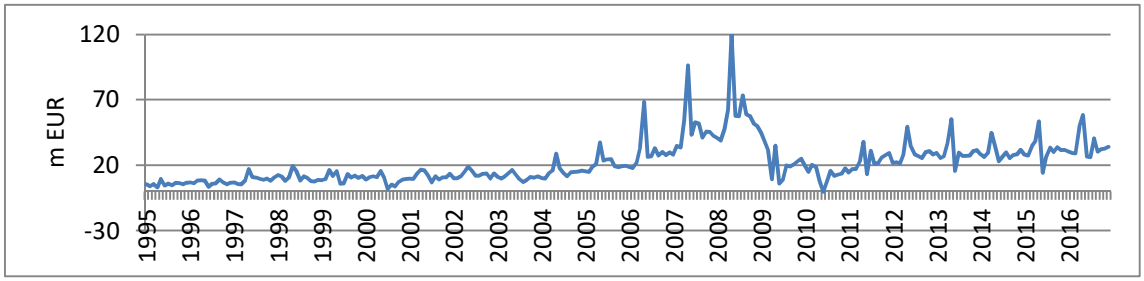
in 15 days after the annual report is filed. According to the Annual Report Law, annual reports can be filed to the State Revenue Service not later than one month after the annual report has been approved and not later than 4 months after the end of the year.

Advance payments are made mostly on monthly basis. The amount of advance payments is calculated, taking into account tax payments with 2 years / 1 year lag (depending on the date when annual report is filed) and official consumption price index in the previous year, but exceptions are possible. Advance payments, which exceed calculated tax payment can be transferred to tax liabilities, to future tax payments or paid back within 30 days.

In addition, if the enterprise is a micro-enterprise tax payer and limited liability company, 1.9% (till 2016 4.9%) of micro-enterprise tax revenues are transferred to the corporate income tax revenues account. Micro-enterprise tax base is annual turnover and revenues of employees, if they exceed 720 EUR. Since 2017, micro-enterprise tax rate is 15% (previously 9% in the first 3 years of operation, afterwards 12%), if there are 5 employees or less in the enterprise. The rate increases by 2%points for each additional employee. The rate is 20% for the turnover, which exceeds 100 000 EUR. Micro-enterprise tax is paid each quarter till the 15th day of the subsequent month. As CSB uses different criteria for classification of the enterprises, it is not possible to determine the significance of micro-enterprises and thus quarterly payments of corporate income tax. However, it is known that the share of micro-enterprise tax revenues in corporate income tax revenues is small and thus should not considerably influence the structure of the tax payments within the year.

Dynamics of monthly revenues of corporate income tax is shown in Figure 1. We can see that the revenues are usually higher in May, but in other months revenues usually do not differ much. The main reason is that final corporate income tax payments are paid after the annual reports are filed, which can be as late as in May and depends on profit, but advance payments are calculated based on the tax payments in the previous years. Although advance payments can be adjusted taking into account the performance of enterprises, it is nevertheless hard to predict the actual profits, which often leads to higher final payments of the corporate income tax.

Fig. 1: Corporate Income Tax Revenues in Latvia in 2005-2016, m EUR



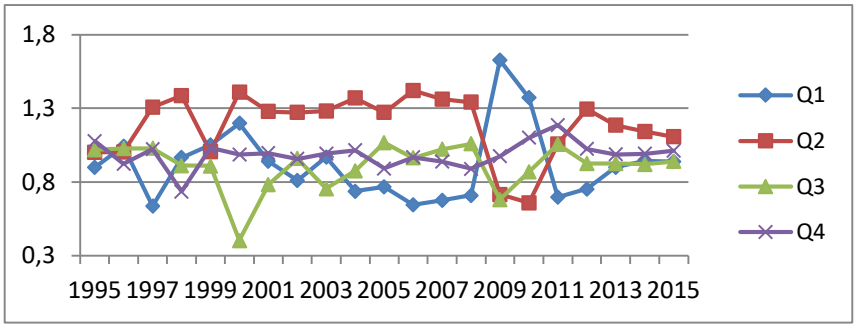
Source: Authors' own elaboration according to (Treasury 2017)

Seasonal patterns of different kinds are usually analysed using seasonality indexes. In this case seasonality indexes were calculated by dividing the revenues in each month or quarter by the average monthly or quarterly revenues in each year. Quarterly pattern of the corporate income tax is not very explicit and stable (see Figure 2). However, the general trend is that the 1st quarter comes with lower values, the 2nd quarter has the highest values, but the 3rd and 4th quarters are in the middle. Increase in

the value of seasonal index for the 1st quarter and decrease for the 2nd quarter after 2013 may indicate that the advance payments are lately estimated more precisely.

Analysis of monthly seasonal indexes argues that there is no strong evidence of the higher tax revenues in the first month in each quarter, therefore monthly payments of corporate income tax dominate over quarterly payments. The highest values of seasonal indexes are usually associated with May. However in some cases the values are high also in April and March and during the economic crisis (in 2008-2010) also in January and February.

Fig. 2: Quarterly Seasonal indexes of the corporate income tax revenues in Latvia in 1995-2015



Source: Authors' own elaboration according to (Treasury 2017)

Analysis of the seasonal indexes indicates that it is necessary to distinguish among advance payments and final payments when modelling corporate income tax revenues. Moreover, final payments should be related to May in most cases or spread among March, April and May.

2 Methods

One of two main approaches can be applied for tax revenues modeling. It is possible to use identities, where effective tax rate or coefficient, characterizing tax rate, is multiplied by appropriate tax base. Traditionally tax base is endogenous and tax rate – exogenous (Willman & Estrada 2002). Moreover, effective tax rate is calculated as a ratio of tax revenues and tax base. In case of corporate income tax revenues, tax base can be profit of enterprises (Willman & Estrada 2002; Livermore 2004) or gross operating surplus (Kattai 2005). In macroeconomic models profits are usually calculated similar as gross operating surplus – GDP minus earnings of employees (wages multiplied by number of employees) minus indirect taxes.

The second approach is based on the estimation of econometric equations, which usually include tax base as the main factor. Econometric equations make it possible to use a wider range of influencing factors, including tax rates officially stated in legal acts and tax reliefs (Ozoliņa & Pocs 2013). Also mixed approach can be used – identities can be used for calculation of tax revenues and econometric equations for calculation of efficient tax rate.

In the quarterly and monthly level, data on profits are not available, therefore it is necessary to understand, what factors influence profits. From the macroeconomic point of view, profits before taxes can be calculated as investment minus non-business saving plus dividends and corporate profits taxes. Moreover, sources of profits determine profits (Levy et al. 2008). It means that sources of profits or even factors

influencing the sources of profits can be used to model corporate income tax revenues. For example, investment, exports, imports and price levels can be used as the factors.

3 Problem solving

Within the research, models are made in 3 levels – monthly, quarterly and annual. The Treasury data (national classification) are used in monthly and quarterly calculations and CSB data (ESA 2010 classification) are used in annual calculations.

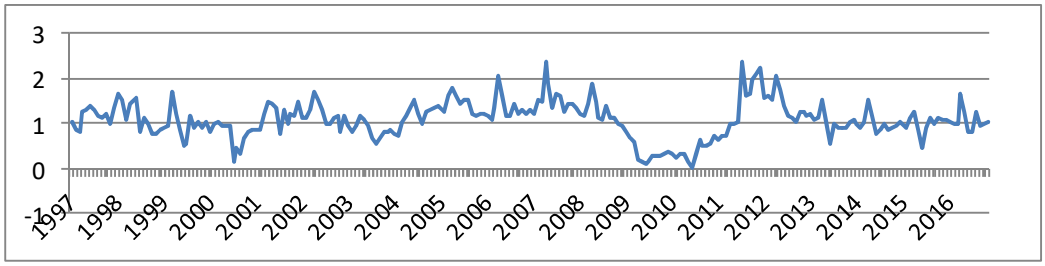
Two options can be used for modelling monthly revenues of corporate income tax. The first option is related to the official regulations – the way advance payments and final payment of taxes are usually calculated and afterwards paid in the budget. Equation (1) shows that monthly revenues of corporate income tax are influenced by the tax payments made in the previous two years adjusted for inflation and profit in the previous year. It should be noted that advance payments from January to May are influenced by the tax payments made 2 years ago, but from June to December – by the tax payments made 1 year ago. Profit is taken into account only in May, when final calculations are made.

$$CITR = coefmon * CITRlag *(1 + PCIinfl/100)/12 + coefmay *PROFlag/100, \quad (1)$$

where *CITR* – corporate income tax revenues; *CITRlag* – annual corporate income tax revenues with 6-17-month lag (for example, in June 2015 to May 2016 the value of annual corporate income tax revenues of 2014 is used); *coefmon* – corporate income tax advance payments coefficient; *PCIinfl* – annual growth rate of private consumption price index in the previous year; *coefmay* – corporate income tax revenues coefficient applied only in May; *PROFlag* – annual profit in the previous year.

The values of the corporate income tax advance payments coefficient fluctuates around 1 (see Figure 3).

Fig. 3: Dynamics of the Corporate Income Tax Advance Payments Coefficient in Latvia in 2005- 2016

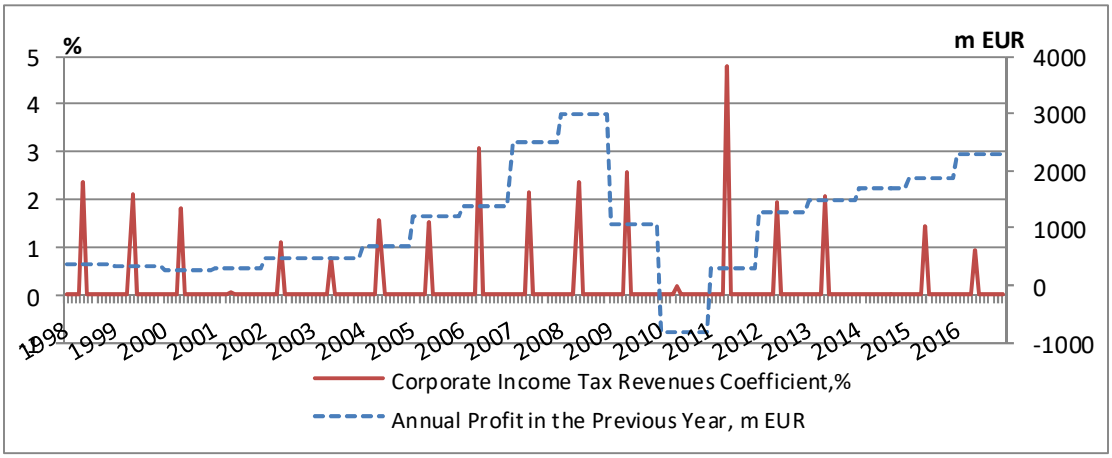


Source: Source: Authors' calculations

If the value of the coefficient is less than 1, advance payments are downward adjusted and/or taxes are not paid in due time and companies are closing their business. If the value of the coefficient is larger than 1, advance payments are upward adjusted and/or new tax payers arise (new companies, more non-residents etc.). The values are comparatively low during the global economic crisis and comparatively high in 2012 – just after the crisis. The corporate income tax revenues coefficient (applied in May) basically shows what part of tax payments is not covered by the advance payments. The average value of the coefficient in 1998-2013 is 1.9, which means that approximately 10% of tax payments are not covered by the advance payments (afterwards this share decreases). Exception can be seen in 2010, when the

final payment should have been a negative number (money paid back or reserved for the future tax payments). The value of the coefficient is actually positive, because in total companies were working with losses in 2010. Figure 4 shows that the general trend is that the values of the corporate income tax revenues coefficient increase, when profit tends to increase and vice versa.

Fig. 4: Dynamics of the Corporate Income Tax Revenues Coefficient and Annual Profit in Latvia in 1998- 2016



Source: Authors' own elaboration according to (Treasury 2017; CSB 2017)

If the equation (1) is used for forecasting, only values of two macroeconomic indicators have to be estimated before, as well as two coefficients. However, profit is a tricky variable to forecast. Therefore alternative approaches should be used as well. Thus for econometric equation other macroeconomic variables available monthly were tested. Econometric equation (2) was estimated, taking into account that both advance payments and final payment of corporate income tax is based on the past information – with the lag of 6 up to even 24 month. But the payments are adjusted following the recent trends, therefore 12 month was chosen as a maximum lag. Exports, personal consumption and wages were chosen as the factors influencing the profit.

$$\ln(CITR) = \alpha + \beta_1 \ln(PCI(-12)) + \beta_2 6\ln(EX(-12)) + \beta_2 \ln(EX(-3)) + \\ + \beta_4 DFP^* \ln(EX(-12)) + \beta_5 \ln(W\_NOM(-7)) + \beta_6 TAXR + \beta_7 D\_00 + \\ + \beta_8 D\_09 + \beta_9 D\_10\_C^* \ln(W\_MIN(-12)), \quad (2)$$

where *CITR* – corporate income tax revenues; *PCI* – private consumption price index; *EX* – exports; *W_NOM* – gross nominal wages; *TAXR* – corporate income tax rate; *W_MIN* – minimum wage; *DFP* – dummy of final payments (0.3-1 in March, April and/or May, 0 otherwise); *D_00* – dummy (June to September 2000 = 1, 0 otherwise); *D_09* – dummy (April to July 2009 = 1, 0 otherwise); *D_10_C* – dummy (since 2010 = 1, 0 otherwise).

Several final payment dummies were tested in order to get more precise results, because, for example, in 2014 higher corporate income tax revenues were collected in April and not in May, as before. Therefore seasonal indexes were analysed in order to determine, whether final tax payments could be made also in April or March. Two types of dummies were tested – traditional ones with the values 0 or 1 (for March, April or May, in case the value of seasonal index was relatively high) and "cumulative effect" dummies, where the total value of dummy for final payments was split among

the months (the sum of this dummy is 1 in each year). The "cumulative effect" dummy was chosen, as it ensured a better fit (see the estimated coefficients in Table 1).

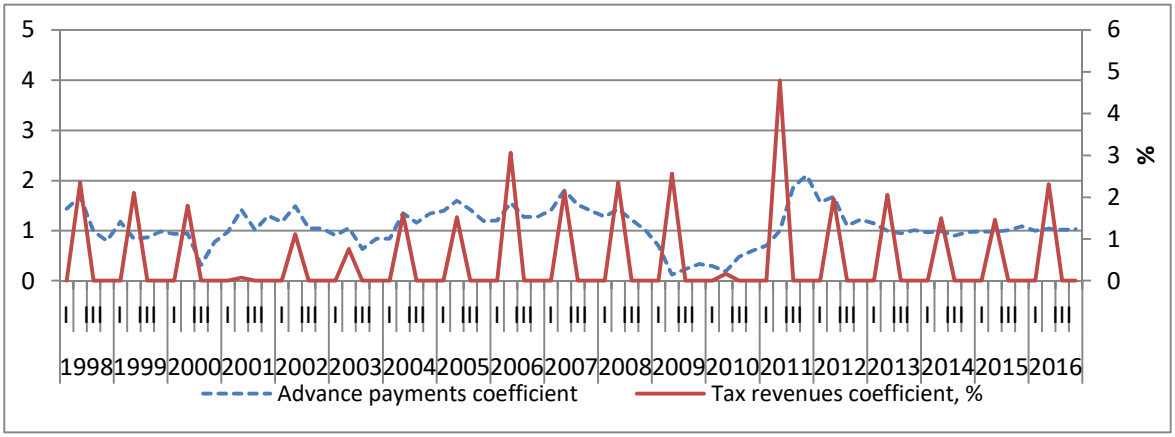
Tab. 1: OLS Models of Corporate Income Tax Revenues of Latvia

Monthly Equation, dependent variable ln(*CITR*)		**Quarterly Equation, dependent variable ln(*CITR*)**		**Annual Equation, dependent variable ln(*CITR/PCI*)**	
Variable	Coefficient, significance	Variable	Coefficient, significance	Variable	Coefficient, significance
const.	0.04	const.	-6.0 *	const.	-4.2 *
ln(*PCI*(-12))	-2.64 *	ln(*INV*)	0.38 *	log(*INV_FP*(-1))	0.64 *
ln(*EX*(-12))	0.64 *	ln(*INV*(-4))	0.60 *	*D_10*	-0.61 **
ln(*EX*(-3))	0.84 *	ln(*INV*(-8))	-0.68 *		
*DFP**ln(*EX*(-12))	0.16 *	*@seas(2)**ln(*INV*(-2))	0.04 *		
ln(*W_NOM*(-7))	0.86 *	ln(*CONS*(-2))	0.96 *		
TAXR	4.68 *	*TAXR*	3.31 **		
D_00	-0.87 *				
D_09	-1.07 *				
*D_10_C**ln(*W_MIN*(-12))	-0.13 *				
R^2adj	0.86	R^2adj	0.87	R^2adj	0.71
DW	1.88	DW	1.63	DW	1.55
** denotes significance at 1% level, ** at 5% level					

Source: Authors' calculations

In the initial equation there were comparatively large residuals in 2000 and 2009, which suggested that the periods of the crisis could be withdrawn from the estimation sample. Therefore two additional dummies were used in equation (2).

Fig. 5: Dynamics of Corporate Income Tax Coefficients in Latvia in 2005-2016



Source: Authors' calculations

In quarterly calculations equation (1) adjusted to quarterly data is used for identity-based modelling. The values of corporate income tax advance payments coefficient and corporate income tax revenues coefficient (for final payments) are shown in Figure 5. The values of the tax revenues coefficient related to the final tax payments are taken from the monthly calculations (in 2014 and 2016 the values are adjusted due to the high revenues in April). The values of the advance payments coefficients are calculated the same way as in the monthly calculations, but in the 2nd quarter they are adjusted taking into account the values of the final payments. With the exception of 2009-2012, the values of advance payments coefficients are relatively stable.

As an alternative, equation (3) was estimated using private consumption expenditures and investment as the main factors. The idea behind the factor choice is similar as in monthly calculations – to choose variables, which characterize economic development and thus show, how advance payments can be adjusted.

$$\ln(CITR) = \alpha + \beta_1 \ln(INV) + \beta_2 \ln(INV(-4)) + \beta_3 \ln(INV(-8)) + \\ + \beta_4 @seas(2) * \ln(INV(-2)) + \beta_5 \ln(CONS(-2)) + \beta_6 TAXR, \quad (3)$$

where *CITR* – corporate income tax revenues; *INV* – gross capital formation; *CONS* – private consumption expenditures; *TAXR* – corporate income tax rate; *@seas(2)* – dummy of the 2nd quarter (1=2nd quarter, 0 – otherwise). See the estimated coefficients in Table 1.

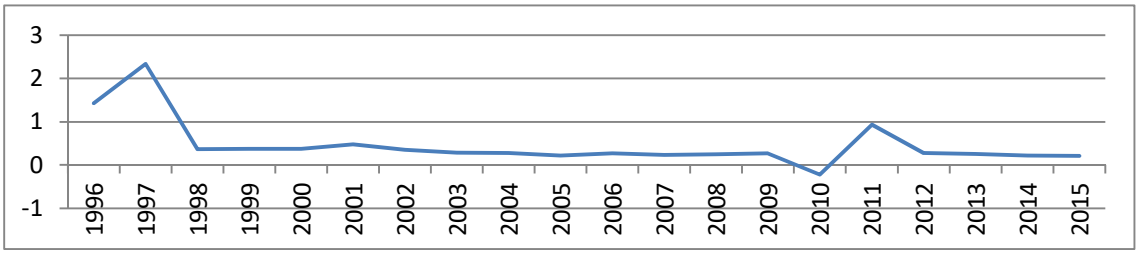
Annual models usually reveal medium and long-term trends and relationships among economic variables. Therefore short-term forecasts by annual models are not always very accurate. As a result identities (the same as in the quarterly calculations) are preferred in annual level, if the values of exogenous indicators are reasonably stable and thus predictable. On the other hand, if the tax base is not easy to predict, econometric equations may prove useful. Using annual data and identity approach corporate income tax revenues can be calculated with the equation (4) with profit in the previous year as the tax base (tax rate is not used here, as it is relatively stable and changes are not planned in near future, only the tax rate coefficient which can be interpreted as the effective tax rate).

$$tax\_rev = taxr\_coef * tax\_base, \quad (4)$$

where *tax_rev* – tax revenues; *taxr_coef* – tax rate coefficient; *tax_base* – tax base.

The values of the tax rate coefficient are relatively stable (see Fig.6), however the pattern changes dramatically in 2010-2011, which can be attributed to the effects of the crisis.

Fig. 6: Dynamics of the Tax Rate Coefficient of the Corporate Income Tax in Latvia in 1996-2015



Source: Authors' calculations

In order to obtain alternative forecasts econometric equation (5) was estimated using investment in the previous year as a factor.

$$\ln(CITR/PCI) = -4.2 + 0.6 \ln(INV\_FP(-1)) - 1.0 D\_10, \quad (5)$$

where *CITR* – corporate income tax revenues; *PCI* – private consumption price index; *INV_FP* – gross capital formation at constant prices; *D_10* – dummy (in 2010 = 1; 0 – otherwise). See the estimated coefficients in Table 1.

The final modelling step in annual calculations is to transfer forecasts from ESA 2010 methodology to the national methodology in order to use the forecasts in national

budget planning. For this purpose simple coefficient is used. In case of the corporate income tax revenues, the value of this coefficient is close to 1 (0.99 on average in 1995-2015). Further the quarterly and annual values can be transferred to monthly projections using seasonal indexes.

4 Results and Discussion

Precision of forecasts generally depends on two things – the reliability of the chosen method and on the assumptions regarding exogenous indicators and coefficients. In case of identity-based approach, it is not possible to estimate the accuracy of the future values of exogenous indicators. However, in case of econometric equations it is possible to check, whether their previous performance results in accurate forecasts. For this purpose chosen equations were estimated till the end of 2014 (Month 14 and Quarter 14) and till the end of 2015 (Month 15 and Quarter 15) and then forecasts were calculated till the December of 2016. The monthly forecasts were aggregated to quarterly forecasts and the accuracy of forecasts was evaluated using Mean Absolute Percentage Error[1] (MAPE) as a criterion (see Table2).

Tab. 2: Mean Absolute Percentage Errors of Quarterly Forecasts, %

Period	Month 14	Month 15	Quarter 14	Quarter 15
2015	7.7	x	3.7	x
Q1	5.5	x	1.0	x
Q2	17.1	x	5.0	x
Q3	2.1	x	6.4	x
Q4	6.2	x	2.4	x
2016	7.2	6.6	13.3	13.2
Q1	13.0	9.9	8.5	8.2
Q2	9.3	11.0	14.8	15.0
Q3	0.4	2.0	16.6	16.3
Q4	5.9	3.3	x	x

x – no results possible due to the method applied

Source: Authors' calculations

From the Table 2 we can see that if the equations are estimated using data till the end of 2014, quarterly equation gives more precise results for 2015. Critical period is the 2nd quarter, where the value of MAPE is very high for monthly equation (17.1%) due to the unexpectedly low corporate income tax revenues in June (almost half as much as forecasted and as in July, which is the next smallest revenue value in 2015). In quarterly forecasts the value of MAPE was comparatively high in the 2nd (5.0%) and the 3rd (6.4%) quarters. However, in 2016 monthly equations give better results, except in the 1st quarter. It means that econometric equations can be used for forecasting; however obtained forecasts for the 1st and the 2nd quarter have to be adjusted, using results from other models or expert evaluations.

[1] Formula of MAPE is: $MAPE = \frac{1}{n}\sum_{t=1}^{n}\frac{|\varepsilon_t|}{y_t} \cdot 100$, where ε_t – error, y_t – actual data, n – number of errors

Tab. 3: Mean Absolute Percentage Errors of Annual Forecasts, %

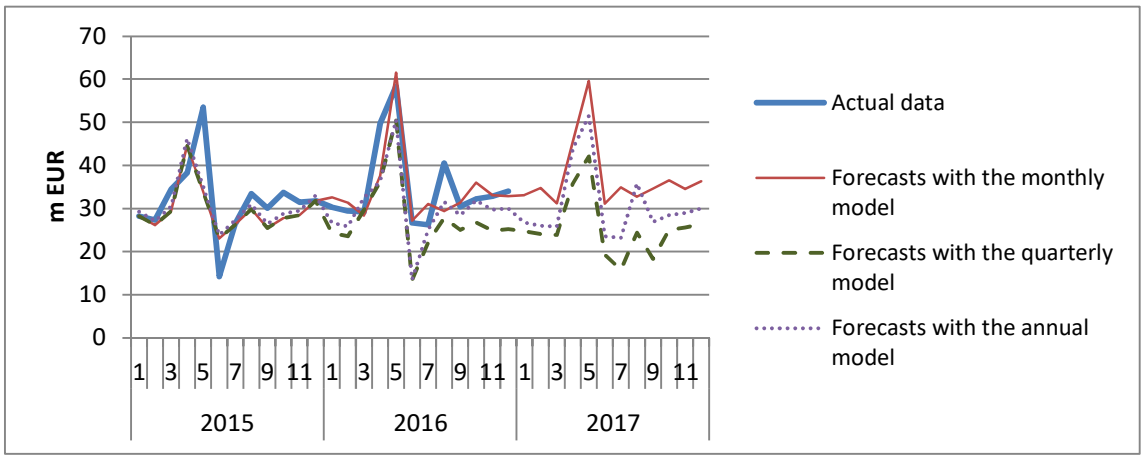
Model	2015	2016
Month 14	8.1	1.3
Month 15	x	1.1
Quarter 14	1.0	10.4
Quarter 15	x	10.3
Year 14	4.6	13.2
Year 15	x	12.9

x – no results possible due to the method applied

Source: Authors' calculations

Similar procedure was carried out for annual forecasts. Annual econometric model was estimated till 2014 and 2015, and then forecasted for 2015 and/or 2016. It was assumed that the tax revenues in both national and ESA 2010 classifications do not differ. MAPE of this forecast (Year 14) in 2015 is 4.6% (see Table 3), which is relatively small, but higher than for quarterly forecasts in 2015. However, in 2016 both annual forecasts (Year 14 and Year 15) are the least precise of all. Monthly equations provide quite accurate annual forecasts in 2016. This may mean that 2016 may include important structural changes or export should be tested as a factor influencing the corporate income tax revenues also in quarterly and annual models. Indeed, annual econometric equation with exports as the main factor helps reducing the value of MAPE to 2.8% in 2015 and 7.8-8.5% in 2016; however with the quarterly data it was not possible to specify a more precise equation using exports as a factor.

Fig. 7: Forecasts of Corporate Income Tax Revenues in Latvia using Econometric Models in 2014-2017



Source: Authors' calculations

Monthly forecasts of corporate income tax revenues obtained by the econometric equations for 2015-2017 are given in Figure 7.We can see that the quarterly model gives comparatively more pessimistic forecasts already in 2016, which indicates that other alternatives should be used instead. Monthly econometric model gives more precise forecasts for 2016, as it uses only the actual data. In 2017 these forecasts are the most optimistic ones.

As the analysis of MAPE showed, econometric equations tend to be too optimistic or pessimistic in the 1st and the 2nd quarter, therefore it is advisable to use mixed

forecasts – monthly econometric forecasts mixed with the quarterly and/or annual forecasts using identities, as well as expert evaluations.

Conclusions

It is possible to use the estimated monthly econometric equation for the short-term forecasting as it provides reasonably precise results and demands less assumptions as other proposed models, but it has to be evaluated together with the results of the identities, involving additional assumptions regarding advance payments and final tax payments coefficient. For the quarterly and annual econometric equations a more appropriate combination of factors or alternative factors should be considered. The use of the annual identity depends on the credibility of the future estimates of the profit, which is a comparatively complicated indicator to forecast. Estimated equations have to be applied together with the reliable models of influencing factors. The proposed equations should be tested each year and additional factors should be considered in case the tax laws change which influence the tax base and/or effective tax rate. The research findings are valuable for other countries as corporate income tax is a standard tax in fiscal system in all EU and other countries.

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THE ROLE OF MASS MEDIA IN CRISIS COMMUNICATION

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Abstract: *The objective of our work was to identify the role mass media play in crisis communication. We chose the "methanol affair" as an example of a crisis situation which seriously affected the health and lives of people. We wanted to find out whether there are links between the number of published articles and the subsequent volume of spirits sold during the crisis situation in the Czech Republic such as the methanol affair. We used regression analysis and established that the number of articles related to the methanol affair significantly influenced the sales of spirits. The publication of each article was followed by a decrease in sales of spirits and vice versa, i.e., following a decline in the number of articles, sale volumes went up. Negative consequences have also been reported by producers whose annual sales have fallen in a year-to-year comparison. Last but not least, the government also suffered a loss by collecting significantly less money from excise duty as well as other taxes (VAT, income tax). The role of mass media is crucial in crisis communication, businesses should not underestimate the cooperation with mass media and they should be the first to promptly inform the mass media so that they can maintain the confidence of consumers.*

Keywords: *Crisis situation, Crisis communication, Influence of mass media, Decline in sales volumes, Excise duty.*

JEL Classification: *M37, M19.*

Introduction

It is extremely important for most manufacturers whether their business (or their product) is evaluated by consumers as trustworthy and safe. The interest of consumers drops as soon as there are any doubts about product quality. Should such doubts be connected with a real impact on human health and lives, it can have a fatal impact on further operations of a business. This imbalance results in a crisis situation a business must deal with without delay.

Ideally, businesses should be able to prevent potential crises, however, there are situations where it is impossible without prejudice. For example, a crisis can originate in another business which offers similar products. Subsequent medialization of the case then results in mistrust of all similar products. We had such a situation in the Czech Republic in 2012 and the case is generally known as the methanol affair.

A well-managed business should anticipate all risks within its risk management programme, nonetheless, it is not always possible as the above-stated example shows. Once the first symptoms of a crisis have arisen, the business' management should immediately establish a crisis team, which will then develop a crisis plan. The situation should first be thoroughly analysed and steps taken upon the established facts. Each crisis plan should most decidedly respect all principles of crisis communication. Competences must be exactly defined (who will communicate on behalf of the enterprise), the means of communication will be selected (particularly printed mass

media and electronic mass media) and, last but not least, the content, i.e., what shall be communicated. Crisis planning at the level of business enterprises was dealt with by Penrose (2000), for example. He established that businesses are increasingly interested in crisis management and they want to be prepared for crisis situations so as to be able to respond to situations which have arisen and eliminate possible negative impacts. Similar conclusions were made by Johansen et. al. (2012) as well. The situation is different in small business enterprises (up to 25 employees). Only 10% of these deal with crisis management (Spillan and Hough, 2003).

1 Statement on a problem

Crisis situations with a wide-ranging impact occur all around the world. Many of them are analysed and published afterwards, e.g., the "Tylenol crisis" (Chicago) in which 7 people died after being administered Tylenol medicament (Gorman, 2006). In similar situations, mass media intervene in the crisis communication of a business enterprise, i.e., both serious mass media, primarily taking on the role of a source of information, and tabloids. Tabloids present information in such a way as to attract the widest possible number of readers, even at the cost of correctness, which can have very serious consequences especially in the case of crisis situations.

Social media also play a considerable role. Fišer and Mišič found that young people (students at Maribor University) look very critically and sceptically at mass media and show very little interest in watching the news on TV, for example. They distinguish between public media (which they trust more) and commercial media (where trust is considerably lower). However, it was social networks which are shown to be the preferred source of information (Fišer and Mišič, 2015).

The influence of the media on consumers is also confirmed by Vilella-Vila and Costa-Font (2008). The most important daily newspapers in Great Britain and Spain informed about the issue of genetically modified food. The authors conducted the research repeatedly (in 1999 and 2002). They established that in 1999, when the mass media repeatedly and frequently informed the public about the risks related to genetically modified food over a long period of time, respondents showed very negative attitudes towards it. After three years, when the media stopped writing about the issue, the public attitude changed. More respondents saw benefits in genetically modified food and fewer risks as well. Similar studies dealing with genetically modified food were published by Oguz (2009), Tongyang et al. (2015), for example. Social media play a very important role here, as well (Scherman et al. 2015; Stephen and Galak, 2012).

The influence of mass media is apparent also in situations we cannot consider as critical. Theobald et al. (2006) verified an increased demand (especially from females) for cosmetic dentistry confirmed by stomatologists (such as teeth whitening) after TV programmes which frequently focused on cosmetic dentistry.

Businesses must work closely with mass media within their crisis communication, as these can considerable influence public opinion. In some crisis situations, proper communication can save human lives. For example, disasters affecting large populations. The crisis communication of the Chinese government during the earthquakes in Sichuan was analysed by Chen (2009). The large investigation established that the strategy and all

the measures taken by the government, particularly the effective information provided to the public, helped reduce the impacts of the catastrophe.

A catastrophe can also be seen in situations where food or drinks containing poisonous ingredients are distributed on the market and can consequently damage human health or cause death.

Consumers´ behaviour towards dangerous food is very sensitive. Vermeir and Verbeke (2008) verified shopping habits in students. They concluded that students are willing to pay more for environmentally-friendly products which do not contain substances harmful to health.

Xiao and Kim (2009) conducted a large research and divided consumers into individualists (who prefer brand products to satisfy emotional and social needs) and collectivists (who prefer brand articles because they link them with quality and credibility). In this case, credibility is bound to safety, i.e., food safety.

Food safety and quality was dealt with by Röhr et al. (2005), as well. They repeatedly conducted a similar investigation and concluded that consumers can be divided into two groups – price-sensitive consumers and those sensitive to food safety.

This proved true in the Czech Republic, when the so-called methanol affair affected primarily price-sensitive consumers. However, we suppose it has impacted other segments, i.e., consumers sensitive to food safety, spirits manufacturers and the government.

Our article deals with both the influence of mass media in crisis situations and the impacts on individual segments.

2 Methods

The objective of the work was to identify how mass media influenced the sale volumes of spirits as a result of the so-called methanol affair and what the impacts of the crisis situation were on other entities (consumers, producer and government)

The so-called methanol affair is one of the crisis situations with the most tragic consequences in the current track record of the Czech Republic. A group of businessmen who wanted to avoid paying tax illegally produced spirits containing a high percentage of methanol. Consumption of this substance can cause lasting damage to human health or even death. These spirits were illegally distributed on the market as well and it was consumers sensitive to price who bought them (Röhr et al., 2005).

The first spirit consumption-related death occurred in September 2012. More deaths followed in the following weeks all over the country. 48 people in total died.

The first measure taken was an official ban on sales of spirits with over 30% content of alcohol, followed by a prohibition on all drinks containing more than 20% of alcohol. Neighbouring countries (Poland, Slovakia, Russia) immediately responded with a prohibition on the import of these spirits from the Czech Republic. The whole progress of the crisis situation was given great attention by the mass media. We wanted to establish whether the media communication influences the shopping behaviour of consumers. Our first research question was whether the number of articles published in the mass media influenced the sales of spirits.

We worked with secondary data taken from more sources, e.g., the company Anopres IT, a.s. (Anopres IT, 2016), which provides professional monitoring of mass media (press, TV, radio, Internet) and ACNielsen Czech Republic s.r.o. (ACNielsen, 2016) , which is engaged in monitoring sales volumes and consumer behaviour, and we also used data from financial statements of individual spirits producers (Ministerstvo spravedlnosti, 2016a až 2016d).

Anopres IT monitors the most important sources of information. Their monitoring also includes articles from national daily newspapers (e.g., Hospodářské noviny, Lidové noviny, Mladá fronta Dnes), radio (e.g., ČRo, Hitrádio, Blaník), TV (e.g., ČT 1, NOVA, PRIMA Family), regional magazines and daily newspapers (e.g., Ústecký deník), magazines (Ekonom, Respekt, E15), and the Internet (websites of printed daily newspapers, ceska-justice.cz, dtest.cz).

3 Problem solving

We restricted the period in which we monitored the influence of published articles on the volumes of sold spirits. The first article on the methanol affair was issued in the first week of September 2012, so we started with this week. The monitoring was finished after one year, i.e., the last week in September 2013. From October 2013, information focusing on this issue occurred sporadically, usually in relation to the punishment of guilty persons rather than the direct threat to consumers.

The number of articles in individual weeks in the monitored period was established from the Anopress IT database based on the entered key words. The news contained negative information (mentioned the number of victims, informed about new cases of poisoning, police procedures to find the offenders).

The information on the sales volumes of spirits was obtained from the ACNielsen database. A line chart was developed based on these two sources.

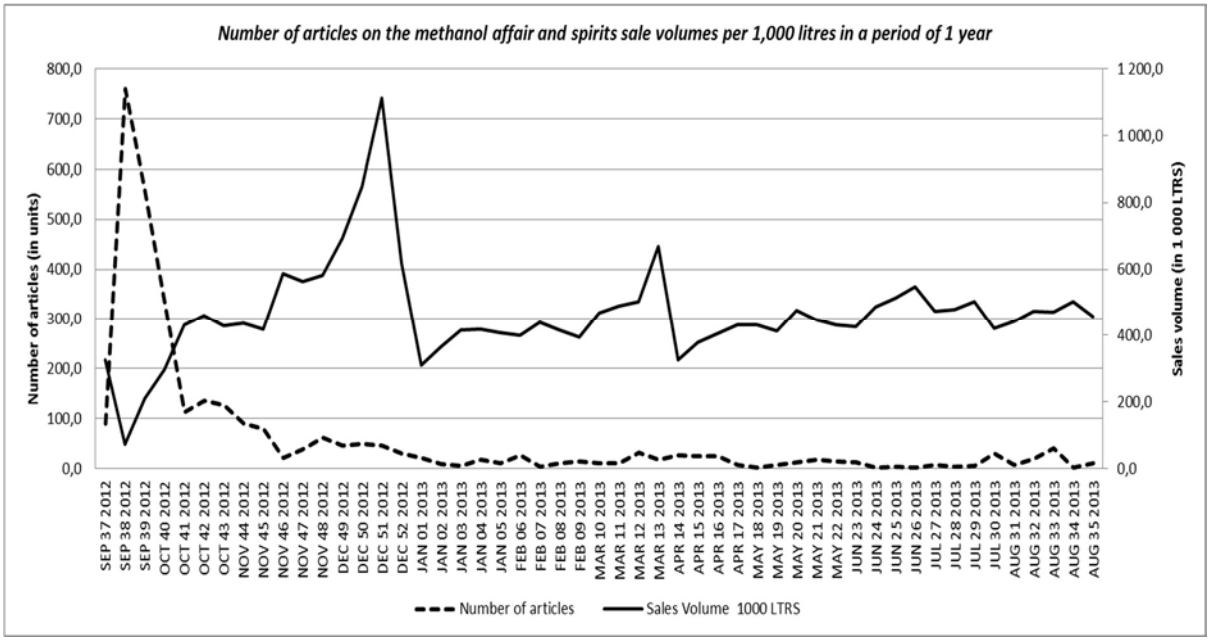
Chart 1 shows that the most articles were published in September 2012, i.e., at the time the crisis situation started with the first death. Sales of spirits dropped well below usual figures. In the following weeks, the number of articles significantly declined. A moderate increase was apparent particularly when a new case of poisoning or death occurred. The sales line apparently shows the increase at pre-Christmas time, followed by the Easter period, which is a typical seasonal fluctuation trend for spirits.

In September 2013, i.e., one year after the breakout of the methanol affair, the number of articles went up moderately – the mass media used the opportunity of the "one-year anniversary". However, sales were not influenced by the increase as no information on any acute threats was published.

Our research question was whether the number of articles in the media influenced the volumes of spirits sold during the crisis situation (the so-called methanol affair). We used regression analysis to establish the dependence. The input data were the data for the whole specified period, i.e., from the first week in September 2012 until the end of September 2013. P value = 0.003 was established, which is less than the limit value of 0.05. So, we can confirm that the number of articles on the methanol affair influenced the volumes of spirits sold. The final figure was -0.435. If the number of articles fell by one, the sales of spirits in the specific week increased by approximately 430 litres. The established value of the correlation coefficient is -0.39. Hence, there is a minor indirect

dependence, i.e., the more articles on the methanol affair that were published, the lower the sales volumes.

Chart 1: Development of spirits sales per 1,000 litres and number of articles on the methanol affair in the Czech Republic from September 2012 until the end of September 2013

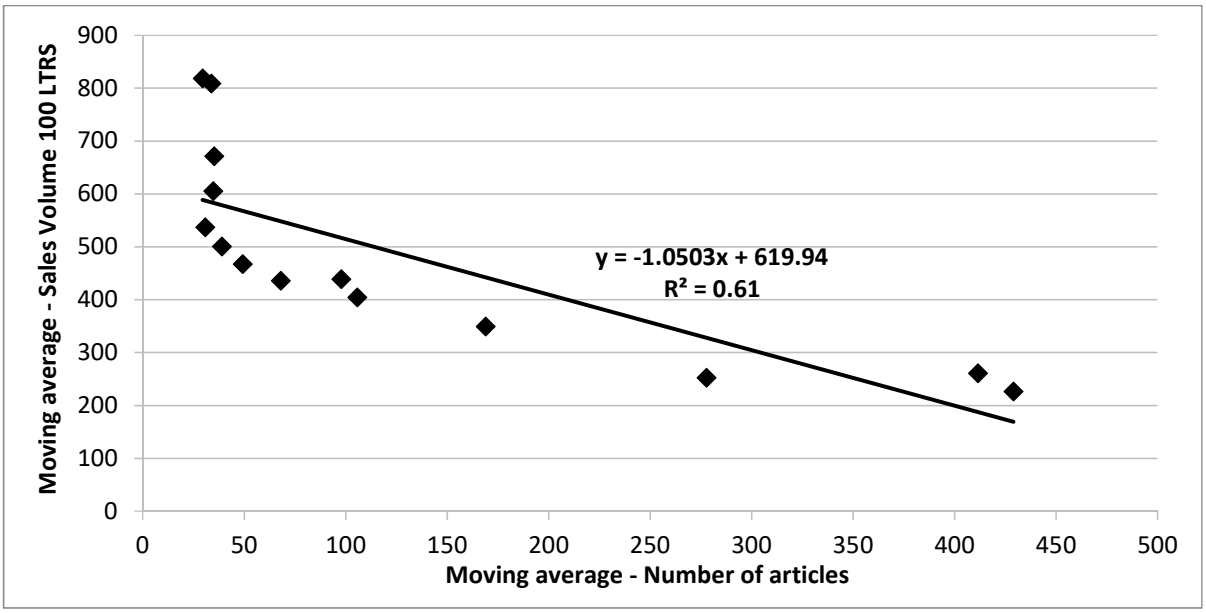


Source: Own processing

As Chart 1 apparently shows, the most news dealing with the methanol affair occurred from the first week in September until the end of 2012. For the subsequent calculation, we used moving averages (4 weeks) to compensate for more significant fluctuations (either as a result of further deaths or as a result of seasonal sales). The second reason for using moving averages was the fact that the influence of articles has a certain echo effect, i.e., not only is it manifested immediately after the article was published, but also in the following period.

The established P value= 0.001 was even lower than in the case of the first calculation. The value of the index determination is 0.61, from which it follows that the variability of spirit sales volumes was determined by 61 % of the number of articles. The final figure from the regression analysis was -1.05. This means that with each following article in this period sales of spirits declined by approximately 1,050 litres. The calculated correlation coefficient of -0.78 confirmed a strong and indirect dependence. Over a shorter time period with the used moving average the correlation coefficient was significantly stronger than in the period from September 2012 to September 2013. Our research question can then be positively answered. Figure 2 shows a graphical representation of data relating to the moving averages in the period from September to the end of 2012, together with the regression line. **The number of articles in the mass media which related to the methanol affair significantly influenced the quantity of spirits sold.**

Chart 2: Relation between the number of articles on methanol and the sale of spirits per 1,000 liters in the Czech Republic from September to the end of September 2012



Source: own processing

A regression analysis was also performed for the following period, i.e. from the beginning of the year to September 2013. The curve of the regression line appeared insignificant at the 5% level of significance (p-value = 0.07). The value of the correlation coefficient was only 0.29. It follows from both these values that the number of articles after the beginning of 2013 no longer affected the sales of spirits.

We were also interested in the impact on individual spirits producers on the Czech market. The data for the following calculation were taken from the financial statements of individual companies. It was not possible to obtain partial data which would indicate a decline in the sales volumes of spirits, however, it is obvious that the total sales of all legal producers dropped particularly during the methanol affair.

Tab. 1 Sales development showing sales of own products and services

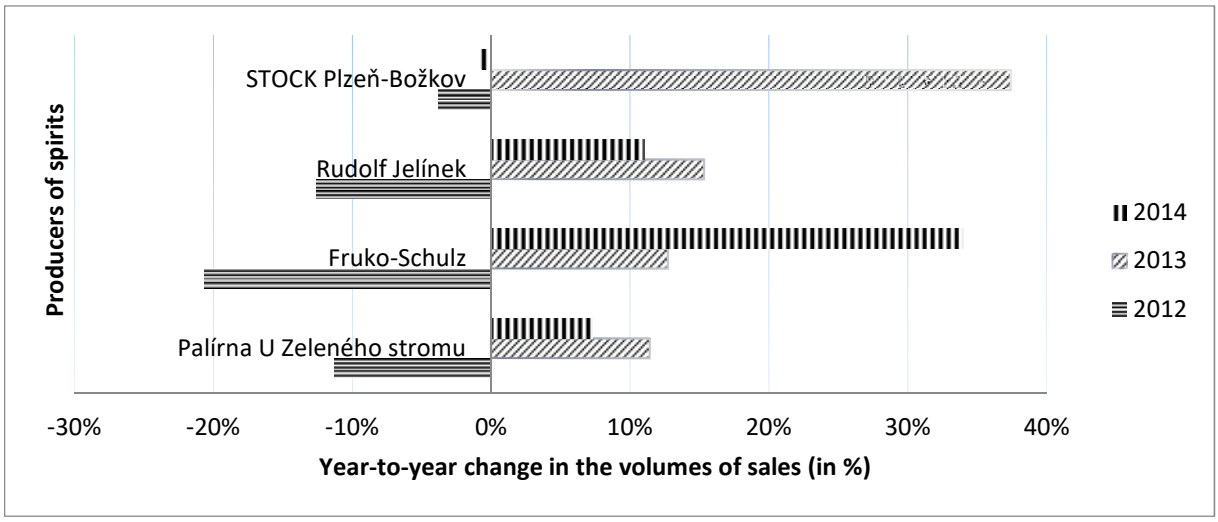
(Figures in thousands of CZK)

	2011	2012	2013	2014
STOCK Plzeň Božkov	1,639,569	1,577,408	2,167,808	2,148,841
Rudolf Jelínek	313,077	273,652	315,609	350,505
Fruko-Schutz	183,236	145,382	163,893	219,673
Palírna U Zeleného stromu	522,152	463,231	516,179	554 055

Source: own processing

The sales reported by the biggest players in spirits production in the Czech Republic were taken to calculate year-to-year changes in the volumes of sales from selling own products and services. The established values are shown in Chart 3.

Chart 3: Year-to-year change in the volumes of sales of the largest spirits producers in the Czech Republic

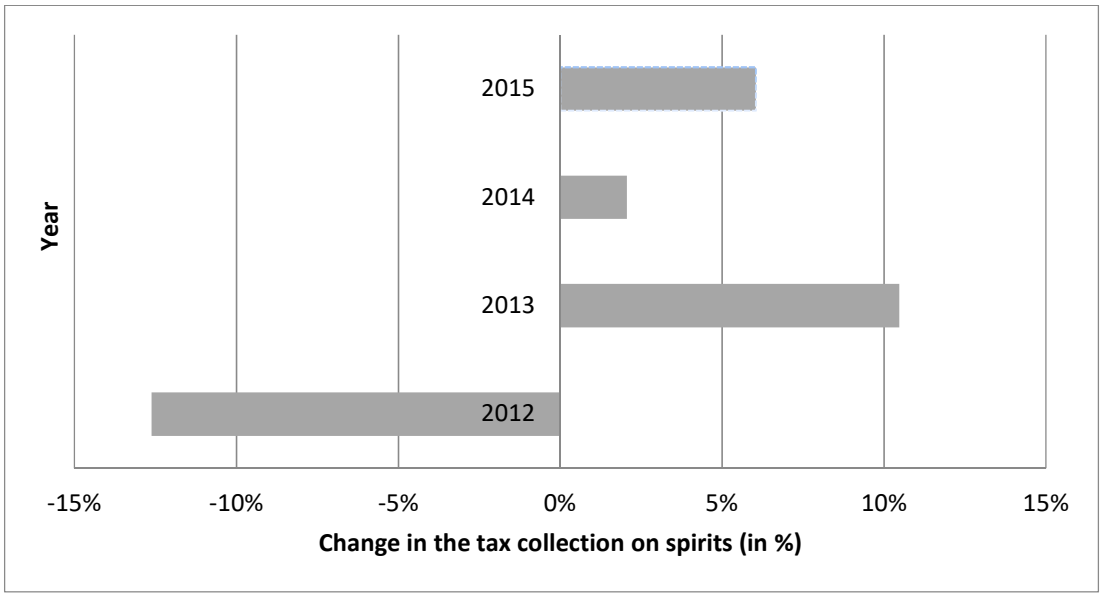


Source: own processing

The values show that in 2012, all spirits producers reported a year-to-year decline in sales of own products and services. The biggest decline was reported by Fruko-Schutz (more than 20 %), followed by Rudolf Jelínek with nearly 13 % and Palírna U Zeleného stromu with 11 %. STOCK Plzeň Božkov, which recorded a year-to-year decline of nearly 4 %, suffered the least impact in the crisis situation.

In the final part of our work we will also focus on the impact of the methanol affair from the point of view of the government. Chart 4 shows values of the collected excise duty. The collected excise duty is lower than the imposed tax, because the figure already includes the returned tax. Compared to the imposed tax, the collected tax also includes tax on imports from third countries.

Chart 4: Year-to-year change in the tax collection on spirits between 2011-2015



Source: Own processing

Chart 4 apparently shows that the methanol affair in 2012 considerably affected the amount of tax collected on spirits. In 2012, the total amount collected from excise duty on spirits dropped by nearly 13 %, which amounts to approximately 870 million CZK

in absolute figures. Lower sales volumes of spirits were also reported in the following periods. The amount collected for excise duties on spirits did not return to the figures of 2011 until two years later.

Apart from the above-stated impact of the methanol affair on the collection of excise duty on spirit, the crisis situation was also reflected in value added tax as well as the income tax of legal entities (see Table 1 Year-to-year decline in sales). Apparently, the methanol affair had very serious impacts on all stakeholders – consumers, producers as well as the government.

4 Discussion

Similar crisis situations have occurred in other countries as well. Dorazín (2016) informed about tragic deaths as a result of methanol poisoning in Irkutsk. Spirits are costly there so people consume other alcoholic drinks. In this particular case, it was a cosmetic preparation for baths which is cheap and at the same time has a high content of spirit. 77 deaths were reported. A similar situation had occurred before in Russia. In 2006, 15 deaths were reported due to methanol poisoning.

There were further cases of deaths related to methanol consumption. In resorts, there are usually individual deaths as a result of failures of individual persons. In Indonesia, two tourists died after consuming gin in which methanol was found afterwards, similarly, two young females were poisoned in Bali (Pointer, 2013).

The countries which report increased volumes of home-made alcohol in large scales show high rates of deaths. For example, 68 people died in Estonia after consuming home-made spirits (Kreč, 2012), 20 people died in Turkey after consuming illegally distilled spirits, 50 people were hospitalised in Norway in 2002 – 2004, of whom 17 people died. The highest number of methanol-related deaths was reported in India – the east Indian state of Orissa - 200 people, and 170 in Sangrampur (Zdravi.euro.cz, 2016). Hence, a similar situation can occur in any country. The risk grows in countries featuring low purchasing power of the population and at the same time high prices of alcohol, where alcohol is often burdened with high taxes (excise duty, VAT and others). To reduce the consumption of illegally produced alcohol, Lachenmeier et al., (2011) propose reducing the excise duty on spirit. This would reduce the difference in final price of spirits between the legal and "black" markets. However, the government opposes this argument, stating that the subsequent income for the national budget would be reduced. However, our study clearly shows that the state budget income would be considerably reduced as a result of a similar crisis situation. Even though the incentives of consumers for purchasing goods may differ in individual countries (Honkanen and Frewer, 2009; Novotný and Duspiva, 2014; Prescott et al., 2002; Röhr et al., 2005), safety and food safety is a priority in economically advanced countries.

Businesses should not underestimate the preparation of crisis plans. Johansen et al. (2012) conducted research in Denmark and found that there is a relationship between the size of a business and its readiness for crisis situations. They also draw attention to the necessity of internal crisis communication. Consequently, each enterprise should think about co-operating with mass media as the impact is great (Mugwisi, 2015).

Conclusion

The objective of our work was to establish whether there are links between the number of published articles and the subsequent sales volumes of spirits in the period of a crisis situation in the Czech Republic such as the "methanol affair". We have established via regression analysis that the number of articles related to the methanol affair significantly influenced the sales volumes of spirits. With the number of articles reduced by one, sales of spirits in the specific week increased by approximately 430 litres. The more articles that were published on the methanol affair, the lower the sale volumes that were reported. We established from the analysis using moving averages that the variability of sales volumes of spirits was largely determined (61 %) by the changes in the number of articles. With every subsequent article sales of spirits fell by approximately 1,050 litres. The number of articles in the mass media which related to the methanol affair significantly influenced the quantity of spirits sold.

A demonstrable decline in sales must necessarily affect spirits producers as well. We have established from the financial statements of the five most important spirits producers that a year-to-year decline in sales were reported by all of them, one producer reporting more than a 20% year-to-year decline.

The government was in the end affected as well. We managed to calculate the decline in the collected excise duty. It amounts to 13 % (i.e., approximate CZK 870 million). Lower amounts of collected excise duty were reported in the next two years. Logically, other taxes fell as well, such as VAT (lower turnovers) or corporate tax (lower overall sales).

The above-stated shows how important communication in crisis situations is. The mass media can significantly influence the behaviour of consumers. Hence, it is necessary to always cooperate with the media, and particularly proactively provide information in a crisis situation.

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CLUSTERING SMALL AND MEDIUM ENTERPRISES IN THE TRANSPORT INDUSTRY

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Abstract: *Small and medium-sized enterprises are exposed to many risks which could threat their existence. One of possible way, how to reduce these risk is clustering. The cluster initiative represents a set of activities aimed at improving the economic level and competitiveness of small and medium-sized enterprises. Besides of it, cluster initiative helps organizations which interested in cooperation obtain the necessary information. The main goal of the article is identification and analysis of structure of clusters operating in Slovakia and creating the current list of clusters. Further, the article aims at closer examination of the clustering of transport companies in the cluster and other forms of cooperation in Slovakia. On the base of the fact that here does not exist an accurate list of clusters in the Slovak Republic, we decided to create it. We faced many problems which are described in the article. In spite that the list of clusters has certain restrictions we can state that it provides a general overview about the forms of cooperation in Slovakia. We discussed and depicted the structure of clusters according to different criteria in the third part of article. Particularly we focused on forms of cooperation between small and medium-sized transport enterprises.*

Keywords: *Cluster, Cluster initiative, Transport industry, Small and medium enterprises.*

JEL Classification: *M21, R12.*

Introduction

Every enterprise operates in a particular environment. Enterprises are affected by this environment directly or vicariously. The enterprises are affected by various factors from internal and external environment. These factors can have a positive as well as negative character. Positive factors that affect small and medium enterprises (SMEs) are associated mainly with their indoor environment. SMEs have a simpler organizational structure, closer relationships with customers and are able to react more flexibly to market changes.

From the perspective of risk management is more important monitor the factors, whose consequences have a negative character. These factors are divided into external and internal, and are referred to as barriers to business (Mihók, 2010; Šubertová, 2009).

Internal barriers have mainly subjective character and are resulting from the personality of the entrepreneur or manager. They can be characterized as:

- Inherent barriers - They relate mainly to the psychological characteristics of the manager or entrepreneur personality. In relation to risk management is assessed mainly attitude of the entrepreneur / manager to the risk. Inherent barriers may be related to the lack of organizational skills, lack of purposefulness, inability to resolve conflicts, work under pressure ... In this category could be included lack of motivation for business development too.

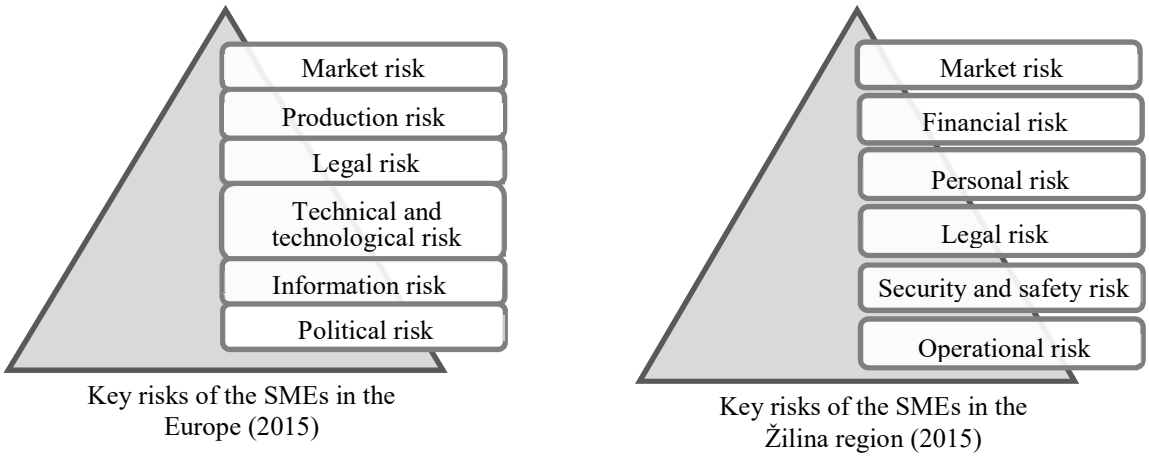
• Acquired barriers - They are associated with personality development and the acquisition of general and specific knowledge. Small enterprises have very often lack knowledge about the requirements related to business. Precisely for this reason are not able to assess market opportunities, formulate strategic goals, assess the financial return of business...

• Capital barriers - It is a lack of own financial resources for doing business, which partly result from the starting (family) capital situation They are also affected by the barriers, which are mentioned above.

External barriers have objective character. They have the same effect on all businesses. Enterprises are able to change these barriers minimally. Some barriers are active in the phase of establishment and formation of SMEs, others throughout the all enterprise life cycle. But most of them are increasing costs for SMEs.

More institutions have dealing with identification of these barriers / risks. Based on the results of their surveys (Key, 2015; Hudáková, 2015) it should be concluded, that SMEs in Europe and specifically in the Žilina region (SK), are most threatened by market risks.

Fig. 1: Comparison of risks, which threaten SMEs in Europe and in Žilina region



Source: Bobáňová, 2017

Progress but also existence of SMEs is most affected by market risks. Factors of market risks are for example price, marketing and market position. These risks are mainly associated with the price creation of raw strategic materials and exchange rates. SMEs cannot greatly influence them by their core activities. Enterprises should focus on areas that they can regulate in some way. They can strengthen their marketing strategy. It includes the creation of the company's reputation (goodwill) and prefers quality over quantity... Very important role for SMEs should be a regular market research. Thanks to research keeps up with the competition, but on the contrary, will always be one step ahead.

SMEs have limited resources. Therefore, it is very difficult for them to face these barriers, and risks. It is advantageous for them to unite and to spread risks and financial demands. The aim of this paper is to point out the most appropriate way of cooperation for SMEs and to provide SMEs an overview of the areas and potential partners in the Slovak Republic (SK) as well as in neighboring countries.

1 Statement of a problem

Enterprises, regardless of their size, can use the various forms of economic cooperation, which enable them to cope with mentioned barriers and risks. Economic cooperation can be based on a formal but also on informal basis and can be carried in one country or internationally. The biggest advantages of this cooperation are: greater certainty turnover greater possibility of access to resources, the possibility of reducing costs (Liška et al, 2004).

Economic cooperation also entails some disadvantages. For example, the problem of minor enterprises with failure to adapt to the working practices and management style of the majority society. This problem stems from different corporate cultures in cooperating enterprises.

If SMEs want to retain its legal personality and draw benefits from the cooperation it is the most appropriate forms of association in clusters. According to Porter cluster is a geographically proximate group of interconnected companies, suppliers, and related institutions in a particular field (Porter, 1998). Members of the cluster are not only SMEs, but also educational institutions, research institutes, local self-government and agencies to support development of business and of region too. Between the members are creating intense, systematic and mutually beneficial relations. These relations are creating on similar or on complementary products, production processes, technologies, demands on natural resources, on specific qualifications or distribution channels (Klastre, 2009).

The importance of clusters is in increasing productivity and competitiveness of enterprises on the national but also international level. Specifically, it is the use of results of scientific and technological development, increasing of specialization, qualification development and employment, supporting new business initiatives (start-ups), achieving economies of scale, use of a common marketing policy … Clusters also deliver benefits to other interested participants, not only to businesses. For educational institutions they bring the possibility of dual education for practical needs as well as applied research and technology transfer into practice. For regions and local self-government in particular mean economic benefits but also the development of infrastructure (transport or information).

1.1 Forms of Cross-Border Cooperation in Cluster Area

The cluster offers a space for establishing an internationally competitive business and it is important for it to provide information about the international markets, trends and innovations. Therefore one of the important tasks, which the cluster organisation but also the companies face, is to initiate the international cooperation. The international cooperation from the point of view of the clusters can be classified into the following groups:

- The international cluster initiative.
- The domestic cluster with foreign participation.
- The cross-border cluster.
- The cross-border cooperation of clusters.

The cluster initiative is understood as an organised activity aimed at improving the level and competitiveness of the cluster organisations (Duman et al, 2009). The group

of the international cooperation can involve establishing various supporting policies, strategies, projects and institutions at the EU level, e.g. the European Cluster Alliance or European Cluster Policy Group.

A domestic cluster with foreign participation represents cooperation based on the membership or collaboration with a foreign company as well as an educational or research institution. This group can be divided into sub-groups according to the involvement of the foreign subject to the domestic cluster:

- A foreign subject is a member of the domestic cluster.
- A foreign subject is the founder member of the domestic cluster.
- The collaboration of the domestic cluster with a foreign company.

The domestic cluster with foreign participation arises on the basis of a certain legal form. In Slovakia it is predominantly an interest association of legal entities and a citizens´ association. The domestic cluster with foreign participation is financed predominantly by the subsidies of the domestic country and membership fees.

The cross-border cluster arises on the basis of the calls of various programmes aimed at cross-border cooperation. The establishment of such a cross-border cluster is determined by working out a project in which the domestic and foreign subjects participate. The cooperation of the subject in the framework of a cross-border cluster is realised with the purpose to achieve the goals of the project, including building and strengthening the foreign relations. The cross-border clusters are e.g. the Hunting and Forestry Cluster of Economic Cooperation and Nature Protection in the border areas of Hungary and Slovakia; the Czech-Slovak-Polish Cluster aimed at common projects in the area of the road, railway and building construction or the Czech and Slovak Industrial Cluster of Collaboration of East Moravia and West Slovakia. The EU funds, governmental co-financing and in a smaller extent co-financing of the involved subject and partners belong to the resources of financing the projects of the cross-border clusters in comparison with a domestic cluster with foreign participation.

The cross-border cooperation of the clusters develops on the basis of the same orientation on a particular economic activity of several countries. E.g. the cooperation of the Automotive Cluster of the Slovak Republic and Moravia-Silesian Automotive Cluster or between the Slovak Plastic Cluster, Czech Plastic Cluster and the Industrial Cluster Bydgoski. There are several examples of such cluster collaboration between countries.

1.2 Support of Clusters in Slovakia

The emergence of the first Slovak clusters was mainly determined by the initiative of the Slovak companies in a certain line of business or region. The legal form of such a companies´ association depends especially on the valid legislation in the particular country. The clusters in Slovakia are mainly established as interest associations of the legal entities and citizens´ associations. These two preferred legal forms seem to be most suitable due to the fact that a legal basis for founding them is missing. The official means of the government support for the clusters were provided for the first time in 2012 by the Ministry of Education, Research and Sport of the Slovak Republic through subsidies aimed at the scientific and technical services (Kaliňák, 2012). The Ministry of Economy will cover the support of clusters through the Scheme for Support of Industrial Cluster

Organisations from 2018. In 2016 seven applicants obtained subsidies for supporting the industrial clusters and three ones were rejected (Zoznam, 2016). On the basis of this document only clusters with the legal form "interest associations of the legal entities" can obtain the subsidies (Schéma, 2014). A cluster with the legal form "citizens´ association" can apply for a subsidy from the Ministry of Economy based on the law No. 71/2013 Coll., about providing subsidies by the Ministry of Economy. Based on this law the purpose of the subsidy for the clusters can be support of the SMEDs, research, development and innovations or development of the industrial production and services (law No. 71/2013, Coll.). Regardless to the legal form of the tourism clusters, the subsidies are provided by the Ministry of Transport, Construction and Regional Development according to the law concerning support of tourism (law No. 91/2010, Coll.). The regional budgets, university budgets or EU structural funds can be introduced as the other possibilities of financing from the public resources. Financing from the public resources is important especially during the initial phases of the cluster life cycles. The financing of the clusters by the private sector is utilised in a smaller extent. The financial contributions of the cluster member companies, membership fees or sponsoring by the subjects that are not the cluster members belong here. Financing from the private resources is utilised during the later phases of the cluster life cycle, the membership fees are very important (Pavelková et al, 2009).

The Slovak Innovation and Energy Agency (SIEA) is providing the information support to the clusters. SIEA published an analytical study Clusters for Support of Innovations in 2009. It can be called the first publication mapping the situation with clusters in Slovakia (Duman et al, 2009). Another analytical study was published in 2015 – Cluster Policy in the Conditions of Slovakia (Balog, 2015). The list of clusters performing in Slovakia shown on the web site of the agency SIEA has not been updated since 2009 and the study Cluster Policy in the Conditions of Slovakia brings a list from 2010. The organisation European Cluster Observatory (ECO) provides more updated information, cluster and cluster policy analyses in Europe. The statistical data about clusters is available until 2011. The Cluster Union of Slovakia deals with the activities for support of the cluster policy development in Slovakia as well as with other activities. The union was established in 2010, currently there are 11 members (the clusters of different orientations) and participates in various international projects. The union currently cooperates in the framework of the project V4 Clusters Go International which is aimed at building international cluster capacities and at orientation on new markets (Únia, 2016).

2 Methods

A list of clusters active in Slovakia was created in the framework of investigating the number and orientation of the clusters in Slovakia. Based on this list the structure of the clusters was analysed. The list with the exact name and orientation of the identified clusters is not part of this article. The information for creating a list of clusters performing in Slovakia was achieved from the register of the interest associations of the legal entities and the register of citizens´ associations published by the Ministry of Interior of the Slovak Republic (Registre 2016). The password "cluster" was entered to the searching field of the registers (according to the name). This list was completed by organisations in the name of which we cannot find the word "cluster". They are e.g. the organisations Biterap, IT Valley, Z@ict and Celim Slovakia which are shown on the

web sites of SIEA and ECO as clusters. The interest associations based on the applications for subsidies for supporting the industrial clusters approved by the Ministry of Economy of the Slovak Republic were added to the list. The Association for Development of the Region Horná Nitra and the Slovak Centre of Productivity belong to the applicants. The list of clusters can be completed also by the interest associations which have in their names words "development of the region", as in the case of the cluster Association for Development of the Region Horná Nitra (an applicant for subsidies for a cluster). In this way it was possible to find 70 clusters, out of which 23 having the legal form "citizens´ association".

Transport clusters were also searched in the registers of published by the Ministry Ministry of Interior. The password "transport" was entered to the searching field of the registers (according to the name). We identified 34 organizations whose activities are aimed at encouraging cooperation between transport enterprises.

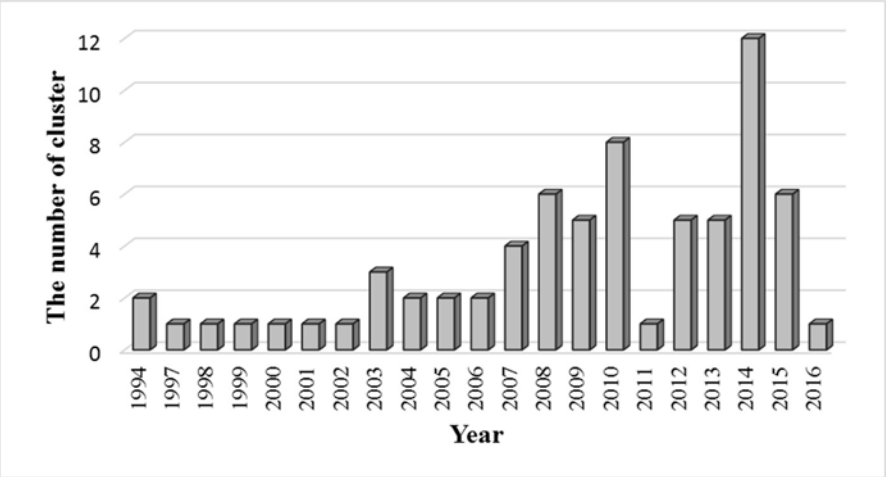
However, this list has three main restrictions. Firstly, it is not possible to say it involves all cluster organisations performing in Slovakia. This restriction results from the procedure how the list was created. Secondly, it is necessary to emphasise that if the cluster is registered in the register of interest or citizens´ associations, this fact does not automatically guarantee the cluster is active. Thirdly, the cluster organisation can have another legal form and it need not inevitably introduce the word "cluster" in its name. Last but not least, it is not possible to speak about an exact definition or a border when we can designate a given association of the companies and other subjects as cooperation without any closer specification or as a cluster. However, the list provides a general survey about the clusters in Slovakia and in this way it creates a theoretical basis for development or possibilities of development of the cluster initiative and policy in the area of the Slovak Republic.

3 Problem solving

The activities aimed at improving the level of the cluster organisations by the government, the subjects of both the public and private sector should be oriented on creating particular measures taking into account the structure of the clusters in Slovakia. The mapping activities of the clusters´ orientation in Slovakia play an important role here. The analytical study Cluster Policy in the Conditions of Slovakia (Balog, 2015) brings a list of 16 clusters which were active in Slovakia until 2010. It is necessary to find out the current number of the clusters and their orientation.

The majority of clusters in Slovakia arose in 2014. Out of 70 clusters included to the research, 12 were registered in the given year. It represents three times the amount of clusters registered during previous two years. They were mainly clusters oriented on tourism as well as associations which were not present in Slovakia at that time – transport clusters (railway and air transport) and an agricultural and food cluster.

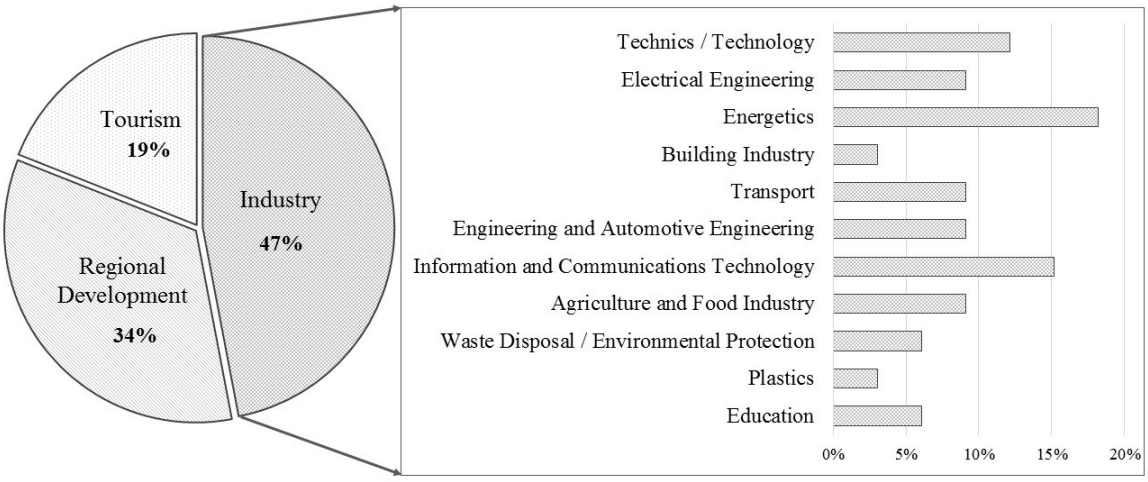
Fig. 2: Distribution of clusters in the Slovak Republic by year of foundation



Source: Authors

The aforementioned analytical studies (Duman et al, 2009; Balog, 2015) classify the cluster organisations to two groups, namely the technological and tourism clusters. In this article we use the classification into three groups – tourism, industry and region development (see the figure 3). The tourism clusters in Slovakia associate subjects aimed at tourism with their seats in a certain region or a popular tourist area. The second group – the region development – comprises those clusters which associate subjects in various lines of business in the same region. Simply said, their aim is to increase the competitiveness of the region through activities oriented on improving the economic activity, erudition, reducing unemployment, protecting the environment and supporting tourism. The industrial clusters, compared with the two aforementioned ones, associate also subjects with their seat in another region, however, with the same orientation of the economic activity – the line of business.

Fig. 3: Percentage division of clusters in Slovak Republic by area of activity



Source: Authors

Out of the 70 clusters identified, approximately 19 % are aimed at tourism, 30 % belong to the group "region development" and 51 % orient on a particular economic activity. The classification of a cluster to a particular group was carried out on the basis of the cluster's orientation in the aforementioned registers of the Ministry of Interior of the Slovak Republic. The clusters classified to the group industry can be furthermore divided to 11 areas according to the determination of their orientation (see the figure 3).

The most clusters are focusing on energy, technology in general and information and communication technologies. In contrast, the cooperation between enterprises with a focus on education and building industry, including processing and production of plastics, has in our area each only one cluster organizations.

4 Forms of cooperation between small and medium-sized enterprises in transport

In the list of existing / potential clusters in the Slovak Republic there are also three clusters whose area of activity is related to transport. To these clusters belongs:

- Aviation Cluster Slovakia (Košice) focusing on the development of civil aviation industry.
- Slovak AeroSpace Cluster (Bratislava) focusing on aerospace research (aviation and astronautics).
- Railway transport cluster (Poprad) focusing on the rail transport and engineering production.

Mentioned clusters were incorporated in 2014 and 2016. Due to the absence of web pages and inaccessibility of information about cluster`s activities it is not possible to find, if these clusters are currently inactive.

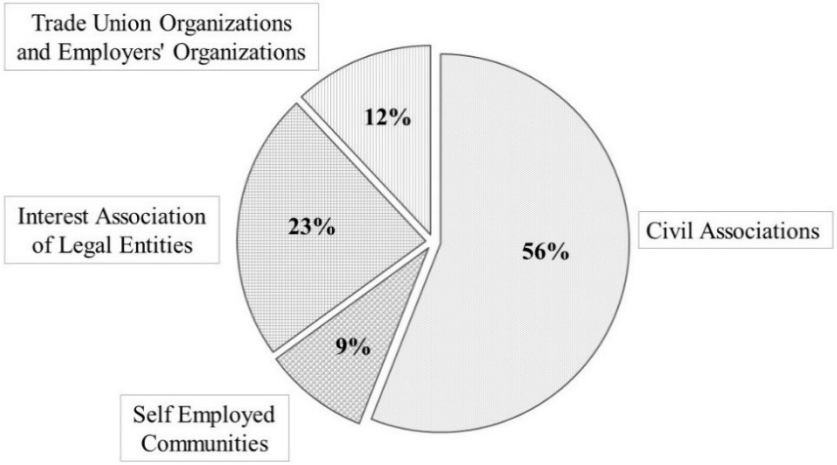
We would recommend participation in the European Aerospace Cluster Partnership (EACP) for clusters focusing on the aviation. Aim of the association is to strengthen the position and competitiveness of European companies on the global markets in sector of Aeronautics and Astronautics. The main activities of EACP are active exchange of information and knowledge in the relevant area and development of transnational cooperation between clusters. EACP is a network of European aerospace clusters, which has 36 members from 14 countries. The members of this association are also clusters of neighboring countries of Slovak Republic for example Moravian Aerospace Cluster (CZ), Hungarian Aerospace Cluster (HU) or Aviation Valley Association (PL). Slovak Republic doesn´t have representative in the EACP currently (Members, 2016).

Besides of three clusters mentioned above, in the Slovak Republic exist clusters that carry out activities to support the development of transport (despite the fact they do not have the main focus on transport), for example Danube Knowledge Cluster or Slovak IT Cluster. The core activities of Danube Knowledge cluster are creation of cooperation between Slovak and foreign experts so due to the main objective is included to sector education in figure 1. The Danube Knowledge Cluster is responsible researcher of the study Analysis of the possibilities of transposition of the EU Strategy for the Danube Region in the operational program Transport (DVK, 2010). Slovak IT Cluster focuses on developing of information systems, including information systems in transport.

Based on previous findings, we should state that here is lack of clusters oriented on road transport in the Slovak Republic. Cooperation in this field is realized in various unions and associations etc., which do not have the form and characteristic elements of the cluster.

We identified 34 organizations whose activities are aimed at encouraging cooperation between transport enterprises. The most frequent is the cooperation of enterprises in the form of civil association. For example The Union of Slovak Road Hauliers (UNAS) is focusing on road freight transport and it is a member of pan-European organization UETR (Dopravcovia, 2016; European, 2016).

Fig. 4: Percentage distribution of organizations with a focus on cooperation in road transport by legal status



Source: Authors

The second preferred form is cooperation within association of legal entities. Here can be mentioned, for example, The Association of operators of public passenger transport in urban agglomerations in the Slovak Republic. Their main aim is the promotion and reciprocal assistance in ensuring services and operation of public passenger transport.

Another example of cooperation is CESMAD Slovakia. This organization has approximately 900 members, companies of national and international road transport. The aim of the organization is to support the development and prosperity of road transport in Slovakia, including the promotion the interests of their members. CESMAD Slovakia is also a member of the International Road Transport Union (IRU) (Profil, 2016). The next important organization is Association of bus transport. Members of the Association of bus transport are transport companies that doing business in the public regular passenger transport and other entities whose activities are related to public transport (Stanovy, 2014).

Small and medium enterprises focused to transport can interoperate also without membership in some association. They have the possibility to register on various websites. They mostly offer free storage and transport capacity by joining transporters, forwarders and customers. One example is the internet domain www.trans.eu. The benefits of such cooperation are economies of scale, increase the frequency of deliveries and more efficient inventory management. Cooperating companies achieve mainly reduction of transport costs, when they use common distribution facilities to send the goods or the transport of persons in the same or overlapping destinations.

Conclusion

Based on a survey focused on identification of number and structure of clusters we can say that the Slovak Republic is developing activity in the area of association of private and public sector in clusters. It was identified 70 existing or potential clusters but it is not possible to talk about the exact number of clusters. The problem is absence of legislation that would define legal form of association of organizations. Therefore, they are based in the form of various legal forms where the word “cluster” doesn´t have to be adduced directly in the business name. Selection of legal form depends mainly on

ways and possibilities of obtaining financial resources. Nevertheless it is possible to point out that the preferred legal form is interest association of legal entities and civil society organizations.

Transport companies use to reduce risks usually other forms of association, such as clusters. However, we identified three clusters focused on air and railways transport. Cooperation of road transporters is realized through membership in various unions and associations, which do not have forms and features of cluster, for example interest association of legal entities and civil society organizations, proprietor communities and labor unions and employers' organizations. It was identified 34 associations in the Slovak Republic. Transporters, forwarders and their customer also have the opportunity to cooperate without membership in these organizations through the registration on websites. As a result they do not have to bind their capital in the means of transport, which capacity would not have been fully utilized. Despite it we can conclude that cooperation of transport SMEs with educational institutions, research institutes, local authorities and agencies to support of business development in the clusters and in the above associations provides many advantages for SMEs.

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SPOLOČENSKÁ NÁVRATNOSŤ INVESTÍCIÍ: PRÍPADOVÁ ŠTÚDIA KOMUNITNÉHO KULTÚRNEHO CENTRA

THE SOCIAL RETURN ON INVESTMEN: THE CASE STUDY OF COMMUNITY CULTURAL CENTRE

Miriam Šebová

Abstract: *The paper examines the method of the Social Return on Investment (SROI) which is increasingly drawn to evaluate the social impacts of programs or projects in nonprofit or public sector. SROI helps to understand the „social value" generated by these activities and compares it with „the costs". The conceptual framework of SROI is based on similar principles as CBA (cost-benefit analysis). It tries to quantify and monetise the social value into financial values, which result in an SROI coefficient. The most important phase of implementation of SROI is the application of „Theory of change". It has to enable the understanding of the impacts of the analysed activities on the stakeholders. The paper is focused on the theoretical routes of SROI, there are described the main features of the method and also discussed its limitations. In the second part of the paper is introduced the case study – SROI Analysis of the community cultural centre in Košice. This case study is the first application of SROI analysis in Slovakia.*

Keywords: *SROI Analysis, Evaluation, Impact Measurement, Social Impact, Culture*

JEL Classification*: L3, R58.*

Úvod

Tradičný problém vyjadrenia finančnej hodnoty netrhových statkov a služieb sa prejavuje v hľadaní metód, ktoré by boli schopné čo najvernejšie oceniť to, čo sa vlastne peniazmi vyjadriť nedá. Dôvody potreby rozvoja týchto metód sú prozaické - rastúci dopyt po zodpovednosti a dobrom spravovaní spoločnosti a potreba efektívnejšieho využívania obmedzených verejných zdrojov (Murray, Caulier-Grice, & Mulgan, 2010). Inšpirácia ako vyjadriť ekonomické kategórie aj v neziskovom sektore prichádza zo súkromného sektora a príležitosťou sú modifikácie bežných ekonomických analýz. Namiesto finančných indikátorov (napr. výnosy) sa však sledujú spoločenské prínosy neziskových aktivít, ktoré sú ich hlavným výsledkom a cieľom existencie.

Vznik nasledujúcej štúdie stimuloval dopyt po analýze, ktorá by dokázala vyjadriť prínosy miestneho kultúrneho centra Výmenník Štítová vybudovaného v rámci projektu Košice Európske hlavné mesto kultúry (EHMK) 2013. Na základe rešerše metód a techník, ktoré sa používajú na ekonomické hodnotenie neziskových projektov, sme vybrali metódu spoločenskej návratnosti investícií (angl. Social return on Investment – SROI). Cieľom nášho príspevku je preto analyzovať socioekonomickú hodnotu vybraného centra a kriticky zhodnotiť použitú metódu SROI.

Nasledujúca štúdia predstavuje pravdepodobne prvú aplikáciu metódy SROI na Slovensku, z tohto dôvodu ju vnímame ako praktické testovania a úvod do kritickej akademickej diskusie o jej výhodách a limitoch. Keďže ide o novú metódu oceňovania

spoločenských prínosov neziskových aktivít, v príspevku sa obšírnejšie venujeme aj jej vývoju, praxi a metodologickému rámcu. V druhej časti príspevku uvádzame prípadovú štúdiu ocenenia aktivít spoločenskej hodnoty Výmenníka Štítová.

1 Formulácia problematiky

SROI bola vyvinutá v USA v 90. rokoch 20. storočia so zámerom vytvoriť nástroj, podľa ktorého by sa mohli investori v neziskovom sektore lepšie rozhodovať pri umiestňovaní svojich investícií v sociálnej ekonomike. Autorom konceptu je Jed Emerson, ktorý publikoval hlavné východiská SROI v roku 1996 v americkej konzultačnej agentúre Roberts Enterprise Development fund (Emerson & Twersky, 1996). V USA sa SROI rýchlo etablovala a vznikali ďalšie štúdie napr. (Olsen, 2003). V európskom prostredí sa SROI aplikuje od roku 2003 najmä vo Veľkej Británii.

Ďalšiu evolúciu metódy a jej rozšírenie v Európe ovplyvnili dva faktory. Prvým sú tradičné rozdiely medzi angloamerickým a európskym vnímaním verejného a súkromného sektora. V angloamerickom prostredí sú ekonomické kategórie v neziskovom sektore vnímané veľmi podobne ako v komerčnom sektore na rozdiel od kontinentálnej Európy, kde je deliaca čiara medzi verejným a súkromným sektorom výraznejšia. Tým sa v kontinentálnej Európe prejavuje omnoho nižšia ochota ekonomicky ohodnocovať sociálne projekty (Krlev, Münscher, & Mülbert, 2013). Druhým faktorom je pôvod autorov metódy. Je potrebné zdôrazniť, že iniciátormi SROI boli v USA konzultačné firmy. SROI teda nie je prvotne výstupom akademického prostredia. SROI vznikla ako praktický nástroj na oceňovanie spoločenskej hodnoty sociálnych podnikov a prvé publikácie SROI sú návody, ako analýzu krok po kroku uskutočniť. Takéto návody publikovali v americkom prostredí (Emerson, Wachowicz, & Chun, 2001) a (Chun, 2001), vo Veľkej Británii (Lawlor, Neitzert, & Nicholls, 2008) a (Nicholls & al., 2012), v Holandsku vznikla štúdia (Context, 2010) a pod. Akademická diskusia k SROI bola podnietená až následne, po jej rozšírení konzultačnými firmami a vládnymi iniciatívami v praxi (napr. Škótska vládna iniciatíva v roku 2009).

1.1 Metodologický rámec SROI

SROI vychádza z klasickej CBA so zámerom lepšie porozumieť širším vplyvom neziskových aktivít. CBA je štandardnou metódou na hodnotenie verejných investícií, ktorá je teoreticky vydiskutovaná. Vychádza z ekonomickej teórie blahobytu a mikroekonomickej teórie hraničnej užitočnosti (Džupka, 2014). Väčšina štúdií, napr. (Krlev, Münscher, & Mülbert, 2013), uvádza, že výhodou SROI oproti CBA je holistický prístup k hodnoteniu. Niektorí autori považujú SROI za špeciálnu aplikáciu CBA napr. (NPC, 2010) a(Rauscher, Schober, & Millner, 2012) alebo dokonca za chybnú aplikáciu CBA (Mertens, Xhauflair, & Marée, 2015). SROI je síce založená na podobnej logike ako CBA (náklady verzus prínosy), ale aplikuje ju rozdielnym spôsobom. Koncepčne je v SROI namiesto nákladov používaný pojem investície a miesto prínosov pojem spoločenská návratnosť. Dôvodom na zámenu nákladov za investície je, že slovo „investície“ má pozitívnu konotáciu, kým slovo „náklady“ skôr negatívnu. SROI chce ukázať, že výdavky do neziskového sektora môžu byť vnímané aj ako investície do rozvoja nielen ako náklad (Schober & Then, 2015). Výsledkom spoločenskej ROI je tak pomer monetizovanej spoločenskej hodnoty a investícií (Millar & Hall, 2012).

$$SROI = \frac{\text{Čistá súčasná hodnota spoločenských prínosov}}{\text{Čistá súčasná hodnota investícií}} \quad (1)$$

Napr. výsledok 2:1 vo vzorci (1) indikuje, že investície v hodnote 1 Eura vytvorili 2 Eura spoločenskej hodnoty.

SROI využíva princípy uplatňované v CBA tak, že spoločenské prínosy identifikuje, kvantifikuje a oceňuje. Ťažiskom SROI je teória zmeny (angl. theory of change) (Rauscher, Schober, & Millner, 2012). Ide o vyjadrenie zmeny v cieľovej skupine na základe výstupov analyzovaného projektu, programu alebo organizácie, pričom tieto výstupy vedú k účinkom, ktoré je možné aktérom priradiť, spočítať a následne previesť na peniaze (monetizovať). SROI je založená na masívnom kvalitatívnom výskume, v ktorom sa podrobne sledujú dopady na zainteresované subjekty, ktoré analyzované aktivity ovplyvňujú.

1.1.1 Limity SROI

Akademická kritika SROI je orientovaná najmä na nedostatočnú teoretickú koherentnosť metódy. (Mertens, Xhauflair, & Marée, 2015) spracovali kritickú štúdiu, kde vyčítajú SROI štyri hlavné nedostatky a to: „hybridný charakter ukazovateľa SROI“, „limity ukazovateľa SROI na komplexné zachytenie reálnej spoločenskej hodnoty“, „výsledky zahrnuté do SROI môžu byť ovplyvňované kvalitou vstupných dát a preferenciami spracovateľa“, „spoločenská hodnota nemôže byť redukovaná na jeden finančný ukazovateľ“. Ďalšiu kritickú štúdiu voči oceňovaniu nefinančných výstupov pomocou SROI publikovali (Maier, et al., 2014). Keďže techniky oceňovania sú z princípu určitým kompromisom s pomerne jasnými limitmi, pri meraní spoločenskej hodnoty nie je možné komplexne zachytiť presnú hodnotu, len sa pokúsiť o jej čo najvernejšiu kvantifikáciu (kvalifikovaný odhad). Keďže SROI je založená na kvalitatívnom výskume, ktorý realizuje výskumník, je tam skutočne riziko klasických chýb (angl. research bias), ktoré by mali byť minimalizované vedecky korektným prevedením štúdie (napr. zahrnutím kontrolnej skupiny).

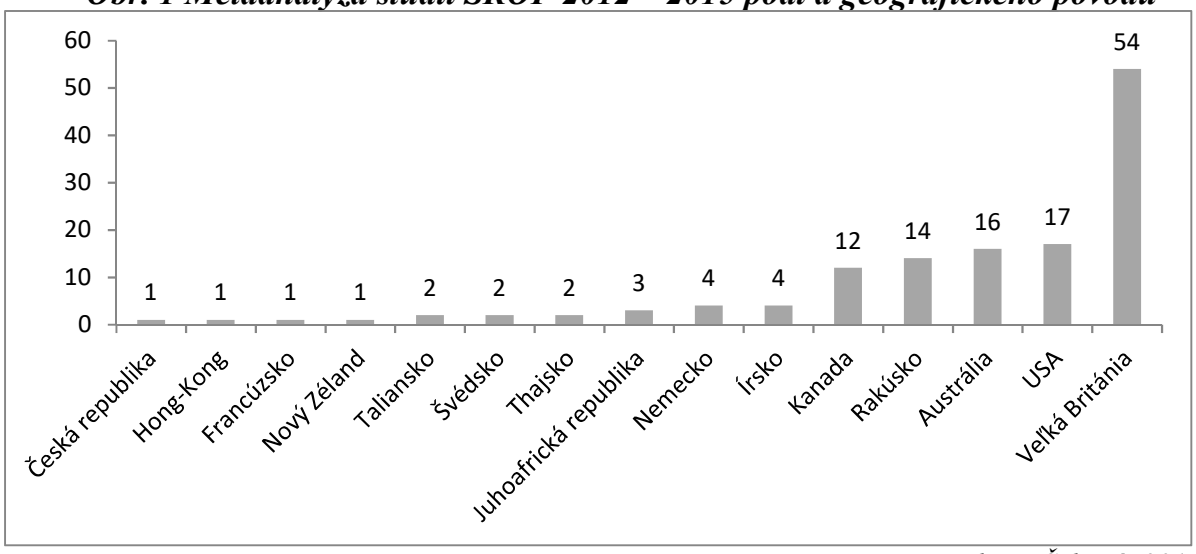
Predsudky voči SROI vychádzajú z doposiaľ malého množstva aplikácií, ktoré neumožňujú širšiu štandardizáciu. Ako konštatujú (Krlev, Münscher, & Mülbert, 2013), chýba všeobecne akceptovaná štandardne spracovaná metodológia SROI, i keď v posledných rokoch sme zaevidovali jej metodologický posun (Mertens, Xhauflair, & Marée, 2015), (Pathak & Dattani, 2014), (Maier, et al., 2014). Keďže SROI je relatívne „mladá“ metóda, tvorenie jej metodologického rámca stále pokračuje. Akademická diskusia poukazuje na niekoľko nejasností a medzier, ktoré je potrebné prepracovať, resp. doplniť návody, ako sa s nimi vysporiadať, keďže z praxe vychádza dopyt po tomto type metódy.

1.1.2 Praktické a akademické štúdie SROI

V rovine praktických štúdií sa metóda intenzívnejšie začala používať po roku 2007 a najmä po roku 2010. Nemeckí autori z Centra pre sociálne investície na Univerzite v Heidelbergu (Krlev, et al., 2013) spracovali metaanalýzu, v ktorej hodnotia 114 analýz SROI publikovaných v rokoch 2000-2011 na základe internetovej rešerše. Konštatujú, že od roku 2010 došlo k exponenciálnemu nárastu SROI analýz najmä v angloamerických krajinách. Naším zámerom bolo zistiť súčasný stav v oblasti realizovania a publikovania praktických štúdií SROI a vedeckých článkov o SROI. Preto sme nadviazali na nemeckú metaanalýzu a uskutočnili sme rešerš praktických štúdií SROI 2012 – 2015 dostupných na internete. Analyzovali sme 129 štúdií, ktoré boli zverejnené celé, s korektnou metodológiou a výsledkami v anglickom jazyku (Šebová,

2016). Uvádzame len vybrané výsledky metaanalýzy. Štúdie SROI pochádzajú aj po roku 2012 naďalej vo veľkej prevahe z angloamerických krajín ako Veľká Británia, USA, Kanada, Austrália (Obr.1). Z kontinentálnej Európy sa SROI ako analytická metóda začala intenzívnejšie uplatňovať v Rakúsku a Nemecku napr. štúdie (CSI, 2012), (Then & al., 2012), (Rauscher, et al., 2012). V stredoeurópskom prostredí je medzera v aplikovaní a skúmaní tejto metódy. Krátku pilotnú štúdiu sme našli z Česka, z oblasti zamestnávania hendikepovaných osôb, spracovanú v češtine (Krátky, 2012). Mnohé štúdie SROI pravdepodobne existujú v materských jazykoch v jednotlivých krajinách. Na obrázku (Obr.1) je uvedená početnosť štúdií analyzovaných v metaanalýze podľa ich geografického pôvodu.

Obr. 1 Metaanalýza štúdií SROI 2012 – 2015 podľa geografického pôvodu



Zdroj: Šebová, 2016

1.1.3 Aplikácia SROI v sektore kultúry

Rastúci tlak na mnohé kultúrne a umelecké organizácie vyjadriť ich hodnotu a legitimizovať ich existenciu, poukazuje na to, že demonštrácia hodnoty má význam aj pre širší kultúrny a umelecký sektor (Allpress, Rohani, & Meares, 2014). Cez inštrumentálne hodnoty kultúra spôsobuje zmeny v iných sektoroch, ktoré nezachycujú klasické ekonomické hodnotiace metódy. Štúdie z oblasti kultúry dokazujú, že kultúrne aktivity môžu zlepšiť kvalitu mestského života, ovplyvňujú tiež zdravie a blahobyt obyvateľov (Allpress, Rohani, & Meares, 2014). Typológia vplyvov kultúry (Tab. 1) je rozpracovaná napr. v štúdií „Measuring Museum Impacts“ (Bollo, 2013).

Tab. 1: Vplyvy kultúry

Vplyvy na jednotlivca	• Osobný rozvoj, učenie/ Kontinuálne a ďalšie vzdelávanie • Inšpirácia, imaginácia a vízia • Posilnenie komunity , posilnenie občianstva
Vplyvy na spoločnosť	• Sociálna kohézia/ sociálna inklúzia, zdravie • Lokálny imidž a identita • Rovnosť, znižovanie nezamestnanosti, znižovanie kriminality • Integrácia marginalizovaných skupín/migrantov

Zdroj: (Bollo, 2013)

Pri metaanalýze štúdií SROI (Šebová, 2016) sme analyzovali 10 štúdií z oblasti kultúry a umenia (Tab. 2). Štúdie ukazujú na pomerne vysokú spoločenskú hodnotu projektov v oblasti kultúry (ukazovateľ SROI od 4,18 do 27).

Tab. 2: Metaanalýza štúdií SROI v oblasti kultúry

Názov štúdie	Autor	Oblasť pôsobenia	Pomer SROI
Arts' Youth mpowerment Program (2013)	Learning through the Arts, Kanada	Prevencia kriminality cez umelecké vzdelávanie	4,91
Nonprofit Arts and Culture Field in Illinois (2015)	Social IMPACT Research Centre, USA	Umenie a kultúra	27,00
National Museum Liverpool and House of Memories (2015)	Liverpool University, UK	Sociálna integrácia cez zapojenie do kultúrnych aktivít	8,66
Auckland Museum's Moana - My Ocean Exhibition (2014)	Auckland Council, Nový Zéland	Umenie a kultúra	4,66
Blue Teapot Theatre Company (2016)	Research Group, Írsko	Sociálna integrácia cez zapojenie do kultúrnych aktivít	4,18
Work -based learning at the Museum of East Anglian Life (2010)	Museum of East Anglian Life, UK	Podpora zamestnateľnosti cez zapojenie do komunitných umeleckých aktivít	4,3
Craft Cafe (2011)	Social Value Lab, UK	Sociálna integrácia cez zapojenie do kultúrnych aktivít	8,27
Creative Pathways (2013)	Impact Arts, UK	Podpora zamestnateľnosti cez zapojenie do umeleckých aktivít	5,68
Fab Pad programme (2009)	Impact Arts, UK	Sociálna integrácia a rozvoj ohrozených skupín cez zapojenie do kultúrnych aktivít	8,38
Young Apprenticeships Programme (2011)	Clifford, J. et al., UK	Vzdelávanie a zamestnanie v kreatívnych odvetviach	4,33
Medián			***5,3***
Priemer			*8,04*

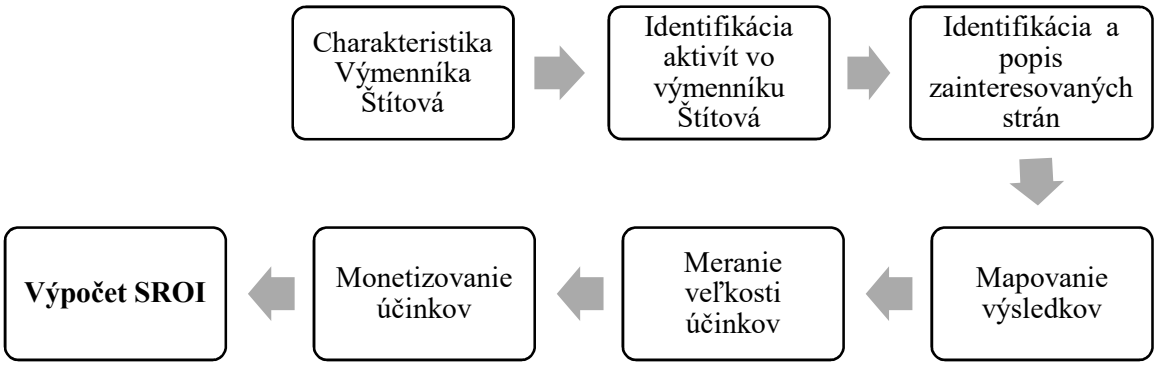
Zdroj: vlastné spracovanie

Hodnota SROI napr. 4,18 znamená, že 1 investovaná peňažná jednotka vygenerovala sociálnu hodnotu 4,18 peňažných jednotiek. Uvedené SROI v kultúre sa pre nás stali inšpiráciou pre spracovanie prípadovej štúdie SROI z Košíc.

2 Metódy

Realizácia SROI analýzy vyžaduje interdisciplinárny prístup – kombináciu techník sociologického výskumu a ekonomických metód. Pre získanie primárnych údajov do analýzy SROI sme tak uskutočnili kombinovaný výskum: kvalitatívny (hĺbkové rozhovory so zainteresovanými subjektmi) a kvantitatívny (dotazníkové prieskumy so zainteresovanými subjektmi). Jednotlivé fázy SROI analýzy sú zobrazené na obrázku (Obr. 2).

Obr. 2: Postup analýzy SROI



Zdroj: vlastné spracovanie

Časové obdobie zberu údajov do analýzy bolo máj 2016 až september 2016. V období máj až september sme realizovali 14 pozorovaní vo Výmenníku. Realizovali sme hĺbkové pološtruktúrované rozhovory so 37 rôznymi jednotlivcami a dotazníkový prieskum so 60 respondentmi, ktorých vplyv sledujeme v štúdii. Zber informácií od zainteresovaných skupín sme ukončili v bode „saturácie", keď respondenti opakovali už zistené účinky, teda neobjavovali sa pre nás nové informácie. Uvedená SROI predstavuje retrospektívnu analýzu, ktorá hodnotí účinky aktivít Výmenníka za január až máj 2016. Monetizovanie účinkov sme realizovali technikou hľadania paralelných cien v súkromnom sektore.

3 Rozbor problému

Výmenníky v blízkosti panelákov boli postavené v 60. a 70. rokoch a pôvodne slúžili na redistribúciu tepla pre byty. Novou technikou vykurovania obytných domov stratili svoj účel a v rámci EHMK 2013 boli zrekonštruované na komunitné kultúrne centrá na sídliskách. V súčasnosti (rok 2017) v Košiciach funguje 7 výmenníkov na 5 sídliskách. Hlavným zámerom projektu Výmenníky - SPOTs bola decentralizácia kultúry do okrajových častí mesta. Celková hodnota rekonštrukcie výmenníkov na miestne kultúrne centrá bola vo výške 1,3 mil. Eur. Výmenníky spravujú kultúrni mediátori, ktorí pracujú v úzkej spolupráci s komunitami. Programová štruktúra Výmenníkov tvorí 70% participatívnych projektov, ktoré sú iniciované a realizované obyvateľmi. (Hološ & Zolnaiová, 2015) Výmenník je vlastne sídliskovou klubovňou, kde návštevníci bez platenia vstupného a nájomného môžu rozvíjať s podporou mediátora vlastné kreatívne nápady a získavať pre ne ďalších ľudí z okolia. Tak by sa cez kultúrny rozvoj individuálnych návštevníkov mala rozvíjať sídlisková komunita.

Cieľom nasledujúcej analýzy je oceniť socio-ekonomickú hodnotu aktivít Výmenníka Štítová. Zameranie a ciele štúdie sme konzultovali s projektovým manažérom a kultúrnou mediátorkou Výmenníka Štítová. Vzhľadom na rozsah príspevku uvádzame výrazne skrátenú prípadovú štúdiu Výmenníka Štítová.

3.1 SROI analýza Výmenníka Štítová

Výmenník Štítová bol pre verejnosť sprístupnený v apríli 2013. Hlavným zámerom Výmenníka bolo vytvoriť výstavný priestor uprostred sídliska. Architektonicky je koncipovaný prioritne ako malá galéria, s bielymi stenami na dvoch poschodiach a s prístupom na strechu. Úžitková plocha Výmenníka je cca 200 m^2. Tento Výmenník je najbližšie k centru mesta (cca 15 min. pešo), kde je koncentrovaná kultúrna

infraštruktúra a podujatia. To znižuje jeho exkluzívnosť ako priestoru na sídliskové kultúrne aktivity v porovnaní s inými Výmenníkmi.

Aktivity Výmenníka sú určené pre všetky vekové kategórie obyvateľov sídliska. Cieľovou skupinou sú amatérski umelci – jednotlivci a formálne i neformálne skupiny, ktoré pôsobia na sídlisku prioritne v oblasti kultúry a kreatívnych odvetví. Zámerom je „vyprovokovať“, aby jednotlivci a existujúce, príp. novovzniknuté skupiny, „osídlili“ Výmenník a našli v ňom priestor na stretávanie a organizáciu podujatí. Výmenník tak vytvára zázemie pre amatérskych umelcov v sídliskovej komunite, ktorí tu majú možnosť spolupracovať s profesionálnymi umelcami. Ďalšou cieľovou skupinou sú vzdelávacie inštitúcie. S Výmenníkom pravidelne spolupracujú Fakulta umení Technickej univerzity v Košiciach a Škola úžitkového výtvarníctva v Košiciach, našli tu rezidenčný priestor na výstavy študentov. Vo Výmenníku pracuje 1 kultúrna mediátorka a vypomáhajú dobrovoľníci.

3.1.1 Zainteresované subjekty a prvý návrh účinkov

V prvom kroku sme v spolupráci s kultúrnou mediátorkou identifikovali zainteresované skupiny, na ktoré majú relevantný vplyv aktivity Výmenníka Štítová (Tab. 3).

Tab. 3: Zainteresované skupiny

Zainteresované subjekty	Zahrnutie do analýzy	Dôvod
Profesionálni umelci	Nie	Platení za aktivity, osobné benefity zo spolupráce sú vedľajšie vplyvy zmluvnej spolupráce.
Amatérski umelci	Áno	Cieľová skupina aktivít.
Študenti umeleckých škôl	Áno	Cieľová skupina aktivít.
Rodinní príslušníci amatérskych umelcov a študentov	Nie	Nedostatok dôkazov o materiálnych účinkov.
Návštevníci Výmenníka	Áno	Cieľová skupina aktivít.
Obyvatelia sídliska s výhľadom na Výmenník	Nie	Nedostatok dôkazov o materiálnych účinkov.
Neformálne a formálne skupiny obyvateľov	Áno	Cieľová skupina aktivít.
Vzdelávacie inštitúcie	Áno	Materiálne účinky aktivít.
Zamestnanci	Nie	Platení - mzda
Dobrovoľníci	Áno	Materiálne účinky aktivít.
Miestna samospráva MČ Sever, mesto Košice	Nie	Nedostatok dôkazov o materiálnych účinkov.

Zdroj: vlastné spracovanie

Zainteresované subjekty sú definované ako „ľudia alebo organizácie, ktoré pocítili zmenu, pozitívnu alebo negatívnu ako výsledok analyzovaných aktivít“. (Nicholls, 2012) V ďalšom kroku sme uskutočnili prvý rozbor aktivít Výmenníka, ktorých vplyvy sme priradili k zainteresovaným skupinám. (Tab.4)

Tab. 4: Zainteresované skupiny

Priestor pre skupiny	Wernisáž, včelári, Galéria 6, Glóbus,...
Participatívne umenie v komunite	Ďakujem šused...
Výstavy	Študenti umeleckých smerov, Amatérski umelci
Umelecké a kreatívne workshopy	Platené/ Neplatené
Komunitné aktivity	Premeny a výmeny, susedské schôdze

Zdroj: vlastné spracovanie

3.1.2 Zostavenie mapy účinkov

Kľúčovou časťou SROI analýzy je zostavenie mapy účinkov. Formou jednoduchej schémy zobrazuje vzťah medzi vstupmi analyzovaných aktivít, výsledkami a účinkami na zainteresované subjekty. Vizualizuje teóriu zmeny, ktorá nastala u skúmaných subjektov (Nicholls, 2012). Výsledok je každý výkon alebo produkt, ktorý bol výsledkom aktivít Výmenníka Štítová. Účinok je ekonomický alebo sociálny benefit, ktorý získali zainteresované subjekty účasťou na aktivitách Výmenníka Štítová. Vyjadrujeme len také účinky, ktoré by nenastali, ak by Výmenník neexistoval, zisťovali sme preto mŕtvu váhu realizovaných aktivít. Z nášho výskumu vyplynuli nasledujúce zistenia účinkov pre zainteresované skupiny.

Študenti umeleckých škôl

Študenti vystavujú práce vo Výmenníku, ktoré vznikajú najmä počas vyučovania. Existencia Výmenníka neovplyvňuje vznik prác, iba vystavovanie prác. Pri hromadných výstavách študentov, by tieto výstavy s veľkou pravdepodobnosťou boli inštalované v priestoroch školy alebo iných priestoroch v správe mesta alebo VÚC. Výmenník poskytuje špecifický priestor vhodný pre výstavu (veľké biele plochy, flexibilný priestor), ktorý si študenti cenia viac ako priestor v škole. Z rozhovorov so študentmi FUTU (6.6. 2016) sú to: *„nové priestory, čisté, iné ako stiesnené historické priestory"; „špecifické miesto iné od klasických galérií, uprostred sídliska bližšie k ľuďom"; „výstava vo Výmenníku je predstupeň pred galériou"*. Viacerí študenti-respondenti zdôraznili priestor „Kontajnera", ktorý je oddelená súčasť Výmenníka a umožňuje osobitne realizovať unikátnu inštaláciu. Pri niektorých projektoch študentov Výmenník spolupracuje aj príspevkom na materiál, inak by diela študentov nevznikli. Spoločné výstavy študentov sme zarátali podielom 50% (50% mŕtva váha). Ako výrazný účinok sa ukazuje publicita, ktorú Výmenník komplexne poskytuje klientom. Publicitu zarátavame preto 100% podielom.

Iná situácia je pri autorských výstavách (jedného príp. niekoľko študentov), ktoré by sa „*pravdepodobne neuskutočnili v inom priestore*" ako uviedol kurátor SŠUV (rozhovor 16.6. 2016) alebo by sa uskutočnili len ako súčasť hromadnej výstavy študentov. Autorské výstavy majú vyššie účinky pre študentov (ako prax, súčasť ich umeleckého portfólia, benefit pre ďalšie štúdium, resp. pri uchádzaní sa do práce). Pri autorských výstavách niektoré diela vznikajú aj kvôli výstave (rozhovor 16.6. 2016 autorka výstavy – študentka SŠUV). Z týchto dôvodov pri autorských výstavách zarátavame 100 percent hodnoty účinkov.

Amatérski umelci

Potvrdilo sa nám, že pre amatérskych umelcov má možnosť vystavovať, príp. realizovať workshop vo Výmenníku vyššiu hodnotu ako pre študentov. Amatérski umelci – jednotlivci, ktorí nie sú organizovaní vo formálnych združeniach, majú veľmi

obmedzené príležitosti vystavovať výsledky svojej umeleckej činnosti zadarmo vo verejných priestoroch. Amatérski umelci vyjadrovali veľkú vďačnosť za zriadenie Výmenníka a uvedomovali si príležitosť, že môžu využívať priestory bezplatne. V rámci amatérskych umelcov sú špecifickou skupinou seniori, u ktorých možnosť praktizovania umeleckých aktivít a ich vystavovanie vo Výmenníku vedie k pocitu sebarealizácie, sebaprezentácie, pocitu užitočnosti a zmysluplného trávenia voľného času, ktoré vedú k pocitom sociálnej a emocionálnej pohody. Pri senioroch dochádza k pozitívnym účinkom na ich individuálnej úrovni, ale aj k účinkom pre mesto (znížené náklady na zdravotnú starostlivosť), tie však nevieme kvantifikovať. V meste fungujú špecializované zariadenia pre seniorov (napr. Seniordom v MČ Košice Sever), seniori však uvádzajú, že vo Výmenníku je „*liberálnejšie*“ prostredie na realizáciu ich aktivít (rozhovor 1.6. 2016). Seniori sa angažujú aj ako dobrovoľníci vo Výmenníku.

3.1.3 Meranie veľkosti účinkov

Na základe monitoringu aktivít Výmenníka Štítová sme vytvorili zoznam výstupov (podujatia, účastníci a pod.) v sledovanom období podľa skupín aktivít (Tab. 5).

Tab. 5: Aktivity Výmenníka Štítová január – máj 2015

Aktivita	Počet podujatí	Počet umelcov/skupín	Celkový počet návštevníkov/účastníkov
Výstavy	7	14	450
Workshopy	27	-	511
Komunitné aktivity	14	-	102
Požičanie priestoru	5	3	27

Zdroj: vlastné spracovanie, údaje interné materiály K13

Na základe rozhovorov so zainteresovanými subjektmi, v ktorých sme sa ich pýtali na zmenu, ktorú zažili v súvislosti s analyzovanou aktivitou vo Výmenníku, sme identifikovali kľúčové účinky na zainteresované subjekty. Pre rozsah príspevku uverejňujeme len vybrané účinky na amatérskych umelcov (Tab. 6).

Tab. 6: Účinky na zainteresované subjekty

Zainteresované subjekty	Aktivity Výmenníka	Výsledky	Účinky
Amatérski umelci	Výstavy	Počet inštalovaných výstav/realizovaných workshopov	Prax v inštalácii výstavy
	Workshopy	Počet umelcov ktorí vystavovali práce	Pocit uspokojenia zo sebaprezentácie
		Počet vystavených prác	Zvýšenie sebavedomia
		Počet dní výstavy	Publicita

Zdroj: vlastné spracovanie

Každý účinok sme kvantifikovali pomocou výsledkov (napr. počet návštevníkov, počet hodín) a následne sme im priradili finančnú hodnotu. Vo fáze monetizovania účinkov sme využívali metódu hľadania ceny za porovnateľný substitút na komerčnom trhu, ktorý môže mať na zainteresované subjekty porovnateľné účinky ako aktivity Výmenníka. Realizovali sme prieskum cien za podobnú aktivitu v Košiciach. Uvedená monetizácia obsahovala len ocenenie účinkov, pri ktorých bolo možné nájsť ceny

zodpovedajúcich substitútov, napr. prenájom skúšobne na nácvik kapely, prenájom porovnateľného výstavného priestoru, cena za podobný workshop v Košiciach. Referenčné ceny sme stanovili vždy ako priemer min. 3 cien za porovnateľný substitút. Príklad monetizácie je uvedený v Tab. 7.

Tab. 7: Príklad monetizácie

Zainteresované subjekty	Monetizácia účinkov	Cena v Eur
	Pocit uspokojenia zo sebaprezentácie	
	Počet dní výstavy × cena za prenájom porovnateľného priestoru v MČ Sever	2604
Amatérski umelci	**Publicita**	
	Priemerná doba práce PR pracovníka, fotografa, grafika v hod. × priemerná mzda týchto povolaní v Košiciach	2994,5
	Priemerná cena propagačných materiálov	
	Priemerná cena inzercie v médiách	

Zdroj: vlastné spracovanie

Pomerom monetizovaných účinkov (12 996,2 Eur) a nákladov (37 56,4 Eur) na Výmenník bol vypočítaný ukazovateľ SROI 3,5 v mesiacoch január – máj 2016. Tento ukazovateľ poukazuje na „výnosnosť“ Výmenníka, vzhľadom na to, že z 1 Eura je schopný „vyprodukovať“ 3,5 Eur spoločenskej hodnoty.

4 Diskusia

Cieľom príspevku bolo analyzovať socioekonomickú hodnotu aktivít komunitného kultúrneho centra a kriticky zhodnotiť použitú metódu SROI.

Výsledky prípadovej štúdie potvrdili, že umenie a kultúra majú významné účinky na osobnej úrovni jednotlivcov. Prinášajú im pocity sebarealizácie a spokojnosti, ktoré majú vplyv na zachovanie psychickej a emocionálnej pohody. Kultúra môže byť tiež nástrojom posilnenia komunít a sociálneho rozvoja mestských sídlisk, teda môže mať účinky na lokálnej úrovni. Pozitívne vplyvy kultúry na rozvoj komunít potvrdili aj iné štúdie napr. (Allpress, et al., 2014), (Bollo, 2013), (Crossick & Kaszynska, 2016).

V štúdii o Výmenníku Štítová v Košiciach sme prvý krát aplikovali metódu spoločenskej návratnosti investícií (SROI) na Slovensku, keďže táto metóda získava na popularite vo vedeckej komunite aj v praxi vo vyhodnocovaní efektívnosti neziskových organizácií. Praktické použitie metódy SROI v prípadovej štúdii poukazuje na jej metodologické nedostatky, ktoré vychádzajú najmä z hybridného charakteru ukazovateľa SROI. Podobne ako v štúdii (Pathak & Dattani, 2014) vnímame problém pri interpretácii pojmov investícií a nákladov ako aj nastavení ukazovateľa SROI, ktorý prepája finančné a spoločenské ukazovatele. Z týchto dôvodov považujeme za hlavný prínos štúdie kvalitatívnu časť, ktorá umožnila detailne popísať účinky analyzovaných aktivít Výmenníka na základe primárneho sociologického výskumu so zainteresovanými subjektmi. Za hlavný výsledok tak považujeme zostavenie mapy účinkov aktivít Výmenníka, nie samotný výpočet SROI. I keď kvantifikovaný ukazovateľ SROI zodpovedá výsledkom z podobných analýz v oblasti kultúry, ktoré uvádzame v metaanalýze. Ďalšími závermi z realizácie prípadovej štúdie je, že časová a personálna náročnosť kvalitatívneho výskumu ako aj sektorovo špecifické výsledky pravdepodobne ostanú limitmi širšej štandardizácie metódy SROI. SROI má svoje metodické limity, ktoré je potrebné ďalej skúmať, a metódu upravovať a upresňovať

smerom k väčšej koherentnosti. Napriek tomu ju považujeme za vhodný nástroj pre neziskové projekty na miestnej úrovni, ako zhodnotiť prínos ich aktivít v miestnej ekonomike a komunite.

Záver

Štúdia, ktorú sme realizovali, bola pre Výmenník prínosná z viacerých hľadísk. Získané údaje z rozhovorov tvorili cennú informáciu a spätnú väzbu pre manažment Výmenníka Štítová, ktorý výsledky štúdie môže reflektovať v ďalšom plánovaní a riadení Výmenníka. Vyhodnotenie účinkov umožnilo posúdiť „efektívnosť" ich aktivít a identifikovať aktivity s mŕtvou váhou. Štúdia tak objektivizuje pohľad na aktivity Výmenníka, ktorý sa uchádza o obmedzené verejné zdroje z rozpočtu mesta. Podrobná analýza účinkov aktivít umožní lepšie plánovať ich budúce aktivity. Naším odporučením pre manažment Výmenníka Štítová bolo, že Výmenník má zatiaľ málo využitý potenciál pôsobiť ako spoločný priestor pre sídliskovú komunitu, ktorú by mohlo stimulovať viac projektov zameraných na participatívne umenie.

Štúdia môže slúžiť aj ako marketingový materiál pre prípadných donorov Výmenníka, keďže po roku 2018 bude mesto prehodnocovať financovanie kultúrnych organizácií, ktoré vznikli v rámci projektu Košice EHMK 2013. V roku 2017 sme pokračovali v SROI analýze pre ďalšie štyri Výmenníky v Košiciach, pričom v budúcnosti plánujeme doplniť štúdie aj pre ostatné Výmenníky a získať tak ucelený pohľad spoločenské vplyvy ich aktivít na rôznych úrovniach (jednotlivec, skupina, komunita, sídlisko), ktoré by nebolo možné zachytiť konvenčnými ekonomickými metódami.

Poďakovanie

Táto práca bola podporovaná Agentúrou na podporu výskumu a vývoja na základe zmluvy č. APVV-014-0512.

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THE IMPACT OF SELECTED FINANCIAL INDICATORS RELATED TO THE STRUCTURE OF FUNDING SOURCES ON CORPORATE LIQUIDITY IN ENERGY SECTOR IN THE CZECH REPUBLIC AND SLOVAK REPUBLIC

Markéta Šeligová

Abstract: *The aim of this paper is to determine the impact of selected financial indicators related to the structure of funding sources on liquidity of companies in energy sector in the Czech Republic and Slovak Republic. With the purpose to fulfill the aim, we examine existence and character of relationship between selected financial factors (debt equity ratio, return on equity, share of fixed assets to total assets, share of earnings before interest and taxes to total assets, equity ratio) and liquidity of the companies in energy sector in the Czech Republic and Slovak Republic. The existence of relationship between financial factors and liquidity of companies is tested by correlation analysis and generalized method of moments called GMM method. We found that corporate liquidity was positively influenced by the equity ratio and return on equity in energy sector in the Czech Republic. We found that corporate liquidity was positively influenced by the equity ratio and share of earnings before interest and taxes to total assets in energy sector in the Slovak Republic. On the other hand, we found that corporate liquidity was negatively influenced by the share of earnings before interest and taxes to total assets, share of fixed assets to total assets in the Czech Republic. We found that corporate liquidity was negatively influenced by the share of fixed assets to total assets in energy sector in the Slovak Republic.*

Keywords: *Correlation, Debt equity ratio, Fixed assets, Generalized method of moments, Leverage ratio, Liquidity, Return on equity.*

JEL Classification: *G32, G34, G39.*

Introduction

Myers (2001) argues that agency effects of various kinds may create important reasons for holding liquid assets with the further implications of different patterns of corporate liquidity depending on capital structure or other firm characteristics. He believed that holding liquid assets will be important for companies facing growth opportunities and the expected return fluctuates over time. Given that the decision on liquidity associated with the debt structure of companies, each of them needs to monitor its liquidity relations following the decision of debt. Liquidity is a key financial indicator to measure whether the company is able to meet its debt obligations based on short-term debt ratio, long-term debt ratio and total debt ratio without causing undesirable losses. Stulz (1990) argues that firms with high leverage and losing their financial flexibility, may have difficulty in finding new funds to finance their projects. Šarlija and Harc (2012) suggest that liquidity is a characteristic of the company's assets that can be quickly converted to cash. Firms hold a certain amount of liquidity in during their activities to be able to meets its obligations on time. For this reason,

Saleem Rehman (2011) argues that liquidity management is very important for each company in order to maintain the ability to pay its obligations properly and on time.

The aim of this paper is to determine the impact of financial indicators related to funding sources on liquidity of companies in energy sector in the Czech Republic and Slovak Republic from 2007 to 2015. With the purpose to fulfill the aim, we examine existence and character of relationship between selected financial factors (debt equity ratio, return on equity, share of fixed assets to total assets, share of earnings before interest and taxes to total assets, equity ratio) and liquidity of the companies in energy sector in the Czech Republic and Slovak Republic. The first part of this article will include a literature review. The second part of this article will focused on methodology and data. The third part of this article will contain results and discussion. Last part of this article will conclude results.

1 Literature Review

Williamson (1988), Schleifer and Vishny (1992), Anderson (2002) believe that more liquid companies are less costly to monitor and liquidate therefore higher liquidity growth leverage. On the contrary, De Jong et al. (2008), Lipson and Mortal (2009), Šarlija and Harc (2012) argue that more liquid companies are less indebted, because they could use the additional liquidity to internally finance their activities.

In accordance with the aim of this paper, it would be appropriate to mention a study focusing on the liquidity of companies in the Czech Republic and Slovak Republic. Unfortunately, there are few studies focusing on the liquidity of companies in the Czech Republic and Slovak Republic. For this reason, the literature review will be supplemented with additional relevant studies focusing on the liquidity of companies in other countries.

Anderson (2002) examined the relationships among the firm's financial structure, its choice of liquid asset holdings and growth on UK and Belgian companies. Using regression analysis he examined the factors determining liquid asset holdings and the link between firm liquidity and capital structure using the following variables: liquidity (dependent variable, sum of cash, bank balances, and investments in current assets divided by total assets) and independent variables such as cash flow (earnings before taxes and interest divided by total assets), long term debt, medium term debt, short term debt, R&D expenditures and market value to book value. The results revealed positive associations between leverage and liquid asset holding.

One of funding sources are depreciation that are related with fixed assets. For this reason, it is appropriate to examine the relationship between liquidity of companies and depreciation through fixed assets. Unfortunately, there is only minimum specific studies that focus on this relationship. For this reason, study of Mehar (2005) was selected to the literature review. He examined whether equity financing plays a central role in determination of the liquidity position of a companies in Pakistan. The relation between the equities and working capital has been observed. He analysed relation between liquid assets (dependent variable) and independent variables such as fixed assets at historical cost, net profit after tax and retained earnings. There was found that liquidity is positively correlated with fixed assets. An increase in the fixed assets will lead to the increase in depreciation expenditure, so, availability of the funds will be

increased without a decline in the cash balance. He found that depreciation fund has been classified as a source of liquidity. The long-term debt may deteriorate the liquidity position of a firm. The results shows that profit and liquidity have significant positive relation where relation between liquidity and retained earnings was found as negative. On the other hand, Sibilkov (2007) found that liquidity increases the costs of managerial decision making and that the effect of liquidity of assets on leverage is conditioned by a combination of hedged receivables and a direct relationship between liquidity and unsecured debt. He also confirmed that liquidity increases with growth indebtedness in highly indebted firms. He also confirmed that liquidity is increasing in companies with low interest coverage and a low value of fixed assets.

Shah (2012) examined relationship between profitability and liquidity trade off through the application of working capital analysis in India. This study undertakes the identification of the key variables that influence the working capital management and its impact on profitability and liquidity of pharmaceuticals manufacturers. He examined the relationship between liquidity (dependent variable, including current ratio) and independent variables (components of working capital) such as gross operating cycle period and quick ratio. It has been found that there is a positive relationship between liquidity and variables such as quick ratio and gross operating cycle period. He examined the relationship between liquidity (current ratio) and profitability (earnings before depreciation, interest, and tax as a percentage of assets). It has been found that there is a negative relationship between liquidity and profitability.

Šarlija and Harc (2012) investigated the impact of liquidity on the capital structure of Croatian firms. Pearson correlation coefficient was applied to the test on the relationship between liquidity ratios and debt ratios, the share of retained earnings to capital and liquidity ratios and the relationship between the structure of current assets and leverage. The results showed the existence of a statistically significant negative correlations between liquidity ratios and leverage ratios. The results showed that there are statistically significant correlations between leverage ratios and the structure of current assets. The relationship between liquidity ratios and the short-term leverage is stronger and negative than positive relationship between liquidity ratios and the long-term leverage. The more liquid assets firms have, the less they are leveraged. Long - term leveraged firms are more liquid. Increasing inventory levels leads to an increase in leverage. Furthermore, increasing the cash in current assets leads to a reduction in the short-term and the long-term leverage.

Trippner (2013) analysed the relationship between liquidity (cash ratio, current ratio and quick ratio) and profitability (return on assets - ROA, return on equity - ROE) in the Polish company from 2002 to 2012. Using correlation analysis it has been found that there is a positive and negative relation between liquidity and ROA and ROE.

Miloś (2015) analysed the determinants of capital structure of the Romanian companies using panel data. He used variables including ratio between total debt and total liabilities, profitability (return on assets), liquidity (ratio between current assets and current liabilities), tangibility (ratio of tangible assets divided by the total assets) and size (natural logarithm of total sales). The results show that there is a negative connection between liquidity and leverage. The results suggest that less liquid companies obtain the necessary capital by borrowing. Companies often prefer and use a short-term loans when there is a lack of liquidity.

Růčková (2015) analysed the impact of liquidity and profitability on use of deb finance sources of companies in manufacturing industry in V4 countries. She examined the relationship between using debt sources (debt/equity ratio) and liquidity. The study results showed a positive relationship between liquidity and using debt sources in the Czech Republic. It can be stated that the increasing liquidity of companies is also increasing the using debt sources.

2 Methodology and Data

Given that the article focuses on liquidity of companies in Czech Republic and Slovak Republic, it is appropriate to mention that various sectors of the economy are involved to varying degrees in the consumption and production of the national economy. The sectors such as mining and quarrying, manufacturing, construction, service sector and energy sector represent the largest proportion of the performance of the Czech and Slovak economy. For this reason, the article focuses on determine the relationship between the funding sources and liquidity of the companies in energy sector. All financial date are taken from Amadeus database. This database includes data from the annual reports of individual companies in energy sector the Czech Republic and Slovak Republic. The sample of analysed companies includes 172 companies in the energy sector from the Czech Republic and 62 companies in the energy sector from the Slovak Republic. To determine the relationship between selected financial indicators and liquidity of companies, medium sized companies, large companies and very large companies were selected. The sample of companies includes combination of public limited company and private limited company. A medium-sized companies includes less than 250 employees, an annual turnover of less than 50 million EUR or an annual balance sheet total of less than 43 million EUR. A large companies and very large companies can be considered as a companies that exceed the above mentioned criteria for medium-sized companies. The detailed structure of companies in energy sector includes electricity, gas, steam and air conditioning supply such as electric power generation, transmission and distribution, production of electricity, transmission of electricity, distribution of electricity, trade of electricity, manufacture of gas; distribution of gaseous fuels through mains, manufacture of gas, distribution of gaseous fuels through mains, trade of gas through mains, steam and air conditioning supply, steam and air conditioning supply. The dataset cover the period 2007-2015. All data and time series are on annual frequency. The data are the basis for the application of correlation analysis and panel regression analysis, specifically generalized method of moments (GMM).

We can define relationship between liquidity of companies and financial indicators related to funding sources based on the above studies and formulated goals. This relationship will be identified for energy. We will examine how funding sources affect liquidity of companies.

Correlation analysis and generalized method of moments (GMM) is used to determine the relationship between liquidity of companies and financial indicators related to funding sources. First, we can determine the relationship between liquidity of companies and financial indicators related to funding sources using correlation analysis. The correlation can be expressed by the following equation (1):

$$K_{XY} = \frac{cov(X,Y)}{\sigma_X \sigma_Y} \quad (1)$$

Where X is the mean value matrix liquidity of companies and Y is the mean value matrix of debt equity ratio, return on equity, share of fixed assets to total assets, share of earnings before interest and taxes to total assets, equity ratio. This indicator should be in the interval from -1 to 1. Values closer to the value of 1 would suggest that with increased liquidity of companies is growing debt equity ratio, return on equity, share of fixed assets to total assets, share of earnings before interest and taxes to total assets, equity ratio. Values closer to the value of -1 would suggest that with decreased liquidity of companies is growing debt equity ratio, return on equity, share of fixed assets to total assets, share of earnings before interest and taxes to total assets, equity ratio. Values which are zero signal independent of one another.

The generalized method of moments (GMM) is used in econometrics and statistics. The generalized method of moments (GMM) is a generic method for estimating parameters in statistical models. It is applied in the context of semiparametric models, where the parameter of interest is finite dimensional, whereas the full shape of the distribution function of the data may not be known, and therefore maximum likelihood estimation is not applicable. The method requires that a certain number of moment conditions were specified for the model. These moment conditions are functions of the model parameters and the data, such that their expectation is zero at the true values of the parameters. The GMM method then minimizes a certain norm of the sample averages of the moment conditions. Hansen (1982) claims that the GMM estimators are known to be consistent, asymptotically normal, and efficient in the class of all estimators that do not use any extra information aside from that contained in the moment conditions.

I will draw from the Haas a Lelyveld (2010) to construct the model. The relationship between liquidity of companies and funding sources will be estimated using the following equations in general form (2):

$$L_{it} = \alpha_1 + \beta_1 * \Delta L_{it-1} + \beta_2 * X_{1it} + \beta_3 * X_{2it} + \cdots \ldots + \beta_n * X_{nit} + \varepsilon_{it} \qquad (2)$$

In consistent with studies Anderson (2002), Mehar (2005), Trippner (2013) and Růčková (2015), variables include debt equity ratio (DER), return on equity (ROE), share of fixed assets to total assets (FA/TA) and share of earnings before interest and taxes to total assets (EBIT) and equity ratio (ER)

The dependent variable Lt is an indicator of current liquidity (L3) of companies in the Czech Republic and Slovak Republic at time t, Xnt are other factors that represent funding sources and which may affect the liquidity of companies in the Czech Republic and Slovak Republic. These factors include debt equity ratio (DER), return on equity (ROE), share of fixed assets to total assets (FA/TA), share of earnings before interest and taxes to total assets (EBIT), equity ratio (ER). β0 and εt is model constant and the residual component in the model.

Tab. 1: Description of used variables

Variables	Calculation	Expected relationship
Liquidity (L3)	Current assets/ current liabilities	Dependent variable
Debt equity ratio (DER)	Debt/equity	-
Return on equity (ROE)	Net profit/ equity	+/-
Fixed assets (FA/TA)	Fixed assets/total assets	+/-
Earnings before interest and taxes (EBIT)	Earnings before interest and taxes/total assets	+/-
Equity ratio (ER)	Equity / total assets	-

Source: Authors' calculations

Table no 1 represents description of used variables. The funding sources are represented through the variables (debt equity ratio, return on equity, share of fixed assets to total assets, share of earnings before interest and taxes to total assets, equity ratio). The financial ratios (variables) are used to determine relationship between funding sources and liquidity of companies. The choice of variables is based on the above studies.

The liquidity ratio is very important indicator because liquid company only is able to pay its payables. If the company has a sufficient amount of funds for payment of its current liabilities, the company will be liquid. An excessively high value of liquidity is usually accompanied by lower values of equity (return on equity) that is associated with a conservative approach. On the other hand, companies that have too low levels of liquidity typically use debt sources for financing their activities.

Debt equity ratio (leverage) measures debt sources to equity. The higher value of the debt equity ratio, the higher ratio of debt sources to equity. This fact can indicate a higher risk for creditors. The value of debt equity ratio 1 indicates that equity and debt sources are involved in the financing of companies in the same amount. Higher debt represents a higher level of risk of companies. On the other hand, higher debt may mean a larger volume of funding sources because the costs of external funding tend to be cheaper than costs of equity. Companies that have too low levels of liquidity typically use debt sources for financing their activities. For this reason, we can expect a negative relationship between liquidity of companies and debt equity ratio. This fact is consistent with study Miloś (2015) who found negative relationship between liquidity and debt equity ratio.

The return on equity (ROE) is important especially for the owners of the company or competing companies. The return on equity shows how efficiently a company uses its own equity (funds of owners of company). Return on equity can also affect the costs of external funding (debt sources). Positive relationship between liquidity of companies and return on equity is expected based on the study Trippner (2013). More profitable companies are the ones that can use their retained earnings in order to finance their investment projects. Companies with higher earnings and less volatility in earnings are the ones that have greater indebtedness, due to the increased credibility in front of potential creditors. Moreover, they have more income to shield from taxes. An excessively high value of liquidity is usually accompanied by lower values of profitability that is associated with a conservative approach. There is a causal link between the liquidity of companies and profitability of companies. Profitability and liquidity will positively affect the availability of external financing. However, as a rule, liquidity growth may reduce efficiency because liquidity involves holding funds in a less efficient form of assets (inventories, receivables, financial assets). The compromise theory says that profitable companies tend to use other external financing through tax shield. If companies are profitable, then their free cash is growing under otherwise unchanged conditions, the risk of availability of funds in general is diminishing and, at the same time, the availability of debt financing on favorable terms in terms of debt costs is increasing. It also means that with the growth of profitability the probability of bankruptcy and the cost of financial distress are decreasing.

A higher value of fixed assets always requires a higher value of liquid assets. An increase in the fixed assets will lead to the increase in depreciation expenditure, so,

availability of the funds will be increased without a decline in the cash balance. Fixed assets present a crucial role in ensuring the necessary collateral for bank borrowing and raising secured debt. A low level of fixed assets could decrease the volume of debt that the company may achieve. A high level of fixed assets may ensure cheaper debt resources and lowers the risk taken by the creditor. On the other hand, the companies rely more on short-term debt than on long-term debt in which case the collateral is not so important. The companies with high value of fixed assets rather use their retained earnings or issue equity than finance their activity by increasing indebtedness. Another explanation could arise from the fact that usually, in emerging economies, companies rely more on short-term loans rather than long-term ones, consequently the importance of collateral is reduced. The causal link can also be found in the context of the representative conflict. The increased debt ratio will not be allowed by managers due to the increased threat of bankruptcy, because the possibility of consuming the benefits of a managerial position is diminishing with the growth of the threat of bankruptcy. This leads to a very consistent use of debt financing and its collateral. However, this is reversed to the fact that companies with a smaller volume of assets that can be used to secure debt will consider a lower debt ratio from the point of view of the representative conflict because the lack of appropriate assets increases the cost of debt and thus reduces the level of managers' benefits. The existence of fixed assets in the context of capital structure management is still linked to the existence of a non-debt tax shield. It expresses the savings that an enterprise earns by depreciating costs and reducing the tax base. It can be said that a non-debt tax shield has a substitution effect in relation to the interest tax shield for the management of the capital structure. Based on study of Mehar (2005) and study of Sibilkov (2007) there is no clear relationship between corporate liquidity and share of fixed assets to total assets. This relationship will be estimated in this article.

Companies with higher earnings and less volatility in earnings are the ones that have greater indebtedness, due to the increased credibility in front of potential creditors. Moreover, they have more income to shield from taxes. On the other hand, more profitable companies are the ones that can use their retained earnings in order to finance their investment projects. An excessively high value of liquidity is usually accompanied by lower values of profitability that is associated with a conservative approach. On the other hand, Trippner (2013) found a positive and negative relationship between liquidity of companies and share of earnings before interest and taxes to total assets. In consistent with these facts, it is not clear what relationship can be expected. Therefore, the resulting relationship will be determined using panel regression analysis, specifically generalized method of moments.

From a theoretical perspective too, a very important indicator is the equity ratio. The equity ratio is a financial ratio indicating the relative proportion of equity used to finance a company's assets. The equity ratio is a good indicator of the level of leverage used by a company. The equity ratio measures the proportion of the total assets that are financed by stockholders, as opposed to creditors. A low equity ratio will produce good results for stockholders as long as the company earns a rate of return on assets that is greater than the interest rate paid to creditors. It is expected a negative relationship between equity ratio and corporate liquidity. The more liquid assets firms have, the less they are leveraged. The advantage of a lower amount of equity is usually lower cost debt sources than the cost of equity, however, if the company is highly

indebted and its financial stability impaired, creditors increase the cost of their resources and the positive effect of savings in financing of debt sources is gone.

3 Results and Discussion

This part focuses on the results of correlation analysis, generalized method of moments (GMM) and their comments. First, we can determine the relationship between liquidity of companies and funding sources using correlation analysis. The following table (2) reflects the degree of interdependence of monitored parameters in energy sector in the Czech Republic (CR) and Slovak Republic (SR).

Tab. 2: Correlation between selected variables in energy sector in the Czech Republic and Slovak Republic

	DER	ROE	FA/TA	EBIT	ER	DE/TA
Liquidity L3 (CR)	-0.007457	0.002802	-0.042887***	0.003357	0.316481*	-0.316726*
Liquidity L3 (SR)	-0.024746	0.005309	-0.180512*	0.084198***	0.250970*	-0.248340*

Note: ∗ denotes significance at 1% level, ∗∗ denotes significance at 5% level, ∗∗∗ denotes significance at 10% level

Source: Authors' calculations

Table 2 presents correlative relationship between liquidity of companies (dependent variable) and independent variables such as debt equity ratio, return on equity, share of fixed assets to total assets, share of earnings before interest and taxes to total assets, share of capital for consideration to total assets, equity ratio in energy sector in the Czech Republic and Slovak Republic. From this table (2) is evident that there is significant correlation between corporate liquidity and variables such as share of fixed assets to total assets, equity ratio and share of capital for consideration to total assets in energy sector in the Czech Republic. The positive correlation between corporate liquidity and equity ratio is 0.316481. This means that there is a positive correlation between liquidity of companies and equity ratio (ER). The result suggests that with increase in equity ratio increases corporate liquidity in energy sector in the Czech Republic. On the other hand, there was recorded negative correlation between corporate liquidity and variables such as share of capital for consideration to total assets (-0.316726) and share of fixed assets to total assets (-0.042887). This means that with decrease in share of capital for consideration to total assets and share of fixed assets to total assets increases corporate liquidity in energy sector in the Czech Republic.

With regards the Slovak Republic, there is positively significant correlation between corporate liquidity and variables such as equity ratio (0.250970) and share of earnings before interest and taxes to total assets (0.084198). The results suggest that with increase of these variables increase corporate liquidity in energy sector in the Slovak Republic. The results suggest that there is a negatively significant correlation between corporate liquidity and variables such as share of fixed assets to total assets (-0.180512) share of capital for consideration to total assets (-0.248340). This means that with decrease of these variables increase liquidity of companies in energy sector in the Slovak Republic. Using correlation analysis we found that there is positive, negative and no relationship between liquidity of companies in energy sector in the Czech Republic and Slovak Republic and independent variables (funding sources).

Generalized method of moment (GMM) will be used to determine, how significant will be the relationship between corporate liquidity and financial indicators related to funding sources. This relationship is expressed by the following equations (3).

$$L_{it} = \alpha_1 + \beta_1 * \Delta L_{it-1} + \beta_2 * DER_{it} + \beta_3 * ROE_{it} + \beta_4 * FA/TA_{it} + \beta_5 * EBIT_{it} + \beta_6 * ER_{it} + \varepsilon_{it} \quad (3)$$

Table 3 presents the resulting relationship between corporate liquidity (dependent variables) and financial indicators related to funding sources (independent variables) using generalized method of moments (GMM).

Tab. 3: Estimation results between liquidity of companies and financial indicators related to the structure of funding sources in energy sector in the Czech Republic

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ER	7.178679	1.309279	5.482925	0.0000
EBIT	-1.964857	1.055425	-1.861674	0.0630
ROE	0.013036	0.007639	1.706541	0.0883
FA/TA	-3.204574	0.719724	-4.452505	0.0000
Effects Specification				
Cross-section fixed (orthogonal deviations)				
Mean dependent var	-0.193186	S.D. dependent var	4.126527	
S.E. of regression	4.016116	Sum squared resid	13177.55	
J-statistic	19.24496	Instrument rank	26	

Source: Authors' calculations

In empirical analysis, we examined the relationship between corporate liquidity and funding sources in energy sector in the Czech Republic and Slovak Republic (Table no 3 and table no 4). We investigated which variables have an effect on liquidity of companies in energy sector. Table no 3 suggests that liquidity of companies was influenced by variables such as equity ratio, share of earnings before interest and taxes to total assets, return on equity and share of fixed assets to total assets in energy sector in the Czech Republic from 2007 to 2015. Some of the independent variables were not statistically significant, thus we are not able to confirm the impact of these variables on liquidity of companies in the Czech Republic. For this fact, table no 3 indicates only statistically significant variables that have impact on liquidity of companies in energy sector in the Czech Republic.

The empirical analysis shows that there is a negative impact of share of earnings before interest and taxes to total assets (EBIT) on liquidity of companies in energy sector. This means that increase of EBIT of unit decreases the corporate liquidity of 1.964857 units. These results confirm study of Trippner (2013) who found negative relationship between corporate liquidity and share of earnings before interest and taxes to total assets. More profitable companies are the ones that can use their retained earnings in order to finance their investment projects. We can argue that the more liquid the firm is, it is the less leveraged. The empirical results indicate that there is a negative impact of share of fixed assets to total assets (FA/TA) on corporate liquidity. If the share of fixed assets to total assets rises by one unit, corporate liquidity drops by 3.204574 units. This result is not confirmed by any of the above study. The resulting relationship can be explained in the following argument. Assets of the company can be divided into fixed assets and current assets. The liquidity of the company consists of current assets. Liquidity growth should be accompanied by an increase in current assets. From this argument it shows that the growth in current assets is accompanied

by a decrease in fixed assets. From this fact, can be inferred negative relationship between liquidity of company and fixed assets.

The results also suggest that there is positive impact of return on equity (ROE) on corporate liquidity. The results suggest that the increase of return on equity of unit increases the liquidity of companies of 0.013036 units. This result confirm the findings of Trippner (2013) who found positive relationship between corporate liquidity and return on equity (ROE). More profitable companies are the ones that can use their retained earnings in order to finance their investment projects. We can argue that the more liquid the firm is, it is the less leveraged. The empirical analysis also shows that there is positive impact of equity ratio (ER) on corporate liquidity. This means that increase of equity ratio of unit increases the corporate liquidity of 7.178679 units. This is not consistent with theoretical bases, which expected a negative relationship between equity ratio and liquidity of companies.

Tab. 4: Estimation results between liquidity of companies and financial indicators related to the structure of funding sources in energy sector in the Slovak Republic

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ER	3.020023	0.449429	6.719691	0.0000
EBIT	1.249220	0.434477	2.875224	0.0043
FA/TA	-2.107302	0.650677	-3.238632	0.0013
Effects Specification				
Cross-section fixed (orthogonal deviations)				
Mean dependent var	0.037302	S.D. dependent var	2.624710	
S.E. of regression	2.568143	Sum squared resid	2183.064	
J-statistic	17.54956	Instrument rank	26	

Source: Authors' calculations

The empirical results indicate that there is a positive impact of equity ratio (ER) on corporate liquidity. This means that increase of equity ratio of unit increases the corporate liquidity of 3.020023 units. This is not consistent with theoretical bases, which expected a negative relationship between equity ratio and liquidity of companies.

The results show that there is a positive impact of share of earnings before interest and taxes to total assets (EBIT) on corporate liquidity in energy sector in the Slovak Republic. This means that increase of EBIT of unit decreases the corporate liquidity of 1.249220 units. These results confirm study of Trippner (2013) who found positive relationship between corporate liquidity and share of earnings before interest and taxes to total assets. More profitable companies are the ones that can use their retained earnings in order to finance their investment projects. We can argue that the more liquid the firm is, it is the less leveraged.

Table no 4 suggests that there is a negative relationship between corporate liquidity and share of fixed assets to total assets (FA/TA). If the share of fixed assets to total assets rises by one unit, corporate liquidity drops by -2.107302 units. This result is not confirmed by any of the above study. The resulting relationship can be explained in the following argument. Assets of the company can be divided into fixed assets and current assets. The liquidity of the company consists of current assets. Liquidity growth should be accompanied by an increase in current assets. From this argument it shows that the growth in current assets is accompanied by a decrease in fixed assets. From this fact, can be inferred negative relationship between liquidity of company and fixed assets.

Conclusion

The aim of this paper was to determine the impact of financial indicators related to funding sources on liquidity of companies in energy sector in the Czech Republic and Slovak Republic from 2007 to 2015.

We estimated the effect of funding sources (debt equity ratio, return on equity, share of fixed assets to total assets, share of earnings before interest and taxes to total assets, equity ratio) on corporate liquidity in energy sector in the Czech Republic. All identified resulting relationships correspond with the conclusions of correlation analysis through which we determined what relationship exists between liquidity of companies and independent variables.

We found that corporate liquidity was positively influenced by the equity ratio (ER) and return on equity (ROE) in energy sector in the Czech Republic. We found that corporate liquidity was positively influenced by the equity ratio (ER) and share of earnings before interest and taxes to total assets in energy sector in the Slovak Republic. This means that with increase of these variables increases corporate liquidity in energy sector in the Czech Republic and Slovak Republic.

On the other hand, we found that corporate liquidity was negatively influenced by the share of earnings before interest and taxes to total assets (EBIT), share of fixed assets to total assets (FA/TA) in the Czech Republic. We found that corporate liquidity was negatively influenced by the share of fixed assets to total assets (FA/TA) in energy sector in the Slovak Republic. It can stated that decrease of these variables increase liquidity of companies in energy sector in the Czech Republic and Slovak Republic.

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DOES ECONOMIC CYCLE INFLUENCE TWIN DEFICITS IN EUROPE? A THRESHOLD MODEL.

Veronika Šuliková

Abstract: *The aim of the paper is to test the impact of output gap on twin deficits existence in euro-area countries and three non-euro area countries (Sweden, Denmark and United Kingdom) over the time 1995 – 2015. The idea is motivated by the fact that certain European countries succeeded to adjust their current account deficits during recession and a principal motor of this adjustment was a decrease in their domestic demand. A panel data threshold model estimated two thresholds of output gap and divided the relation between budget balance and current account into three intervals. If an output gap is slightly negative or positive, the model confirms twin deficits, whereby a "twin relation" is stronger if an output is above its potential level. If an output is importantly below its potential level during recession, we conclude to twin divergence (e.g. in Greece, Portugal and Spain): even though a country increases its budget deficit during recession, it can succeed to adjust its current account deficit. We recommend taking into account an output gap when testing twin deficits as neglecting this effect could potentially lead to spurious rejection of twin deficit hypothesis.*

Keywords: *Twin deficits, Twin divergence, Output gap, Current account, Budget balance, Threshold model.*

JEL Classification: *E32, F32, F41, H62.*

Introduction

The origin of twin deficit hypothesis dates to 1980' when simultaneous fiscal and current account deficit has been observed in United States (Abell, 1990; Enders and Lee, 1990; Bahmani-Oskooee, 1992). Recently, the topic of twin deficits became again very actual with an increase in current account global imbalances (Gruber and Kamin, 2007; Aizenman and Sun, 2010). Current account imbalances divide Europe in surplus economies having current account surpluses (northern European countries, e.g. Germany, Netherlands, Sweden) and deficit economies with current account deficits (southern European countries, e.g. Portugal, Greece, Italy). However, according to the report of the International Monetary Fund (IMF, 2014), some southern European countries succeeded to eliminate significantly their current account deficits in times of economic recession caused by crisis from 2008-2009. IMF (2014) concluded that a principal motor of adjustment in current account deficits was a decrease in domestic demand and domestic product. Furthermore, recent empirical studies on twin deficits (e.g. Algieri, 2013) manifest that there is no positive relation between budget balance and current account, therefore twin deficits are not valid.

These stylised facts lead us to the idea that the existence of twin deficits can be determined by an economic cycle. We expect that in times of expansion, when an output gap is positive, twin deficits exist, but in times of recession, when an output gap is negative, there are no twin deficits and we can expect even a "twin divergence" (i.e. a situation when an increase in one deficit is accompanied by a decrease in second

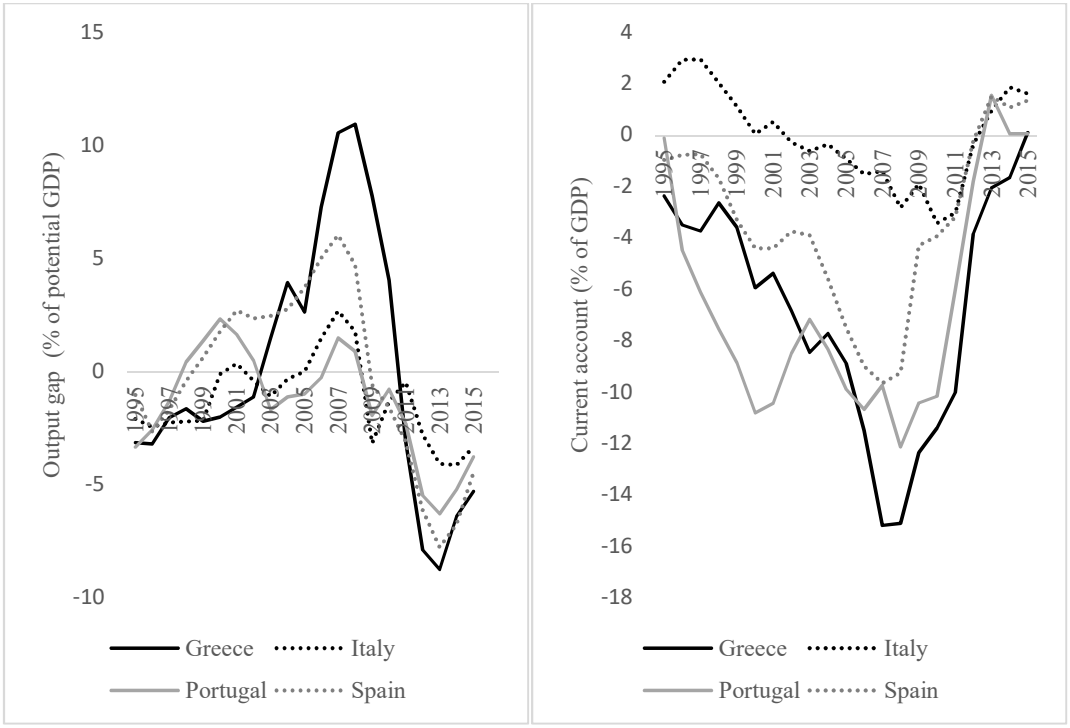
one). Our ambition is to contribute to the empirical research on twin deficits by determination of the intervals of output gap for which we confirm the twin deficits existence and the intervals for which either we reject a twin deficit hypothesis or conclude to the "twin divergence".

1 Statement of a problem

A theoretical approach to current account determinants (Krugman and Obstfeld, 2014) as well as recent empirical research (IMF, 2014) conclude that a GDP growth has a negative impact on current account balance as an increase in domestic demand supports imports and deteriorates an external balance. Consequently, an output gap, measuring the phase of the economic cycle, is also an important determinant of current account balance as an increase in output gap deteriorates a current account (confirmed e.g. by Nickel and Vansteenkiste, 2008; Angelini and Farina, 2012). Therefore, we can suppose that a positive output gap, i.e. high domestic output over its potential level in times of expansion has a negative impact on current account. On the contrary, in times of recession, a negative output gap is accompanied by current account improvement.

This idea is in accordance with the evolution of output gap (in % of potential GDP) and current account (% of GDP) in chosen southern European countries – Greece, Italy, Portugal and Spain (Fig. 1). For instance, in Greece or Spain, an increase in positive output gap in times of expansion (years 2003 - 2008) is accompanied by an increase in current account deficit (see Fig. 1). An increase in positive output gap is connected with higher national income, which supports higher domestic demand, increases domestic imports and finally leads to the deterioration in current account.

Fig. 1: The evolution of output gap and current account



Source: Own editing, data from IMF (2017)

On the other hand, a decrease in output gap from 2008 - 2009 and even a negative output gap in next period is accompanied by a decrease in current account deficit in

Greece, Spain, Portugal as well as Italy (see Fig. 1). We can therefore suppose a "mirror" evolution of output gap and current account: an increase in output gap leads to current account deterioration and a decrease in output gap leads to current account amelioration. Consequently, we can even suppose that this fact will determine the existence of twin deficits.

Twin deficits are documented when an increase in budget deficit is accompanied by an increase in current account deficit (Abell, 1990). A theoretical approach to twin deficits is supported by the Mundell-Fleming model (Mundell, 1963) and by the Keynesian theory of absorption, according to which an increase in budget deficit causes an increase in current account deficit. On the other hand, the Current Account Targeting Hypothesis (CATH) supports a reverse causality between two deficits (Summers, 1988). Thirdly, the Ricardian equivalence theory (see Barro, 1989) argues that there is no relation between budget and current account deficits. Barro (1989) offers an explanation why an expansionary fiscal policy does not positively influence a domestic demand. He explains that consumers reflect an increase in government spending and public debt into their expectations of increase in taxes in the future and therefore reduce their current consumption. A domestic demand decreases, which is connected with a decrease in imports. Finally, an increase in budget deficit is not positively linked with an increase in current account deficit and there is no twin deficit relation.

The empirical research on twin deficits tests the co-movements of budget and current account balances and the causality between them. Some authors (e.g. Piersanti, 2000; Chinn and Prasad, 2003; Salvatore, 2006; Beetsma et al., 2008; Bussière et al., 2010; or Chihi and Normandin, 2013) concluded to the twin deficit existence and confirmed the Keynesian view showing the causality running from budget deficit to current account deficit. However, the others (e.g. Kim and Kim, 2006; Marinheiro, 2008; Makin and Narayan, 2013; Sobrino, 2013) revealed a reverse causality between two balances supporting CATH hypothesis. Furthermore, some authors (e.g. Corsetti and Muller, 2006; Algieri, 2013) confirmed the Ricardian equivalence theory showing no relation between budget and current account balances. Some studies (e.g. Muller, 2008; Kim and Roubini, 2008) revealed even a "twin divergence" between budget balance and current account. Finally, recent empirical research (e.g. Nickel and Vansteenkiste, 2008; Holmes, 2011; Nickel and Tudyka, 2014) confirmed the "twin relation", i.e. twin deficits existence, only under certain macroeconomic conditions.

As recent scientific papers on twin deficits manifest different results, we suppose that twin deficits existence is determined by several macroeconomic factors. Our ambition is to contribute to the empirical research on twin deficits by identifying the impact of the output gap on the validity of twin imbalances (i.e. twin deficits or twin surpluses). We aim to determine the intervals of output gap, for which we confirm a twin deficit hypothesis and the intervals, for which we reject twin deficits or reveal a twin divergence. In order to achieve it, we estimate a panel data threshold model, which allows identifying the threshold values of output gap dividing the estimated relationship between budget balance and current account into several output gap intervals.

The idea is following. In times of expansion, when an output gap is positive and increases in time, we suppose the existence of twin deficits, which can be explained by the Keynesian theory of absorption or the Mundell-Fleming model. An increase in budget deficit, created by an increase in government spending, supports an increase in

national income (which creates an increase in output gap) and in domestic demand, which leads to an increase in imports and current account deficit. An increase in budget deficit therefore causes an increase in current account deficit and we conclude to the existence of twin deficits. On the other hand, if an increase in budget deficit is accompanied by a decrease in national product and a decrease in / or negative output gap, domestic demand decreases, which leads to decrease in imports and therefore a decrease in current account deficit. Consequently, an increase in budget deficit is accompanied by current account amelioration, which is interpreted as so-called twin divergence (the term "twin divergence" is used e.g. by Kim and Roubini, 2008; Nickel and Tudyka, 2014). Note that a decrease in national product can be caused by a recession during a crisis period or by a decline in domestic consumption because of Ricardian equivalence existence.

The impact of cyclical fluctuations of output on twin deficit hypothesis has been revealed by Kim and Roubini (2008), who concluded that divergent co-movements of fiscal and current account balances in United Stated are driven by output shocks - more than fiscal shocks. Florio and Ghiani (2015) applied Markov-Switching VECM for United States and concluded that "twin relation" tends to differ with the business cycle - it is stronger during expansions and weaker during recessions. Furthermore, Çatık et al. (2015) estimated two-regime threshold VAR for Turkey and concluded that twin deficits exist only if the economy operates above its potential level whereas two deficits manifest divergent movement if the economy is in the lower regime.

Consequently, we can suppose that the value of output gap will determine the "twin relation" between budget balance and current account. If an output gap is below a certain threshold, we suppose that twin deficits are not documented and a twin divergence prevails. However, if an output gap exceeds a certain threshold value; we expect the existence of twin deficits.

2 Methods

In order to determine the above mentioned threshold effects of output gap in the "twin relation", we use a panel data threshold model.

2.1 Data

Our analysis focuses on European countries, i.e. euro area countries[1] and three non-euro area countries (Sweden, Denmark and United Kingdom). The annual panel data then cover 19 countries over the time 1995 - 2015. Following other panel data models, which test twin deficit relation (e.g. Salvatore, 2006; Forte and Magazzino, 2013), a current account balance is a dependent variable and a budget balance is an independent variable. As we aim to reveal the impact of economic cycle on twin deficit validity, an output gap (in percentage of potential GDP) is defined as a threshold variable, whose values will determine the relation between budget balance and current account. Furthermore, we include other control variables, which could explain the evolution of current account: GDP growth (e.g. according to Chinn and Prasad, 2003; or Forte and Magazzino, 2013), private investment (e.g. Nickel and Vansteenkiste, 2008), nominal

[1] From our sample of the euro area countries, we excluded Latvia, Lithuania and Malta due to the data unavailability for output gap during the analysed period.

effective exchange rate, public debt-to-GDP ratio (e.g. Nickel and Vansteenkiste, 2008), openness (e.g. Chinn and Prasad, 2003) and inflation. Data are retrieved from IMF (WEO database, April 2017) and Eurostat database.

2.2 Threshold model: twin deficits and output gap

In order to test the impact of output gap on twin deficit hypothesis, we estimate a panel data threshold model, which was introduced by Hansen (1999). A threshold model is useful if regression between dependent and independent variable is not same in the whole sample. Here, a threshold model permits to estimate different regimes of the relation between budget balance and current account balance, which will depend on values of output gap (defined as a threshold variable in our case).

Hansen (1999) developed a panel data threshold model with fixed effects:

$$y_{it} = \mu_i + \beta'_1 x_{it} I(q_{it} \leq \gamma) + \beta'_2 x_{it} I(q_{it} > \gamma) + e_{it} \quad (1)$$

The index i indicates a country, the index t indicates a time, y_{it} is an explained variable (i.e. a current account in our case), x_{it} is an explicative variable, which depends on the regime of threshold variable (i.e. a budget balance), q_{it} is a threshold variable (i.e. an output gap); γ is the estimated threshold.

The model estimates regression coefficients β_1, β_2 and threshold γ. This type of model estimates two different coefficients β_1 and β_2 and therefore divides a panel data set in two regimes: 1) if real values of threshold variable q_{it} are smaller than estimated threshold γ: relation between dependent and independent variable is determined by β_1; 2) if real values of threshold variable q_{it} are higher than estimated threshold γ: relation between dependent and independent variable is determined by β_2. The threshold γ is estimated by iteration procedure searching for the regression (β_1, β_2) with the smallest values of the sum of squared errors (Hansen, 1999).

In case of double threshold model, the model estimates two thresholds and divides the relation between dependent and independent variable into three regimes:

$$y_{it} = \mu_i + \beta'_1 x_{it} I(q_{it} \leq \gamma_1) + \beta'_2 x_{it} I(\gamma_1 < q_{it} \leq \gamma_2) + \beta'_3 x_{it} I(q_{it} > \gamma_2) + e_{it} \quad (2)$$

with the estimated thresholds $\gamma_1 < \gamma_2$ (Hansen, 1999).

As we suppose that twin deficits existence depends on the phase of economic cycle, which can be described by output gap, the relation between budget balance and current account will change with different output gap values. We expect that twin deficits should be valid only in times of expansion with higher economic growth, i.e. only if an output gap overcomes a certain threshold value. For this purpose, we define an output gap as a threshold variable. We estimate a single threshold model as well as a double threshold model. Our double threshold model is defined in following way:

$$CA_{it} = \mu_i + \beta_1 BB_{i,t-1} I(GAP_{i,t-1} \leq \gamma_1) + \beta_2 BB_{i,t-1} I(\gamma_1 < GAP_{i,t-1} \leq \gamma_2) + \beta_3 BB_{i,t-1} I(GAP_{i,t-1} > \gamma_2) + \theta_1 GDP_{i,t-1} + \theta_2 INV_{i,t-1} + \theta_3 NEER_{i,t-1} + \theta_4 DEBT_{i,t-1} + \theta_5 OPEN_{i,t-1} + \theta_6 INFL_{i,t-1} + e_{it} \quad (3)$$

CA_{it}	is current account balance (in % of GDP)
$BB_{i,t-1}$	is budget balance (in % of GDP): a regime-dependent variable
$GAP_{i,t-1}$	is output gap (in % of potential GDP): a threshold variable
$GDP_{i,t-1}$	is GDP growth (annual, %)
$INV_{i,t-1}$	is private investment (in % of GDP)
$NEER_{i,t-1}$	is nominal effective exchange rate (index, 2005=100)
$DEBT_{i,t-1}$	is public debt (in % of GDP)
$OPEN_{i,t-1}$	is trade openness (in % of GDP)
$INFL_{i,t-1}$	is inflation (annual, %)

In our model, we distinguish two types of explicative variables:

1) regime-dependent variable (i.e. budget balance), which depends on the regime of threshold variable (output gap), and for which the estimated coefficient is different in each interval of the threshold variable – i.e. coefficients β_1, β_2, β_3;

2) regime-independent variables (i.e. control variables explaining current account balance: GDP growth, private investment, nominal effective exchange rate, public debt, openness and inflation), which are identical in each interval of the threshold variable – i.e. coefficients θ_1, θ_2, θ_3, θ_4, θ_5, θ_6.

As Baum et al. (2013) recommended, each explicative variable (including a threshold variable), is lagged by one year, which enables to avoid an endogeneity bias.

3 Problem solving

Tab. 1 presents the estimation results of single and double threshold models. Single threshold model estimated one threshold value of output gap: 1.024. If an output gap is higher than 1.024%, threshold model estimated a positive relation between budget balance and current account (β_2 = 0.415, Tab.1), i.e. confirmed the existence of twin deficits or twin surpluses. A positive relation between budget balance and current account is confirmed also if an output gap is smaller than 1.024%, however the impact of budget balance on current account is weaker in this case (β_1 = 0.117, Tab.1).

The estimation of single threshold model does not permit to see the impact of output gap on "twin relation" as there is a positive relation in both output gap regimes, so that we estimated a double threshold model (Tab. 1). Here, the model determined two threshold values of output gap (-4.938 and 1.024) and divided the relation between budget balance and current account in three intervals:

1) Output gap smaller than -4.938%;
2) Output gap between -4.938% and 1.024%;
3) Output gap higher than 1.024%.

The model estimated different relations between budget balance and current account in each of these three intervals (Tab. 1, coefficients β_1, β_2, β_3 in double threshold model).

Tab. 1: The impact of output gap on twin deficits: threshold model estimates

		Single threshold m. Estimated threshold: T1=1.024		**Double threshold m.** Estimated thresholds: T1= -4.938, T2=1.024	
		Estimate	Error	Estimate	Error
Regime-dependent variables					
BB_{t-1} if ($GAP_{t-1} \leq 1.024$)	β_1	0.117 ***	(0.043)		
BB_{t-1} if ($GAP_{t-1} > 1.024$)	β_2	0.415 ***	(0.086)		
Regime-dependent variables					
BB_{t-1} (if $GAP_{t-1} \leq -4.938$)	β_1			-0.254 ***	(0.081)
BB_{t-1} (if $-4.938 < GAP_{t-1} \leq 1.024$)	β_2			0.111 ***	(0.039)
BB_{t-1} (if $GAP_{t-1} > 1.024$)	β_3			0.389 ***	(0.084)
Regime-independent variables					
GDP_{t-1}	θ_1	-0.031	(0.060)	-0.016	(0.060)
INV_{t-1}	θ_2	-0.719 ***	(0.070)	-0.712 ***	(0.069)
$NEER_{t-1}$	θ_3	-0.059 ***	(0.020)	-0.057 ***	(0.020)
$DEBT_{t-1}$	θ_4	-0.024 **	(0.012)	-0.036 ***	(0.012)
$OPEN_{t-1}$	θ_5	0.003	(0.009)	0.002	(0.009)
$INFL_{t-1}$	θ_6	-0.062	(0.088)	-0.050	(0.090)

Notes: Dependent variable: current account. ***=.01, **=.05 indicate 1%, 5% significance level. The panel data threshold model is a panel model with fixed effects, which takes into account individual (country specific) fixed effect. Regime-dependent variable: budget balance (the estimated coefficient between budget balance and current account varies according to interval values of threshold variable). Regime-independent variables influence current account and are independent from the intervals of threshold variable. Non-existence of co-linearity between explicative variables is confirmed by correlation matrix. Errors: heteroscedasticity corrected standard errors.

Source: Own calculations, output from R

In double threshold model (Tab. 1), a positive relation between budget balance and current account (i.e. "twin relation" validity) is confirmed if an output gap is either between -4.938% and 1.024% ($\beta_2 = 0.111$) or higher than 1.024% ($\beta_3 = 0.389$). Note that the impact of budget balance on current account is stronger if an output gap exceeds 1.024% ($\beta_3 > \beta_2$). However, if an output gap is smaller than -4.938%, the model estimated a negative relation between budget balance and current account (here, $\beta_1 = -0.254$). The estimated relations between budget balance and current account in each of three intervals (i.e. the coefficients β_1, β_2, β_3) are statistically significant (see Tab. 1).

Tab. 2 presents the robustness check for the estimated double threshold model, for which the robustness is documented in case of the estimated thresholds of output gap as well as in case of the estimated regime-dependent and regime-independent coefficients.

Tab. 2: The robustness check of the estimated double threshold model

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**
Estimated thresholds	T1 = -4.938 T2 = 1.024	T1 = -4.938 T2 = 1.024	T1 = -4.938 T2 = 1.024	T1 = -4.938 T2 = 1.488	T1 = -4.938 T2 = 1.488
Regime dependent var.					
BB_{t-1} ($GAP_{t-1} \leq T1$)	-0.254 ***	-0.255 ***	-0.265 ***	-0.283 ***	-0.286 ***
BB_{t-1} ($T1 < GAP_{t-1} \leq T2$)	0.111 ***	0.111 ***	0.107 ***	0.090 **	0.090 **
BB_{t-1} ($GAP_{t-1} > T2$)	0.389 ***	0.391 ***	0.393 ***	0.428 ***	0.428 ***
Regime-independent var.					
GDP_{t-1}	-0.016	-0.015	-0.013	0.023	0.023
INV_{t-1}	-0.712 ***	-0.714 ***	-0.714 ***	-0.703 ***	-0.701 ***
$NEER_{t-1}$	-0.057 ***	-0.056 ***	-0.051 **		
$REER_{t-1}$				-0.013	-0.010
$DEBT_{t-1}$	-0.036 ***	-0.036 ***	-0.036 ***	-0.036 ***	-0.035 ***
$OPEN_{t-1}$	0.002			-0.001	
$INFL_{t-1}$	-0.050	-0.049		-0.026	

Notes: Dependent variable: current account. ***=.01, **=.05 indicate 1%, 5% significance level.

Source: Own calculations, output from R

4 Discussion

A double threshold model (see Tab. 1) reveals a significant impact of cyclical fluctuations on "twin relation" between budget balance and current account as an output gap in % of potential GDP (i.e. a threshold variable) determines three different relations between these two balances.

If an output gap is smaller than -4.938%, the model estimates a significant negative relation between budget balance and current account (β_1 = - 0.254 for double threshold model in Tab. 1). In other words, if an output is below its potential level in times of recession, twin deficits do not exist as a positive co-movement between budget balance and current account is not confirmed. In this case, a negative coefficient even concludes to the twin divergence between budget balance and current account, i.e. an increase in budget deficit is accompanied by a decrease in current account deficit. In the period of recession, when an output gap is negative and a national product decreases, an increase in budget deficits leads to current account amelioration. According to the traditional Keynesian view of twin deficits, an increase in public expenses (i.e. an increase in budget deficit) stimulates a domestic demand, increases imports and leads to increase in current account deficit. However, a decrease in national product below its potential level during recession (i.e. if an output gap is smaller than -4.938% in our case), causes a decrease in domestic demand and imports and it leads to the adjustment of current account deficit. Our results show that this is a case of southern European countries (e.g. Greece, Spain, Portugal, Cyprus) over the time period 2013 - 2015, as they had a negative output gap smaller than -4.938% and are situated in the first estimated interval (see Tab. 3). Note that the results of the IMF report (IMF, 2014) concluded that these countries succeeded to adjust their current account deficits "thanks to" a decrease in domestic demand, which is in accordance with our results of the twin divergence existence.

Tab. 3: Percentage of countries in three estimated intervals of output gap

	Percentage of countries in 3 intervals		
Output gap	**≤ -4.938%**	**-4.938% to 1.024%**	**> 1.024%**
Relation between BB and CA	Negative (β_1 = -0.254) twin divergence	Positive (β_2 =0.111) twin deficit twin surplus	Positive (β_3 =0.389) twin deficit twin surplus
Year			
1996	5% (IE)	89%	5% (CY)
1997	0%	100%	0%
1998	0%	95%	5% (EE)
1999	0%	89%	11% (EE, FI)
2000	0%	84%	16% (DK, NL, PT)
2001	0%	47%	53%
2002	0%	53%	47%
2003	0%	95%	5% (ES)
2004	0%	84%	16% (EL, IE, ES)
2005	0%	68%	32%
2006	0%	58%	42%
2007	0%	42%	58%
2008	0%	5% (SK)	95%
2009	5% (SK)	16% (FR, PT, UK)	79%
2010	11% (EE, SE)	74%	16% (CY, EL, SK)
2011	5% (EE)	84%	11% (CY, EL)
2012	0%	95%	5% (CY)
2013	21% (EL, IE, PT, ES)	74%	5% (CY)
2014	32% (CY, EL, IE, PT, SI, ES)	68%	0%
2015	21% (CY, EL, PT, ES)	79%	0%

Notes: Output gap is lagged by one period, i.e. year 1996 (2015) correspond to the output gap from year 1995 (2014). BB = budget balance, CA = current account, CY = Cyprus, DK = Denmark, EE = Estonia, EL = Greece, ES = Spain, FI = Finland, FR = France, IE = Ireland, NL = Netherlands, PT = Portugal, SE = Sweden, SI = Slovenia, SK = Slovakia, UK = United Kingdom.

Source: Own calculations, output from R

If an output gap is between -4.938% and 1.024%, a double threshold model estimates a significant positive relation between budget balance and current account (Tab. 1, β_2 = 0.111) and confirms a twin deficit relation. It should be pointed out that majority of countries from our sample are situated in this output gap interval (Tab. 3). However, in 2008, it was only a case of Slovakia and majority of countries are found in the third interval with an output gap over 1.024% (Tab. 3).

If an output gap is higher than 1.024%, a double threshold model also concludes to the twin deficit relation showing a significant positive relation between budget balance and current account. Here, an increase in budget deficit is accompanied by an increase in output over its potential level by more than 1.024% and an increase in domestic demand during the period of expansion, which leads to increase in current account deficit. It should be noted that the estimated coefficient β_3 = 0.389 in this output gap

interval is higher than $\beta_2 = 0.111$ in the second interval (see Tab. 1). It means that in times of expansion, when an output is above its potential level (i.e. an output gap is superior to 1.024%), a positive impact of budget balance on current account is more important and we conclude to "stronger" twin deficit relation. However, in our sample, we can find also countries having twin surpluses in certain years, i.e. budget surpluses accompanied by current account surpluses. Let us take an example of Denmark and Netherlands, which are situated in the third interval with an output gap higher than 1.024% (see Tab. 3, year 2000). These countries recorded simultaneous budget and current account surpluses accompanied by a positive output gap.

Our results for European countries are consistent with previous studies researching the impact of cyclical fluctuations on twin deficits in United States (Kim and Roubini, 2008; Florio and Ghiani, 2015) or in Turkey (Çatık et al., 2015), which concluded that a twin relation varies with the business cycle and twin deficits are confirmed only if output is above its potential level. On the other hand, if an output is below its potential level (i.e. an output gap smaller than -4.938% in our case, Tab. 1), a co-movement of budget balance and current account is divergent. Even though a country increases a budget deficit during recession, it succeeds to adjust its current account deficit.

Conclusion

The paper aimed to contribute to the existing empirical research on twin deficits by estimating the impact of cyclical fluctuations on twin relation existence for European countries over the time 1995 - 2015. We supposed that an output gap determines whether we confirm a twin deficit relation or a twin divergence. The idea was motivated by the fact that certain European countries succeeded to adjust their current account deficits during the period of recession and by the research of the IMF (2014), which concluded a significant impact of domestic demand decrease on current account adjustment.

A double threshold model, used for panel data, estimated two thresholds of output gap (-4.938% and 1.024%) and therefore divided the relation between budget balance and current account into three intervals, whereby the relation is different in each one. If an output gap is smaller than -4.938% (i.e. an output is below its potential level in times of recession), the model concludes to negative relation between budget balance and current account, i.e. a twin divergence. If an output gap is between -4.938% and 1.024%, the model confirms a twin deficit hypothesis. Moreover, a "twin relation" is confirmed if an output gap is over its potential level during the period of expansion (i.e. an output gap is higher than 1.024%), whereby the twin deficit relation in this output gap interval is stronger as in the second one. Consequently, we can conclude that the phase of economic cycle determines a "twin relation" and therefore neglecting the effects of output gap could lead to spurious rejection of twin deficit hypothesis.

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UNDERLYING FACTORS OF MANAGEMENT PRACTICES IN CZECH COMPANIES

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Abstract: *The main purpose of the present paper is to identify the factor structure of managerial approaches. Based on a survey performed in 241 Czech companies from various sectors (e.g. mechanical engineering, construction and consumer industry) we identify six factors underlying managerial practices in these companies: Strategic management, Leadership, Partners and customers, Human resources, Process management, and Knowledge and innovation. Therefore, the empirical factor structure is partially different from the theoretical five-dimensional structure assumed in the widespread EFQM model. The present paper thus improves our understanding of the interrelations among various aspects of management in Czech companies. This better understanding can in turn lead to more informed implementation of total quality management in the firms. Understanding the structure of managerial approaches typical for Czech companies can also contribute to smoother transitions when foreign managers are appointed to run Czech firms (because the structure of managerial approaches is culture-dependent, as has been shown by former research).*

Keywords: *Managerial approaches, EFQM, Quality management, Survey, Factor analys*

JEL classification: *C38, L20, M10*

Introduction

In this paper we analyze managerial approaches in 241 Czech companies with factor analysis. Managerial approaches can be measured using the European Foundation of Quality Management (EFQM) model, which recognizes five main dimensions (see EFQM, 2002). EFQM model is an operational framework to implement Total Quality Management (see e.g. Bou-Llusar et al., 2009; Hendrics et al., 1997; Van Der Wiele et al., 2000). The five main areas – the enabler criteria – measured by the EFQM model are Leadership, Strategic management, Human resources, Partnership and other resources, and Processes. However, previous studies indicate that empirically there are often more than five underlying factors (or areas of correlated practices) in companies' management (see e.g. Conca et al., 2004; Quanzi et al., 1998).

We assess the managerial approaches with a 42-item questionnaire. The 42-item questionnaire is inspired by the EFQM model. Technically, each of the items in our questionnaire measures one variable. Hence, each company is described by 42 variables. Subsequently, we study the interrelations among the 42 variables using factor analysis. Factor analysis is a method for exploring complex datasets, i.e., datasets with a large number of variables. Specifically, it can be used to identify the underlying structure of complex datasets by clustering interrelated variables into common factors (see for instance Tabachnick et al., 2007). A factor can be understood as a latent variable (e.g. employees' productivity) that expresses something common or similar to the measured variables (i.e., questionnaire items) contained in it. Factor

analysis has been used in various areas of management and economics (see e.g. Dyer et al., 2005; Půlpánová et al., 2012; Saraph et al., 1989; Žižka, 2011).

With factor analysis we can discover the actual underlying structure of managerial approaches in the 241 companies under study. This latent factor structure can be quite similar to the structure suggested by the EFQM model (the five enabler criteria), but there can be important differences. For example we might discover just four factors, not five, i.e., one of the EFQM areas could be "swamped" by the remaining areas (specifically, one of the areas can share so much variance with one or more of the other areas that it does not emerge as a factor per se in the factor analysis, but is contained in one or more of the remaining factors). Although, what we actually discover is that there are six factors underlying managerial approaches in our sample of companies.

1 Statement of the problem and research background

On the one hand, relationships between certain selected EFQM criteria have been examined in the study of managerial approaches, see e.g. (Burli et al., 2012; Calvo-Mora et al., 2005; Eskildsen et al., 2000; Ghosh et al., 2003; Gomez et al., 2011; Meyer et al., 2001; Pannirselvam et al., 2001; Wilson et al., 2000) for an overview see (Bou-Llusar et al., 2009; Heras-Saizarbitoria et al., 2012). Factor analysis, on the other hand, allows the researcher to take all the interrelations among all measures of management into account.

Using factor analysis on responses to an EFQM model-based questionnaire, (Conca et al., 2004) discovered 10 underlying dimensions of quality management. Similarly, (Saraph et al., 1989) discovered eight factors of quality management, (Badri et al., 1995) found eight factors, (Quanzi et al., 1998) indentified 16 factors, (Burli et al., 2012) found six factors (plus four results factors). For an overview see (Conca et al. 2004; Sila et al., 2003).

The factors identified in past research partially overlap with the criteria of the EFQM model. For example factors 2, 5, 6 and 8 in (Burli, et. al., 2012) are fairly similar to standard EFQM factors Human resources, Strategic management, Leadership and Processes, respectively. Sometimes, however, new aspects of quality management are uncovered with factor analysis. For example the 10 dimensions in (Conca et al., 2004) were Leadership, Quality planning, Communication, Training, Specialist training, Suppliers management, Customer focus, Process management, Continuous improvement, and Learning.

(Dijkstra, 1997) employed factor analysis and found that the five EFQM areas had a common underlying factor. Likewise, (Bassionbi et al., 2008) found one[1] common factor underlying the areas in their modified EFQM model. (Bou-Llusar et al. 2009) arrived at a similar result (i.e., the existence of a common general factor underlying the five enablers) using multidimensional structural equation modeling.

In addition, using factor analysis (Bou-Llusar et al., 2009) confirmed that individual enablers were unidimensional, i.e., the items related to the respective areas (Leadership, Strategic management, Human resources, Partnership and other resources and Processes) had just one underlying factor each (Heras-Saizarbitoria et al., 2012

1 Two factors would have been extracted by Kaiser's criterion.

report the same result). (Bassioni et al., 2008) also report that each criterion in their modified EFQM model has just one underlying factor.

(Jayamaha et al., 2011) computed factor loadings and cross-loadings for quality management assessment items on factors (such as Leadership and Strategic planning) in two variants of a model similar to the EFQM model[2]. They found that the items loaded highly not only on their assigned factors (i.e., a Leadership item correlates highly with a Leadership factor), but that they loaded (somewhat less) highly on the remaining factors also. This result shows that neither variant of the examined quality management model has good measurement validity. In a good model items should correlate highly with their assigned factor (convergent validity) and have relatively low correlations with the remaining factors (discriminant validity, see Gefeb et al., 2005 and Jayamaha et al., 2011 for details). The results obtained by (Jayamaha et al., 2011) imply that either the items or the theoretically assumed factors would need to be modified (to achieve satisfactory validity). (Jayamaha et al., 2008) and (Jayamaha et al., 2009) report results similar to (Jayamaha et al., 2011).

To summarize, no clear picture of the empirical factor structure of EFQM practices emerges from past research. Overall, previous studies tend to cast doubt on the theoretically assumed five-dimensional structure.

In principle, moreover, previous exploratory factor analyses cannot be statistically extrapolated to Czech companies (see Conca et al., 2004). And since there might be cultural differences in quality management practices in different countries (see e.g. Madu et al., 1995; Solis et al., 2000; Vecchi et al., 2009; Vecchi et al., 2011) a mere heuristic extrapolation from previous research performed in different countries could be culturally biased. Therefore, it is necessary to do factor analysis for Czech companies, if we do not want to simply rely on the theoretical assumption that there are five enabler areas (which has been shown to be inaccurate repeatedly, see above).

2 Methods

We performed a survey in a convenience sample of 241 Czech companies of different size (M = 469.3 employees, SD = 1475.6). The companies operate in different sectors (mechanical engineering, electrical engineering, civil engineering, development and production of computer software and hardware, services, and consumer industry). Data were collected with help of trained student interviewers between 2013 and 2015. Breakdown of companies included in the sample, according to sector, is as follows: mechanical engineering (n = 49), civil engineering (n = 33), development and production of computer software and hardware (n = 36), services (n = 58), and consumer industry (n = 41).

Obtaining a more homogenous sample can be seen as one of the tasks for future research, because the factor structure might be sensitive to the size and type of the company (on the other hand, Bou-Llusar et al., 2005 show that mixing service and manufacturing firms in one sample does not confound the results). Note that factor analysis has high requirements with respect to sample size, therefore obtaining a homogenous sample can be quite difficult.

2 Namely the Baldridge Criteria for Performance Excellence model.

Also, if future researchers manage to collect data from a sample representative for the whole country (or any other population of interest), this would provide more generalizable findings. However, it is difficult to obtain a representative sample due to typically low response rates. Even though researchers may initially approach a randomly chosen selection of companies, probably only a fraction of this initial sample would be willing to participate in the study (see e.g. Gutierrez et al., 2010), response rate was 8.4% in their study). This means that the final sample of participating companies is essentially self-selected and most likely no longer representative.

The companies were approached by our trained student collaborators who interviewed the companies' managers. Obtainng information based on respondents' perceptions is common in organizational research (see e.g. Gomez et al., 2011; Nair, 2006; Powell, 1995). A structured interview technique using the 42-item questionnaire was used. The items are available from the first author upon request. They are not reproduced here to spare space (just five examples are given below).

As we mentioned in the introduction the 42-item model is based on the EFQM model, hence it covers the five EFQM areas:

1. Leadership (or People, items LEAD1-LEAD8, Cronbach's $\alpha = 0.92$), e.g. "Managers define and develop the function, vision, culture and values of the organization."
2. Strategic management (or Policy and strategy, items STR1-STR6, Cronbach's $\alpha = 0.91$), e.g. "The current and future needs and expectations of parties involved (including customers) are satisfied."
3. Human resources (items HR1-HR8, Cronbach's $\alpha = 0.89$), e.g. "HR planning is well documented and is in agreement with the strategy and with the organizational and process structure."
4. Partnership and other resources (items PAR1-PAR9, Cronbach's $\alpha = 0.89$), e.g. "Mutual development of the company and its partners is promoted."
5. Processes (items PROC1-PROC11, Cronbach's $\alpha = 0.90$), e.g. "System of quality management is built and/or certified according to the norm ISO 9001. It is implemented and fully functional."

Fulfilling/satisfying the tasks/criteria described by each item was scored on a scale 0-100 (with 0 being the worst possible score and 100 the best). This is in line with the usual practice in management audit and consulting (in fact, the 42-item questionnaire has been used by the first author and his colleagues – auditors and consultants – in a number of companies in the past).

Note that when each of the five areas (e.g. Leadership) is viewed as an individual scale within our questionnaire, we can conclude that each scale has very good reliability, as reflected by high Cronbach's alpha values (given above).

As far as the factor analysis is concerned, we use principal component analysis as the extraction method and direct oblimin as the rotation method. We replace missing data with mean for the respective item (the missing data are not normally distributed, thus it is not recommendable to exclude the cases with missing data from the analysis).

Our research objective is to establish an empirical factor structure of the EFQM model that emerges from managerial practices in a sample of Czech companies. As outlined in the previous section, former research does not provide a clear support for the five-factor structure of the EFQM model, which the authors of this model assume

(EFQM, 2002). Therefore, further empirical investigations into this topic are needed. So far, however, there is also not a clear evidence for a specific alternative of the five-dimensional conceptualization – between one and 16 factors have been identified in the papers we have reviewed in the previous section. Finally, we were also not aware of any related research performed in socio-economic conditions similar to those in the Czech Republic, which could have otherwise given us guidance with respect to what factors might emerge. This set of reasons led us to employ exploratory factor analysis (rather than confirmatory factor analysis, see Long, 1983), which is a method that is commonly used without formulating any a priori predictions or hypotheses. We will, nevertheless, return to the issue of formulating specific hypotheses in future research in our conclusions.

3 Problem solving (results)

Kaiser-Meyer-Olkin measure of sampling adequacy is equal to 0.95 for our data, which verifies our data have excellent factorability (i.e., there is some underlying structure in the data). KMO for individual items is above 0.9 in all cases. The minimum acceptable value of KMO is 0.5, values of 0.8 and above are considered very good.

Using Bartlett's test of sphericity we confirm that our data are adequate to be analyzed using factor analysis, $\chi 2(861) = 5051.6$, $p < 0.001$. Bartlett's test tells us that sufficiently large correlations exist between items, which is necessary for factor analysis to work.

By Kaiser's criterion (i.e., eigenvalue of each factor is above 1) we extract six factors. The factors are listed in Table 1. The total percentage of variance in the data explained by the six factors is 63.4.

Tab 1: Summary of the six factor solution

Factor	Factor interpretation	Eigenvalue before rotation	Percentage of variance explained by unrotated factor	Eigenvalue after rotation
Factor 1	Strategic management	18.44	43.92	11.66
Factor 2	Leadership	2.89	6.89	11.46
Factor 3	Partners and customers	1.48	3.51	6.26
Factor 4	Human resources	1.34	3.20	9.63
Factor 5	Process management: Core processes	1.31	3.11	9.63
Factor 6	Process management: Innovation	1.15	2.74	5.31

Source: own

The total percentage of explained variance is naturally the same for rotated and unrotated factors. Note, however, that in the rotated solution the relative importance of the factors is equalized (compare the eigenvalues before and after rotation in Table 1).

Table 2 gives the item loadings to the rotated factors. More precisely, the pattern matrix is reproduced here. The pattern matrix indicates the unique contribution of an item to each factor (only loadings with magnitude higher than |0.35| are displayed).

Tab 2: Items loading the factors – rotated pattern matrix

Item	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
STR4	0.67					
STR3	0.67					
PAR5	0.64					
PAR4	0.62					
STR6	0.62					
PAR3	0.60					
STR5	0.52					
STR2	0.48					0.38
PAR6	0.40		0.37			
HR1	0.39					
LEAD2		0.83				
LEAD6		0.79				
LEAD7		0.78				
LEAD4		0.76				
LEAD8		0.75				
LEAD1		0.70				
LEAD5		0.69				
LEAD3		0.66				
STR1		0.47				
PAR2			0.68			
PAR1			0.61			
PROC11			0.57			
HR2				-0.58		
HR5				-0.57		
HR7				-0.56		
HR3				-0.52		
PROC8				-0.51		
HR4				-0.47		
HR6		0.38		-0.45		
HR8		0.39		-0.42		
PROC3					0.89	
PROC2					0.75	
PROC1					0.61	
PAR7					0.45	
PROC6					0.41	
PROC7					0.38	
PAR8						
PAR9				-0.35		0.48
PROC9			0.37			0.47
PROC10					0.41	0.45
PROC4						0.44
PROC5					0.39	0.43

Source: own

Each item loads on six factors in total. We call the highest factor loading the "main loading" and the remaining five factor loadings "cross-loadings". The average main factor loading for the 42 items is 0.57 (SD = 0.14), while the cross-loadings are 0.12 on average (SD = 0.10)[3]. The difference between the two means is statistically significant (t-test for independent samples, two-tailed, $t(49.6) = 19.87$, $p < 0.001$), and the effect size is very large, $r = 0.94$. This means that our empirical factor structure has good convergent validity (high main loadings), as well as good discriminant validity (low cross-loadings), unlike the theory-based quality management models studied in (Jayamaha et al., 2008; Jayamaha et al., 2009; Jayamaha et al., 2011) that have poor discriminant validity (high cross-loadings).

3 The descriptives are based on absolute values of factor loadings. Levene's test for equality of variances rejects the null hypothesis that variances are equal in the 42 main factor loadings and in the 210 cross-loadings ($F = 11.98$, $p < 0.001$), therefore equality of variances is not assumed in following the t-test.

4 Discussion

Based on the content of questionnaire items that load highly on a given factor we can interpret what each factor represents. For example Factor 4 captures most of the HR management aspects (seven HR items, one Processes item and one Partnership item load on this factor). Factor 2 quite clearly represents several aspects of leadership (eight Leadership items, one Strategy item and two HR items load on this factor). An almost identical factor was identified in our preliminary work (Veselý et al., 2013), which supports the robustness of the Leadership factor. This is in line with the observation that Leadership is among the most culturally universal factors in quality management (Sila et al., 2003). Our interpretation of the remaining factors is given in Table 1.

We can observe that the initial areas predicted by theory (i.e., the five enabler criteria of the EFQM model) are mapped onto six factors. The six factors represent one of the following:

- a factor similar to one of the factors assumed in theory (namely, factors 2 and 4 represent Leadership and Human resources, respectively);
- a sub-area of the initial five EFQM criteria (there are two distinct Processes factors 5 and 6: Process management and Knowledge and innovation);
- a mixture of sub-areas of the EFQM criteria (factors 1 and 3 represent a mixture of Strategic management and Partnership and of Partnership and Processes, respectively).

We can notice that items from different areas of the EFQM model are sometimes contained in one underlying variable (a factor). This indicates that actions/situations described by these items are in fact closely related and should not be treated as independent and unrelated by companies' managers. In particular, while Leadership and Human resources represent a more or less distinct factors in management of the companies under study (see factors 2 and 4), Processes are an important ingredient in several factors (especially in factors 5 and 6, but also in factors 3 and 4). Also, notice that the Strategic management and Partnership aspects of management are closely linked (see factor 1).

Optimization of synergies between the elements of quality management should be easier when the typical empirical structural properties within the set of those elements are known (to which our study contributes). (Bou-Llusar et al., 2009) argue that understanding the structure of managerial approaches can help us assess the application of quality management in companies. Successful application of quality management leads in turn to better organizational performance and higher employee and customer satisfaction, see e.g. (Bou-Llusar et al., 2005; Duh et al., 2012; Ehrlich, 2006; Eskildsen et al., 2000; Hendricks et al., 1996; Kaynak, 2003).

Our findings can be also useful when foreign companies take over Czech firms and/or when foreign managers are hired to run Czech companies. In those cases the new managers can benefit from knowing the structure of managerial approaches typical for Czech companies, which may be different from the structure typical for companies in their country (see e.g. Madu et al., 1995; Solis et al., 2000).

Given cultural differences in quality management practices (see e.g. Vecchi et al., 2009; Vecchi et al., 2011), it could be interesting to use comparable samples of companies (e.g. with respect to size, sector and turn-over) from different countries to

see in what respects the structure of managerial approaches varies as a function of cultural differences. Future research can also focus on sector-specific differences in the structure of managerial approaches.

There is one intricate challenge for future research, namely to uncover and explain causal links among various aspects of company management. When we, for example, take a look at factor 1, we can see that companies with good Strategic management also perform well when it comes to the Partnership aspects of management. However, because in survey-based studies variables (such as items related to Strategic management) cannot be varied exogenously, we are unable to tell whether an increased performance in Strategic management causes an increase in Partnership, or the other way round. Or, alternatively, whether the increase is caused by another (unobserved) variable. Understanding the actual causal links can be obviously vital for efficiently implementing a system of management (see e.g. Bou-Llusar et al., 2005).

Experimental research – that is used to identify causal relations – is common in modern economics (see e.g. Camerer, 2011; Falk et al., 2009; Smith, 1982). However, it seems that an experimental study of managerial approaches would have to be done in the field (not in the lab), which renders possible future experimental research of managerial approaches all the more challenging.

Conclusion

The main purpose of the present paper was to pin down the factor structure of managerial approaches in a sample of Czech companies. We identified six factors of managerial approaches in the selected companies. Hence, the theoretical five-dimensional structure postulated in the EFQM model does not describe the interrelations between the individual quality management elements particularly well. On the other hand, there are also similarities between the empirical and theoretical structure – we identified two distinct empirical factors (Leadership and Human resources) that are almost identical to those assumed in the EFQM model.

Suggestions for further research: It is important to replicate our results in subsequent studies (see Maniadis et al., 2014). In particular, whereas our research was exploratory in nature (i.e., given the variety of results obtained by previous researchers, we did not have strong prior hypotheses concerning the factor structure), subsequent research can use the results presented here to formulate specific hypotheses. Our results can be especially relevant in this respect for replications performed in Central European countries or in other countries with comparable socio-economic conditions. A suitable method to be used in future research is confirmatory factor analysis (see e.g. Long, 1983). This method allows the researcher to compare the fit of different pre-specified alternative models to the empirical data at hand. One could for example compare the fit of our six-factor solution to the fit of the original five-factor model. What can be also interesting is to compare the fit of the different models across different types of companies (e.g., industrial vs. service companies).

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THE STRATEGIC IMPORTANCE OF HUMAN RESOURCES MANAGEMENT AND THE ROLES OF HUMAN CAPITAL INVESTMENT AND EDUCATION

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Abstract: *The entry focuses on the issue of strategic importance of human resource (HR) management. The questionnaire survey was aimed at companies from the Region of South Bohemia. The approach to personnel agenda was analysed, as well as the connections to the branches in which the tested businesses were active, the size of the company, the education level of their HR officers, and their company level investments in human capital. A high level of heterogeneity in the data was found and no statistical differences were found in tested hypotheses. However, it was discovered that if the HR department employees have tertiary education, it is a sign of a higher standard and competence level of the department. The higher level of competency and HR planning independence was found in the service sector. This supports the claim that a vast variety of skills is needed in order to provide agenda of life-long learning and professional growth.*

Keywords: *Czech Republic, Region of South Bohemia, Human resources management, Personnel department, Human resources officer, Human capital.*

JEL Classification: *O15, J24, I21.*

Introduction

This paper deals with the role of human resources (HR) manager's level of education, company investment in learning and skills and controls for company size and economic activity. The analysis is aimed at HR departments and particularly their size and strategic management's importance. In other words, this paper focuses on the relationship between strategic position of HR department and the HR manager's level of education, quality of Human resources management (HRM) activities which are measured by regular human capital investment.

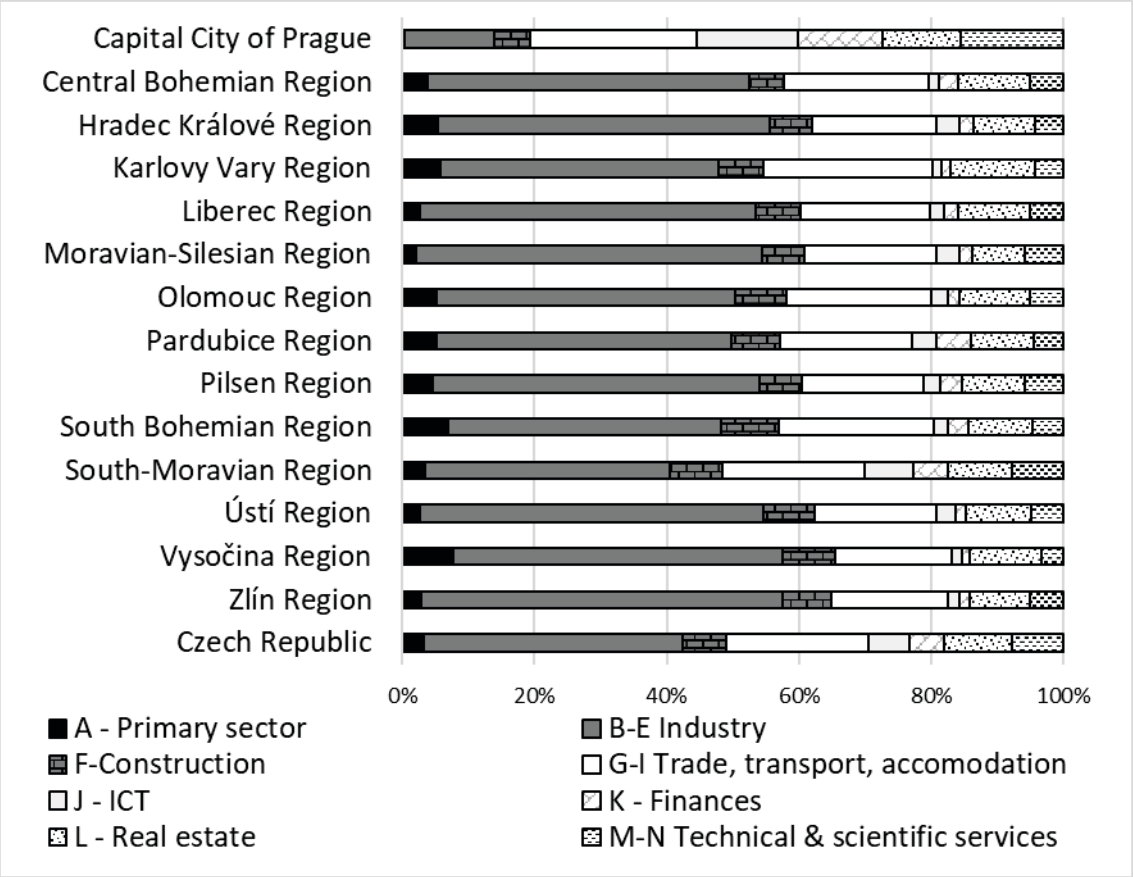
Human resources management (HRM) in the Region of South Bohemia is influenced by the Czech Republic being a transitional economy. Previously, Tung and Havlovic (1996) stated that the Czech Republic is historically closely linked to Austria and Germany, and has a higher level of industrialization. This suggests that many of Czech HRM policies and practices are similar to the ones created in the industrialized West. The process of privatization evokes changes in how firms in transitional economies function. It also influences the organizational structure of these firms (Cooke et al., 2011; Horwitz, 2011). Outdated and inflexible organizational structures have to evolve and be transferred into structures that are more flexible and newer.

The competitive pressures of multinational enterprises (MNEs) needed to be taken in account as well (Zupan and Kaše, 2005; Poór et al., 2014). Several empirical studies from advanced Western economies (at the firms/individual levels) confirm (Dany et

al., 2008; Grund and Martin, 2012) the necessity of HRM functions and advanced training to gain competitive advantages (Ognjenovic, 2015).

When it comes to comparing the current state in Bulgaria, Czech Republic, Hungary, Poland, Romania, and Slovakia, there are distinct and divergent cultural differences between the countries (Buzady, 2016; Zupan et al., 2017). Because of these differences, staffing strategies, talent management, and MNEs' policies have to be introduced and fine-tuned to the specific needs of the countries. Strielkowski, Shishkin and Galanov (2016) were analyzing new management approaches, such as self-management, decision-making delegation, constituting of keystones of "modern management".

Fig. 1: Gross value added at basic prices by NUTS 3 regions in 2014



Source: Eurostat, 2017

The business structure in the region of South Bohemia (Fig. 1) is characterized by higher share of gross added value in primary sector and construction in comparison to the national economy average. The share of services (NACE codes G to N) is about 43 % which is comparable share to the structure of other regions except service oriented region of Capital city of Prague. About 32.4 % of workers are employed in the industry 11.2 % in trade activities, and 8.7 % in construction in the region of South Bohemia (Krajská správa Českého statistického úřadu v Českých Budějovicích, 2016).

Looking at the research about the Region of South Bohemia, Dalíková and Doležalová (2012) analyze how process management is practiced in small and medium-sized enterprises (SMEs) in the Region of South Bohemia in connection with several business sectors. The analysis conducted by Straková, Vokoun, Váchal, Stellner and Vaníčková (2016) proved that companies are highly interested in further

training their employees but not by signing them to programs of life-long learning but by providing training courses that focus on specific specialized skills, concrete new technologies, soft skills, and certificates.

1 Statement of a problem

The analysis is based on the importance of human capital investment and particularly the role of education. The returns from education and various types of training to the individual, firm and the economy have been widely studied (Blundell et al., 1999; Kwon and Rupp, 2013; Bhattacharya et al. 2014). The evidence has shown that investment in human capital and selected training activities are an important factor in individual, company, region, and national economy growth. This paper tries to prove that the strategic importance of HR department depends on the ability to provide quality human capital investment which is based on the education level of HR workers.

The research was conducted in South Bohemian businesses via an electronic questionnaire in November and December 2015. Tested hypotheses firstly focus on the services sector, in which the business comes in close contact with its customers and where the knowledge and skills of employees tend to be higher than in industrial businesses. The first two hypotheses are rather descriptive and provide a control function. Last two hypotheses aim to provide the links between human capital investment, and strategic importance of HR department.

The first hypothesis states: "There are differences in HRM between the service sector and companies from other branches." The analysis conducted here focuses on the role of the human resources officers that requires higher standards and skills of these officers within bigger businesses. The second hypothesis thus states: "The group of middle-sized and bigger companies (more than 50 employees) is specific and has different criteria for their human resources officers and their skills than micro-enterprises (0-9 employees) and small enterprises (10-49 employees)."

The next hypothesis focuses on the effects of long-term and regular investments in human capital, which should create advantages over rival companies. The third tested hypothesis therefore states: "Respondents, who pay attention to lifelong learning activities within businesses, invest in long-term human capital and require significantly different personnel agenda and employees."

The last hypothesis concerns itself with the signaling theory and with realizing that a qualified HR manager is a key asset within a company. It also detects the differences between companies that see tertiary education of human resources managers as a specific sign of higher qualification. The fourth hypothesis states: "Companies demanding tertiary education of their human resources managers have a different approach to personnel agenda."

2 Methods

This paper employs and interdisciplinary approach. This method of analyzing HRM activities requires knowledge from a variety of social sciences. The individual level is connected to the focus on knowledge of the human brain, the findings about limited rationality, and mistakes in everyday decision-making (Kahneman, 2011), discovering motivation factors, the effective use of innovation potential and talents of engineers,

designers, mechanics and computer programmers (Dries, 2013; Festing et al., 2013). The interdisciplinary approach also accentuates the role of history, personal and professional past employees have and to which generation the employees belong (Solnet and Hood 2008).

In HR research about human capital investment the models such as hourly wage model by Mincer (1974), Cobb-Douglass production function or data envelopment analysis (Mehra et al., 2014) are used to determine the effects of investment to the individual worker, company or national economy efficiency. We are not interested in the efficiency of individuals or the company, but strategic position of HR department within the organization. We had to employ a standard non-parametrical approach to the questionnaire and hypotheses testing because the variables of interest were not normally distributed. Parametric approach was possible in terms of categorical logit estimation, but we were not able to provide unbiased model. It is because we faced omitted variable problem and severe heteroscedasticity. There are individual effects in companies and other factors influencing strategic position of HR department.

In order to test the hypotheses, a Wilcoxon rank-sum z-test (Wilcoxon, 1945) was used. It tests unpaired data on the equality of two independent variables X_1 (for example group size) and X_2 (answer to a selected question Q#). The probability of type I errors was chosen at the level $\alpha = 5\%$ (p-value ≤ 0.05). For the purposes of interpreting the results, differences between the mean values are used as an approximate representation of statistical difference between groups during otherwise same conditions (ceteris paribus). No interactions of more variables are considered in this approach.

The questionnaire research in selected companies was conducted in November and December 2015; only South Bohemian businesses were selected. A list was assembled of altogether 300 active respondents (companies and organizations) from the private and public sectors. An electronic questionnaire with a return rate of 24.33 per cent was used. There were also few respondents that do not have an HR department (outsourcing). It is possible to consider a much higher return rate without such cases. But even such gross return rate (69 companies in total) is a representative sample for testing basic hypotheses of two business groups. 32 companies in total (46.38 %) are businesses providing services (including financial services, wholesale, and shipping agencies). Other companies are from the manufacturing and construction industries. We are aware of the possible systematic and even misleading distortion in the design of the questionnaire. Academic terminology is used in some questions, which can be incomprehensible; some departments might not know all of the used terms (f.e. “outplacing”). Nobody did however report any comprehension problems or complained about the questions’ instructions in the commentary sections.

3 Problem solving

The number of registered employees of HR departments is converted to full-time employee units; it does not matter what branch, meaning if the respondent is providing services or is from the production branch. The size of the enterprise is also irrelevant, meaning whether the respondent is a small enterprise (maximum of 50 employees); the education level of employees is also irrelevant, meaning it does not matter if the respondent’s human resources department offers lifelong learning programmes; the

education requirements for HR managers are also irrelevant (Tab. 1). If we observe a high deviation, the number will develop and will be dependent on other factors rather than the observed factors.

Tab. 1: Number of registered employees of human resources departments

Number of observations	Average	Standard deviation	Minimum	Maximum
65	3.63	5.37	0.2	26
H1 – Economic sector (services)		No differences (z = 0.435; p-value 0.66)		
H2 – Firm's size (large firms)		No differences (z = -0.74; p-value= 0.46)		
H3 – Human capital investments		No differences (z = -1.156; p-value= 0.25)		
H4 – HR director's education		No differences (z = -1.66; p-value= 0.09)		

Source: Authors, 2016

We observe results with a high variability of values; summarizing values suggest a prevalence of the share of employees with secondary education and a relatively high share of employees with tertiary education (Tab. 2). Because of the high standard deviations however, it is necessary to test potential hypotheses about the higher share of employees with tertiary education in more detail. This share is branch independent; the size of the enterprise is also irrelevant, meaning it does not matter if the respondent is a small enterprise with less than 50 employees, or a middle-sized or big enterprise with more than 50 employees.

Tab. 2: The share of employees according to the level of their education

Share of HR employees	Number of observations	Average	Standard deviation	Minimum	Maximum
Tertiary edu.	69	40.41	40.39	0	100
H1 – Economic sector		No differences (z = -1.291; p-value= 0.20)			
H2 – Firm's size		No differences (z = 1.927; p-value= 0.054)			
H3 – HC investments		+18.22 % points (z = -2.109; p-value= 0.032)			
H4 – HR director's education		+29.83 % points (z -3.013; p-value= 0.00)			
Secondary edu.	69	53.34	39.33	0	100
H1 – Economic sector		No differences (z = 1.113; p-value= 0.27)			
H2 – Firm's size		No differences (z = -0.793; p-value= 0.43)			
H3 – HC investments		No differences (z = 1.397; p-value= 0.16)			
H4 – HR director's education		+22.35 % points (z = 2.210; p-value= 0.03)			
Lower education	69	6.25	18.05	0	94
H1 – Economic sector		No differences (z = 0.265; p-value= 0.79)			
H2 – Firm's size		No differences (z = -0.864; p-value= 0.39)			
H3 – HC investments		No differences (z = 0.454; p-value= 0.65)			
H4 – HR director's education		No differences (z = 0.368; p-value= 0.72)			

Source: Authors, 2016

As expected, there is a certain dependency on education demands, meaning if the respondent requires tertiary education. There is also a dependency in form of 29.83 per cent higher share of HR employees when tertiary education of the manager is demanded than in companies where tertiary education of managers is not required.

This connects to 22.35 per cent higher share of HR employees with secondary education in companies where tertiary education of the manager is required than in companies where it is not. There is no difference of the share of the least educated HR employees in the departments of all companies. The dependency result in form of 18.22 per cent higher share of HR employees with tertiary education in the department if the company provides lifelong learning and professional development opportunities as a part of its personnel agenda is interesting. An influence of human capital investments in other education groups was not observed.

Tab. 3: The strategic management's perception of the importance of the human resources

Number of observations	Average	Standard deviation	Minimum	Maximum
69	2.14	1.00	1	5
H1 – Economic sector		No differences (z = 0.965; p-value= 0.33)		
H2 – Firm's size		No differences (z = 0.66; p-value= 0.51)		
H3 – HC investments		No differences (z = 1.193; p-value= 0.23)		
H4 – HR director's education		+0.43 % points (z = 2.173; p-value= 0.03)		

Source: Authors, 2016

Note: Likert scale: 1- Very useful, 2 - Useful, 3 – Necessary, 4 – Almost useless, 5 - Useless.

This value is branch independent; the focus of the company is not relevant (Tab. 3). The value is also independent on the size of the enterprise, meaning if the respondent is a small company (maximum of 50 employees), a middle-sized or a big company with more than 50 employees (z = 0.66; p-value= 0.51; N=69). The value is also independent on the form of employee education, meaning if the respondent provides lifelong learning within the human resources department (z = 1.193; p-value= 0.23; N=69). The value is however dependent on the demands for education, meaning if the respondent demands tertiary education of its human resources employees (z = 2.173; p-value= 0.03; N=69). If the company does require tertiary education, its HR department is seen more positively, by 0.43 per cent, in comparison with companies that do not require tertiary education.

Tab. 4: The formation of human resources plan (medium-term department plan)

Firms with no HR autonomy, competency, i.e. someone else is running HR planning (A, B, C, D) vs. There is certain level of autonomy and competency and HR planning (E, F, G).	
H1 – Economic sector (services)	+29.05 % points (z= 2.43; p-value= 0.02)
H2 – Firm's size (large firms)	No differences (z= 1.94; p-value= 0.052)
H3 – Human capital investments	+25.17 % points (z=-2.08; p-value= 0.04)
H4 – HR director's education	No differences (z=-0.56; p-value= 0.58)

Source: Authors, 2016

Note: A: Higher management forms the plan (53.6 %), B: We do not form a plan (2.9 %), C: The plan is formed by someone else (1.4 %), D: The plan is formed by higher management according to the long-term business plan (1.4 %), E: The plan is formed by higher management with comments by the HR department (24.6 %), F: The head of the HR department according to the long-term business plan of the enterprise

forms the plan (13.0 %). G: Higher management of the human resources department forms the plan (2.9 %).

In the corporate sphere, HR officers are often perceived as administrators, statisticians in a function office position, instead of being viewed as a part of higher management, a communicator between management and employees that provides methodological leadership and consulting services for the company's employees. In the HR department, medium-term department plan is perceived as something that is decided by strategic management (higher enterprise management in more than half of the cases). Only 15.9 % of respondents have tactical autonomy while forming plans. Approximately a fourth of the departments have the possibility of commenting on plans that are introduced by higher management.

The level of autonomy (Tab. 4) is dependent on the branch type, meaning if the respondent provides services or is active in the production branch ($z = 2.433$; p-value= 0.02; N=69). Lower competence share is in the services providing branch, by 29.05 per cent; the competence share in the production branch is 54.05 %, 25 % in the services providing branch (meaning the competence to create a plan).

This value is independent on the size of the company, meaning if the respondent is a small company having maximum of 50 employees, or a middle-sized or big company employing 50 and more employees ($z = 1.945$; p-value= 0.052; N=69).

The value is independent on the education requirements, meaning if the respondent requires tertiary education during admissions to the human resources department ($z = -0.560$; p-value= 0.58; N=69).

The value is dependent on the form of the employees' education, meaning if the respondents secure lifelong learning opportunities for their human resources departments ($z = -2.087$; p-value= 0.04; N=69). A higher share of competences is in companies that offer lifelong learning and professional development opportunities to their employees. It is by 25.17 % (plan creating competence), 54.17 per cent is the competence share in enterprises offering lifelong learning opportunities, 30 % in companies that do not.

4 Discussion

This entry had tested hypotheses linked with the current debate in HRM research, discovering a high demand for further employee education, primarily focused on specialized skills, in detail new technologies, soft skills and certifications. A relatively high level of heterogeneity was found in the dataset. A lot of tested hypotheses were found statistically not significant.

The possibility of competent planning is typical in companies in the production branch and depends on a certain corporate philosophy providing long-term lifelong learning programs. These findings are in connection with conclusions of Stacho, Urbancová and Stachová (2013).

The self-evaluation of departments is very heterogeneous. We observe on average a variable score from 1 (very useful) to 3 (necessary department); there are however also evaluations from respondents where they see their own role within the company as superfluous. This value is again dependent on the education requirements of the

companies, if the enterprise demands tertiary education of their human resources officers it is 0.43 per cent points more positive than in enterprise, which do not require tertiary education. The human capital investments are linked with a higher share of HR workers with tertiary education. The role of HR director's education is linked to the higher share of tertiary educated HR workers.

Conclusion

The strategic perception of HR department is dependent on the level of HR director's education. The higher director's education is however not sufficient to provide certain level of HR planning autonomy in the company. The planning autonomy is more dependent on the presence and probably volume of human capital investment and also the type of economic activity. In other words, the company that provides lifelong learning and professional development opportunities as a part of its personnel agenda in service sector is more likely to have HR department with the competency and accountability to prepare medium-term HR department plan.

In general, tertiary education indicates a higher standard and competences of the human resources department. The willingness of management to entrust the personnel agenda to the HR departments with such trained employees depends on the university education and lifelong learning. The number of registered employees of human resources departments is independent of the branch. The size of the enterprise and the education level of employees is also irrelevant, meaning it does not matter if the respondent's human resources department offers lifelong learning programmes; the education requirements for HR managers are also irrelevant.

The share of employees according to the level of their education is branch independent; the size of the enterprise is also irrelevant. As expected, there is a certain dependency on education demands. The share is 18.22 per cent higher in the department if the company provides lifelong learning and professional development opportunities. An influence of human capital investments in other education groups was not observed.

The strategic management's perception of the importance of the human resources is branch independent; the value is also independent on the size of the enterprise, the form of employee education. The perception is however dependent on the demands for education, meaning if the company does require tertiary education, its HR department is seen more positively, by 0.43 per cent, in comparison with companies that do not require tertiary education.

Approximately a fourth of the departments have the possibility of commenting on medium-term department plans that are introduced by higher management. The level of autonomy of HR department is dependent on the branch type, size of the company, the education requirements, and on the form of the employees' education.

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At first, each submission is assessed by executive editor and by The Editorial Board, who check whether the submission satisfies the journal requirements. If it does, they send the papers to the 2 referees. Referees elaborate evaluation reports in the form of a standard blank form (sent to referees by the executive editor). Referees evaluate the papers from content and formal point of view, a summary of comments for the author(s) is included. The referee recommendation to the editor should be one of the following: Accept for publication, accept with minor revisions, accept with major revisions, reject. The Editorial Board reserves the right to return to the authors any manuscript that in their opinion is not suitable for publication in the journal, without expressly stipulating the reasons for doing so. Accepted articles for publication do not undergo linguistic proofreading. Executive editor informs the author about the result of the review procedure.

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