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МЕЂУНАРОДНИ ЧАСОПИС
ЗА ЕКОНОМСКУ ТЕОРИЈУ И ПРАКСУ И ДРУШТВЕНА ПИТАЊА

ЕКОНОМИКА

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ИЗДАВАЧ: Друштво економиста "Економика" Ниш
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DEVELOPMENT TRENDS OF THE TEXTILE INDUSTRY OF THE REPUBLIC OF SERBIA IN LABYRINTHS NEOLIBERAL GROWTH MODEL

Abstract

The textile industry of the Republic of Serbia, for a long time, has been one of the key drivers of economic growth, the mainstay of exports, demographic change and the bearers of social policy. However, in the period from 2000 to 2008, that is, in the period of application of the neoliberal model of growth, it was treated by the creators of economic policy as a relic of the past and the socialist model of growth and continuously recorded negative production results. In accordance with the above, the main goal of the research in this paper is to analyze the key macroeconomic indicators to consider the development trends of this industry in this period. The analysis used the method of induction, while the analysis of competitiveness of the textile industry of Serbia used the following indicators: market share analysis and RCA index (revealed competitive advantage index). The results of the research clearly indicate the disastrous consequences of the application: first, shock therapy in the liberalization of trade flows, second, the wrong model of privatization and third, inadequate economic policy measures, but also the fact that the textile industry has maintained a significant share in exports Republic of Serbia.

Keywords: *Textile industry, structural adjustment, production, employment, foreign trade, competitiveness, Republic of Serbia.*

JEL classification: L67, O11, O14.

РАЗВОЈНИ ТРЕНДОВИ ТЕКСТИЛНЕ ИНДУСТРИЈЕ РЕПУБЛИКЕ СРБИЈЕ У ЛАВИРИНТИМА НЕОЛИБЕРАЛНОГ МОДЕЛА РАСТА

Апстракт

Текстилна индустрија Републике Србије, у дугом временском периоду, била је један од кључних покретача привредног раста, ослонац извоза, демографских промена и носилаца социјалне политике. Међутим, у периоду од 2000. до 2008. године, то јест, у периоду примене неолибералног модела раста, она је, од стране креатора економске политике, третирана као реликт прошлости

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и социјалистичког модела раста и, у континуитету, бележила је негативне производне резултате. У складу са наведеним, основни циљ истраживања у овом раду је да се анализом кључних макроекономских показатеља сагледају развојни трендови ове индустријске гране у наведеном периоду. У анализи је коришћен метод индукције, док су при анализи конкурентности текстилне индустрије Републике Србије коришћени следећи индикатори и то: market share analysis i RCA indeks (revealed competative advantage index). Резултати истраживања јасно указују на погубне последице примене: прво, шок терапије у либерализацији трговинских токова, друго, погрешног модела приватизације и треће, неадекватних мера економске политике, али и на чињеницу да је текстилна индустрија, у посматраном периоду, задржала значајано учешће у извозу Републике Србије.

Кључне речи: *Текстилна индустрија, структурно прилагођавање, производња, запосленост, спољно-трговинска размена, конкурентност, Република Србија.*

Introduction

Trough accepting specific and fundamental principles of the transition doctrine based on the recommendations of the Washington Consensus, the Republic of Serbia started with implementation of the process of structural transformation of its economy in the beginning of the 21st century (Gligorijević & Ćorović, 2019). The creators of economic policy at the time were convinced that the open market would inhibitate structural changes in the economy. They were wrong. Namely, they belived that this is an equal market competition so it will contribute to increasing the competitiveness of national enterprises. However, she lost sight of the fact that the industry of the Republic of Serbia entered a period of development after 2000 and that, in order to gain a more equal position in the competition, it needs time to consolidate after a period of isolation during the last decade of the twentieth century (Gligorijević, et al., 2020).

One of the first industries which felt negative effects of this economic policy was the textile industry of the Republic of Serbia. On the one hand, the unprotected and unregulated domestic market of textile products, thanks to the hasty and misapplied liberalization of foreign trade relations, has become open for preasure of highly competitive producers mainly from developed eastern and western countries, but also a great enironment for gray trade (Gligorijevic, et al., 2021). This was largely due to the inadequate exchange rate policy (overvalued exchange rate) of the domestic currency, which strengthened the competitive advantage of imported goods. This trend had a negative impact on the overall macroeconomic trends in the country, especially in the field of economic relations with foreign countries, because the exchange rate was not in the function of increasing production and exports, but one of the generators of large imports (https://www.danas.rs/ekonomija/-where-over-overestimated-dinar).

The sudden liberalization of imports and the overestimated exchange rate of the dinar stifled domestic production and led to the destruction of domestic production capacities. The wrong approach to privatization has led to difficulties and delays in the

process of finding strategic partners (Ćorović, 2012). With the burden of accumulated financial problems and significant redundancies, the largest number of large socially-owned companies - carriers of production, bypassed the interest of private investors, which resulted in the complete shutdown of production in these companies. What happened, primarily in the sector for production of raw materials, was a vertical disintegration of the serbian textile industry, so import dependence became a key structural feature of this industry.

Based on the above facts, the aim of the research in this paper is to perform a realistic analysis and presentation of development trends of the textile industry of the Republic of Serbia during the neoliberal growth model and to provide an answer to the question: how did this growth model affect its development performance 2000 until the economic crisis in 2008? The basic hypothesis of the paper is that the application of the neoliberal model of growth has had disastrous consequences for the development of the textile industry of the Republic of Serbia.The research methodology in this paper is based on theoretical papers dealing with issues related to the application and results of the application of the neoliberal growth model and statistical data of reference institutions.

Movement of the volume of production

After a great decline in the volume of production that was recorded during the last decade of the 20th century, the textile industry of the Republic of Serbia at the very beginning of the 21st century started on the path of a certain recovery. Namely, during 2001, there was an increase in the volume of production in both sectors of the sector. In the yarn and fabric production sector, the production volume increased by about 10%, while in the underwear and clothing production sector, the production volume increased by about 40% (Statistical Yearbook of Serbia, 2010). Such growth enabled the yarn and fabric production sector to end 2001 with a production volume of about 30%, and the laundry and clothing production sector at a level of 27%, compared to 1990 (Republic Statistical Office). , Internal data).

Starting from 2002, there was a continuous decline in the volume of production in the textile industry, which resulted in its complete marginalization, both in the industrial and economic structure of the Republic of Serbia. Namely, in contrast to the total industry, which recorded a tendency of a certain, but rather slow increase in production, according to official statistics, production in the yarn and fabric sector fell at an average annual rate of 11.5%, while production was underwear and clothing recorded an average annual decline of 19.5%. At the same time, the largest decline in production was recorded during the most intensive implementation of the privatization process in the Republic of Serbia, ie in the period from 2002-2003. years. In these years, production in the yarn and fabric sector decreased by 13% and 28%, respectively, while the decline in production in the lingerie and clothing sector was by 33% and 41%, respectively (Gligorijević, et al., 2021).

Due to the slow and misguided privatization process, the most unfavorable flows are related to the raw materials sector of the textile industry of the Republic of Serbia. It can be said that the negligence of the state (paradoxically) led to the almost complete shutdown of the production of raw materials of strategic importance for the textile

industry - viscose fiber and artificial silk, i.e. basic production in the textile industry, which had no competition in the domestic market. at the same time secure export placement throughout Europe and the Far East.

With the shutdown of the production of strategic raw materials, at the same time, the production of viscose yarns and their mixtures with other fibers, viscose fabrics, cord fabrics for the rubber industry, decorative fabrics for furniture, parts of the flooring industry and many other related products. This has resulted in, on the one hand, the need to import these products, and on the other hand, the impossibility of successful privatization, as well as the decline of many complementary facilities, narrowly specialized in processing viscous raw materials: spinning, weaving, printing house and dyehouse. In this way, the textile industry of the Republic of Serbia has lost the quality of a vertically integrated industry, with far-reaching consequences for its import dependence (Ćorović, 2012). In addition, due to the decline in the purchasing power of the population, there was a large decline in the volume of production of finished textile products. The statistical growth of clothing and underwear production, which was recorded, is a consequence of the growth of finishing works, which is an indicator of the deterioration of the production structure.

Employment trends

The dynamic decline in employment in the textile industry of the Republic of Serbia, which began during the last decade of the 20th century, continued after 2000. This decline was particularly pronounced in 2003, when the privatization process was in full swing (***Table 1***).

Table 1: Employment trends in the textile industry sectors of the Republic of Serbia in the period 2001-2008. years (in 000)

Year	Total number of emplo-yees*	Staff in the proce-ssing industry	**Staff in the yarns and fabrics sector** **	% total emplo-yment	% employees in the processing industry	**Emplo-yees in the sector clothes**	% total emplo-yment	% employees in the processing industry
2001	2102	619	**40**	1,9	6,5	**53**	2,5	8,6
2002	2067	566	**36**	1,7	6,4	**47**	2,2	8,3
2003	2041	525	**29**	1,4	5,5	**37**	1,8	7,0
2004	2050	484	**24**	1,2	4,9	**32**	1,6	6,6
2005	2068	460	**22**	1,1	4,8	**28**	1,4	6,1
2006	2025	421	**18**	0,9	4,3	**24**	1,2	5,7
2007	2002	392	**17**	0,8	4,3	**20**	1,0	5,1
2008	1999	370	**15**	0,8	4,1	**19**	0,9	5,1

* Included are employees of companies, institutions and cooperatives, as well as private entrepreneurs. ** Included employees in companies, without private entrepreneurs.

Source: Republic Bureau of Statistics, *Statistical Yearbook 2003, 2005, 2008, 2010.*

The restructuring of large textile factories began, and most often ended, with the approval of social programs by the state, by which they got rid of surplus labor on a voluntary basis. Without investing in a more serious analysis of the workforce, these companies, after the implementation of the mentioned programs, were left without the minimum necessary structure of employees for the production process, most often only with administrative workers.

The structure of employees by sectors of the textile industry, formed in 2001, remained until the end of the observed period. The clothing sector employed about 57% of the total number of employees in this industry, which at the end of 2008 amounted to slightly more than 19,000 workers. The absolute decline in employment in this sector in the observed period was close to 35,000 workers, observed according to the number of registered workers in enterprises. However, in the same period, there was an increase in the number of private entrepreneurs in the textile industry by 41%, from 4,656 in 2000 to 6,556 in 2008 (Republic Bureau of Statistics, Internal Data).

More than 80% of entrepreneurs were registered for the activity which is categorized as clothing production. If we keep in mind that, technologically speaking, at least three workers are needed to organize the production process, that means that at least about 20,000 more workers were hired based on the work of private entrepreneurs. With those workers in the gray zone, the textile industry of the Republic of Serbia, at that time, employed over 50,000 workers, which, after the production of food and beverages, represented the largest number of employees in the entire industry.

Movement of foreign trade

The foreign trade exchange of the serbian textile industry in the observed period is characterized by cyclical trends in both exports and imports, depending on the country's foreign policy position, then the continuous presence of deficits and the dominance of finishing jobs in the export structure.

Table 2: Foreign trade of the textile industry of the Republic of Serbia in the period 2000-2008. year (million USD)

Year	Total export	Total import	Export textile industry	% of total export	Import textile industry	% of total imports	% coverage imports export	Surplus/ deficit textile industry
2000	1558	3340	171	10,14	136	4,07	125,73	35
2001	1721	4261	228	13,24	189	4,38	120,63	39
2002	2075	5614	201	9,63	258	4,59	77,52	-57
2003	2756	7477	218	7,91	307	4,10	71,00	-89
2004	3513	10753	196	5,57	524	4,87	37,40	-328
2005	4482	10461	301	6,71	467	4,46	64,45	-166
2006	6420	13172	395	6,15	601	4,56	65,72	-206
2007	8825	18554	541	6,13	**869**	4,68	62,25	-328
2008	10973	22875	**657**	5,98	1030	5,98	63,78	-373

Source: Republic Bureau of Statistics, *Statistical Yearbook of Serbia 1991-2010.*

With the normalization of foreign trade relations after 2000, the volume of exports, and especially the volume of imports, was in continuous growth. In 2007, imports exceeded the value from 1990, with a volume of 869 million US dollars (***Table 2***). However, exports of US dollars 657 million in 2008 have not yet come close to the values at the beginning of the period, despite the results of exchanges with Montenegro, Bosnia and Herzegovina, Macedonia and other former Yugoslav republics (Ćorović, et al., 2020).

More dynamic growth of textile exports, especially after 2005, was accompanied by even faster growth of imports and an absolute increase in the foreign trade deficit of this industry, this can be cinsidered as a good indicator of its structural character (Raičević & Ćorović, 2010). The degree of coverage of imports by exports has fluctuated over the years, depending on the volume of total foreign trade in textile products. In the last few years of the observed period, the level of coverage of imports by exports has stabilized at around 65%, despite the absolute changes in the volume of exports and imports.

The most important foreign trade partner of the textile industry of the Republic of Serbia were the countries of the European Union. Exports of textile products to this region, after a period of fluctuation due to political instability, continued to grow in absolute and relative terms, and the structure of exports by country after 2000 changed in the direction of increasing the absolute size and relative share of Italy and decreasing relative share of Germany. with a slight increase in the absolute volume of exports to this country (Gligorijević & Ćorović, 2020).

After the enlargement of the European Union in 2004 and 2007, the Republic of Serbia remained deprived of long-term cooperation arrangements related to finishing works with Germany, which were redirected to Poland, the Baltic countries, Romania and Bulgaria. There have been even more significant changes in the regional structure of textile imports. In the new regional structure of textile imports, a significant place was occupied by Turkey with 20-25% share in total imports (Čukul, 2008), as well as the former Yugoslav republics with 10-15% share. After 2000, there was an increase in the relative share of imports from the European Union region to the level of 50-55%, due to the increase in the volume of finishing work. The most intensive growth of imports is from the region of the Far East, especially China, which became the second most important, with a share of 23%.

The largest volume of surplus in the textile trade was realized with Germany, while with the most important partner Italy, there was a tendency towards balancing exports and imports. The continuously growing deficit was present in trade with Turkey, the countries of the Far East (China, Indonesia, South Korea, Taiwan), as well as with the countries of the Middle East (India, Pakistan, Bangladesh). With its growth dynamics, the deficit with China stood out, which accounted for two thirds of the total deficit in the trade in textile products.

In the observed period, there were significant changes in the structure of exports and imports of the textile industry of the Republic of Serbia, from the aspect of the relative representation of certain sectors of this industry. The structure of exports, at the beginning of the 1990s, with a share of about 60%, was dominated by the export of clothing. However, after 2000, the structure of exports deteriorated, so that in 2008 the relative share of clothing exports reached 51%. The dynamic growth of the share of the

yarn and fabrics sector in the total export of textile products is mainly due to the export of hula-hop women's socks, which reached the level of 203 million US dollars that year, which accounted for almost one third of the total textile industry exports of Serbia.

Structural problems in the functioning of the textile industry of the Republic of Serbia, in the form of lagging behind the development of the yarn and fabric sector, reflected on the growth of imports of basic raw materials and the emergence of deficits in foreign trade of this industry. In conditions of relatively high demand on the domestic market, the import of clothing increased absolutely five times, so that its relative share reached the level of 35.58% in 2008 (***Table 3***). Thus, partly due to the imbalance in the production structure of the entire industry, and collectively, due to less competitiveness in the range that prevails in total demand, domestic producers lost a good part of the domestic market (Gligorijević & Ćorović, 2020).

Table 3: Structure of exports and imports by sectors of the textile industry of the Republic of Serbia in the period 2000-2008. year (million USD)

Year	Export yarn sector and fabric	% of total export textiles	Export sector clothes	% of total export textiles	Import sector yarn and fabric	% of total imports textiles	Import sector clothes	% of total imports textiles
2000	60	34,87	111	65,13	100	72,60	71	27,40
2001	76	33,17	152	66,83	133	70,19	55	29,81
2002	69	34,12	132	65,88	186	72,59	72	27,41
2003	84	37,60	134	62,40	205	65,93	102	34,07
2004	80	40,63	116	59,37	330	69,57	194	30,43
2005	129	42,55	172	57,45	357	75,79	110	24,21
2006	178	45,90	217	54,10	425	72,57	176	27,43
2007	266	48,53	275	51,47	607	69,09	262	30,91
2008	321	48,60	336	51,40	664	64,42	366	**35,58**

Source: Republic Bureau of Statistics, *Statistical Yearbook of Serbia 2000-2010.*

The volume of exports of the ten most important groups of products from the yarns and fabrics sector in 2008 accounted for 83% of the total exports of that sector of the textile industry of the Republic of Serbia. Such concentration is an indicator of a rather narrow and limited range of export supply of this part of textile production, the expansion of which is, above all, a function of eliminating the main structural imbalance in this industry.

The growth of exports of this sector was largely based on the increase in exports of only one group of products, namely women's hula-hop socks, which accounts for 74% of total growth. With exports of 138.6 million euros in the mentioned year, this group of products was the leading export item of the textile industry of the Republic of Serbia and accounted for 30% of the total exports of this branch. The structure of exports of this sector, therefore, was based on the predominant share of standard large-scale products, lower and middle stages of processing, with a large share of labor and high sensitivity to cost changes.

In the case of the clothing sector, exports are concentrated in the ten most important product groups, which is a significant shortcoming in terms of potential for future growth dynamics. Of the total exports, this sector accounted for 84.7%, with a much more even dispersion by individual groups. The export of men's suits and trousers, women's costumes,

skirts and dresses, clothes made of impregnated felt and knitted men's undershirts and mothers stood out in terms of volume. The dynamics of export growth of standard, large-series products, especially knitted men's undershirts and mothers' and women's overalls and underwear, was significantly more pronounced in relation to fashion items, which is an indicator of the deteriorating export structure of this sector.

The presence of a wide range of imported products from the raw materials sector is an indicator of the depth of structural imbalance in the textile industry of the Republic of Serbia. In terms of the volume of imports, intermediate unfinished products dominated, which are the subject of further final finishing, such as yarns made of synthetic filaments and hula-hop socks. In addition, types of fabrics and other products, which were not previously represented in domestic production, such as light cotton fabrics weighing less than 200 g/m^2, impregnated fabrics and impregnated non-woven textiles, were highly represented.

With the liberalization of the foreign trade regime, the greatest dynamics of import growth was recorded by standard large-scale products, whose competitiveness was manifested predominantly in the price level (Raičević & Ćorović, 2010). At the beginning of 2000, these products accounted for about 8% of the sector's total imports, while their relative share in 2008 exceeded 50%.

According to the volume of imports, the import of undershirts and mothers stood out, both for men and women, bras and midi goods, men's cotton shirts, tracksuits and bathing suits, bed linen, various work gloves and the like. Given the low solvent demand of the domestic population, the price factor for these products was predominant in relation to design and quality.

Table 4: Trends in the volume and relative share of finishing jobs in the structure of exports and imports textile industry of the Republic of Serbia in the period 2000-2008. year (million EUR)

	2000	2001	2002	2003	2004	2005	2006	2007	2008
Regular export of yarn and fabric	42	49	47	41	43	46	53	55	62
Export after finishing yarn and fabric	1	1	2	6	12	56	90	135	155
% of exports after finishing	2,5	2,0	2,6	14,3	21,7	54,9	62,7	70,1	71,4
Regular export of clothes	10,6	19,0	15,7	13,8	19,1	15,5	26,1	39,5	51,4
Export of clothes after finishing	-	-	-	0,3	67	123	143	163	179
% of exports after finishing	-	-	-	2,1	76,9	69,0	84,1	80,5	77,7
Regular import of yarn and fabric	97	134	180	162	164	150	179	228	242
Import of yarn and fabric for finishing	6	10	14	16	98	135	165	208	209
% of imports for processing	6,2	7,0	7,5	8,9	60,5	47,3	47,8	48,8	46,4
Regular import of clothes	13	29	51	69	93	72	107	164	220
Import of clothes for finishing	24	31	21	22	21	19	25	30	28
% of imports for processing	63,8	51,9	29,0	24,2	18,7	21,3	19,1	15,5	11,2
% of finishing works in total exports	2,0	1,0	2,0	11,5	61,9	63,8	74,3	75,8	74,6
% of finishing works in total imports	21,4	20,3	13,6	13,6	43,2	41,0	39,8	38,4	33,9

Source: Republic Bureau of Statistics, *Internal Data.*

Forms of foreign trade of the textile industry of the Republic of Serbia were determined by long-term trends in the market of textile products of our country's leading regional partner - the European Union, cost trends in competing countries in the region, and stability of political conditions in the country. As already pointed out, structural changes in the textile industry of Western European countries, since the mid-1970s, have gone in the direction of developing finishing jobs, in order to improve their competitiveness on the world market. These processes coincided with the rapid expansion of processing capacities in the textile industry of the Republic of Serbia, until the beginning of the 1990s, so that finishing operations quickly increased their relative share in the total foreign trade with that region. In the period of the disintegration of the joint state and sanctions, there was a complete cessation of cooperation on the basis of these deals.

The process of their return to the territory of the Republic of Serbia was very slow, partly due to the fact that the finalization moved to the candidate countries for accession to the European Union. In addition, the European Union textile market was occupied by imports of standard large-scale finished products from China, Turkey and other developing countries, so that trade with the Republic of Serbia began to develop in the direction of almost exclusively finishing work in the production of fashion items. sock. By its nature, it is a production of smaller series, medium and higher quality, with short delivery times and frequent changes of items. The growth of finishing standard, large-batch products is mainly related to the addition of the largest work orders and the prompt introduction of these products on the market at the beginning of the season.

Observed at the level of the textile industry of the Republic of Serbia as a whole, the share of finishing works in its exports, in the observed period, was doubled (***Table 4***). „Finally, it can be concluded that the evident growth of exports and export competitiveness of the textile industry of the Republic of Serbia, after the shock wave of privatization, is related to the preservation and transformation of classical determinants, serious improvement of external variables, especially the active role of the state, with the dominance of finishing jobs" (Gligorijević, et. al., 2021).

Competitiveness of the textile industry

With the loss of the raw materials sector and its reduction to processing capacities in the production of clothing, the textile industry of the Republic of Serbia, during the first phase of structural adjustment, lost the quality of vertical integration of production. In the same process, parts of the complementary (supporting) industries that supported its development also disappeared. The textile industry has become an import-dependent branch, with a deficit in foreign trade. Under the burden of strong foreign competition, and thanks to systemic conveniences for imports, a large part of the domestic market in the clothing sector was lost. However, competitiveness indicators point to the conclusion that there have been some positive changes.

The analysis of *market share analyzes* can determine with certainty that in the period from 2000 to 2008 a trend of increasing the relative share of exports of the textile industry of the Republic of Serbia in the total imports of textile products in the world was established. This share has been continuously increasing from 0.047% in 2000 and

in 2008 it reached the level of 0.103%. At the same time, the export of the raw materials sector, ie the production of yarns and fabrics, increased from 0.038% in 2000, the relative share in the world import of these products to 0.128% in 2008. At the same time, the relative share of clothing exports, in the same period, increased from 0.053% to 0.089%. This means that exports of textile products, in both sectors, grew twice as fast as world imports of the same products and reached the level of one per mille (***Table 5***).

The growth of the *market share* of the textile industry of the Republic of Serbia, ie the growth of its competitiveness, was also recorded in its most important export market of textile products - the market of the European Union. Compared to 2000, when the relative share of exports of textile products amounted to 0.081% of the total imports of these products to the European Union, in 2007 this share was more than doubled and amounted to 0.183%. However, in 2008, due to the absolute decline in clothing exports in that year, the share was reduced to 0.163%. Exports of the yarns and fabrics sector also show relative growth, so that in the last year of the observed period there was a growth of 19%, while in 2008 European imports of this part of textile products decreased by 2%.

Similar results in terms of competitiveness were obtained by calculating the *RCA index* (revealed competitive advantage index), ie the index of detected competitive advantage, which shows the relationship between the share of the observed sector in national exports, as opposed to the sector's share in world exports. In 2003, the RCA index was 2.12, while in subsequent years the value of this index was constantly over 1, which is an indicator of the relative competitiveness of this industry internationally (Jefferson institute, 2006). By rank, the textile industry of the Republic of Serbia, among 189 observed countries, was on the 49th place.

Table 5: Market share of the textile industry of the Republic of Serbia and its sectors in the world and the European Union market (in billions of USD)

Description	2000	2005	2006	2007	2008
World - import of textile products	366,2	495,5	542,9	598,5	625,8
EU - import of textile products	139,9	202,0	218,2	246,8	257,9
Serbia - total exports of textile products	0,171	0,301	0,395	0,541	0,657
Serbia - export of textile products to the EU	0,113	0,226	0,325	0,453	0,432
% of Serbian exports in world imports	**0,047**	0,061	0,072	0,090	**0,103**
% of Serbian exports in EU imports	**0,081**	0,011	0,145	**0,183**	**0,163**
World - textile imports	157,3	204,3	220,4	240,4	250,2
World - import of clothes	208,9	291,2	322,5	358,1	375,6
Serbia - textile export	0,06	0,129	0,178	0,266	0,321
Serbia - clothing export	0,111	0,172	0,217	0,275	0,336
% of Serbian textile exports in world imports	**0,038**	0,063	0,080	0,116	**0,128**
% of Serbian clothing exports in world imports	0,053	0,059	0,067	0,076	0,089

Source: Ćorović, E. & Gligorijević (2020). *Development and competitiveness of the textile industry of the Republic of Serbia*, Nis: Faculty of Economics.

Observed in the national context, the competitiveness of the textile industry is highly ranked. According to the mentioned indicators, it was among the first five export sectors of the domestic economy. According to the market share indicator, the RCA

index, as well as the current index, only the production of leather products, food industry, chemical and base metals production had better results (Jefferson institute, 2006).

As can be seen from the above data, the market share of the textile industry of the Republic of Serbia has been gradually increasing in world imports, as well as in the imports of the European Union, as its dominant segment. This was a reliable sign of the gradual return of this industry to international trade flows, for which the condition is a certain level of its competitiveness.

Participation in the creation of gross domestic product

The results of the annual economic activity in the Republic of Serbia after 2000 are statistically, instead of through the calculation of the social product, monitored through the calculation of the gross domestic product. Due to that, the relative share of certain industries decreased by more than 20% in the gross domestic product, in relation to the share in the previously calculated social product. However, regardless of the change in the billing system, there is a declining trend in the contribution of the textile industry of the Republic of Serbia to the overall results achieved. Its relative share in gross domestic product creation decreased from 0.56% in 2000 to 0.16% in 2008 (***Table 6***). At the same time, due to the high share of unregistered production and undeclared work, especially in the clothing production sector, official statistics indicators should be taken with a lot of reservations, regarding the level of relative decline in the share of this industry.

Regarding the relative share of the textile industry of the Republic of Serbia in the gross domestic product of the processing industry after 2000, there was a tendency of constant decrease of that share. Namely, the relative share decreased from 3.52% in 2000, continuously, to the level of 0.76% in 2008.

Table 6: Participation of the textile industry in the creation of gross domestic product of the Republic of Serbia in the period 2000-2008. year (constant prices in 2002 in million dinars)

Year	Gross dome-stic product	GDP proce-ssing industry	GDP sector yarn and fabrics	% total GDP	% GDP proce-ssing industry	GDP sector clo-thes	% total GDP	% GDP processing industry
2000	836920	176141	4764	**0,56**	2,70	6224	0,76	**3,52**
2001	879482	170389	5003	0,56	2,23	6398	0,72	3,75
2002	919230	166508	4362	0,37	2,62	4280	0,46	2,57
2003	941616	155692	3136	0,33	2,01	2516	0,26	1,62
2004	1029560	169404	3086	0,29	1,82	2410	0,23	1,42
2005	1099356	169258	2864	0,26	1,69	1918	0,17	1,23
2006	1272665	173626	2597	0,20	1,49	1849	0,14	1,06
2007	1281694	182039	2454	0,19	1,34	1588	0,11	0,82
2008	1352418	184303	2180	**0,16**	1,18	1406	0,10	**0,76**

Source: Republic Bureau of Statistics, *Statistical Yearbook 2006 and 2010*

Obvious decline of the relative share of the textile industry in the serbian manufacturing industry, at the then level of development of the country, is one of the indicators of the permanent tendency of deformation of the structure of gross domestic product.

The structure of the economy in which the textile industry has a smaller share, compared to other developing countries, is similar to the structure of the economy of developed countries (UNIDO, 2010) and is a clear indicator of premature abandonment of this industry in the economic development of Serbia.

Conclusion

At the beginning of the first decade of the 21st century, the Republic of Serbia began an accelerated process of structural adjustment of the economy, opting for shock therapy and rapid liberalization of foreign trade relations. However, such a determination very quickly led to completely opposite, than expected effects. Namely, its market of textile products (unprotected and unregulated), in a very easy way, was won by highly competitive producers mainly from developed european and asian countries and at the same time it became a suitable terrain for gray trade.

In addition, the wrongly implemented process of privatization of numerous socially-owned enterprises did not provide the expected development stimulus to this industry. Burdened with numerous financial problems and surplus labor, large companies (industrial plants) were not in the focus of private investors, because the privatization model, which involved the sale of capital, was not tempting, and state involvement in their financial consolidation was slow and insufficient. The closure of many companies in the sector of raw material production led to the vertical disintegration of the textile industry of the Republic of Serbia, and also to the continuous increase of its import dependence.

The effects of privatization have been devastating. Of the total number of companies registered with the Privatization Agency, only 32% or 52 of them had successful privatization, and over 28,000 workers lost their jobs. Expectations that privatization will alleviate structural imbalances in this industry have not materialized. On the contrary, there were completely opposite effects. Errors in the management of the privatization process and neglect of basic structural priorities have almost completely shut down the raw materials sector and established long-term import dependence of the textile industry. The inflow of foreign direct investments in this industry was symbolic and was not accompanied by more serious support from state institutions. However, after the completion of most privatizations, at the beginning of the economic crisis in 2008, the share of this industry in the creation of gross domestic product was only 0.10%.

With the normalization of trade relations with the world, after 2000, the volume of exports, and especially imports, was in continuous growth. More dynamic growth of textile exports, especially after 2005, was accompanied by even faster growth of imports and an absolute increase in the foreign trade deficit of this industry, which is a clear indicator of its structural character. The growth of exports of the textile industry of the Republic of Serbia in the period after 2000 is mainly related to the increase in the volume of finishing work. Classic exports stagnated in the period from 2000 to 2005, and by

2008, with a slight growth, they increased by about 35%. Until the same year, the volume of finishing works had a dynamic growth, which resulted in their large relative share in the export of this sector of 72%.

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DAY OF THE WEEK EFFECT IN THE SOUTH AFRICAN EQUITY MARKET: A GARCH ANALYSIS

Abstract

Understanding dynamics of daily stock returns provide insight in trading opportunities available in stock markets. The purpose of the study was to examine whether day of the week effect exists in the South African equity market. Daily data from Top 40, All Shares, Basic Materials, Industrials, Consumer Goods, Health Care, Consumer Services, Telecommunications, Financials and Technology indices were collected for period 1995 to 2018. Exponential and threshold generalized auto regressive conditional heteroskedasticity models were employed to analyse day of the week anomaly. Findings of the day of the week for the mean equation revealed a positive Monday effect for aggregate indices namely Top 40 and All shares whilst the sectorial analysis showed a positive Monday effect for Basic materials, Consumer goods, Health care and Telecommunication. Furthermore, the mean equation for day of the week depicted a positive Tuesday effect for Financials sector, positive Wednesday effect for Consumer services sector and Thursday effect for Industrials and Technology sectors. The variance equation highlighted negative Monday effect for Top 40 and All shares as well as Basic materials, Consumer goods, Health care, Consumer services, Telecommunication and Financials sectors. However, Industrials sector indicated a negative Friday effect. The existence of day of the week effect nullifies the efficient market hypothesis in its weak form. In practice, it is recommended that for Mondays investors should invest in Top 40 and All shares, for Tuesday and Wednesday it would be prudent for investors to invest in Financial and Consumer services sectors respectively. Returns for Thursdays are attractive to an investor investing in the Industrial sector. An investor can reduce exposure by diversifying in the Health sector on Monday and in the by Industrial sector on Friday. Unlike previous studies that focussed on aggregate market indices, this study extended the analysis to sectors that constitute the market index.

Key words: *Day of the week, GARCH, EGARCH, TGARCH, Johannesburg Stock Exchange*

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ЕФЕКАТ ДАНА У НЕДЕЉИ НА ЈУЖНОАФРИЧКОМ ТРЖИШТУ АКЦИЈА: A GARCH ANALYSIS

Апстракт

Разумевање динамике дневних приноса акција пружа увид у могућности трговања које су доступне на берзама. Сврха студије је била да се испита да ли ефекат дана у недељи постоји на јужноафричком тржишту акција. Дневни подаци из индекса Top 40, Све акције, Основни материјали, Индустрија, Роба широке потрошње, Здравствена заштита, Потрошачке услуге, Телекомуникације, Финансије и Индекси технологије су прикупљени за период од 1995. до 2018. Експоненцијални и гранични генерализовани ауто-регресивни модели условне хетероскедастичности су коришћени за анализу аномалија дана у недељи. Налази дана у недељи за средњу једначину су открили позитиван ефекат понедељка за агрегатне индексе и то Top 40 и Алл акције, док је секторска анализа показала позитиван ефекат понедељка за Основни материјали, Робу широке потрошње, Здравство и Телекомуникације. Штавише, средња једначина за дан у недељи је приказала позитиван ефекат уторка за сектор финансија, позитиван ефекат среде за сектор потрошачких услуга и ефекат четвртка за сектор индустрије и технологије. Једначина варијансе је истакла негативан ефекат понедељка за Top 40 и све акције, као и за секторе основних материјала, робе широке потрошње, здравства, потрошачких услуга, телекомуникација и финансија. Међутим, сектор индустрије је показао негативан ефекат у петак. Постојање ефекта дана у недељи поништава хипотезу ефикасног тржишта у њеном слабом облику. У пракси се препоручује да понедељком инвеститори улажу у Top 40 и Алл акције, а за уторак и среду би било мудро да инвеститори улажу у сектор финансијских и потрошачких услуга. Приноси за четвртак су атрактивни за инвеститора који улаже у индустријски сектор. Инвеститор може смањити изложеност диверзификацијом у сектору здравства у понедељак и у сектору индустрије у петак. За разлику од претходних студија које су се фокусирале на агрегатне тржишне индексе, ова студија је проширила анализу на секторе који чине тржишни индекс.

Кључне речи: *Дан у недељи, GARCH, EGARCH, TGARCH, Јоханесбуршка берза*

Introduction

Investors aim to earn abnormal profits on their capital invested. Financial market calendar anomalies are one of those possibilities that may provide investors with profitable trades. Theories of market efficiency describing the creation of stock prices laud that investors involved in a market make sound decisions (Fama, 1970). However, in the context of systemic adjustments in stock prices, seasonal trends have been observed and the study of the relationship between stock returns and calendar anomalies is therefore of utmost importance to investors, researchers and finance professionals around the world (Norvaisiene *et al*., 2015; Winkelried & Iberico, 2018). Investors' irrational decisions pertaining to investment

on the stock market is conceived by calendar anomalies inherent in stock price patterns. By identifying calendar anomalies in a stock market, investors are in a position to develop investment tactics that tap into the excess returns as well as the profitable time to purchase or sell stocks (Halari *et al*., 2018; Jebran & Chen, 2017; Tilica & Oprea, 2014). Financial literature has documented different kinds of calendar anomalies observed in advanced and emerging financial markets. Anomalies have been evidenced in the form of day of the week, holiday, turn of the month and January seasonality. The day of the week has been widely studied by researchers.

Early work on day of the week anomaly in developed markets such as the US equity market demonstrated that trading on Mondays and Fridays resulted in negative and positive stock returns respectively (Lakonishok & Levi, 1982). Apart from Monday exhibiting lowest returns, it was found to be associated with low trading activities for institutional investors (Lakonishok & Maberly, 1990; Ülküa & Rogers, 2018). Kohers *et al*. (2004) confirmed day of the week effect in US, UK, Japan, France, Germany, Canada, Italy, Netherlands, Switzerland, Hong Kong, and Australia stock markets. Ajayi et al. (2004) found evidence of day of the week effect in Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Russia, Slovakia and Slovenia equity markets. Day of the week anomaly was proved in Greece, France, Finland, Ireland, Italy and Switzerland equity markets (Charles, 2010). Recent studies in US, China and Canada equity markets have exhibited the day of the week anomaly (Vasileiou, 2017; Zhang *et al*., 2017). Day of the week effect is also apparent in developing stock markets for example its existence has been found in Turkey (Oguzsoy & Guven, 2003), Argentina, Brazil, Chile, Colombia, Mexico and Peru (Winkelried & Iberico, 2018), Thailand, India, Taiwan, Philippines, South Korea, Malaysia and Indonesia (Choudhry, 2000). Other developing stock market provided contradictory evidence for instance in Pakistan Nishat and Mustafa, (2002) found no day of the week anomaly. Kaur (2004) demonstrated no day of the week effect in Indian equity market.

Past day of the week studies in South Africa for instance Coutts and Sheikh (2002); Loffe (2008) have focussed on the ordinary least squares (OLS) to examine the relationship between stock returns and trading days of the week in financial markets. The OLS approach ignores the fact that day of the week seasonality may exist in volatility. The generalised autoregressive conditional heteroscedasticity (GARCH) class models have been applied to capture both the effect of day of the week on returns and volatility. Plimsoll *et al*. (2013) day of the week anomaly analysis utilised the GARCH model but could not account for leverage effects and their attention was on aggregate equity market returns. Chinzara and Slyper (2013) employed the exponential GARCH (EGARCH) and threshold GARCH (TGARCH) models for examining day of the week anomaly using aggregate equity market indices.

Given the existence of anomalies in documented in literature, investors face an investment decision challenge of devising profitable anomaly strategy. Failure to have an investment strategy may result in poor investment performance (Pompian, 2012). Therefore, this study sought to examine whether the day of the week anomaly is present on the Johannesburg stock exchange (JSE). Precisely, the EGARCH and TGARCH are used to estimate the relationship between returns and trading days of the week. The EGARCH and TGARCH models are able to address issues of volatility clustering, leverage effects, heteroscedasticity and autocorrelation (Francq & Zakoïan, 2010). The rest of the article

include a literature review section, followed by methodology which provide the methods employed in the study. Next, the empirical findings and discussions for day of the week are summarised and the study end with conclusions and recommendations.

Literature review

Perspectives in day of the week seasonality are rooted in the famous efficient market hypothesis theory. In particular, the weak form efficiency relates well with the daily returns patterns. According to Fama (1970) weak form efficiency is when security prices in a financial market fully reflect all the historical information such as prices and volume changes. If a financial market is weak form efficient then it is impossible for market participants to earn abnormal returns and statistically it means there are no traces of linear or non-linear dependencies in the security returns series (Fama, 1970). The implication of the weak form efficiency is that no trading days should have return and risk that is significantly different from other trading days. However, empirical evidence that tested the effect of stock trading days on returns and risk have provided mixed results.

Charles (2010) examined daily seasonality in Greece, France, Finland, Ireland, Italy and Switzerland equity markets using stock indices data covering the period 1987-2007. The returns and volatility were modelled as a function of Monday, Tuesday, Wednesday, Thursday and Friday. The mean equations indicated negative Monday, positive Monday, Thursday and Friday effects on returns. The volatility equation illustrated a positive Monday, Thursday and Friday as well as negative Tuesday and Thursday effects on volatility. The study unveiled that Monday, Thursday and Thursday effects were prevalent in the studied markets.

Alt *et al*. (2011) studied the day of the week anomaly in the UK, US and Germany equity markets from 1970 to 2008. The returns dependent variable was predicted by Monday, Tuesday, Wednesday, Thursday and Friday dummy variables. Negative Monday effect on returns was observed. The study advised that there was Monday effect (1970-1980) for US and Germany equity markets, which disappeared in 1990s and 2000s.

Asteriou and Begiazi (2013) examined the day of the week anomaly in real estate investment trusts (REITs). The REITs data for the US market spanned from 2000 to 2012. The link between REITs return and independent variables namely Monday, Tuesday, Wednesday, Thursday and Friday were investigated. The results revealed that Friday variable was significantly positive in the mean and volatility equations. The study advised that investors for REITs dislike bad news and the day of the week effect does not influence their behaviour.

Tilica and Oprea (2014) analysed daily seasonal patterns in the Romanian stock exchange utilising the stock indices data covering the period 2005-2011. The returns were estimated as a function of world market risk, Monday, Tuesday, Wednesday, Thursday and Friday variables. Friday was found to have a positive and higher mean return as compared to other trading days. Authors recommended that investors can take advantage of the Friday effect to obtain abnormal returns.

Kumar and Pathak (2016) investigated the day of the week anomaly in the foreign exchange market focussing on the United States dollar, Euro, British pound, Japanese yen against the Indian rupee for years 1999-2014. Monday, Tuesday and Wednesday

have positive and higher returns while Thursdays and Fridays have negative and lower returns. The results indicate that day of the week anomalies are present in the foreign exchange market. However, the authors argue that these have disappeared post 2008 and investors may not make meaningful profits.

Vasileiou (2017) assessed seasonality in daily returns in the US equity market for 2000-2013 sample data period. The study postulated negative effects on returns for Monday and Wednesday. In recession and growth periods, positive and negative effects on Tuesday, positive Thursday, and negative and positive effects for Friday. The author suggested that day of the week effect is influenced by the economic growth status. The study proffer explanation for conflicting results in the literature. Informed investors constantly exploit the day of the week and hence change it.

Zhang *et al*. (2017) analysed day of the week anomaly in Canada, China and US for period 1990-2016. The day of the week which covered Monday, Tuesday, Wednesday, Thursday and Friday were modelled in the return equation only. The returns for Monday, Tuesday and Friday were found to be different from the rest of trading days in the Chinese stock market. The authors highlighted that the trading day anomalies in China were as a result of investors' response to information released during periods when stock prices are falling. The Monday returns were significantly different from other days in the Chinese equity market. For small and mid-cap Chinese stocks, the day of the week anomaly was more pronounced on Monday and Thursday. The Monday and Tuesday effects were found in the US stock market. However, after 2015 the Monday effect remained whilst the Tuesday effect vanished. In Canada, Tuesday effect was stronger than the Monday effect. The study recommended that day of the week anomaly varies with country.

Jadevicius and Lee (2017) tested the day of the week seasonality in UK REITs in the period 1990-2014. The study modelled the relationship between returns and trading days of the week. Results unveiled a negative effect for Monday and positive effects for Tuesday, Wednesday and Friday. The UK REITs are characterised by market inefficiencies which provide profitable opportunities for investors. The authors alluded that returns vary across the trading week. It was recommended that investors should utilise the day of the week effectively in their trading strategies.

Birru (2018) examined the effect of day of the week on US equity volatility for the period 1963 to 2013. The findings showed positive Monday effect and negative Friday effect on volatility. The author asserted that differences in returns across the week are attributed to psychological factors that affect the behaviour of investors. The results suggested a decreasing investors' mood from Monday to Friday.

Mbanga (2018) investigated the day of the week effect in the Bitcoin, a cryptocurrency from 2011 to 2018. Findings highlighted no Monday effect but only the Friday anomaly. It was observed that the clustering was weaker on Mondays and stronger on Friday. Evidence of price clustering in Bitcoin highlights the different daily patterns in the cryptocurrency market. Fridays were found to be a driver in Bitcoin price clustering. The majority of studies found that day of the week effect was present in developed and developing financial markets. However, there were variations observed for the significant trading days of the week.

Research Design, Methodology, Research Tasks and Hypothesis

The study applies a quantitative approach. The GARCH, EGARCH and TGARCH models are employed to examine day of the week effect on returns and volatility for the Johannesburg stock exchange (JSE). The mean and variance equations for analysing the day of the week effect are adapted from Caporale and Zakirova (2017). We include dummy variables for trading days from Monday to Friday and exclude Saturday in the volatility equations. For specifications purposes an order (1,1) is used for GARCH family models are as follows:

$$R_t = \sum_{i=1}^{5} \alpha_i D_{it} + \epsilon_t \quad (1)$$

$$h_t = a + b\epsilon_{t-1}^2 + ch_{t-1} + \sum_{i=2}^{5} d_i D_{it} \quad (2)$$

D_{it} is a dummy variable equal to one where returns occur in trading day i defined from Monday to Friday otherwise its zero.

The EGARCH model specification for the day of the week is as follows:

$$In(h_t) = a + cIn(h_{t-1}) + f_1 \frac{\epsilon_{t-1}}{\sqrt{h_{t-1}}} + f_2 \frac{|\epsilon_{t-1}|}{\sqrt{h_{t-1}}} + \sum_{i=2}^{5} d_i D_{it} \quad (3)$$

TGARCH model for day of the week:

$$h_t = a + b\epsilon_{t-1}^2 + ch_{t-1} + \gamma\epsilon_{t-1}^2 I_{t-1} + \sum_{i=2}^{5} d_i D_{it} \quad (4)$$

Daily indices data from JSE covers the period 1995 to 2018 and were sourced from IRESS database, a financial data firm. Indices have been used to study calendar anomalies in (Loffe, 2008; Astin, 2015; Du Toit *et al*., 2018). The indices consist of top 40 (J200), all shares (J203), basic materials (J510), industrials (J520), consumer goods (J530), health care (J540), consumer services (J550), telecommunications (J560), financials (J580) and technology (J590). Eviews 10 integrated with R software was used to analyse the data.

The null hypothesis for the study is that the average returns for Monday, Tuesday, Wednesday, Thursday and Friday are equal. The estimation procedures of the GARCH, EGARCH and TGARCH models involved various steps. Firstly, descriptive statistics were computed to have an understanding of the financial characteristics of the data. Secondly normality of data was tested using the Jarque-Bera test. Thirdly, The Augmented-Dickey-Fuller (ADF) test for stationarity were employed. Fourthly, Ljung and Box autocorrelation and ARCH effect tests were employed. Fifthly, non-linearity structure of returns were tested by Keenan tests whereas the Hsieh test assessed whether the source of non-linearity was additive or multiplicative. Sixthly, the GARCH, EGARCH and TGARCH with different orders were estimated with the objective of attaining the best model for the day of the week effect. Seventhly, the best model was estimated and Nyblom test was conducted to assess the stability of parameters over time. The null hypothesis of the Nyblom test is that the estimated parameters are stable over time.

Research results and Discussion

This section looks at the results for day of the week modelling, beginning with the descriptive statistics, followed by tests and model selection and finally estimation of the optimum model.

Preliminary analysis

Descriptive statistics for JSE's sectorial indices in addition to the Top 40 and All shares indices are presented. The descriptive statistics looks at the mean, standard deviation, skewness, kurtosis and Jarque-Bera normality test results are also explained.

Table 1: Summary statistics of daily series for JSE indices

Variable	Indices	J200	J203	J510	J520	J530	J540	J550	J560	J580	J590
Daily	Mean	0.00039	0.00041	0.00027	0.0004	0.00056	0.0004	0.00053	0.0004	0.00037	0.000275
	Std. Dev.	0.01321	0.01202	0.01693	0.01221	0.01567	0.01336	0.01288	0.02042	0.01276	0.019167
	Skewness	-0.3712	-0.4395	-0.0018	-0.438	0.23876	-0.3056	-0.3331	-0.1575	-0.4387	-0.673301
	Kurtosis	9.13867	9.0863	7.17077	9.52205	8.50191	8.64729	6.96216	9.92434	10.0192	14.53108
	Jarque-Bera	9302.092	9200.25*	4232.147	10535.64	7420.164	7849.906	3927.326	11689.11	12174.15	32790.67*
	Observations	5839	5839	5839	5839	5839	5839	5839	5839	5839	5839

*indicates significant at 1% level of significance. J200=Top 40, J203=All shares, J510= Basic materials, J520=Industrials, J530=Consumer goods, J540=Health care, J550=Consumer services, J560=Telecommunication, J580=Financials and J590=Technology.

Table 1 reveals positive average daily returns for the JSE indices studied with the highest average returns being found in the Consumer goods sector. Based on the standard deviation results, Telecommunication is the riskiest sector. The Consumer goods sector has positive skewness implying more positive values on the distribution tails and the rest of the indices have negative skewness (Cisar & Cisar, 2010; Conrad *et al*., 2013). The daily returns on the JSE are leptokurtic with kurtosis exceeding 3 for all indices which is in contrast with mesokurtic kurtosis that is assumed in an efficient market (Aparicio & Estrada, 1977). A joint test of skewness and kurtosis using the Jarque-Bera tests rejects the null hypothesis that JSE indices returns distribution are normally distributed. Normality test findings contradicts the random walk model of assessing stock market efficiency which assumes the Gaussian distribution but however supports the non-normal distribution of returns (Bachelier, 1900; Fama, 1965; Mishkin & Eakins, 2018).

Table 2: Preliminary tests for GARCH models estimation

Returns	Stationarity	Autocorrelation and ARCH	Nonlinearity	Hsieh	Conclusion
J200	Stationary I(0)	Autocorrelation and ARCH effects	Nonlinear	Multiplicative	GARCH class
J203	Stationary I(0)	Autocorrelation and ARCH effects	Nonlinear	Multiplicative	GARCH class
J510	Stationary I(0)	Autocorrelation and ARCH effects	Nonlinear	Multiplicative	GARCH class
J520	Stationary I(0)	Autocorrelation and ARCH effects	Nonlinear	Multiplicative	GARCH class
J530	Stationary I(0)	Autocorrelation and ARCH effects	Nonlinear	Multiplicative	GARCH class

J540	Stationary I(0)	Autocorrelation and ARCH effects	Nonlinear	Multiplicative	GARCH class
J550	Stationary I(0)	Autocorrelation and ARCH effects	Nonlinear	Multiplicative	GARCH class
J560	Stationary I(0)	Autocorrelation and ARCH effects	Nonlinear	Multiplicative	GARCH class
J580	Stationary I(0)	Autocorrelation and ARCH effects	Nonlinear	Multiplicative	GARCH class
J590	Stationary I(0)	Autocorrelation and ARCH effects	Nonlinear	Multiplicative	GARCH class

J200=Top 40, J203=All shares, J510= Basic materials, J520=Industrials, J530=Consumer goods, J540=Health care, J550=Consumer services, J560=Telecommunication, J580=Financials and J590=Technology.

Stationarity findings in Table 2 were based on the ADF showed that the natural logarithm returns of JSE were stationarity at level. The Ljung and Box autocorrelation and ARCH effect test results for JSE stock returns. The results highlighted significant evidence of autocorrelation and ARCH effects in the residuals at 1% and 5% level of significance. The strong significance of the ARCH effects results implies that it is scientifically justified to use GARCH family models specification because of non-constant variance (Ahmed & Suliman, 2011). The presence of autocorrelation and ARCH implies that modelling of calendar anomalies should incorporate past residuals (Gazda & Výrost, 2003).

The Keenan test revealed that JSE returns have a nonlinear structure, which is a characteristic for financial data (Francq & Zakoïan, 2010; Bisaglia & Gerolimetto, 2014). Furthermore, examining source of non-linearity of a return series of JSE indices using the Hsieh test. The step was crucial in specifying whether the use of GARCH in mean (GARCH-M) or GARCH models not incorporated in mean (Hsieh, 1989). The Hsieh results showed that the number of acceptances were more than the rejections and hence the null hypothesis of a multiplicative source of non-linearity was accepted at the 5% level of significance and it is concluded that GARCH in mean models are irrelevant to model JSE returns.

Table 3: Order selection for GARCH modelling of day of the week anomaly

Returns	Day of the week
J200	EGARCH-t (2,2)
J203	EGARCH-t (2,2)
J510	EGARCH-t (3,2)
J520	TGARCH-t (1,1)
J530	EGARCH-t (3,3)
J540	EGARCH-t (3,1)
J550	EGARCH-t (2,1)
J560	EGARCH-t (2,3)
J580	EGARCH-t (1,3)
J590	TGARCH-t (3,2)

J200=Top 40, J203=All shares, J510= Basic materials, J520=Industrials, J530=Consumer goods, J540=Health care, J550=Consumer services, J560=Telecommunication, J580=Financials and J590=Technology.

Table 3 delineate the results of running various GARCH class models of p and q ranging from 0 to 3 for day of the week anomaly. The variables p and q represent the

GARCH and ARCH terms respectively. The optimum selection criteria utilised the AIC and SC information criteria through choosing the model with the lowest value (Asteriou & Hall, 2007). The findings on the order for GARCH models are incompatible with parsimonious principle that recommended order (1,1) (Kaur, 2004; Du Toit *et al*., 2018). Of interest, it was noted that order (1,1) was selected as the best for the Industrial sector for TGARCH with studentised distributed residuals. The EGARCH and TGARCH with Student-*t* distributed errors performed best in modelling day of the week effect based on the AIC and SC information criteria. The EGARCH were also applied to model day of the week in US equity market by Vasileiou (2017), in Hong Kong stock market by Chan and Woo (2012), in Ghana by Alagidede and Panagiotidis (2009), Israel by Alberg *et al*. (2008). The TGARCH modelling of daily seasonality in equity market is supported in Vasileiou (2017) for US, Derbali and Hallara (2016) for Tunisia, Charles (2010) for Germany, US, UK and Japan, and Alagidede and Panagiotidis (2009) for Ghana. The next section reports and interprets the findings from estimating the optimum EGARCH and TGARCH models.

Looking at the mean equation in Table 4, the Top 40, All shares, Basic materials, Consumer goods, Health care, Consumer services and Telecommunications indices illustrate a significant positive Monday effect. Only Consumer services and Financials sectors have significant positive Tuesday effect. A significant positive Wednesday effect is only applicable to the Consumer services sector. Thursday effect are positively significant in Top 40, All shares, Consumer services, Telecommunications and Financials indices. No Friday effect was found in the mean equation for the JSE indices.

The findings in Table 4 shows no sign bias for all series which demonstrate the strength of EGARCH to capture asymmetric behaviour in returns of JSE indices which the GARCH is unable to incorporate (Brooks, 2014). The Nyblom test indicates that the estimated parameters in the mean and variance equations for the JSE indices are stable. In the light of the variance equation, there is a significant negative Monday effect for all JSE series. Telecommunications sector demonstrates the greatest reduction in risk when an investor trades a unit of investment on a Monday. The lowest reduction of risk on a Monday is found in Consumer goods sector. Fridays have negative significant effects for Top 40, All shares and Consumer services indices. In comparison, trading on Mondays offers a greatest reduction on risk to investors than Fridays. All JSE series exhibit a phenomenon known as the leverage effect highlighted in Brooks (2014), where a fall in stock returns causes volatility to increase. The volatility-return relationship illustrates that negative information has a greater impact on volatility as compared to positive information of the same magnitude (Brooks, 2014). Investors on the JSE are more sensitive to bad news than good news of equal size. The parameter values of f_2 are significantly positive showing a positive impact on current volatility from shocks emanating from bad news generated on the previous day for the series in Table 4. Likewise, news from the previous two days have a positive magnitude on the current volatility as highlighted by the significant positive parameters values, f_3 for Top 40, All shares, Basic materials, Consumer goods and Telecommunications indices. However, information generated in past 3 days have a negative impact on the current volatility because the estimated f_4 values are negatively significant for Consumer goods and Telecommunications sectors. The sum of c_1, c_2 and c_3 coefficients show that volatility is persistence for the JSE series. For example, Top 40 index has a sum of is about 0.97 implying that past shocks in returns impacts highly on current volatility and continue for a long period (Srinivasan & Kalaivani, 2013; Brooks, 2014).

GARCH modelling results for day of the week

Table 4: EGARCH models results for day of the week

R_t	J200	J203	J510	J530	J540	J550	J560	J580
Mean equation								
α_1	0.001302**	0.001302**	0.001218**	0.001287**	0.000977**	0.001175**	0.000921*	0.000451
α_2	0.000135	0.000243	0.00018	5.86E-07	0.000486	0.001044**	0.000799	0.000861**
α_3	0.000111	0.000173	-0.000152	0.000356	0.000573	0.001208**	9.12E-05	0.000483
α_4	0.000843**	0.000883**	0.00064	0.000542	0.000526	0.001003**	0.000876*	0.000829**
α_5	2.86E-05	0.000221	-0.000323	0.000158	0.000251	0.000361	0.000547	-4.83E-05
Variance equation								
A	-0.433209**	-0.444788**	-0.445582**	-0.102016*	-0.475879**	-0.361765**	-0.48997**	-0.214138**
f_1	-0.117571**	-0.115278**	-0.074898**	-0.029207**	-0.050505**	-0.0646**	-0.033305*	-0.063887**
f_2	0.147035**	0.147549**	0.154284**	0.236833**	0.248739**	0.235122**	0.292693**	0.244217**
f_3	0.096929*	0.102175*	0.146888**	0.03049*			0.144085**	-0.025931
f_4				-0.208013**			-0.137281**	-0.049736
c_1	0.494996**	0.457803**	0.180956	0.723842**	0.610609**	0.564615**	0.090139	0.980312**
c_2	0.477743**	0.514867**	0.315129	0.980101**	0.032058	0.4109**	0.883592**	
c_3			0.48337**	-0.708564**	0.329495**			
d_2	0.025292	0.030481	0.099871	0.049201	0.056075	0.002325	0.06759	-0.089563
d_3	0.102848	0.094564	0.146029	0.043796	-0.011074	0.002239	0.034746	-0.070916
d_4	0.020674	0.029724	0.044806	-0.018019	0.128862	-0.010098	0.073183	-0.133703
d_5	-0.162193*	-0.162911*	-0.077221	0.012219	0.033576	-0.193729*	0.089265	-0.173385
AIC	-6.147672	-6.34312	-5.614728	-5.794269	-6.039671	-6.157577	-5.25356	-6.263238
SC	-6.129389	-6.324837	-5.595302	-5.773701	-6.021387	-6.140436	-5.234134	-6.244955
LL	17964.13	18534.74	16409.2	16934.37	17648.82	17992.05	15354.77	18301.52
SB	1.227	1.1557	0.18321	0.4123	1.1162	0.35037	0.7429	0.59383
NEGSB	1.025	1.2650	0.04455	0.9575	1.3509	1.16464	1.8114	1.31074
POSSB	1.248	0.7857	0.18920	0.4037	0.3121	0.09211	1.0117	0.06009
JE	2.619	2.2524	0.04674	1.1121	2.7066	3.32966	5.1604	1.72166

+ indicates significant Nyblom test at 5% level. * and ** indicates significance at 5% and 1% level respectively. n* denote that normal distributed error is assumed in the model. J200=Top 40, J203=All shares, J510= Basic materials, J530=Consumer goods, J540=Health care, J550=Consumer services, J560=Telecommunication and J580=Financials.

There is evidence of volatility persistence for the JSE indices indicating that past volatility of returns affects current volatility (Paolella, 2019). The Nyblom tests for estimated GARCH effect parameters are unstable for Top 40, All shares and Telecommunications indices showing time sensitivity of the parameters. A negative Friday effect was found for Top 40 and All shares indices in variance equation. A negative Tuesday, Wednesday, Thursday and Friday effects as well as a positive and unstable Monday effect was found in the Financials sector. The leverage effect is present as illustrated by the positive gamma parameter, γ for all JSE indices. The mean equations for Top 40, All shares indices have a positive Monday and Thursday effects. Monday effects are displayed in Basic materials, Consumer goods and Health care sectors. It is observed that Consumer services sector has positive effects for all trading days whilst the Financials has Monday, Tuesday and Thursday effects.

Table 5: TGARCH models results for day of the week

R_t	J520	J590
Mean equation		
α_1	0.000729*	0.000718*
α_2	0.00065	0.000451
α_3	0.000334	0.000833**
α_4	0.00092**	0.000907**
α_5	0.000323	0.000499
Variance equation		
a	1.24E-05**+	2.14E-06+
b_1	0.052029**	0.240646**
γ	0.078779**+	0.002737**
b_2		-0.238398**
c_1	0.883479**	1.24759**
c_2		0.072294
c_3		-0.323715**
d_2	-1.12E-05	-1.73E-06
d_3	-5.81E-06	-3.81E-06
d_4	-1.04E-05	-5.14E-06
d_5	-1.69E-05*	7.20E-07
AIC	-6.233252	-5.602572
SC	-6.217254	-5.583146
LL	18211.98	16373.71
SB	0.2538	1.8401
NEGSB	3.7969**	1.1756
POSSB	0.5828	0.8516
JE	18.3392**	3.5711

+ indicates significant Nyblom test at 5% level. * and ** indicates significance at 5% and 1% level respectively. n* denote that normal distributed error is assumed in the model. J520=Industrials and J590=Technology.

Table 5 reports the day of the week effect results for TGARCH models for Industrials and Technology sectors. In the light of the mean equation, there is positive and significant Monday and Thursday effects for Industrials and Technology sectors. Additionally, the Technology sector has positive and significant Wednesday effect. The returns are much attractive on Thursday for Industrials and Technology sectors as compared to other significant trading days. The coefficient for the Monday effect is unstable as revealed by the Nyblom test and hence can change over time.

The mean equation for Industrials sector has a positive Monday and Thursday effects. The volatility equation depicted a positive Monday and negative Friday effect for the Industrials sector. Technology sector revealed Monday, Wednesday and Thursday effects in the mean equation. The AIC, SC and LL justified the use of Student-*t* distributed errors in TGARCH models for day of the week anomaly (Paolella, 2019). Negative, positive and joint sign bias are present in the returns of JSE indices.

The results shed light on the day of the week effect on the JSE. Daily seasonality in equity markets has now become a stylised fact for financial securities as highlighted by empirical evidence (Zhang *et al*., 2017). Vasileiou (2017) found that EGARCH with Student-*t* distributed errors was a better model than TGARCH in the US stock market and significant positive Tuesday and Thursday effects in the mean equation which was also present on the JSE. In contrast, Jebran and Chen (2017) in the Islamic equity market found negative Tuesday and Thursday effects in the variance equation of a GARCH model, and negative Monday and positive Friday effects in the mean equation. The study results agree with Derbali and Hallara (2016) findings in Tunisia stock market for positive Thursday and Wednesday effects for the EGARCH and TGARCH models. Similar with the South Africa equity market, Chan and Woo (2012) found positive Monday in the mean equation and negative Friday in the variance equation for the Hong Kong, however investors' returns on Monday are aligned to the risk reflected in the volatility equation, the only exception is Industrials sector. The positive Monday effect displayed in variance equation for the Industrials sector tallies with findings in Charles (2010) for Germany, UK and Japan equity markets, Alagidede and Panagiotidis (2009) in Ghana stock market, and Alberg *et al*. (2008) for Israel equity market. JSE indices has negative Monday effect in the variance equation with the exception of Industrials and Financials sectors, the results are supported by Charles (2010) for US equities.

On the local platform, results of day of the week appear to be consistent with Du Toit *et al.* (2018) in some aspects for instance a positive Monday effect on all sectorial JSE indices, positive Monday to Thursday effects for Consumer services sector. Positive Monday effects obtained are in contrast with negative Monday effects obtained in Darrat *et al*. (2013) which disappeared after 2008. Inconsistently, Ndako (2013) found negative Monday effect in mean equation and positive Friday effect in variance equations for pre-liberalisation whereas for post-liberalisation it was positive Thursday and Friday effects. Current findings paint a totally different picture with Ndako's results.

The Monday and Thursday effects on the JSE is attributed to the current settlement process, a T+3 that is when one trades on Monday, the cycle ends on a Thursday for the transaction (Chen *et al*., 2001). A reverse Monday effect is noted and the investors' mood are different across the sectors (Birru, 2018). For Top 40, All shares, Consumer services, Telecommunications and Financials indices, investors' mood declines in the trading week Monday to Thursday and the mood increases for Industrials and Technology sectors.

In addition, varying returns reflect some incorporation of information being processed during the trading week (Nishat & Mustafa, 2002). The positive Monday suggests that investors act upon information in weekly reports and process it during the weekend and this drive pressure of securities on Monday and thereby increasing their yields (Zhang *et al*., 2017).

The findings of day of the week effect invalidate the EMH. The observed trading days returns on the JSE are not equal and therefore investors can make use of past information on returns and volatility to gain profitable trades. Investors can buy securities on any other day then sell on Monday when the return is higher. Trading on a Monday and Friday reduces uncertainty in returns.

Conclusion

The study endeavoured to test whether day of the week effect existed on the JSE. The relationship between returns and trading days of the week was estimated using the EGARCH and TGARCH models. In modelling for the day of the week, the Top 40, All Shares, Basic materials, Consumer goods, Health care, Consumer services, Telecommunications and Financials utilised EGARCH with Student-*t* distributed errors. Industrials and Technology sectors were modelled by TGARCH with Student-*t* distributed errors. The aggregate indices, namely Top 40 and All Shares revealed a positive Monday effect in the mean equation. The mean equation for the sectoral analysis of the day of the week anomaly showed a positive Monday effect for Basic materials, Consumer goods, Health care and Telecommunications in the mean equation. The Financials sector depicted a positive Tuesday effect, and a positive Wednesday effect was observed in the Consumer services sector. The Industrials and Technology sectors had positive Thursday effects. Monday effect is highest in aggregate indices, namely the Top 40 and All Shares of the JSE. The highest Tuesday and Wednesday effects were found in the Financials and Consumer services sectors respectively, whilst the Industrials sector had the greatest Thursday effect.

Looking at the variance equation, the aggregate indices, symbolised by the Top 40 and All Shares revealed a negative Monday effect. The sectoral indices, namely Basic materials, Consumer goods, Health care, Consumer services, Telecommunications, and Financials, indicated a negative Monday effect. The Industrials sector highlighted a negative Friday effect.

Based on EGARCH and TGARCH model findings for modelling the day of the week anomaly, an investor should invest in aggregate indices, namely the Top 40 and All Shares, as these provide the highest Monday returns compared to investing in specific sectors. The investment in the Top 40 and All Shares will involve constructing an index fund that mimics performance of the said aggregate indices on Mondays. For Tuesday and Wednesdays, it would be prudent for investors to invest in the Financial and Consumer services sector respectively, as they offer the largest returns for the corresponding trading days. On Thursdays, an investor has to be invested in the Industrials sector to earn abnormal returns. An investor can reduce exposure by diversifying in the Health sector on Monday and in the Industrials sector on Friday. The study is limited to South Africa equity market and suggestion for further studies may include the use of panel GARCH methods.

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ANALYSIS OF E-RETAILING IN DANUBE REGION COUNTRIES

Abstract

This paper investigated the role and importance of e-retailing in traditional marketing channels in the selected countries of the Danube region. The main aim of the research was to highlight the economic benefits of e-retailing in traditional retail institutions analyzing the revenue from the sale of e-retailing in traditional retailers' business and representation of e-retailing "click and brick" in the group of largest e-retailers. The core idea of this paper was to empirically evaluate if the e-retailing implementation is in correlation with business profit, origin and specific form of a retailer. In this context, the study was conducted using the volume of sales revenue, the origin of retailer and form of the retail outlet, as independent variables based on which a volume of e-retailing presence as the dependent variable is evaluated. This study eliminates retailer's sales revenue as a statistically significant indicator which influences the implementation of e-retailing. On the other hand, the findings show that foreign retailers significantly less likely to implement e-retailing than domestic retailers when analyzing all countries in the region. When it comes to retailing formats, results suggest that retailers with retail format shopping centres and kiosks don't have e-retailing. All remaining retail formats have e-retailing. This paper formulates practical suggestions for further using of e-retailing in Danube region countries' marketing channels.

Key words: *e-retailing, marketing channels, retail revenue, retailers, Danube region*

JEL classification: L81, H27, M3

АНАЛИЗА ЕЛЕКТРОНСКЕ МАЛОПРОДАЈЕ У ЗЕМЉАМА ДУНАВСКОГ РЕГИОНА

Апстракт

Рад истражује улогу и значај електронске малопродаје у традиционалним каналима маркетинга у одабраним земљама Дунавског региона. Главни циљ истраживања је да укаже на економске користи од електронске малопродаје кроз анализу учешћа прихода од електронске малопродаје у укупним пословним приходима малопродаваца. Основна идеја рада је емпиријска процена да ли је имплементација електронске малопродаје у корелацији са пословним

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профитом, пореклом и специфичном формом малопродавца. Добијени резултати елиминишу приходе од продаје малопродавца као статистички значајан показатељ који утиче на имплементацију електронске малопродаје. Резултати показују да се домаћи малопродавци чешће одлучују на увођење електронске малопродаје и електронски пласман производа и услуга, у односу на иностране малопродавце. Када је реч о малопродајним форматима, резултати сугерирају да тржни центри и "продавнице из суседства" немају имплементирану електронску малопродају, док преостали малопродајни формати примењују вишеканални пословни модел. Овај рад формулише практичне сугестије за даљу имплементацију електронске малопродаје у каналима маркетинга земаља Дунавског региона.

Кључне речи: *електронска малопродаја, канали маркетинга, пословни приход, малопродавци, Дунавски регион.*

Introduction

Development of the Internet changes the structure of the traditional marketing channels directly (Lovreta et al., 2019; Christina & Roselina, 2019). The Internet cannot eliminate or replace the traditional functions performed in marketing channels, but it can significantly restructure marketing channels and contribute to the development of new relationships between the participants (Altıntaş, Kılıç, & Akhan, 2019). In that context, with the emergence of Amazon.com in academic research, prevalent thinking was that the Internet would destroy the traditional "brick and mortar" book retailers, instead, there have been changes in the concept of the traditional book retailing (Smith, & Linden, 2017). Studies (Najib, & Sosianika, 2019; Teixeira, Guissoni, & Veludo-de-Oliveira, 2018) confirm that traditional retailers are adapting to the new changes and multichannel competition and find ways to accept the competitive advantages offered by e-retailing. As such, e-retailing appears as an additional possibility based on which traditional retailers expand their market participation, improve the image of the retailer and achieve their competitive advantage. Furthermore, the new technology is making omnichannel retailing inevitable and is reducing the ability of geography and ignorance to shield retailers from the competition, as it breaks down the barriers between different retail channels as well as the divisions that separate retailers and their suppliers (Brynjolfsson, Hu, & Rahman, 2013).

In the Danube region and in the region of Western Balkans the implementation of e-retailing is in its beginning stage since some of the aspects of the legislation are adjusted to traditional ways of doing business. (Petrović, 2018). However, even with these limitations, an expansion of e-retailing is noticeable. The results show that in 2017 over 40% of business entities ordered products and services via the Internet, whereas 25% of companies have received orders via the Internet. Looking at the countries of the Danube region, the average participation of e-shoppers in total shopping in 2018 is 41.1%, where Germany dominates with 77%, whereas in Romania this percentage is only 16%. Regarding the volume of e-retailing, in proportion to the size of the market, the highest amount was spent in Austria - 2.3 billion euros in 2018 (Ecommerce Europe, 2018).

It is evident that in the Danube region there is an increasing number of traditional retailers is turning to multichannel business modelling which e-retailing is taking the leading position (Chabault, 2019; Delgado-de Miguel et al, 2019). Traditional retailers, which essentially do business through the so-called fixed location, have redesigned their business strategy in accordance with the conditions of the electronic market. As the most common form of participation of the traditional retailers within e-retailing Brick-and-click strategy stands out. This strategy is taken over from the leading world retailers such as Walmart, Tesco, IKEA, etc. By applying this strategy consumers are enabled to choose products and services both in retail outlets and in online shops.

Having in mind the aforementioned aspects, the *subject of this paper* is the analysis of the role and importance of e-retailing in traditional marketing channels in nine countries of the Danube region. The Danube region which consists of 14 countries, out of which nine were chosen for the purpose of this paper due to the availability of data: Austria, Bulgaria, Croatia, Germany, Hungary, Serbia, Romania, Ukraine and Slovakia. The Danube region is interesting for researchers since this is a market with over 180 million people which covers one fifth the EU territory. Besides this, in its EU Strategy for the Danube Region, the European Commission has indicated as one of its priority areas, better connectivity between countries through the digitalization of business processes, e-commerce and ICT (Szüdi, 2019). With regards to this, the *aim of this paper* is the analysis of economic benefits from e-retailing in traditional retail institutions of selected countries of the Danube region. On the sample of 90 retailers, it has been examined whether the implementation of e-retailing correlates with the amount of revenue, retailer's origin and specific retail form. Based on the obtained results, a set of measures and programs as incentives for a broader implementation of the e-retailing in countries of the Danube region will be proposed.

Theoretical backgrounds

Research (Malhotra & Aggarwal, 2019) shows that retailers who are pioneers in the market in e-retailing have an important place on the electronic market in each country, and place for development opens up an innovative approach towards the introduction of e-retailing, which should provide a comparative advantage over the competition. The success of the product placement via the Internet is possible only if the consumers' needs are met at a higher level than by using traditional retail forms. (Türk, 2019). It is necessary to present to consumers some important characteristics of a product, which are not available to them due to the absence of direct contact (Rose, Clark, Samouel, & Hair, 2012; Herington & Weaven, 2009). Starting from this fact, it is of extreme importance for a retailer to be familiar with all the indicators which affect the application of e-retailing. Therefore, the analysis of role and importance of e-retailing, measuring the quality of electronic service and of the product bought in this way, becomes the main question in the global market and the basis for lots of research studies and programs.

Studies (Kusuma & Marhaeni, 2019; Türk, 2019; Malhotra & Aggarwal, 2019; Cho & Menor, 2012) show that introducing e-retailing in marketing channels, on one hand, depends on economic viability for the institutions of channel participants and on the other hand, on the benefits which these channels bring to end-consumers. Significant

indicator of the success of implementation of e-retailing is the impact on the financial performance of retailers, which is subject of research that revealed that electronic channel addition announcement could increase a firm's accumulative abnormal returns, Economic Value Added (EVA) measure and Market Value Added (MVA), therefore concluded that electronic channel addition could help increase the financial performance of the firm (Braojos, Benitez, & Llorens, 2019; Cho & Menor, 2012; Cheng, Tsao, Tsai, & Tu, 2007). Other studies (Kusuma & Marhaeni, 2019) claim that SMEs which use e-retailing record better economic performance than those who do not use it. Besides, it is believed that the "click and brick" retailers can increase their added value by integrating information that enables consumers to locate the nearest retail store, check the products in retail store, order and pay for products, create account and manage it (Kurniawan & Achyar, 2019; Toufaily, Souiden, & Ladhari, 2013).

Expanding marketing channels with implementation of e-retailing choice offers retailers others benefits: a) in their repeat purchases, customers incorporate multiple channels and the multichannel segment of users is substantial; b) retailers do not lose their investments in older channels when they add new channels, because customers' history and trust from past experiences continue to influence their choices; c) internet customers are likely to incorporate multiple channels in their repeat purchases, and learning costs and risk aversion are likely to be lower among this group (Sharma & Gupta, 2018; Sudarević & Marić, 2018). On the other hand, from the vantage point of the retailer, e-retailing can serve one or more roles (Vojvodić, 2019; Berman & Evans, 2013): project a retail presence and enhance the retailer's image, generate sales as a major source of revenue for an online retailer or as a complementary source for a store-based retailer, reach geographically dispersed consumers, including foreign ones, provide information to consumers about products carried, store location, customer loyalty products and so on, promote new products, furnish consumer service, be more personal with consumers, conduct retail business in cost-efficient manner, obtain customer feedback, promote special offers, etc.

The world is increasingly turning to e-commerce, the question now has arisen: "How should a business survive and flourish in the world of e-commerce?" (Farhoomad & Lovelock, 2001). E-retailing presents a retail marketing channel with the fastest-growing rates, and as Laudon and Traver (2012) indicate it remains profitable channel focused on market share growth, revenue growth, the growth of the value of individual purchases and increase of the efficiency of operations. However, e-retailing doesn't have identical effects and role for all retailers, which at the same time is the subject of this research. The key idea was to determine if the effects of e-retailing and its implementation to marketing channels depend on operating income or volume of turnover, ownership of the retailer (domestic vs. foreign) and the specific form of retail (discount, supermarket, hypermarket, retail cooperation, shopping centres, wholesale club, etc.). For the purpose of this research, the largest retailers in the nine countries were chosen which cover all specific forms of retail and cater to the market of over 180 million consumers. On the other hand, this market is characterized by the distinctly developed application of e-retailing (Germany, Austria) and very moderate application (Romania, Bulgaria, Serbia) which ensures the diversity and representatively of the research sample.

Methodology

Aim and hypothesis. The aim of the research is to determine if there is a statistically significant correlation between e-retailing application and operating income, origin and specific form of the retailers in the example of nine selected Danube region countries. The following research hypotheses have been defined:

H_1: *E-retailing is applied by retailers with above-average revenues*. Based on previously studies (Vojvodić, 2019; Kusuma & Marhaeni, 2019; Kurniawan & Achyar, 2019; Berman & Evans, 2013) the main aim is to highlight the economic benefits of e-retailing in traditional retail institutions analyzing the revenue from the sale of e-retailing in traditional retailers' business and representation of e-retailing "click and brick" in the group of largest electronic retailers on the national level, or in a region. On the basis of the revenues from the sale of the largest retailers, retailers with above-average sales revenues in this group were selected.

H_2: *Domestic retailers apply e-retailing more successfully and more often than foreign retailers*. The aim of this hypothesis is to estimate how much e-retailing is represented depending on the origin of retailer - by analyzing the origin of retailers who implement e-retailing and the amount of sales revenue (Sharma & Gupta, 2018; Sudarević & Marić, 2018; Laudon & Traver 2012).

H_3: *The specific retail formats often apply e-retailing and have greater success in the e-retailing*. A commercial effect of the application of e-retailing was analyzed on the basis of representation of the e-retailing in certain retail format, and if any, to what extent is represented (Vojvodić, 2019; Kurniawan & Achyar, 2019)

Research sample. The study of the effects of e-retailing was conducted in nine countries in the Danube region (Austria, Bulgaria, Croatia, Germany, Hungary, Serbia, Romania, Ukraine and Slovakia). The sample consisted of 10 largest retailers in the market per country by revenue in 2018, making a total of 90 biggest retailers in the Danube region. Data had been collected from 1) official financial reports of companies which are available on their websites, 2) official reports from national agencies for business registries, 3) national statistical yearbooks.

Research procedure and variables. Analysis of e-retailing and retail sectors was conducted using the desk research analyzing of financial reports of retailers allocating their sales revenue in 2018, as well as the categories of products sold and other general characteristics (origin, whether they have e-retailing or not, and type of e-retailing). With the aim of confirming the set hypotheses, as independent variables, the following was chosen: volume of operating income from sales, origin of the retailer (domestic vs. foreign) and form of the retail outlet (discount, supermarket, hypermarket, retail cooperation, furniture showroom, C&C, markets, shopping centres, wholesale club, electronic retailer, multichannel retailer, convenience stores, pharmacy, drugstore, perfumery, speciality shops, kiosks and specialized supermarkets). The scope or representation of e-retailing presents the dependent variable. Statistical methods that were used in the analysis are frequency analysis and the $\chi 2$ test. The collected data have been processed and analysed in statistical software for analysis IBM SPSS Statistics 20.0

Results and discussion

As part of the hypothesis, H_1 is the fact that retailers with above-average sales (more than 500 million €) have a bigger capacity and the potential for the development of e-retailing. Otherwise, in the area of economic benefits, and how e-retailing has an impact on revenue from the sale, the assumption is that retailers with above-average sales use e-retailing, as well as only those retailers with a higher level of revenues from sales that have the potential for implementation of e-retailing. Frequency analysis was conducted in order to analyze whether retailers with above-average sales have e-retailing in a particular country. Based on research results (Table 1) data shows that retailers with above-average revenues from sales don't have e-retailing just in Slovakia and Ukraine, while in other countries it is present in the 33% to 66.7% of the cases.

Table 1. The presence of e-retailing at retailers with above-average revenues in the country

No.	Country	no.*	E-retailing		
			No	Yes	Yes (%)
	Austria	7	4	3	42.85
	Bulgaria	4	3	1	33.00
	Croatia	2	1	1	50.00
	Germany	4	2	2	50.00
	Hungary	5	3	2	40.00
	Romania	4	2	2	50.00
	Slovakia	3	3	0	0.00
	Ukraine	3	3	0	0,00
	Serbia	3	1	2	66.67
	Total	**35**	**22**	**13**	**37.14%**

** Number of retailers with an above-average revenue from sales (more than 500 million €) in the country*

In order to test the first research hypothesis, x^2 test was applied. It was applied for the analysis of the relationship between the revenue of retailers in relation to the countries of origin and the presence of e-retailing. The results suggest (Table 2) that there is no significant connection between the amount of revenue in the country from retailing and electronic retail presence ($x^2_{(1)}$=0.53; p=0.45). On the basis of the obtained results, it can be said that there is no statistically significant correlation between the volume of revenue and application of e-retailing. The obtained results are similar to the findings of some previous studies (Kusuma, & Marhaeni, 2019; Kurniawan & Achyar, 2019; Brynjolfsson et al., 2013; Rose et al., 2012) which indicate that for the retailers which make above-average profits it doesn't mean that they, at the same time, invest more in the implementation of e-retailing. They are simply satisfied with the existing sales volume and their market participation, they have a worked out system of doing business which brings in profit and they tend to avoid big new investment and cost. On the other hand, smaller retail chains fight for the market and consumers, adapt better to new sales formats and integration of e-retailing in marketing channels.

Table 2. Relations between income level retailers and the presence of e-retailing

Revenue	E-retailing		
	No	Yes	Total
Revenue more than 500 million €	22	13	35
Revenues less than 500 million €	38	25	55
In total	60	38	90
χ^2	0.563		
Df	1		
p level	0.453		

Analysis of hypothesis H_2 of the presence of e-retailing based on analyzing the origin of retailers who implement e-retailing showed the following results by using the frequency analysis (Table 3). Retailers from all analyzed countries have represented e-retailing to a certain extent, wherein the representation varies between countries.

Table 3. Relation between the origin of retailers and the presence of e-retailing

No.	Country	Origin	E-retailing			Total%*
			No	Yes	%	
	Austria	Domestic	0	3	100.00	
		Foreign	4	3	42.86	60.00
	Bulgaria	Domestic	1	2	66.67	
		Foreign	4	3	42.86	50.00
	Croatia	Domestic	3	1	75.00	
		Foreign	6	0	-	10.00
	Germany	Domestic	2	7	78.00	
		Foreign	0	1	100.00	80.00
	Hunagry	Domestic	2	1	33.33	
		Foreign	6	1	14.29	20.00
	Romania	Domestic	0	0	-	
		Foreign	7	3	30.00	30.00
	Slovakia	Domestic	1	4	80.00	
		Foreign	3	2	40.00	60.00
	Ukraine	Domestic	5	2	28.57	
		Foreign	2	1	33.33	30.00
	Serbia	Domestic	4	2	33.33	
		Foreign	2	2	50.00	40.00
Total		**Domestic**	**18**	**22**	**55.00**	
		Foreign	**34**	**16**	**18.00**	**42.22**
		χ^2	11.9			
		Df	1			
		p level	**0.001**			

* The percentage of domestic and foreign retailers that have e-retailing

The lowest percentage of e-retailing is in Croatia (10%) and Hungary (20%), while the highest is in Germany (80%). When it comes to domestic retailers, e-retailing

is not recorded in Romania and is present in all other countries. The lowest percentage of e-retailing implemented by domestic retailers is in Ukraine (28.57%), while the highest is in Austria (100%).To examine the association between the presence of e-retailing and retailers' origin (domestic or foreign) on the global scale (for all countries in total), the χ2 test was applied. The results suggest that there is a significant relationship between these variables ($x^2_{(1)}$=11.9; p=0.01), or foreign retailers significantly less likely apply e-retailing than domestic retailers when analyzing all countries in the region.

The H_2 hypothesis is accepted and it can be concluded that there is a statistically significant correlation between the origin of the retailer and the volume of application of e-retailing. This conclusion directs to the fact that the purchase of global and international electronic retailers may be influenced by unsatisfactory supply in the domestic market, simultaneously it may be discouraged by the costs of delivering, the closeness of markets or high delivery costs and fees that accompany the purchase from the other countries, even when product is purchased electronically. Therefore, if there are no foreign or global retailers in the retail market among the largest electronic retailers, it does not necessarily mean that local electronic retailers fully meet the needs of the domestic market, but the question is the benefits of purchasing from out of the country from the global electronic retailers or electronic retailers from other countries.

Frequency analysis is used in the part of analyses about the representation of e-retailing in certain retail form is used. The results suggest (Table 4) that retailers with retail format shopping centres and kiosks don't have e-retailing. All remaining retail formats have e-retailing ranging from 16.67% to 100% depending on the retail format.

Table 4. Frequency of e-retailing for different retail formats

No.	Retail format	E-retailing			
		Total	No	Yes	Yes %
	Discount	12	10	2	16.67
	Super Market	32	18	14	43.75
	Hypermarket	15	11	4	26.67
	Retail cooperation	3	1	2	66.67
	Furniture showroom	1	0	1	100.00
	C & C	5	3	2	40.00
	Markets	7	5	2	28.57
	Shopping centers	1	1	0	0.00
	Wholesale club	1	0	1	100.00
	Electronic retailer	1	0	1	100.00
	Multichannel retailer	2	0	2	100.00
	Convinient stores	2	1	1	50.00
	Pharmacy	1	0	1	100.00
	Drugstore	1	0	1	100.00
	Perfumery	1	0	1	100.00
	Specialty shops	2	0	2	100.00
	Kiosks	1	1	0	0.00
	Specialized supermarkets	2	1	1	50.00

Source: Authors' calculation

From the above table, it can be noticed that each retail format such as furniture showroom, wholesale club, electronic retailer, multichannel retailer, pharmacy, drugstore, perfumery and speciality shops, apply e-retailing. A very small per cent of outlets such as discount (16.67%), hypermarket (26.67%), markets (28.57%) and C&C (40.00%) along the traditional marketing channel apply e-retailing as well. The remaining retail formats (supermarket, retail cooperation, convenience stores and specialized supermarkets) do this in the half per cent, from 40 to 66%. For testing the third hypothesis $\chi 2$ test was applied. The results present that specific retail formats often use e-retailing ($x^2_{(1)}=12.3$; $p=0.000$). That is, H_3 is accepted and we conclude that the application of e-retailing is statistically significantly related to the different forms of retailers.

Conclusion

Analysis of the effects of e-retailing in marketing channels was conducted based on the benefits of e-retailing on business of traditional retail institutions analyzing the revenue from the sale of e-retailing in traditional retail business on the national level, and the region level. The results showed that retailers with above-average revenues don't have e-retailing in Slovakia and Ukraine, while in other countries is represented in the 33% to 66.7% of the cases. Analysis of the relation between revenue level of retailers in relation to the country of origin and the presence of e-retailing suggest that there is no significant correlation between the amount of revenue in the country and e-retailing presence, by which the results of the previous studies have been confirmed (Kusuma, & Marhaeni, 2019; Kurniawan & Achyar, 2019; Brynjolfsson et al., 2013).

In the part of the research on how much e-retailing is represented depending on the origin of retailers, the analysis was conducted of the origin of retailers who implement e-retailing and their amount of sales revenue. Retailers from all analyzed countries have the presence of e-retailing to some extent. The lowest percentage of e-retailing in traditional retailing is in Croatia (10%) and Hungary (20%), while the highest is in Germany (80%). When it comes to domestic retailers, e-retailing is not recorded only in Romania and is present in all other countries. The lowest percentage of e-retailing implemented by domestic retailers is in Ukraine (28.57%), while the highest is in Austria (100%). Foreign retailers have e-retailing significantly less than domestic retailers when analyzing all countries in the region. The research points out the reasons for the high sales revenue of global electronic retailers in the market, which may be different. Purchasing form global and foreign electronic retailers may be influenced by unsatisfactory supply in the domestic market, and on the other hand, maybe discouraged by the costs of delivering, the closeness of markets or high fees and other duties that accompany the purchasing from other countries, even when the product is purchased electronically. Similar studies direct to this conclusion as well (Kumar & Mehra, 2019; Kathiravan 2019; Shala & Balaj, 2018; Kumar et al., 2015) so we can assume that if the market doesn't have foreign or global electronic retailers among the largest electronic retailers, it does not necessarily mean that local electronic retailers fully meet the needs of the domestic market, but questions the benefits of purchasing out the country from the global electronic retailers or electronic retailers from other countries.

Effects of the e-retailing and its representation in certain retail formats suggest that retailers with retail format shopping centres and kiosks don't have e-retailing. All

remaining retail formats have e-retailing ranging from 16.67% to 100% depending on the retail format. In this context, to balance the application of e-retailing by retail formats, competent institutions and trading policy creators should apply a whole set of measures which incorporate a more efficient education of retailers and consumers, tax reliefs, financial and credit subsidies, faster and more efficient work of delivery services, better promotion of e-retailing, raising visibility of e-retailer's certification, measures for fighting the grey economy in e-retailing, help with technology, etc.

Research disadvantages. The disadvantage of the research is that the sample of the research is limited to the selected countries of the Danube Region. An objective reason for choosing such a sample lies in the author's familiarity with the e-retailing system in the Danube region, as well as the availability and transparency of data from retailers in this region.

Suggestions for future research. As part of suggestions for future research, existing research should be extended to countries outside the Danube region, increase the number and structure of retailers in the sample, and compare results between EU vs. non-EU countries.

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TRADE OFF BETWEEN SIMPLICITY AND PRECISION OF INDEX MODELS

Abstract

In the basis of contemporary portfolio theory is Markowitz model of portfolio analysis which accurately defines a set of efficient portfolios for a relatively small number of securities in its composition. With the increase in the number of securities in the portfolio, the application of the Markowitz's model becomes complex, so financial theory found the solution of the problem in the single-index Sharpe's model. The later emergence of multi-index models, which better reflect reality, increased precision in determining a set of efficient portfolios, but at the cost of greater complexity of the model. The aim of the research is to analyze a kind of substitution between the simplicity and precision of the model, and to search answer to the question of what is the optimal number of explanatory factors of the model. Using qualitative economic analysis method, it was concluded that the number of factors (indexes) in the model should be increased until marginal benefits in the form of increased precision are equalized with marginal costs in the form of increased complexity, reduced applicability and associated costs of obtaining informations. In striving for greater precision of models, financial analysts must not overlook that the index models emerged from the practical necessity of simplifying the original Markowitz's model.

Key words: *single-index model, market model, two-index model, two-sector index model, multi-index models*

JEL classification: G00, G10, G11

TRADE OFF ИЗМЕЂУ ЈЕДНОСТАВНОСТИ И ПРЕЦИЗНОСТИ ИНДЕКСНИХ МОДЕЛА

Апстракт

У основи савремене портфолио теорије налази се Markowitz-ев модел портфолио анализе који прецизно одређује сет ефикасних портфолија за релативно мали број хартија од вредности у његовом саставу. Са повећањем броја хартија од вредности у саставу портфолија примена Markowitz-евог

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модела постаје сложена, па је решење проблема финансијска теорија пронашла у једноиндексном Sharpe-овом моделу. Касницом појавом вишеиндексних модела, који боље одражавају реалност, повећана је прецизност приликом одређивања сета ефикасних портфолија, али по цени веће сложености модела. Циљ истраживања је анализирање својеврсне супституције између једноставности и прецизности модела, и тражење одговара на питање који је то оптималан број објашњавајућих фактора модела. Применом метода квалитативне економске анализе закључено је да број фактора (индекса) у моделу треба повећавати све док се маргиналне користи у виду повећане прецизности не изједначе са маргиналним трошковима у виду повећане комплексности, смањене апликативности и пратећих трошкова прибављања информација. У тежњи за већом прецизношћу модела, финансијски аналитичари не смеју изгубити из вида да су се индексни модели појавили из практичне нужности поједностављења оригиналног Markowitz-евог модела.

Кључне речи: *једноиндексни модел, тржишни модел, двоиндексни модел, двосекторски индексни модел, вишеиндексни модели*

Introduction

Markowitz model of portfolio analysis, when determining a set of effective portfolios, requires an estimate of the expected return and variance for each security, as well as an estimate of the covariance between each pair of analyzed securities. (Markowitz, 1952; 1959). The total number of inputs required to successfully operate the Markowitz's model is $\frac{n^2+3n}{2}$, which for the case of 10, 100 and 1000 available securities is 65, 5150 and 501500 data. The latest case of estimating over half a million data represented an impossible mission for analysts, and therefore it comes to finding simpler methods that would require less input.

The solution to the problem described in the form of a single-index model was offered by William F. Sharpe in his paper "*A Simplified Model for Portfolio Analysis*" (Sharpe, 1963). Sharpe's single-index model and all other index, that is, factor models are based on a return generation process that describes how and from which components the securities returns are created. According to index models, one or more factors systematically affect the returns of all securities. Thus, the correlation of the returns of two securities is not determined directly, but indirectly based on their relationship with one or more factors contained in the model. In this way, the number of required covariancec is equated with the number of securities analyzed. It decreases from earlier $\frac{n^2-n}{2}$ in Markowitz's model to n, while the total number of inputs decreases from $\frac{n^2+3n}{2}$ to $(k + 2)n + 2k$, or equivalent, $2n + 2k + kn$, where: n – number of securities, and k – the number of factors used in the model. The epilogue of the above mentioned is a significant simplification of the process of determining a set of effective portfolios, that is, of drawing an efficient limit, which is truly obtained at the cost of less exactness in relation to the original Markowitz's model.

The factors contained in the index models explain the systemic variability of returns, i.e. system component of stochastic movements of securities' returns. The

remaining unexplained part of the stochastic return movements is attributed to the unexpected effects specific to the security and its issuer.

Bearing in mind the above mentioned, the subject of research are single-index model, which explains the systemic variability of returns using one factor, and multi-index models, which use two or more factors to explain the systemic variability of securities' returns. The aim of the research is to present the positive and negative aspects of these models and their variations such as the original single-index market model, Jensen's single-index market model, two-index model and two-sector index model to the investment public in the Republic of Serbia.

Starting from a defined subject and formulated research objective, the basic research question is: What number of explanatory factors of the model is optimal? The method of qualitative economic analysis will be applied in the research in order to make valid conclusions about the research problem by studying the relevant literature.

Single-index model – simplicity at the expense of precision

The single-index model represents the simplest form of the return generation process. The total number of data required for its successful functioning is $3n$ +2. The basic premise of the single-index model is that the returns of securities are sensitive to the movement of one common factor that systematically changes prices, and therefore, the returns of all securities.

The general single-index model takes the following form (Leković, 2017):

$$r_{it} = a_i + b_i F_t + \varepsilon_{it}\,, \tag{1}$$

where:

r_{it}– the return rate, i.e., the return in the holding period of the security i,

a_i – the expected return of the security i for the case of zero value of factor F,

b_i – the sensitivity of return of the security i to the changes in factor F,

F_t – the value of a factor that systematically affects the price of security i in the period t,

ε_{it} – the random error, i.e., the random variable with an expected zero value in the period t.

The previous equation divides the total return of the security i (r_{it}) на systemic ($a_i + b_i F_t$) and non-systemic component (ε_{it}). The systemic component of the total return is explained by a common factor F, while the non-systemic component represents the unique (specific) return of the observed security.

It is important to point out the autonomous component of the return of security i (a_i), independent of the impact of the common factor F, consisting of a_i and ε_{it}:

$$a_i = a_i + \varepsilon_{it}\,. \tag{2}$$

In the financial literature, market movement, i.e., market index is most often cited as the common factor explaining the systemic variability of securities returns. Other factors of systemic variability of return are also in use, such as the unexpected growth rate of gross domestic product

(Petković et al., 2020), the unexpected increase rate of inflation (Pantić & Milojević, 2019), and similar. According to Elton et al. (2011), the fact that securities' prices generally rise with market growth, that is, they fall when the market is in crisis, suggests that one of the reasons for the correlation between the returns of securities lies in their common response to market changes. Therefore, many authors propose interrelating the return of individual security and the market rate of return as a useful measure of the correlation of the observed securities' returns. Single-index model that uses the market rate of return as explanatory factor is called the market model and has the following form (Ferruz et al., 2010, p. 271):

$$r_{it} = a_i + \beta_i r_{mt} + \varepsilon_{it}\,, \tag{3}$$

where:

β_i – the sensitivity of return of securitiy i to changes in the market index,

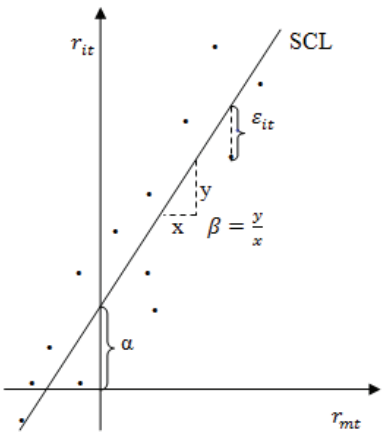
r_{mt} – the market rate of return (the rate of return on the market index) in the period t.

Using single-index market model requires estimation of beta coefficient (β_i) for each security. Beta coefficient can be obtained by subjective estimates of analysts, or by estimating a historical beta based on historical data. Historical beta coefficients provide useful information about future beta coefficients, if they are relatively stable over time. A more stable historical beta means a more reliable estimate of the future beta and also greater reliability of the entire model.

The value of the estimated beta coefficient is interpreted as follows: if β_i equals, for example, +0.5 the return of the observed security will increase (decrease) by 0.5% in the case of a rise (fall) in the market index for 1%. Exceptionally, if the beta coefficient takes a negative value, a change in the market index will result in a change in the return of the observed security in the opposite direction.

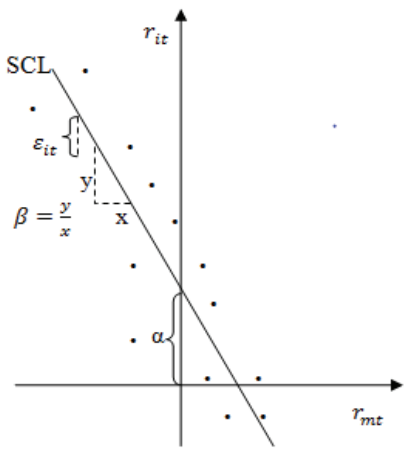
Graphical representation of single-index market model is done by using *Security Characteristic Line (SCL)*. Security Characteristic Line describes the relationship between the return of the observed security (r_{it}) and market return (r_{mt}) (Figures 1 and 2).

Figure 1: Security Characteristic Line in the case of a positive beta



Source: Authors

Figure 2: Security Characteristic Line in the case of a negative beta



Source: Authors

Each point in the diagram indicates one pair of returns for a particular security and a market return, and a regression line constructed between these points such that the sum of all square deviations from that line is minimal is called Security Characteristic Line. The degree of deviation of the return points from the Security Characteristic Line indicates the level of correlation between the return of a particular security and the market return. The greater vertical deviation of the return points from the characteristic line (marked with ε_{it}), implies the smaller correlation. The perfect correlation of observed and market return exists only in the case of zero residual ($\varepsilon_{it} = 0$), when the return points lie on the characteristic line. This situation is an idealized theoretical case, since the imperfect correlative relation corresponds more to reality. Because of the above, the return points generally do not lie on the characteristic line.

The slope of the characteristic line is determined by the beta coefficient. In other words, the beta coefficient is the slope coefficient of the characteristic line. The characteristic line has a positive slope in the case of a positive beta (Figure 1), or a negative slope in the case of a negative beta (Figure 2). In Figure 1, the return of the observed security (r_{it}) rises (falls) with rising (falling) market return (r_{mt}), while the movement of the security return and the market return in Figure 2 is inverse. The return points that lie on the characteristic line of positive slope indicate the perfect positive correlation between the return of a particular security and the market return, while the return points from the regression line of negative slope indicate a perfect negative correlation.

It is also important to interpret the alpha coefficient (α) which shows the expected return of the observed security in the case of zero market return. In Figures 1 and 2, the alpha coefficient represents the distance from the coordinate origin to the intersection point of the characteristic line and the *y*-axis. The alpha coefficient indicates the deviation of the actual from the expected return:

- if alpha is positive, the actual return is higher than expected and the security is undervalued;
- if alpha is negative, the actual return is lower than expected and the security is overestimated;
- the zero alpha coefficient indicates the absence of an undervaluation, that is, an overestimation of the observed security and the presence of a price equilibrium.

Due to the functioning of the market mechanism and market laws, the first two situations in the final instance result in the third. In the first case, return higher than expected and price below the equilibrium price to attract buyers who increase demand (Milašinović et al., 2019). Demand growth affects price growth, which leads to a gradual decrease in the real return down to the equilibrium level represented by the third situation. In the second case, the return lower than expected and the price higher than the equilibrium price reject customers who reduce demand. The fall in demand causes the price to fall, resulting in a gradual increase in the real return to the equilibrium level.

Important assumptions single-index market model related to random error (ε_{it}) are (Francis & Kim, 2013, p. 167):

- the expected value of the random error (residual) is zero ($E(\varepsilon_{it}) = 0$),
- the variance of random error is constant ($\sigma^2_{\varepsilon_i} = const$),
- the random error is uncorrelated with market return ($Cov(\varepsilon_{it,}\, r_{mt})=0$),
- the random errors are serially uncorrelated ($Cov(\varepsilon_{it,}\, \varepsilon_{is})=0$, за $t \neq s$),
- the random errors of different securities are mutually uncorrelated ($Cov(\varepsilon_{it,}\, \varepsilon_{jt})=0$, за $i \neq j$).

The last assumption about the mutual independence of the residuals of the analyzed securities is the most important of the above mentioned, since it implies that the only cause of the systemic variability of the return of the different securities is the chosen factor – in this case, the market movement (market rate of return). Non-correlation of residuals indicates that there are no additional factors that systematically affect securities' returns and that the presented single-factor model is valid.

Using the single-index market model, the following terms are derived (Elton et al., 2011, p. 134):

- expected return of individual security: $\bar{r}_i = \alpha_i + \beta_i \bar{r}_m$,
- variance of return of individual security: $\sigma_i^2 = \beta_i^2 \sigma_m^2 + \sigma_{\varepsilon i}^2$,
- covariance of returns between securities: $\sigma_{ij} = \beta_i \beta_j \sigma_m^2$.

In analogy to the division of the overall return of the security to the systemic and non-systemic component, the total variance of return (σ_i^2) is divided into systemic and non-systemic variance, i.e., on systemic (factor) and non-systemic (non-factor) risk. Systemic risk is represented by the product of the squared beta coefficient and the market variance ($\beta_i^2 \sigma_m^2$), and non-systemic risk by the variance of the residual of the individual security ($\sigma_{\varepsilon i}^2$). Since the market variance (σ_m^2) is the same for all securities, the beta coefficient (β_i) is considered the right measure of systemic risk:

- if $\beta_i = 1$, the security has the same systemic risk as the total market;
- if $\beta_i > 1$, securities have higher systemic risk than the total market;
- if $\beta_i < 1$, securities have less systemic risk than the total market.

According to the *Modern Portfolio Theory (MPT*), decisions should be made in the context of portfolios, not in the context of individual securities. This caused even greater practical value that have the following terms based also on the single-index market model:

- Retrun in the holding period of the securities' portfolio: $r_{pt} = \alpha_p + \beta_p r_{mt} + \varepsilon_{pt}$;
- The expected return of the securities' portfolio: $\bar{r}_p = \alpha_p + \beta_p \bar{r}_m$;

where:

$$\alpha_p = \sum_{i=1}^{n} w_i \alpha_i, \quad (4)$$

$$\beta_p = \sum_{i=1}^{n} w_i \beta_i, \quad (5)$$

$$\varepsilon_{pt} = \sum_{i=1}^{n} w_i \varepsilon_{it}. \quad (6)$$

Alpha coefficient, beta coefficient and portfolio random error (residual) (α_p, β_p i ε_{pt}) are weighted averages of alpha coefficients, beta coefficients and residuals of component securities. Thereby, parts of the total portfolio value invested in a particular security are used as weights (w_i).

- The variance of the securities' portfolio: $\sigma_p^2 = \beta_p^2 \sigma_m^2 + \sigma_{\varepsilon p}^2$;

where:

$$\sigma_{\varepsilon p}^2 = \sum_{i=1}^{n} w_i^2 \sigma_{\varepsilon i}^2. \quad (7)$$

If the residuals of the return rates of different securities are not mutually correlated, the variance of the portfolio residual represents the weighted average of the variance of the residuals of the individual securities in its composition. Assuming that the same proportion of money is invested in each of the securities ($w_i = \frac{1}{n}$), the formula for

residual portfolio variance becomes:

$$\sigma_{\varepsilon p}^2 = \frac{1}{n}\sum_{i=1}^{n}\frac{1}{n}\sigma_{\varepsilon i}^2. \quad (8)$$

It is clear that by diversifying and increasing the number of component securities, the non-systemic variance (variance of residual) of the portfolio decreases drastically and disappears in the final instance, so that the overall risk of the portfolio becomes:

$$\sigma_p^2 = {\beta_p}^2\sigma_m^2, \quad (9)$$

or equivalent,

$$\sigma_p = \beta_p\sigma_m. \quad (10)$$

In addition to the original single-index market model that uses return in the holding period, it is useful to present Jensen's single-index market model that uses the excess return (risk premium) instead of return in the holding period:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}, \quad (11)$$

where:

R_{it} – the excess return (risk premium) of the security *i* in period *t*, that is, the return rate of a particular security above the risk-free rate of return in the observed period;

R_{mt} – the market excess return (market risk premium) in period *t*, that is, the return rate of the market portfolio above the risk-free rate of return in the observed period.

Michael C. Jensen presented this model in his doctoral dissertation, published in 1968, citing its high utility value and its numerous advantages in the evaluation of investment performance as a reason for introducing (Jensen, 1968).

It is important to point out that, under the assumption of constant risk-free rate of return (r_f = *const*), the original single-index market model and Jensen's single-index market model are very similar. Beta coefficients (β_i) and random errors (ε_{it}) do not differ in the described versions of the single-index models, since the same constant (r_f) is subtracted from the dependent and independent variables. Only alpha coefficients differ, and the relationship between the original alpha (α_i) and Jensen's alpha (α_i') can be represented as (Francis & Kim, 2013, p. 171):

$$\alpha_i' = \alpha_i - r_f(1 - \beta_i). \quad (12)$$

These alphas have different values, meanings and different uses. The introduction of Jensen's alpha coefficient significantly facilitates the process of measuring realized investment performance.

On the other hand, under conditions of fluctuating risk-free rate of return (r_{fi}), the original and Jensen's single-index market models are moving away from each other, i.e., they lose similarities because they have different not only alpha, but also beta coefficients.

Multi-index models – precision at the expense of simplicity

If the residuals of the component securities' return rates are mutually correlated, the single-index model loses validity and usability, and it is necessary to introduce additional indices (factors) that together with the existing factor would better explain the

systemic component of the stochastic movements of the portfolio's securities. According to Lee et al. (2010), the simplest way to construct a multi-index model is to supplement a market model based on a market index with other factors such as an index that shows the movement of the industry to which the enterprise belongs. with increasing number of factors, multi-index models are generated and the covariance among residuals approaches zero. This increases the precision and complexity of the model.

The simplest variant of a multi-index model is a two-index model, with the required number of inputs $4n + 4$. For each security it is necessary to determine the alpha coefficient (α_i), beta coefficient relative to the first index (β_{i1}), beta coefficient relative to the second index (β_{i2}), as well as residual variance ($\sigma_{\varepsilon i}^2$). It is also necessary to determine the expected rates of return and variances for both selected indices.

The basic premise of the two-index model is that securities' returns are dependent on the systemic impact of two common factors, which explain the systemic component of stochastic movements in returns of component securities. Thereby, the unexplained non-systemic component is attributed to the unanticipated effects specific to the particular security and its issuer.

According to Sharpe et al. (1995), the economy is not a monolithic entity, therefore, a number of factors can influence the return of securities: the growth rate of gross domestic product, the level of interest rates, the inflation rate, the level of the oil price.

The two-index model, which uses the Gross Domestic Product (GDP) and unexpected inflation rate (INF) as explanatory factors, takes the following form (Leković, 2017):

$$r_{it} = \alpha_i + \beta_{i1} GDP_t + \beta_{i2} INF_t + \varepsilon_{it}, \quad (13)$$

where:

α_i – the expected return of security *i* for the case of zero value of factors *GDP* and *INF*,

β_{i1} – the sensitivity of the return of security *i* to changes in the growth rate of the Gross Domestic Product (*GDP*),

β_{i2} – the sensitivity of the return of security *i* to changes in the inflation rate (*INF*).

The systemic component of the total return of the observed security is represented by the sum of the first three elements of the right part of the equation ($\alpha_i + \beta_{i1} GDP_t + \beta_{i2} INF_t$), while the last fourth element (ε_{it}) indicates the non-systemic component of the total return.

The graphical representation of the two-index model described is done using a characteristic plane. Thereby, each point in a two-dimensional space indicates a combination of the return of a particular security, the growth rate of gross domestic product and the inflation rate.

Earlier assumptions of single-index model related to random error (ε_{it}) apply to both two-index and multi-index models. An additional assumption, aimed at simplifying the computational process, is the non-correlation of the indices used, that is, the selected factors ($Cov(GDP_t, INF_t) = 0$). The possible impact of one factor on another can be eliminated by an orthogonalization process that turns correlated factors into uncorrelated ones.

The present two-index model leads to the appropriate formulas for:

- the expected return of individual security: $\bar{r}_i = \alpha_i + \beta_{i1} \overline{GDP} + \beta_{i2} \overline{INF}$,
- the variance of return of individual security: $\sigma_i^2 = \beta_{i1}^2 \sigma_{GDP}^2 + \beta_{i2}^2 \sigma_{INF}^2 + \sigma_{\varepsilon i}^2$,

- the covariance of returns between securities: $\sigma_{ij} = \beta_{i1}\beta_{j1}\sigma^2_{GDP} + \beta_{i2}\beta_{j2}\sigma^2_{INF}$.

In the formula for the total variance of the return of an individual security ($\sigma_i^2 = \beta_{i1}^2\sigma^2_{GDP} + \beta_{i2}^2\sigma^2_{INF} + \sigma^2_{\varepsilon i}$) systemic risk is represented by the sum of the first two elements of the right part of the equation: 1) the squared beta coefficient of the security *i* relative to the first index multiplied by variance growth rate of gross domestic product ($\beta_{i1}^2\sigma^2_{GDP}$) and 2) the squared beta coefficient of the security *i* relative to the second index multiplied by variance rate of inflation ($\beta_{i2}^2\sigma^2_{INF}$). On the other hand, non-systemic risk is represented by the residual variance of individual security ($\sigma^2_{\varepsilon i}$).

In the case of portfolio, using the two-index model results in the following terms:

- The return in the holding period of the securities' portfolio of: $r_{pt} = \alpha_p + \beta_{p1}GDP_t + \beta_{p2}INF_t + \varepsilon_{pt}$;
- The expected return of the securities' portfolio: $\bar{r}_p = \alpha_p + \beta_{p1}\overline{GDP} + \beta_{p2}\overline{INF}$;

where:

$$\beta_{p1} = \sum_{i=1}^{n} w_i\beta_{i1}, \quad (14)$$

$$\beta_{p2} = \sum_{i=1}^{n} w_i\beta_{i2}. \quad (15)$$

The beta coefficient of the portfolio relative to the first index and the beta coefficient of the portfolio relative to the second index (β_{p1} и β_{p2}) are the weighted averages of the beta coefficients of individual securities relative to the first or second index, whereby parts of the total portfolio value invested in a particular security are used as weights (w_i).

- The variance of return of the securities' portfolio: $\sigma_p^2 = \beta_{p1}^2\sigma^2_{GDP} + \beta_{p2}^2\sigma^2_{INF} + \sigma^2_{\varepsilon p}$.

By increasing the number of securities in the portfolio, the non-systemic risk of the portfolio, represented by the residual variance of the portfolioa ($\sigma^2_{\varepsilon p}$), drastically decreases and approaches zero, so the total portfolio risk is reduced to systemic risk:

$$\sigma_p^2 = \beta_{p1}^2\sigma^2_{GDP} + \beta_{p2}^2\sigma^2_{INF}. \quad (16)$$

In addition to the classic two-index model, it is important to introduce *two-sector-factor model*. Prices of the securities in the same sector often show a high degree of correlation, indicating the systemic impact of a particular sector factor. The basic premise of this model is that all securities are divided into two sectors, with their returns being affected solely by the factor characteristic for the sector to which the securities belong. Thus, factor characteristic for the first sector (F_1) systematically affects the returns of securities of the first sector, while the factor related to the second sector (F_2) systematically affects the returns of securities of the second sector. The sensitivity of the return of the first sector securities to changes of factor F_2 is equal to zero, and inversely, the sensitivity of the return of the second sector securities to changes of factor F_1 is also zero. The above mentioned indicates that in the general two-index model:

$$r_{it} = \alpha_i + b_{i1}F_{1t} + b_{i2}F_{2t} + \varepsilon_{it}, \quad (17)$$

either b_{i1} or b_{i2} will be equal to zero, depending on the sector to which the security belongs. If the security belonging to the first sector is marked with *i* and the security belonging to the second sector is marked with *j*, the corresponding two-sector index models will take the following form:

$$r_{it} = \alpha_i + b_{i1}F_{1t} + \varepsilon_{it}, \quad (18)$$

or,

$$r_{jt} = \alpha_j + b_{j2}F_{2t} + \varepsilon_{jt}. \quad (19)$$

So, unlike the classic two-index model whose trequired number of inputs is $4n + 4$, the total number of data necessary for the successful functioning two-sector index model is smaller and amounts $3n + 4$, which is also a key advantage of this model.

Extending the two-index model with additional factors leads to more complex multi-index models that require larger number of inputs:

- three-index model ($5n + 6$ inputs),
- four-index model ($6n + 8$ inputs),
- five-index ($7n + 10$ inputs),
- k-index model (($k + 2)n + 2k$, or equivalent, $2n + 2k + kn$ inputs, where: n – number of securities, and k – number of factors in the model).

General multi-index model with k factors of systemic variability of the securities' return has the following form:

$$r_{it} = \alpha_i + b_{i1}F_{1t} + b_{i2}F_{2t} + \cdots + b_{ik}F_{kt} + \varepsilon_{it}. \quad (20)$$

The following analytical expressions are obtained using this model:

- the expected return of individual security: $\bar{r}_i = \alpha_i + b_{i1}\bar{F}_1 + b_{i2}\bar{F}_2 + \cdots + b_{ik}\bar{F}_k$,
- variance of return of individual security: $\sigma_i^2 = b_{i1}^2\sigma_{i1}^2 + b_{i2}^2\sigma_{i2}^2 + \cdots + b_{ik}^2\sigma_{ik}^2 + \sigma_{\varepsilon i}^2$,
- covariance of returns between securities: $\sigma_{ij} = b_{i1}b_{j1}\sigma^2{}_{i1} + b_{i2}b_{j2}\sigma^2{}_{i2} + \ldots + b_{ik}b_{jk}\sigma^2{}_{ik}$,
- retrun in the holding period of the securities' portfolio: $r_{pt} = \alpha_p + b_{p1}F_{1t} + b_{p2}F_{2t} + \ldots + b_{pk}F_{kt} + \varepsilon_{pt}$,
- the expected return of the securities' portfolio:$\bar{r}_p = \alpha_p + b_{p1}\bar{F}_1 + b_{p1}\bar{F}_2 + \cdots + b_{pk}\bar{F}_k$,
- variance of the securities' portfolio: $\sigma_p^2 = b_{p1}^2\sigma_{F_1}^2 + b_{p2}^2\sigma_{F_2}^2 + \cdots + b_{pk}^2\sigma_{F_k}^2 + \sigma_{\varepsilon p}^2$.

It is not difficult to conclude that the concept is exactly the same as in the case of the two-index model. However, the key problem with the multi-index model is the choice of index, i.e. factors that systemically influence the return generation process. According to Grinblatt and Titman (2001), the three basic ways of assessing common systemic risk factors are:

- the use of statistical techniques, such as factor analysis,
- the specification of macroeconomic factors, such as unexpected changes in interest rates, unexpected changes in the level of economic activity,
- the specification of the characteristics of the securities or companies as microeconomic factors.

Despite numerous researhes (Chen et al., 1986; Idris & Bala, 2015; Jamaludin et al., 2017; Kim, 2006; Sharpe, 1982; Tudor, 2010; Zhu, 2012), the financial literature has not yet reached a consensus on the most important systemic risk factors. Over time, some models such as the Barr Rosenberg Associates (BARRA) model (Rosenberg, 1974), Fama-French three-factor model (Fama & French, 1993), Burmeister-Ibbotson-Roll-Ross (BIRR) model (Burmeister et al., 1994), Carhart' for-factor model (Carhart, 1997) have found application in practice. However, decades of research have not been sufficient for making the final judgment about the factors that systemically influence the return generation process.

The latest researches, among which study carried out by Harvey et al. (2016) stands out in particular, show that hundreds of factors are associated with returns at a

statistically significant level. This study conducted by Harvey et al. (2016) indicates that at least 316 factors are in statistically significant relation to returns. In intention to indicate the appearance and abundance of new factors, Cochrane (2011) uses a picturesque expression "*zoo of new factors*".

It is clear that a greater number of factors implies greater model exactness, while at the same time a greater number of required inputs for the result has greater model complexity. The multi-index model, according to the precision and the number of inputs required, occupies mid position between the original Markowitz' model and the single-index model.

Conclusion

By choosing between Markowitz's, single-index and multi-index model, a kind of *trade off* is made between the simplicity and precision of the model. Striving for greater simplicity of the model, it must not overlook the simultaneous loss of precision in determining a set of efficient portfolios. Inversely, striving for greater precision, the simultaneous loss of simplicity must not be neglected.

As Markowitz model of portfolio analysis requires the calculation of a correlation for each pair of securities within a portfolio, its application to portfolio expansion becomes more complex. With this in mind, William F. Sharpe has offered a simpler solution in the form of a single-index model that involves the systemic impact of one common factor on the returns of all securities and determining the correlation between the returns of securities based on their relationship with the common factor. Compared to the Markowitz's model, the application of Sharpe's single-index model is characterized by simplicity caused by fewer required inputs, but also by less precision in determining a set of efficient portfolios.

In order to determine the efficient limits more accurately and to explain more fully the systemic variability of securities' returns, it is proposed to introduce additional factors and to generate a multi-index model. Introducing additional factors that systemically affect securities' returns increases the precision and complexity of a multi-index model that gradually approaches original Markowitz's model in terms of its characteristics. Each additional factor means greater precision while reducing the applicability of the model in real conditions. Therefore, during a search for optimality, a number of factors should be increased until the marginal benefits in terms of increased model precision are greater than marginal costs in terms of increased complexity, reduced applicability and the associated costs of obtaining information. The above mentioned conclusion is comparable to the conclusion reached by Benjelloun and Siddiqi (2006) and Statman (2004) when examining the optimal portfolio size: the portfolio size should be increased until the marginal benefits of diversification in terms of reduced investment risk are greater than the marginal costs of diversification in terms of increased portfolio management costs.

Based on the above mentioned, it is concluded that the single-index and multi-index models represent a simplification of Markowitz model of portfolio analysis, and that the multi-index model occupies a central position between the original Markowitz's model and Sharpe's single-index model, because it is characterized by medium complexity and medium level of precision in determining the set of efficient portfolios.

The qualitative, but not quantitative, analysis of the optimal number of explanatory factors of the model was performed in the paper, and, therefore, future research should be directed to a comprehensive empirical analysis to support the conclusions drawn using the qualitative methodology.

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EFFECTS OF FINANCIAL INCLUSION TO GDP GROWTH – THE CASE OF NORTH MACEDONIA

Abstract

Achieving higher financial inclusion is a target for each government today, committed to build an economy where everyone has easily accessible financial services, leading to higher economic growth. The aim of this paper is examining the relationship between financial inclusion, measured through a selected set of quantitative indicators (encompassing the penetration, availability and usage dimensions) as independent variables, and the economic growth, measured through the GDP per capita, as dependent variable. The research model applied was the multivariate regression model performed through the Ordinary least squares (OLS) method. The data sample consists of several financial inclusion indicators for North Macedonia and GDP per capita for the period 2007-2019. Findings revealed valuable information for the future strategies, institutional arrangements and measures to strengthen national capacities in function of improving the indicators having significant contribution to GDP growth and achieving higher financial inclusion. Also, findings provided theoretical contribution to the current research database for the specific case of North Macedonia.

Key words: *financial inclusion, GDP growth, regression analysis, North Macedonia*

JEL classification: F3, O16, O4

ЕФЕКТИ ФИНАНСИЈСКОГ УКЉУЧИВАЊА НА РАСТ БДП – СЛУЧАЈ СЕВЕРНЕ МАКЕДОНИЈЕ

Апстракт

Постизање веће финансијске инклузије је циљ сваке владе данас, која је посвећена изградњи економије у којој ће сви имати лако доступне финансијске услуге, што доводи до већег економског раста. Циљ овог рада је испитивање односа између финансијске укључености, мерене кроз одабрани скуп квантитативних индикатора

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(који обухватају димензије пенетрације, доступности и употребе) као независних варијабли, и економског раста, мереног кроз БДП по глави становника, као зависне варијабле. Примењени модел истраживања био је мултиваријантни регресиони модел изведен методом обичних најмањих квадрата (ОЛС). Узорак података се састоји од неколико индикатора финансијске инклузије који су везани за Северну Македонију и њен БДП по глави становника за период од 2007. до 2019. године. Налази су открили вредне информације за будуће стратегије, институционалне аранжмане и мере за јачање националних капацитета у функцији побољшања индикатора који значајно доприносе расту БДП-а и постизања веће финансијске укључености. Такође, налази су дали теоријски допринос актуелној истраживачкој бази података за конкретан случај Северне Македоније.

Кључне речи: *финансијска инклузија, раст БДП-а, регресиона анализа, Северна Македонија*

Introduction

Although we live in an era of advanced opportunities thanks to the various innovations and achievements in the financial services market, still "There are an estimated 1.7 billion adults in the World without access to financial services," according to the statement of the IMF Managing Director Christine Lagarde. Achieving higher financial inclusion is a target for each government today, devoted to build an economy of equal opportunities for every person for easy and affordable access to the financial services, contributing to broader economic and social progress.

North Macedonia, as part of the global economy sets the higher financial inclusion goal as one of its priorities by establishing legal framework in line with European legislation for financial services, as a first step towards creating environment that fosters digitalization and innovation, opens the market for new players in the field of financial services, altogether leading to higher financial inclusiveness resulting in higher economic growth.

The aim of this paper is examining the relationship between financial inclusion, measured through a selected set of quantitative indicators (encompassing the penetration, availability and usage dimensions) as independent variables, and the economic growth, measured through the GDP per capita, as dependent variable, through a multiple regression analysis. The hypothesis of this research is that the financial inclusion positively affects GDP growth in North Macedonia.

Findings revealed that the variable having strongest positive influence on GDP growth is the "Outstanding deposits with commercial banks (% of GDP) and variable "Number of ATM's per 100,000 adults" is also positively associated with GDP growth. The variables "Outstanding loans from commercial banks (% of GDP)" and "Credit and Debit Cards" are negatively associated with GDP growth, since increasing the indebtedness could lead to decreasing the GDP growth.

Findings provided significant information for financial inclusion indicators that have highest influence on the GDP growth in North Macedonia, being important signals for the future strategies, institutional arrangements and measures to strengthen national capacities in function of improving the most influent indicators to GDP growth and simultaneously achieving higher financial inclusion.

The remaining part of the research is structured as follows: Chapter 2 reviewed the literature, Chapter 3 introduced the methodology used for achieving the research objective, Chapter 4 presented the results from the multiple regression analysis and Chapter 5 provided the conclusions.

Literature review

Financial inclusion provides opportunities for each person to be included in the economy and creates possibilities to reach their life goals, which was the reason why the World Bank Group – the World Bank and IFC have made focused interventions to enable access to a transaction account for 1 billion people t through the Universal Financial Access 2020 initiative. (World Bank, 2020a)

Financial inclusion has wide benefits for each economy, especially through the means of fintech and digital finance.

Digital finance brings benefits to financial inclusion

Digital financial technology promises to transform the payments landscape through the use of mobile phones, computers or cards which connect all parties in the payments infrastructure.

According to studies' results, mobile money services can help improve people's income earning potential and thus reduce poverty. For example, the case study of Kenya showed many benefits from the use of mobile money services, particularly for women, increasing their savings by more than a fifth; allowed 185,000 women to leave farming and develop business or retail activities; and helped reduce extreme poverty among women-headed households by 22 percent (Suri and William, 2016).

In addition, digital financial services can also help people manage financial risk — by making it easier for them to collect money from friends and relatives in times of financial crisis. The research for Kenya discovered that even in situations of lower income, users of mobile money maintained the level of household spending, which was not the case with nonusers and users with limited access to the mobile money network, having reduction in their purchases by 7–10 percent. (William and Suri, 2014).

Financial services provided digitally can also contribute to reduction of costs of receiving payments. As Aker et al. (2016) determined that for governments, replacing cash with digital payments can lead to higher efficiency and decrease the level of corruption, as the case of India, where the leakage of funds for pension payments dropped by 47 percent when the payments were made through biometric smart cards rather than being handed out in cash. Brune et al. (2016) detected that financial services can also help people accumulate savings and increase spending on necessities, like the case with market vendors in Kenya, primarily women, who increased their savings and their business investments after being provided with savings accounts.

Financial capability and financial resilience

The term 'financial capability' which is closely related to financial inclusion, is introduced in the Report of financial inclusion by HM Treasury&Department for Work and

Pensions (2019), explaining that financial inclusion and capability are essential for providing security for consumers against falling in financial difficulty, where the government should be the main actor in helping vulnerable consumers to reduce their debts and achieve financial stability, through continuous guidance and advice for improved management of their finances, increase the financial literacy, and education for adequate budgeting and saving.

Financial inclusion is a means to achieving financial resilience, meaning that people will better manage financial risks when they are able to save money and have access to credit.,. In this regard, the Global Findex survey (World Bank, 2018) examined respondents for their possibilities to get emergency funds in case of need within the next month, as well as what is their main source of funding in such cases. The results from the Global Findex survey (World Bank, 2018) were that globally, 54 percent of adults answered that they could come up with emergency funds, in high-income economies 73 percent, and in developing economies nearly 50 percent. The access to emergency funds is not dependent solely on the income level in an economy, but also the cultural differences and gender aspects across economies.

Economic and social impact of digital financial inclusion

The process of digitalization is also expected to have higher economic growth, living standards and increase in GDP.

The benefits of digitalization will also contribute to achieving the United Nations development goals 2030 (United Nations, 2018):

- *Improvement of health care and education, contributing to improvement in human capital.*

Human capital is indispensable tool for achieving economic growth. As explained in the McKinzey (2016) report, human capital is improved by continuous investment in education and health care. Additionally, digital payments contribute to improved services in education and health care.

- *Reducing the informal economy.*

This report (McKinzey, 2016) points out the importance of digital payments to bigger transparency, which leads to reducing the informal economies. It is noted in the report of McKinzey (2016) that there is a high connection between the presence of cash in an economy and the size of its informal sector. Digital payments can help the governments to improve the tax collection and compliance with labor laws if they establish—competitive policies for regulatory and tax issues and strengthen tax collection authorities. According to the findings of one study, if digital payments increase by an average of 10 percent a year, the informal economy could be reduced by up to 5 percent (Schneider, 2013). Reducing the informal economy has significant economic benefits, because formalizing businesses contributes to higher productivity of the entire economy.(McKinsey & Company, 2004; McKinsey Global Institute, 2006; La Porta and Shleifer, 2008)

- *Enhancing liquidity.*

With increase in digital payments, more transactions and payments are performed leading to higher liquidity.

- *Promoting innovation and new business forms.*

As already mentioned, digital payments stimulate emergence of new business models, leading to innovation, and possibilities for creation of new jobs, prompting overall growth.

Figure 1 Digital financial inclusion and UN development goals

Source: Adopted from McKinsey (2016)

Financial exclusion

Opposite to financial inclusion is the term financial exclusion. According to the Findex data of World Bank (2018) all unbanked adults live in the developing world, and nearly half live in just seven developing economies: Bangladesh, China, India, Indonesia, Mexico, Nigeria, and Pakistan.

Main reasons for presence of unbanked population as identified under the Global Findex survey (World Bank, 2018) were the *Gender inequality*, *Poverty*, *Low educational attainment* and *Unemployment*. According to the McKinzey Report (McKinzey&Company, 2016), financial exclusion can also affect the middle class population, besides the poor population, especially valid for emerging economies where limited range of financial

services are available unlike developed countries, which could result in utilizing informal financial services being more expensive. Additionally, the Report (McKinzey&Company, 2016), recognized that businesses in emerging economies face the problem of lacking access or having insufficient access to credit, blocking their business development. A heavy reliance on cash creates problems for financial institutions, leading to higher costs per customer due to lower pool of customers they can work with, as presented in data from the McKinzey Report (McKinzey&Company, 2016), showing high reliance of cash by individuals and businesses in emerging economies accounting for more than 90 percent of payment transactions by volume. In addition, according to the presented data of the World Payment Report (Capgemini Research Institute, 2019), dominant share of non-cash transactions is present in advanced countries, namely North America and Europe, while developing economies significantly lag behind in their percentage share and volume of non-cash transactions. Dominant use of cash also is a problem for governments since it creates issues with expenditure coverage and collected tax revenues and enables corruption. (Rogoff, 2016) The results of one study found that as much as one-third of government cash payments can be lost this way (Consultative Group to Assist the Poor, 2015). Finally, cash payments reinforce large informal economies.

When speaking of financial exclusion, it is worth mentioning that besides involuntary financial exclusion that was elaborated above, there are also cases of voluntary financial exclusion, as recognized in the World Bank Policy Research Report, World Bank and IMF (2008), belonging to some categories of wealthy customers or some older categories of individuals or households in advanced economies who don't use financial services. Moreover, voluntary financial exclusion could be due to ethical, cultural or religious reasons. From a policy point of view, the category of voluntary nonusers of financial services is not a problem for an economy.

Research Task and Methodology

The aim of this paper is examining the relationship between financial inclusion, measured through a selected set of quantitative data on indicators (encompassing the penetration, availability and usage dimensions) as independent variables, and the economic growth, measured through the GDP per capita, as dependent variable.

Research design

For examining the correlation between financial inclusion indicators and economic growth, the research model applied was the *Causal research,* more specifically "the cause and effect relationship" elaborated by Saunders et.al (2003). The aim of this research objective is determining the strength of relationship or dependence of the economic growth, (GDP per capita), as dependent variable, from each of the independent variables of financial inclusion influencing positively/or negatively/or having no influence to economic growth. For this purpose, a multiple regression analysis was performed.

The quantitative indicators representing the "financial inclusion" used as independent variables in the regression analysis were selected by taking care to reflect on all aspects of financial inclusion, namely the penetration, availability and usage of

the financial services, There is growing literature elaborating the question on how to accurately measure the financial inclusion, where some studies suggested it could be done by measuring the proportion of adults or households possessing a bank account (See, e.g., Honohan, 2008). The disadvantage of this approach is that it measures only one aspect of financial inclusion while ignoring other equally important aspects that should represent one inclusive financial system.

The approach suggested by Sarma (2015) also used by many policy makers involves the use of a several indicators determining different aspects of financial inclusion in terms of penetration, availability and usage dimension, such as: Automated teller machines per 100,000 adults and % of branches of commercial banks per 1,000 km2 which were used as proxies of Access, % of deposit accounts with commercial banks per 1,000 adults were used as proxy of penetration and Outstanding deposits with commercial banks (% of GDP) along with Outstanding loans with commercial banks (% of GDP) were used as proxies of usage, while GDP was used as a proxy of economic growth. This approach was also adopted for the subject research.

The following quantitative indicators as determinants for financial inclusion were applied for our research: 1) Number of commercial bank branches per 100,000 adults and 2) Number of ATMs per 100,000 adults, as proxies of "Access" indicators, 3) Outstanding deposits with commercial banks (% of GDP) and 4) Outstanding loans from commercial banks (% of GDP) as proxies of "Usage" indicators, 5) Number of deposit accounts with commercial banks per 1,000 adults, 6) Number of credit cards per 1,000 adults and 7) Number of debit cards per 1,000 adults, as proxies for "Usage – penetration of financial services" indicators. The GDP, or per capita income, was used as a proxy for "Economic growth", representing the dependent variable in the regression analysis. The selection of this specific set of quantitative indicators acting as the most representative indicators for each dimension of financial inclusion is also in line with the IMF Financial Access Survey (IMF, 2019) also identifying these indicators as "Key FAS indicators". Also, the additional indicators selected in our dataset which are not part of the "Key FAS indicators" - the indicators for number of debit and credit cards per 1,000 adults were also included aiming to examine the influence of the digitalization process in North Macedonia on the economic growth, which is recognized in many research studies as a substantial precondition for increasing financial inclusion and positively affecting the economic growth. The indicators on mobile money which are part of the "Key FAS indicators" were excluded from our dataset since North Macedonia still does not have mobile money services.

As regards selection of the measure for economic growth, there are several measures such as: National income levels, physical capital allocation, Gross Domestic Products (GDP) of the nation etc. GDP measures the value of production of activities that fall within the boundary of the national accounts system. Although the measures for GDP could sometime create uncertainties especially when measuring production by the government sector, however GDP is best suited measure for the total value of the economic resources that affect well-being of one economy. For the purpose of this study, GDP per capita was used as proxy for economic growth.

Data sample

The dataset for which regression analysis was performed consists of the financial inclusion indicators and economic growth for North Macedonia for the period 2007-2019

because of the limited data availability for the full set of financial inclusion indicators for the years preceding 2007. The data source for the financial inclusion indicators were secondary data available from the IMF Financial Access Survey (IMF, 2019), while data source for GDP (per capita) was the World Bank database on GDP by countries and income groups (World Bank, 2020b). The original raw data are presented in Table no. 1.

Table no.1 Original time series raw data of GDP and financial inclusion indicators

		X1	X2	X3	X4	X5		X6	X7	Y
Economy	**Year**	**No. of commercial bank branches per 100,000 adults**	**No. of ATMs per 100,000 adults**	**Outstanding deposits with commercial banks (% of GDP) in USD**	**Outstanding loans from commercial banks (% of GDP) in USD**	**No. of deposit accounts with commercial banks per 1,000 adults**	**No. of debit and credit cards per 1,000 adults**	**No. of credit cards per 1,000 adults**	**No. of debit cards per 1,000 adults**	**GDP in USD**
North Macedonia Republic of	2007	19.97110	31.72587	43.01039	33.49630	1276.127	319	101	218	12283.53
	2008	24.34928	45.30514	43.60505	40.47049	1761.834	404	118	287	12943.86
	2009	25.31325	49.20707	45.31236	41.89599	1947.802	489	112	378	12886.68
	2010	25.64760	51.11873	48.77017	42.65875	2007.342	837	178	658	13308.57
	2011	24.16125	51.24758	50.44556	43.60436	1977.841	848	170	678	13608.50
	2012	24.64955	49.64873	52.57580	46.33029	2049.318	878	172	706	13534.72
	2013	24.75643	54.04573	51.66441	45.85298	2089.657	905	182	723	13918.64
	2014	24.87130	55.59807	54.39009	47.94392	2157.926	928	184	744	14411.91
	2015	24.69380	60.66463	54.77906	49.65225	2207.901	966	190	777	14956.44
	2016	25.00528	60.00113	54.27026	47.23683	2232.273	1050	217	833	15371.95
	2017	25.64679	59.41986	54.89045	48.14315	2223.861	1050	216	834	15528.91
	2018	24.15298	59.80737	56.42911	48.64126	2273.077	1047	214	833	15971.86
	2019	24.11153	61.54182	58.14487	48.69918	2276.494	1061	214	846	16479.00

Source: IMF (2019), Word Bank (2020b)

Research method

For conducting the multivariate regression model, Ordinary least squares (OLS) method was utilized. Before running the multiple regression analysis, first, some of variables were log transformed in order to reduce skewness of original data and conform to normal distribution. For this purpose, our regression model used the log transformed dependent variable Y (LNGDP), log transformed X5 (LNACC-Number of deposit accounts with commercial banks per 1,000 adults), log transformed X6 (LNCC - Number of credit cards per 1,000 adults) and log transformed X7 (LNDC - Number of debit cards per 1,000 adults). For the remaining variables X1 (Number of commercial bank branches per 100,000 adults), X2 (Number of ATMs per 100,000 adults), the model used the original data without log transformation, because their values are in similar range with the remaining log values of independent variables and the log dependent variable and there is no need for their log transformation, since transformed data will not

significantly change the results of the regression model. For X3 (Outstanding deposits with commercial banks (% of GDP) and X4 **(**Outstanding loans from commercial banks (% of GDP), log transformation couldn't be applied because they are expressed as percentage values. Summarized dataset with log transformation of some variables is presented in Table no.2.

Table no. 2 Time series dataset of log transformed GDP and some log transformed financial inclusion indicators

	Year	X1	X2	X3	X4	X5	X6	X7	Y
		No. of commercial bank branches per 100,000 adults	No. of ATMs per 100,000 adults	Outstanding deposits with commercial banks (% of GDP)	Outstanding loans from commercial banks (% of GDP)	LNACC per 1,000 adults	LNCC	LNDC	LNGDP
North Macedonia, Republic of	2007	19.97110	31.72587	43.01039	33.49630	7.151585	4.617734	5.384046	9.41601
	2008	24.34928	45.30514	43.60505	40.47049	7.474111	4.768325	5.658231	9.46837
	2009	25.31325	49.20707	45.31236	41.89599	7.574457	4.714482	5.933963	9.46395
	2010	25.64760	51.11873	48.77017	42.65875	7.604567	5.183647	6.489748	9.49616
	2011	24.16125	51.24758	50.44556	43.60436	7.589761	5.135966	6.519806	9.51845
	2012	24.64955	49.64873	52.57580	46.33029	7.625262	5.149706	6.559443	9.51301
	2013	24.75643	54.04573	51.66441	45.85298	7.644755	5.2046	6.583091	9.54098
	2014	24.87130	55.59807	54.39009	47.94392	7.676903	5.216734	6.612185	9.57581
	2015	24.69380	60.66463	54.77906	49.65225	7.699798	5.245251	6.654868	9.61289
	2016	25.00528	60.00113	54.27026	47.23683	7.710776	5.379603	6.725429	9.64030
	2017	25.64679	59.41986	54.89045	48.14315	7.707000	5.374713	6.726471	9.65045
	2018	24.15298	59.80737	56.42911	48.64126	7.728890	5.366282	6.725533	9.67858
	2019	24.11153	61.54182	58.14487	48.69918	7.730392	5.366521	6.741043	9.70984

Source: IMF (2019), Word Bank (2020) and author's own calculation

For building the one best-fitting regression model, the "Backward elimination method" was chosen, that begins with full model containing all independent variables. Before choosing the best-fitting model, several aspects were examined:

- The potential risk of overfitting by examining the correlation between each independent variable and dependent variable set through conducting simple linear regressions between each independent and dependent variable set, then by comparing the p-value for each independent variable in the full multiple regression model (which should be below 0.05 according to the set 95% confidence level), and validating results through the Redundant Variable Test.
- The potential risk of multi-collinearity appears in cases when two or more of the independent variables are highly correlated with each other, leading to the risk for not being sure which of the independent variables determines

the variation in the dependent variable. (David, M.L. et. al, 2017), measured through the Variance Inflation Factors (VIF's), which should be less than 5.0 according to the criteria developed by Snee, R.D (1973).

- The potential existence of autocorrelation of residuals (or serial correlation) especially important when dataset is a time-series data. The autocorrelation is the similarity of a time series over successive time intervals which can lead to the risk of underestimating the standard errors and can cause misleading conclusions that the predictors are significant when they are not.

The autocorrelation of residuals was measured through the Durbin-Watson stat and Breusch-Godfrey Serial Correlation LM Test. The Durbin Watson statistics (limited to detecting first order auto regression) assumes value between 0 and 4, where DW=2 indicates that there is no autocorrelation and errors and normally distributed with a mean of 0, if DW is below 2, there is positive correlation (which is more common for time series data), and if DW is above 2, it indicates negative correlation (less common for time series data). The Breusch-Godfrey Serial Correlation LM Test, or Lagrange Multiplier (LM) Test, also testing the autocorrelation of residuals, is used for detecting autocorrelation up to any predesignated order p.

- The potential risk of heteroscedasticity, as a systematic change in the spread of residuals over the range of measured values, which could lead to inefficient regression predictions (Astivia et al, 2019), is being measured through the Breusch-Pagan-Godfrey heteroscedasticity test and the Jarque-Berra probability coefficient.

The ideal situation would be for all independent variables to be correlated with the dependent variable but not with each other, the errors to be normally distributed with a mean of 0 which would mean non-existence of autocorrelation and to have homoscedasticity, or homogeneity of variance of variables. If redundant variable is determined that does not contribute to the regression equation, or a variable that is highly correlated with other variables, it is removed from the model, up to the stage where all remaining variables are statistically significant to the model, under satisfying other preconditions of nonexistence of autocorrelation and heteroscedasticity.

Research results and discussion

In order to examine the relationship between the variables determining financial inclusion and economic growth, a multiple regression analysis was performed by using E-views tool.

First, the potential overfitting risk was examined by assessing the correlation between each independent variable and dependent variable and eliminate independent variables that have weak or no correlation, by performing simple linear regressions between each independent and dependent variable set.

Table no.3 Summary data of simple linear regressions

	F	p-value	Stand. error	R Square (adj)	X1	X2	X3	X4	X5	X6	X7
BNCH	1.70982	0.21767	0.089106	0.055849	X						
ATM	44.1307	3.64E-05	0.042784	0.782335		OK					
DEP	72.6814	3.55E-06	0.034727	0.856599			OK				
CRED	29.5691	0.000205	0.049875	0.704209				OK			
LNACC	18.8299	0.001176	0.058164	0.597719					OK		
LNCC	36.8449	8.08E-05	0.045926	0.74919						OK	
LNDC	20.6308	0.000841	0.056484	0.620623							OK

Source: Author's own calculations

The summary of simple linear regressions presented in Table no.3 show that the Number of commercial bank branches per 100,000 adults has very weak correlation with GDP, evidenced through the very low value of R square (adj) which is only 0.0558, explaining very low contribution of the predictor X1 to Y of only 5,6%, the lowest value of F (1.71) and p-value (0.217) above the threshold of 0,05 which altogether shows that the independent variable X1 does not contribute to the regression model and is not statistically significant:

- **LNGDP (y) does not appear highly correlated with Number of commercial bank branches per 100,000 adults (x1)**
- LNGDP (y) appears highly correlated with ATM - Number of ATMs per 100,000 adults (x2)
- LNGDP (y) appears highly correlated with DEP - Outstanding deposits with commercial banks (% of GDP) (x3)
- LNGDP (y) appears highly correlated with CRED - Outstanding loans from commercial banks (% of GDP) (x4)
- LNGDP (y) appears highly correlated with LNACC - Number of deposit accounts with commercial banks per 1,000 adults- (x5)
- LNGDP (y) appears highly correlated with CC - Number of credit cards per 1,000 adults (x6)
- LNGDP (y) appears highly correlated with DC - Number of debit cards per 1,000 adults (x7)

Therefore, maybe it would be best to exclude the independent variable (x1) from the multiple regression model as potential redundant variable because it did not contribute to the variation of dependent variable.

However, at this stage the multivariate regression analysis was performed for the full model containing all independent variables, in order to check the results of overall model and validate the above stated assumption.

The results of a multiple regression analysis conducted for the full model of Y (LNGDP) versus all independent variables X1 (BNCH), X2 (ATM), X3 (CRED), X4 (DEP), X5 (LNACC), X6 (LNCC), X7 (LNDC), and the summary of results are presented in Table no. 4.

Table no.4 Least Squares multiple regression analysis of Y vs. X1, X2, X3, X4, X5, X6, X7

Dependent Variable: LNGDP
Method: Least Squares
Sample: 2007 2019
Included observations: 13

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNDC	-0.243585	0.044704	-5.448873	0.0028
LNCC	0.212478	0.067564	3.144832	0.0255
LNACC	0.206578	0.200640	1.029593	0.3504
DEP	0.020339	0.005005	4.063838	0.0097
CRED	-0.012033	0.004377	-2.749086	0.0404
BNCH	-0.003264	0.010151	-0.321598	0.7608
ATM	0.008110	0.002319	3.497058	0.0173
C	7.604263	1.206275	6.303921	0.0015

R-squared	0.993856	Mean dependent var	9.560373
Adjusted R-squared	0.985254	S.D. dependent var	0.091704
S.E. of regression	0.011136	Akaike info criterion	-5.882048
Sum squared resid	0.000620	Schwarz criterion	-5.534387
Log likelihood	46.23331	Hannan-Quinn criter.	-5.953508
F-statistic	115.5417	Durbin-Watson stat	1.930622
Prob(F-statistic)	0.000032		

Source: Author's own calculations

Table no.4 results showed very high R square (adj) = 0.985 and high F confirming very high contribution of the predictor variables to Y of high 98,5% and the p-value of the overall model (0.0015) showed statistically significant model. However, two independent variables have p-values above the threshold and individually are not statistically significant for the model. The variable X1 (BNCH - Number of commercial bank branches per 100,000 adults) has p-value of 0.76 and validates the previous assumption that this variable is redundant, while the p-value for variable X5 (LNACC - Number of deposit accounts with commercial banks per 1,000 adults) is 0.35 which also showed that this variable is not statistically significant for the model and maybe redundant.

The results of this table also show that the Durbin-Watson stat examining the presence of autocorrelation in residuals of the regression model evidences that there was no serial correlation over time since the DW value is close to 2 (DW=1.93). Also, the results of the Table no. 5 show that the p-value is 0.596 (which should be above the threshold of 0.05) validating the assumption that the multiple regression model did not have autocorrelation (serial correlation) of residuals.

Table no.5 Breusch-Godfrey Serial Correlation LM Test:

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.150670	Prob. F(4,1)	0.5960
Obs*R-squared	10.67968	Prob. Chi-Square(4)	0.0304

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 01/22/21 Time: 14:34
Sample: 2007 2019
Included observations: 13
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNDC	0.002770	0.068628	0.040357	0.9743
LNCC	-0.046361	0.088557	-0.523514	0.6930
LNACC	0.092017	0.320456	0.287142	0.8220
DEP	0.001948	0.005950	0.327306	0.7986
CRED	-0.000880	0.005248	-0.167629	0.8943
BNCH	-0.002363	0.010189	-0.231935	0.8549
ATM	-0.000976	0.003910	-0.249632	0.8443
C	-0.433370	2.012771	-0.215310	0.8650
RESID(-1)	-0.405514	0.874816	-0.463542	0.7237
RESID(-2)	-0.726725	0.577962	-1.257394	0.4277
RESID(-3)	-1.609993	0.809714	-1.988348	0.2967
RESID(-4)	-0.472533	1.047436	-0.451132	0.7302

R-squared	0.821514	Mean dependent var	2.05E-16
Adjusted R-squared	-1.141832	S.D. dependent var	0.007188
S.E. of regression	0.010520	Akaike info criterion	-6.989909
Sum squared resid.	0.000111	Schwarz criterion	-6.468417
Log likelihood	57.43441	Hannan-Quinn criter.	-7.097099
F-statistic	0.418425	Durbin-Watson stat	2.019538
Prob(F-statistic)	0.849611		

Source: Author's own calculations

As regards the heteroscedasticity risk measured through the Breusch-Pagan-Godfrey test, examining whether the variance in errors from regression is dependent on the values of the independent variable. With the Breusch-Pagan-Godfrey test, the Chi-square value (along with associated p-value) is tested and indicates whether the variance are all equal if the p-value is above 0.05, when then the null hypothesis is accepted and there is homoscedasticity. In contrary, if the null hypothesis is rejected, there is heteroscedasticity. In our model, results from Table no.6 show that the p-value (0.3362) is above 0.05 and it can be concluded that there was no heteroscedasticity of errors in regression, or the variance of errors is homogeneous.

Table no.6 Heteroscedasticity Test

Heteroscedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.509113	Prob. F(7,5)	0.3362
Obs*R-squared	8.823639	Prob. Chi-Square(7)	0.2656
Scaled explained SS	1.181744	Prob. Chi-Square(7)	0.9913

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 01/22/21 Time: 14:35
Sample: 2007 2019
Included observations: 13

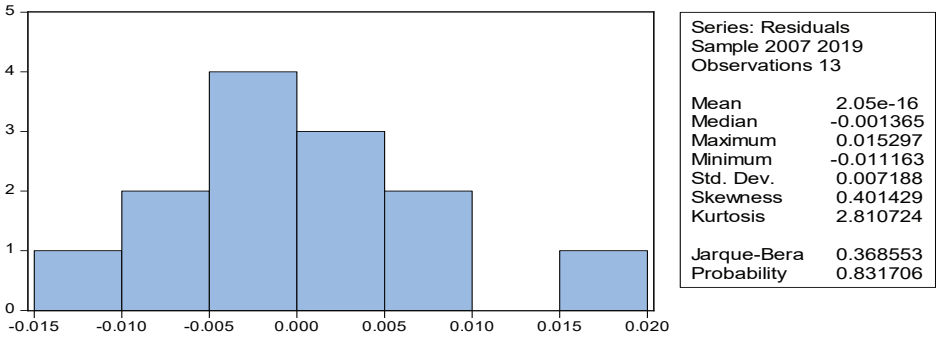
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.009004	0.006354	1.417094	0.2156
LNDC	-0.000181	0.000235	-0.769772	0.4762
LNCC	4.98E-06	0.000356	0.013991	0.9894
LNACC	-0.001830	0.001057	-1.731535	0.1439
DEP	5.58E-05	2.64E-05	2.117139	0.0878
CRED	-1.50E-05	2.31E-05	-0.650896	0.5438
BNCH	0.000149	5.35E-05	2.783424	0.0387
ATM	5.22E-06	1.22E-05	0.427710	0.6867

R-squared	0.678741	Mean dependent var	4.77E-05
Adjusted R-squared	0.228979	S.D. dependent var	6.68E-05
S.E. of regression	5.87E-05	Akaike info criterion	-16.37453
Sum squared resid	1.72E-08	Schwarz criterion	-16.02686
Log likelihood	114.4344	Hannan-Quinn criter.	-16.44599
F-statistic	1.509113	Durbin-Watson stat	2.424978
Prob(F-statistic)	0.336184		

Source: Author's own calculations

To confirm whether the residuals were normally distributed, a Jarque-Bera test was conducted. Jarque-Bera test examines whether sample data have the skewness and kurtosis that match normal distribution. The results of the histogram of the observations for residuals showed that the Jarque-Bera probability is above 0.05, demonstrating that data were normally distributed.

Figure no. 2 Jarque-Bera test



Source: Author's own calculations

The multi-collinearity risk examining if two or more of the independent variables are highly correlated with each other is tested through the VIF for each independent variable summarized in Table no.7. Results showed very high VIF's which leads to potential multi-collinearity amongst independent variables, but the multiple regression analysis was conducted again by eliminating 2 variables identified as redundant and then results of the reduced regression analysis were checked, including the multi-collinearity issues.

Table no.7 Variance Inflation Factors

Variance Inflation Factors
Date: 01/22/21 Time: 14:37
Sample: 2007 2019
Included observations: 13

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
LNDC	0.001998	8643.802	39.07511
LNCC	0.004565	12637.33	30.53279
LNACC	0.040257	244440.8	94.94804
DEP	2.50E-05	6997.689	58.38566
CRED	1.92E-05	4099.601	37.77934
BNCH	0.000103	6456.862	20.46311
ATM	5.38E-06	1620.744	35.56752
C	1.455099	152543.7	NA

Source: Author's own calculations

In order to examine the overfitting risk and validate previously identified redundant variables, the Redundant Variables Test was conducted, which also confirmed that two variables are redundant in the model (variable X1 -BNCH - Number of commercial bank branches per 100,000 adults and variable X5 -LNACC - Number of deposit accounts with commercial banks per 1,000 adults) and should be excluded. The test shows that the p-value of these two variables is 0.5511 which evidenced not statistically significant variables.

Table no. 8 Redundant Variables Test

Redundant Variables Test
Equation: EQ01
Specification: LNGDP LNDC LNCC LNACC DEP CRED BNCH ATM C
Redundant Variables: LNACC BNCH

	Value	df	Probability
F-statistic	0.672807	(2, 5)	0.5511
Likelihood ratio	3.098238	2	0.2124

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.000167	2	8.34E-05
Restricted SSR	0.000787	7	0.000112
Unrestricted SSR	0.000620	5	0.000124
Unrestricted SSR	0.000620	5	0.000124

LR test summary:

	Value	df
Restricted LogL	44.68419	7
Unrestricted LogL	46.23331	5

Restricted Test Equation:
Dependent Variable: LNGDP
Method: Least Squares
Date: 01/22/21 Time: 14:44
Sample: 2007 2019
Included observations: 13

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNDC	-0.214270	0.033220	-6.450123	0.0004
LNCC	0.185396	0.058935	3.145785	0.0162
DEP	0.019514	0.002320	8.412677	0.0001
CRED	-0.009876	0.003406	-2.899919	0.0230
ATM	0.010114	0.001470	6.878378	0.0002
C	8.886713	0.131966	67.34085	0.0000

R-squared	0.992202	Mean dependent var	9.560373
Adjusted R-squared	0.986633	S.D. dependent var	0.091704
S.E. of regression	0.010603	Akaike info criterion	-5.951415
Sum squared resid	0.000787	Schwarz criterion	-5.690669
Log likelihood	44.68419	Hannan-Quinn criter.	-6.005010
F-statistic	178.1427	Durbin-Watson stat	1.474597
Prob(F-statistic)	0.000000		

Source: Author's own calculations

Having in mind the overfitting risk, the independent variables identified as redundant (X1 -BNCH - Number of commercial bank branches per 100,000 adults and X5 -LNACC - Number of deposit accounts with commercial banks per 1,000 adults) were excluded from the model, and the regression analysis was conducted again for the reduced model. Also, in order to reduce the VIF's and due to relatively low number of observations, we tried to merge the independent variables X6 (LNCC - Number of credit cards per 1,000 adults) and X7 (LNDC - Number of debit cards per 1,000 adults), due to the fact that these two variables are indeed highly correlated, determining number of bank cards per 1,000 adults (credit or debit) - LNCDC. If we merge these two variables in one, it was expected to achieve the similar results from examining the relationship between usage of bank cards and GDP, and use this one predictor variable in predicting GDP growth.

Therefore, a reduced log-log multiple regression model was conducted of Y versus X2, X3, X4, (X6+X7) and summary of results are presented in Table no.9.

Table no.9 Least Squares multiple regression analysis of Y vs.X2, X3, X4, (X6+X7)

Dependent Variable: LNGDP
Method: Least Squares
Date: 01/22/21 Time: 14:51
Sample: 2007 2019
Included observations: 13

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNCDC	-0.145773	0.039606	-3.680539	0.0062
DEP	0.024423	0.003190	7.656753	0.0001
CRED	-0.016465	0.004761	-3.458341	0.0086
ATM	0.012085	0.002221	5.440268	0.0006
C	9.375147	0.141762	66.13308	0.0000

R-squared	0.976317	Mean dependent var	9.560373
Adjusted R-squared	0.964475	S.D. dependent var	0.091704
S.E. of regression	0.017284	Akaike info criterion	-4.994315
Sum squared resid	0.002390	Schwarz criterion	-4.777027
Log likelihood	37.46305	Hannan-Quinn criter.	-5.038978
F-statistic	82.44854	Durbin-Watson stat	1.859646
Prob(F-statistic)	0.000002		

Source: Author's own calculations

The coefficients of this multiple regression model showed very high significance of the overall model (R square (adj) =0.9645, p-value=0.0000) and high value of F (82.448) as well as high statistical significance of each independent variables to Y (p-values are below 0,05). The B coefficients of LNCDC and CRED are negative values which can be argumented with the fact that by increase of the percentage share of loans in GDP (CRED), the indebtedness is increased which can lead to decreasing the GDP growth. Also, the LNCDC which variable is a sum of number of debit and credit cards is a negative value due to the similar logic as with loans, i.e an increase in number of cards (where credit cards participate in the overall increase in number of cards) could mean increasing the indebtedness of adults which might lead to decreasing the GDP growth.

Also, values of the Durbin-Watson stat =1.85 (value is around 2) and the Breusch-Godfrey Serial Correlation LM Test having p-value of 0.55 (above 0.05) measuring the existence of autocorrelation confirm that the multiple regression model does not have autocorrelation (serial correlation) of residuals over time.

Table no.10 Breusch-Godfrey Serial Correlation LM Test:

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.854927	Prob. F(4,4)	0.5585
Obs*R-squared	5.991639	Prob. Chi-Square(4)	0.1998

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 01/24/21 Time: 11:43
Sample: 2007 2019
Included observations: 13
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNCDC	-0.013277	0.050572	-0.262547	0.8059
DEP	0.001348	0.003866	0.348831	0.7448
CRED	-0.005454	0.005943	-0.917788	0.4107
ATM	0.002625	0.002928	0.896631	0.4206
C	0.122543	0.184463	0.664325	0.5428
RESID(-1)	-0.169573	0.522444	-0.324576	0.7618
RESID(-2)	-0.454203	0.445600	-1.019306	0.3657
RESID(-3)	-1.035918	0.630176	-1.643856	0.1756
RESID(-4)	-0.111456	0.688733	-0.161828	0.8793

R-squared	0.460895	Mean dependent var	-9.56E-16
Adjusted R-squared	-0.617314	S.D. dependent var	0.014113
S.E. of regression	0.017947	Akaike info criterion	-4.996776
Sum squared resid	0.001288	Schwarz criterion	-4.605657
Log likelihood	41.47905	Hannan-Quinn criter.	-5.077169
F-statistic	0.427464	Durbin-Watson stat	2.495367
Prob(F-statistic)	0.857569		

Source: Author's own calculations

As regards heteroscedasticity issue, the Breusch-Pagan-Godfrey test (Table no.11) showed that the p-value (0.1448) is above 0.05 and it can be concluded that there was no heteroscedasticity of errors in regression, or the variance of errors is homogeneous.

Table no.11 Heteroscedasticity Test: Breusch-Pagan-Godfrey

Heteroscedasticity Test: Breusch-Pagan-Godfrey

F-statistic	2.318639	Prob. F(4,8)	0.1448
Obs*R-squared	6.979585	Prob. Chi-Square(4)	0.1370
Scaled explained SS	1.331051	Prob. Chi-Square(4)	0.8561

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 01/24/21 Time: 11:44
Sample: 2007 2019
Included observations: 13

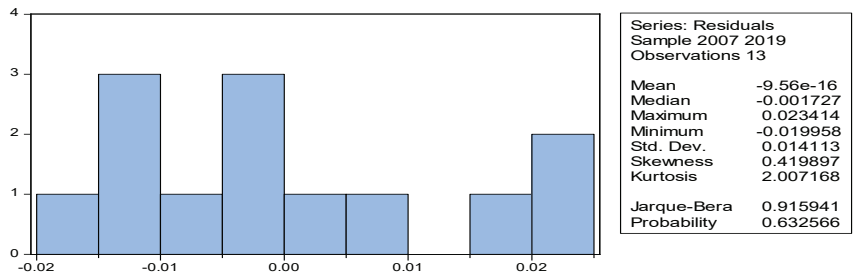
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.002997	0.001313	2.283143	0.0518
LNCDC	-0.000781	0.000367	-2.130107	0.0658
DEP	-1.21E-05	2.95E-05	-0.410637	0.6921
CRED	3.69E-05	4.41E-05	0.836665	0.4271
ATM	2.55E-05	2.06E-05	1.240707	0.2499

R-squared	0.536891	Mean dependent var	0.000184
Adjusted R-squared	0.305337	S.D. dependent var	0.000192
S.E. of regression	0.000160	Akaike info criterion	-14.35839
Sum squared resid	2.05E-07	Schwarz criterion	-14.14110
Log likelihood	98.32953	Hannan-Quinn criter.	-14.40305
F-statistic	2.318639	Durbin-Watson stat	2.015687
Prob(F-statistic)	0.144779		

Source: Author's own calculations

Also, the results of the histogram of the observations for residuals showed that the Jarque-Bera probability is above 0.05, demonstrating that the data is normally distributed.

Figure no.3 Jarque-Bera test



Source: Author's own calculations

Table no.12 Variance Inflation Factors of the regression model Y vs. X2, X3, X4, (X6+X7)

Variance Inflation Factors
Date: 01/24/21 Time: 11:45
Sample: 2007 2019
Included observations: 13

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
LNCDC	0.001569	3036.512	10.13579
DEP	1.02E-05	1179.891	9.844497
CRED	2.27E-05	2013.398	18.55421
ATM	4.93E-06	617.2554	13.54578
C	0.020096	874.4989	NA

Source: Author's own calculations

Table no.12 results testing the multi-collinearity issues showed reduced values of VIF's in comparison with the full model, although still above the suggested level of 5. The multi-collinearity was the only issue with this model, but having in mind that the Beta coefficients with the reduced model remained at approximately similar values (were not distorted), it can be considered that the multi-collinearity should not be a significant issue. Otherwise, if we continue to furtherly exclude independent variables to additionally reduce the VIF's, the p-values of independent variables of the model are distorted and become insignificant, and therefore we face the risk of reducing the model's quality or even lead to statistically non- significant model.

Therefore, the log-log regression model of Y vs.X2, X3, X4, (X6+X7) shall be used for further predictions, which formula is:

$$LN(GDP) = b_{0+} b_{1X} ATM_{+} b_{2X} CRED_{+} b_{3X} DEP_{+} b_{4X} LN(CDC)$$

LN (GDP) = 9.3751 + 0.0121 x ATM + 0.0244 x DEP - 0.0164 x CRED - 0.1457 x LN (CDC)

Before using the regression equation for making predictions, first the regression model has to be validated by using the cross-validation method, by splitting the existing data in two parts, and using the first part of data for developing a multiple regression model and the second part of data for evaluating the predictive ability of the model. (David, M.L et. Al,2017) The first part of data were the time series variables for the period 2007-2016, while the second part of data where the regression equation was evaluated were data for 2017, 2018 and 2019. The regression equation replaced the actual values of the independent variables for the years 2017, 2018 and 2019, and if the results for GDP (after calculating the exponent of LNGDP) were close to the known values of GDP, then the equation is confirmed as correct and can be used for predicting the GDP growth for the future period.

The regression equation for 10 observations was the following:

LN (GDP) = 9.3712 + 0.0113 x ATM + 0.0227 x DEP - 0.0151 x CRED - 0.1357 x LN (CDC)

The results of the formula are presented in the column LNGDP forecast presented in Table no.13.

Table no.13 Validation of the multiple regression model for prediction

Year	Number of ATMs per 100,000 adults	Outstanding deposits with commercial banks (% of GDP)	Outstanding loans from commercial banks (% of GDP)	LNCDC	LNGDP	LNGDP forecast
2007	31.72587	43.01039	33.4963	6	9.416015	
2008	45.30514	43.60505	40.47049	6	9.468377	
2009	49.20707	45.31236	41.89599	6	9.46395	
2010	51.11873	48.77017	42.65875	7	9.496164	
2011	51.24758	50.44556	43.60436	7	9.51845	
2012	49.64873	52.5758	46.33029	7	9.513014	
2013	54.04573	51.66441	45.85298	7	9.540985	
2014	55.59807	54.39009	47.94392	7	9.575811	
2015	60.66463	54.77906	49.65225	7	9.612897	
2016	60.00113	54.27026	47.23683	7	9.6403	
2017	59.41986	54.89045	48.14315	7	9.650459	9.6187447
2018	59.80737	56.42911	48.64126	7	9.678584	9.6508544
2019	61.54182	58.14487	48.69918	7	9.709842	9.7069145

Source: Author's own calculations

As it can be noted from the predicted results for LN (GDP) for 2017-2019 by using the regression equation provided as result of the multiple regression model for the time series data from 2007 to 2016, the LN (GDP) values are very close to the real LN (GDP) values for 2017-2019 and close to the GDP values after calculating the exponents of LN (GDP), which is a proof that the regression model was valid and can be used for prediction purposes.

Conclusion

The final regression equation results uncovered the following relationships:

For 1 unit increase of number of ATM's per 100,000 adults, it is expected to see about 1,2% increase in GDP, holding other variables constant, since exp (0.0120845)= 1.012. For 1 unit increase of Outstanding deposits with commercial banks (% of GDP), it is expected about 2,5% increase In GDP holding other variables constant, since exp (0.024423) = 1.0247, and for 1 unit increase of Outstanding loans from commercial banks (% of GDP), it is expected about 1,7 % decrease in GDP, holding other variables constant, since exp (-0.1457728) = 0.983. As regards the log transformed variable LN (CDC), 1% increase in CDC is associated with 1.4% decrease in GDP, holding

other variables constant. Therefore, results have shown that the research hypothesis is approved, i.e the financial inclusion positively affects GDP growth in North Macedonia.

The regression equation can be utilized for predicting the growth of GDP based on improvement or deterioration of the financial inclusion indicators, being a valuable information for government' and regulator' authorities, providing guidelines for the future directions in improving the variables having most significant positive contribution to GDP growth, as well as undertaking additional efforts to improve variables having negative influence on GDP growth, leading to increasing the financial inclusion. Also, findings give significant theoretical contribution to the current research database for the specific case of North Macedonia.

Recommendations for future research could refer to using the selected dataset of quantitative financial inclusion indicators for calculating a single Index for Financial Inclusion (IFI). Also, the selected proxy for the dependent variable "Economic growth" - "GDP per capita" could also be expanded to include more control variables which are also determining the economic growth (despite only GDP per capita), such as the productivity, physical capital and labour.

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EFFECTS OF CLIMATE CHANGE ON SUSTAINABLE TOURISM DEVELOPMENT IN THE REPUBLIC OF SERBIA - A CASE STUDY OF VRNJAČKA BANJA

Abstract

The most common definition in the professional literature is that climate is a product of the climate system. The climate system is a complex dynamic system whose basic parts are: the atmosphere, hydrosphere, biosphere, cryosphere, and their mutual relations and actions. Climate change is one of the most frequently mentioned negative phenomena in recent years. The consequences they have for the entire environment are almost immeasurable and will remain for future generations. The aim of this paper is to examine the effects of climate change which affect the sustainable development of tourism, with especial reference to Vrnjačka Banja. This tourist destination was chosen as an example of research since it is the largest and most famous spa resort in the Republic of Serbia and is in second place in terms of tourist attendance. Therefore, it is exposed to a larger number of visitors, which also has an impact on changes in the environment of Vrnjačka Banja.

Keywords: *Tourism, Sustainable Development, Climate Change, Effects, Vrnjačka Banja*

JEL classification: Z32, Q54, Q57

ЕФЕКТИ КЛИМАТСКИХ ПРОМЕНА НА ОДРЖИВИ РАЗВОЈ ТУРИЗМА: СТУДИЈА СЛУЧАЈА ВРЊАЧКА БАЊА

Апстракт

У стручној литератури може се наћи најчешћа дефиниција да је клима продукт климатског система. Климатски систем представља комплексан динамички систем чији су основни делови: атмосфера, хидросфера, биосфера, криосфера и њихови међусобни односи и деловања. Климатске промене су један од најчешће спомињаних негативних феномена протеклих година. Последице које имају по целокупну животну средину су скоро немерљиве и

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остају и за будуће генерације. Циљ рада је да укаже на ефекте климатских промена које имају утицај на одрживи развој туризма, са посебним освртом на Врњачку Бању. Ова туристичка дестинација је изабрана као пример истраживања будући да је највеће и најпознатије бањско лечилиште у Републици Србији и налази се на другом месту према туристичкој посећености. Самим тим је изложена и већем броју посетилаца, који такође имају утицај на промене животне средине Врњачке Бање.

Кључне речи: *Туризам, Одрживи развој, Климатске промене, Ефекти, Врњачка Бања.*

Introduction

In recent years, we have witnessed the growing climate change that has befallen the planet Earth. Some of them are small, but have long-term negative effects, while others are noticeable and visible today, such as the increase in temperature due to global warming. All climate change on a global level affects the living world, more precisely the processes and movements of all life on the planet. It can be stated that the anthropogenic factor, production, industry and negligence about natural resources have led to questioning the state of the Planet, which is left not only for the future, but also for the quality of the use of present generations. The rapid progress of information and communication technologies and scientific discoveries in all areas has conditioned the accelerated pace of life, the constant race for income and the acquisition of material goods. Since natural processes are long-lasting and very slow, the environment and the environment do not accept this pattern of behavior. Nature responds to the new situation with climate change, significant fluctuations in temperature, but also with the increased frequency of natural disasters. In order to establish a balance in nature to some extent, it is necessary to take appropriate measures urgently.

When it comes to tourism, it can be noticed that its impact on the environment is not negligible. Mass, which is one of its main characteristics, inevitably results in an impact on the natural resources of destinations that are often visited and popular. An example of this are the cities of Venice and Amsterdam, whose local authorities are strategically working to reduce tourist attendance in order to preserve the natural and cultural resources of the destination. Apart from the mass, one of the characteristics of tourism is the movement of people from place to place, and traffic is necessary for this process. The increase in traffic directly affects the increase in air pollution, which affects the ozone layer, etc. These chain processes have negative effects at the global level, and much more attention needs to be paid to the adequate application of the concept of sustainable development in the strategic documents of countries around the world (Voza & Fedejev, 2020).

Spas as very visited tourist places are extremely susceptible to the negative effects of tourism. The more visited the spa, the better the chances that its natural resources are endangered. Climate change also plays a relevant role in disrupting the current state of the environment and sustainable tourism development. Namely, spa tourism is based on the concept of health tourism and generally spas have a specific microclimate that favors the development of spa tourism. If the climate in these areas is disturbed, the spa loses its

primary property and function. Therefore, even the sustainable development of tourism cannot be properly implemented.

The question arises how to reduce the negative effects of climate change on the sustainable development of spa tourism? We will try to give the answer to this question in further work by presenting examples of the most visited spa destination in the Republic of Serbia - Vrnjačka Banja.

The subject of this paper is the analysis of the effects of climate change on the sustainable development of tourism. The aim of this paper is to examine the effects of climate change which affect the sustainable development of tourism, with especial reference to Vrnjačka Banja. On that occasion, the following scientific research methods were used: methods of analysis and synthesis, methods of induction and deduction, as well as a comparative method. Certain relevant data are presented in a table to make them easier to interpret through the method of descriptive analysis. The authors of the paper used the data from the official website of the Republic Hydrometeorological Institute of the Republic of Serbia for 2019 and 2020 and adjusted them to the structure of the paper. It is expected that the results will indicate unfavorable tendencies in the change of climatic conditions of Vrnjačka Banja. Therefore, there is a change in the ecological picture of this tourist destination. The question is how it is possible to achieve sustainable tourism development of this destination.

Climate change in general

In recent years, on a global level, tourist demand is changing more and more. On the one hand, tourists tend to visit destinations with preserved natural environment and clean air, while, on the other hand, many of them want to travel in order to get to know the cultural and historical assets of the destination where they decided to spend their vacation (Gligorijević & Novović, 2018). Climate change refers to a statistically significant modification in the average state of the climate, which lasts and continues in a longer time interval (usually one decade is used as a time determinant) (Popović, et.al, 2009).

Global climate change has been a frequent topic in recent years due to worrying facts presented by scientists regarding the melting of glaciers, increasing average air temperature in certain areas, as well as due to more frequent natural disasters with increased intensity in scope and duration. Regionally, climate change manifests itself in different ways. Changes can be reflected through the change in the average amount of precipitation, humidity or average temperature for the observed annual period, for a particular region. Low-intensity changes may have a relevant effect on the probability distribution of weather events, as well as on the extent of possible extreme conditions (Wei, et.al., 2013). On the other hand, a meteorological event that is defined as an extreme in a certain region (eg. a heat wave) can be considered a completely normal occurrence in another area. An example of this is the high, tropical temperatures characteristic of the African continent, which, if they occur in, for example, Canada, can seriously damage some ecosystems or human and animal health (Bishop-Williams, et al., 2015). Since the climate system is a very complex phenomenon with various manifestations, scientists warn that crossing a certain threshold in global warming can reach a critical point, more

precisely the state of irreversible warming. This further results in an exponential increase in the greenhouse effect without the potential to mitigate and reduce this negative phenomenon (Prutsch, et.al, 2014).

It is evident, therefore, that climate change brings with it various side effects, such as scope of extreme weather conditions, which, further, have direct material consequences, ie. economic losses. Viewed in this way, the value of economic losses is expected to increase markedly soon.

When it comes to the Republic of Serbia, it is expected that there will be a significant decrease in precipitation during the summer, while a smaller decrease in average precipitation is expected during the fall. The changes during the winter and spring period have a different tendency - an increase is expected. When the average expected precipitation is taken into account, it can be concluded that an annual decrease in precipitation is expected in the Republic of Serbia (Popović, et.al, 2009). On the other hand, warmer summers await us, as well as winters with less intensity of snowfall. Temperatures in the summer increase annually, while the same tendency is observed in the winter, which is a direct consequence of global warming.

Sustainable development and spa tourism

Tourism is a complex socio-cultural and economic phenomenon, which originated primarily on natural resources and the indigenous environment of local communities. Today, the question of the survival of tourism as we know it remains, since the long-term degradation of the basic resources on which it is based, has led to serious environmental damage. In this sense, the concept of sustainable development for tourism has a special meaning (Šušić & Đorđević, 2019).

Some authors point out that the phrase ″sustainable development″ refers to development that meets the needs of present generations, but with special regard to the rational use of limited resources so as not to jeopardize their use to meet the needs of future generations (Pavlović, et al., 2009). This also means that sustainable development represents a harmonious relationship between the needs of the environment and the demands of the economy, to preserve natural resources for future generations. More than a decade ago, World Commission on Environment and Development, also known as ″Brundtland Commission published a detailed report entitled ″Our Common Future″. It presents data and facts that indicate the danger of uncontrolled use of natural resources for profit. The danger is not only reflected in the violation of biodiversity, but it was also stated that man himself is directly endangered in this negative process (Pavlović, et al., 2009).

At a time when climate change and environmental degradation are our present, sustainable development models are recognized as the potential to reduce the negative effects of tourism on specific, vulnerable destinations. Ecological factors of tourism are today a very common topic for the general, professional and general public. In our country, this topic is relevant from the point of view of the accession of the Republic of Serbia to the European Union and the open chapter 27 on environmental protection and climate change - the most expensive and most demanding chapter with several aspects.

Spas, as a special tourist segment, have all the features of ecological tourism, especially in terms of healthy and preserved environment and natural resources. However,

in order for spas to be preserved as areas of special importance, it is necessary to pay attention to the pollution of their ecosystems. Pollution of air and other elements of the environment inevitably affects the change of climate fractors, which further have an impact on tourists, ie consumers of spa products. Therefore, it is necessary to take appropriate strategic measures as soon as possible, in order for spa tourism to remain sustainable (Pavlović, et al., 2009).

Degradation of natural resources can be the most common problem in spa tourist destinations. Namely, the increase in the number of tourists in one destination leads to a change in biodiversity, biogeochemical cycles, and therefore to a general deterioration of the environment. In that sense, it is necessary to strategically lead the tourist development of the spa area with active cooperation with the local community. This can first be done by forming a visitor management strategy.

As mentioned, the area of the Republic of Serbia is extremely rich in thermo-mineral springs, which sets us apart from other countries in Europe, yet only about 30% of groundwater potential has been used properly. However, tourism in Serbia, and especially spa tourism, is one of the activities from which great achievements are expected in economic terms and it is certainly a great opportunity that should be used (Pavlović, et al., 2009). However, apart from the negative consequences that climate change has, the. As much as the situation is not favorable on a global level because of the pandemic of Covid-19, it can be concluded that spa tourism in this sense has potential for development. In accordance with the new situation, tourists visit closer destinations in their countries. This is supported by the fact that, according to Republic Statistical Office of the Republic of Serbia data, compared to August 2019, in August 2020 the number of domestic tourist arrivals increased by 25.3% while the number of foreign tourist arrivals decreased by 87.1%. This situation should, conditionally speaking, be used and work on the development and promotion of spa tourism within the country.

Spa of Serbia and climate change

The spas of the Republic of Serbia represent a great potential for the development of Serbian tourism. The Republic of Serbia is rich in thermo-mineral springs of cold and hot water; on the territory of the state there are over 1000 springs of thermal waters and about 50 spas in which health tourism is most represented. It is easy to come to the conclusion that the area of Serbia has rich natural resources, as well as that spa tourism is a very important branch of Serbian tourism.

The climate of certain geographical regions, such as spa destinations, has a stimulating and sedative effect on the human body, which is understood as the basis of climatotherapy. The healing properties of climate are defined as a dynamic balance of biometeorological elements within optimal limits, starting from the fact that climate treatment is a reactive therapy that achieves the normalization of vital functions, preventive, curative and rehabilitation (Ranđelović, et al., 2016).

Unfortunately, global climate changes have disrupted the ecosystem in our country, and the climate in spas has changed. Climatic factors that seemed relaxing (walking in nice weather in the fresh air in nature, for example) have significantly decreased. The increase in temperature in the summer period results in the non-use of the full benefits of the spa

by tourists. The winter months in regions like ours, which are characterized by a mild climate in the previous five years, have many more rainy days than days with snowfall. This results in very frequent floods in certain parts of Serbia, which prevents the arrival of tourists, more precisely consumers of the spa period, to these destinations. Many of the main and local roads, especially in Eastern Serbia, have been blocked due to floods in previous periods, and this may be the cause of less attendance at Serbian spas.

It should be noted the high concentration of carbon gases, which are released from industrial plants, which results in an increased manifestation of the "greenhouse effect". This is especially noticeable in the regions of Serbia where heavy industry is actively represented (Ranđelović et al., 2016). In addition to the healing properties of thermo-mineral springs, visitors to spa areas also need healthy, fresh air. It certainly cannot be said that the advantage of Serbian spas has been in the past five years. Due to the high concentration of harmful gases in the atmosphere, dense clouds of smoke and soot, which are especially visible in the winter months, are increasingly noticeable above the cities near which the spas are located. An example of this is Gamzigradska Banja, which is located near Bor and Zaječar, cities with a high frequency of air pollution.

The authors of the professional literature state that the attendance in the spas of Serbia dropped significantly in 2014, as well as that the cause is a change in climatic factors (Ranđelović et al., 2016). Since the days during 2014 were marked by intense rainfall, this resulted in a reduced number of sunny days. Temperatures in some tourist destinations decreased by almost 2˚C during the winter, especially during the night. This is reflected in the additional heating of the rooms in which tourists stay in spas; additional heating leads to increased energy consumption, which further results in increased operation of thermal power plants, which are considered one of the major polluters of the environment. This cyclical process seems unstoppable, because the winter months are not the only problem. As temperatures increase during the summer months, there is a noticeable and increased use of air conditioners in spa destinations, which results in the above-mentioned problem of increased energy consumption.

Analysis of the effects of climate change on sustainable tourism development in Vrnjačka Banja

Vrnjačka Banja has the already built and recognizable image at the tourism market, is the largest and most famous spa resort in the Republic of Serbia. It can pride itself on the 150-year-long tradition of organized tourism activity. According to the number of visitors, Vrnjačka Banja has always been ranked the first among other Serbian spas (Lakićević, et al., 2020). In order to analyze the effects of climate change on the sustainable development of tourism in Vrnjačka Banja, we must first get acquainted with its basic, climatic specifics.

The unique topology of the terrain and lush vegetation in the area of Vrnjačka Banja has the influence that the spa has the characteristics of a temperate-continental climate: temperature oscillations are not large, the dry period is short, while the rainy period is on average long. On the other hand, Vrnjačka Banja has a lowland climate, forest type with elements of subalpine climate (Brčeski, Čikara & Maksimović, 2009). Due to this climate, there is not much precipitation in the winter, while the maximum

amount of precipitation was recorded in early summer.

The destination of Vrnjačka Banja is the reason why its climate significantly deviates from the climate of the classic urban settlements that surround it (cities: Kraljevo and Kruševac). Vrnjačka Banja is also characterized by its microclimate, which is conditioned by numerous forests, lush vegetation, significant altitude, as well as cold and hot springs and openness to the north.

The average annual temperature is 10.3°C. In winter, the average temperature is -0.8°C, and in spring it is in the interval of 10.5°C, in summer 20.0°C. In autumn, the average air temperature is 11.4°C. The highest air temperature was recorded on July 22, 1939 and it was 40.5°C. The lowest temperature was recorded on February 11, 1929. year and amounted to -28.5°C. The warmest month is August with an average temperature of 20.2°C (Brčeski, et al., 2009).

The average cloud cover in Vrnjačka Banja is 55%. The difference between the brightest month of August and the most cloudy month of January is large and amounts to as much as 35%. In all months, except the month of June, it was noticed that the clouds are higher in the morning than in the evening. On average, there are about 80 clear days a year, with average cloudiness below 20%. Thus, most of the year in this destination is moderately cloudy (Dimitrovski, et.al., 2019).

Vrnjačka Banja is not a windy area, thanks to the configuration of the terrain, mountain elevations and lush vegetation that protect it. The most common winds that occur are the northwest and north winds along the West Morava. The south wind is of medium strength. During the summer, in the evening, a slight breeze is felt. The average wind strength is between 1.8 and 2.6 Beaufort (Brčeski, et al., 2009). Windy days were recorded in February, March and April, while in other months they were much less. A large number of days in the year are without recorded winds - about 170.

The average annual humidity is quite high (78%). The driest month is August (71%), and the wettest is December (86%). The average air pressure in the summer months is almost the same and is around the value of the average annual pressure (990 mbar). In the spring months, it decreases (985.6 mbar), while in autumn and winter it goes above the average (993.2 mbar). The longest duration of sunshine is in July and August, and the lowest in December and January.

The average amount of precipitation in Vrnjačka Banja on an annual level is 928 mm, which has a favorable effect on vegetation. The month in which the highest rainfall was recorded is June, while the lowest precipitation is in September. In dry periods, drying of periodic springs occurs, while permanent springs reduce the volume of water (Brčeski, et al., 2009).

From the aspect of tourism, Vrnjačka Banja is the most famous and most visited spa in the Republic of Serbia. The development of its tourism is based on the mentioned natural factors: extremely favorable geographical position, climatic features, healing thermo-mineral springs, natural and ecologically preserved environment, flora and fauna, rich cultural and historical heritage, various events organized during the summer months and similar contents. which increases the quality of the time spent by guests (Dimitrovski, et al., 2019).

Table 1. Vrnjačka Banja, tourist arrivals and overnight stays in February 2018, 2019, 2020 year

Vrnjačka Banja	Overnight stay of tourists			Arrival of turists		
	In total	domestic	foreign	In total	domestic	foreign
2020.	31975	28346	3629	11403	9923	1480
2019.	22094	20064	2030	6766	6061	705
2018.	18657	16662	1995	6296	5672	624

Source: Authors, according to Statistical Office of the Republic of Serbia 2018-2020.

So, although the tourism of Vrnjačka Banja is not based only on health tourism, its foundations lie in the elements that make up the preserved environment. In order to gain insight into the attendance of Vrnjačka Banja, Table 1 shows the arrivals and overnight stays of tourists for the month of February in 2018, 2019 and 2020.

From the attached data, it can be concluded that the number of tourists, both foreign and domestic, is constantly increasing. When it comes to overnight stays, in February 2019, there was a total increase of 3,437 tourists compared to the previous year, 2018. In February this year, that number was increased by 13,318 tourists. Tourist arrivals in February 2019 compared to February 2018 were slightly higher (470 more), while that number increased significantly in 2020 and amounted to 5,107 guests more (compared to 2018). It is noticeable that the number of domestic tourists is constantly increasing.

These data support the claim of a constant increase in the number of visitors in Vrnjačka Banja. However, this picture, no matter how favorable it is for the economy and the economy of the locality, it is necessary to pay more attention to the increased use of resources that are directly related to the sustainable development of tourism.

Table 2. Vrnjačka Banja, tourist nights by months in 2019 and 2020.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Total number of overnight stays 2019	25133	22094	36990	54286	83939	85430	142449	210298	94687	62465	40502	49619
Percentage of overnight stays, 2019	2,77	2,43	4,07	5,98	9,25	9,41	15,69	23,16	10,43	6,88	4,46	5,47
Total number of overnight stays 2020	34156	31975	25318	8	31764	72266	138593	186200	92492	46155	0	0
Percentage of overnight stays, 2020	5,18	4,85	3,84	0,00	4,82	10,97	21,03	28,26	14,04	7,00	0,00	0,00

Source: Authors, according to Statistical Office of the Republic of Serbia 2019-2020.

The frequency of foreign tourists' overnight stays on an annual basis is low. In 2019, overnight stays of foreign tourists amount to 14.72% of the total number of overnight stays, and in 2020 that percentage is even less, and amounts to 4.06%. In relation to the total number of overnight stays during 2019, the following months have equal frequency: May, June, and September with 10% of the total number of overnight stays each. The

most frequent month is August with 23.16% of the total annual number of overnight stays. All other months have a lower frequency of overnight stays in relation to the total annual number of overnight stays. The least frequent month is February (2.43%).

In relation to the total number of overnight stays in 2020 the most frequent month is August (23.26%), and then July (21.03%). The lowest frequency of overnight stays was recorded in April (0.0%). The following tables will give a monthly and annual overview of the average air temperature for 2019 and 2020. Note: it should be borne in mind that the average for 2020 is shown until September.

Table 3. Vrnjačka Banja, monthly display of average air temperature in 2019 and 2020, expressed in °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2019.	- 4	7	10	14	18	23	24	26	24	14	7	3
2020.	- 1	8	9	15	20	24	25	28	22	/	/	/

Source: Authors calculation according to Statistical Office of the Republic of Serbia 2019-2020.

If we have in mind the previously mentioned data that on average the coldest month is January with an average temperature of 0.7°C, and the warmest August with an average temperature of 20.2°C, in Table 2 we can see clear deviations. Namely, in 2020, in all analyzed months, an increase in the average air temperature was recorded. The biggest difference is in the month of January, when the average temperature increased by as much as 3°C, while in the warmest month, August, the difference is 2°C. Only in March, a decrease in the average temperature of 1°C was recorded. Vrnjačka Banja as the most famous spa tourist destination in the Republic of Serbia, therefore, records an increase in temperature in the past period compared to average values.

The relation between average temperature per month during the years 2019 and 2020 and the number of overnight stays is significant, positive, and strong. $r(20)=0.77$; $p=0.00$

When the relation of average temperature per months, years, and the number of monthly overnight stays of tourists is taken into consideration, it is perceived to be strong, positive, and significant in 2019, i.e. $r(12)=0.80$; $p=0.00$, as well as in 2020, i.e. $r(8)=0.75$; $p=0.03$.

Such data are very worrying given that they are a consequence of climate change in the region. It should certainly be borne in mind that other climatic factors need to be further examined in order to obtain even more precise data.

Conclusion

We are witnessing global climate change, the consequences of which are already visible and far-reaching. The changes are attributed to anthropogenic influences that lead to an increase in CO_2 emissions and the creation of a "greenhouse" effect. This affects the reduction of the capacity of the environment, during the absorption of the created CO_2. It is also evident that tourist activities greatly contribute to world CO_2 production, through

traffic, heating, cooling, and other forms of energy consumption. The tourism industry has been significantly affected by climate change, both globally and locally.

From all the above, it can be concluded that climate change indirectly has effects on the sustainable development of tourism in the spa areas of the Republic of Serbia, of which, as the most visited, Vrnjačka Banja is significantly endangered. Namely, the tourism of this spa is based on its hitherto pleasant climate, which changes from year to year under the negative influence of climate change. These negative effects can be reduced as follows: strict respect and implementation of the principles of sustainable development; strategic planning of the use of natural resources of the Spa; formation of a working group that would take care that the number of visitors per year does not exceed the capacity of the Spa; switching to alternative forms of energy consumption and adequately implemented care for air pollution at the destination.

The global and regional adverse effects of climate change cannot be controlled by the actions of individuals, but effective cooperation between the public and private sectors is needed. However, some of these solutions can help Vrnjačka Banja, as a very attractive spa destination, reduce the harmful effects of climate change and excessive concentration of visitors.

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APPLICATION OF THE PRINCIPLE OF CONSERVATISM AGAINST THE APPLICATION OF THE FAIR VALUE CONCEPT – AN EXAMPLE OF THE SERBIAN CAPITAL MARKET

Abstract

The characteristic of striving towards the application of the new valuation concept, as opposed to the application of traditional accounting principles, modern financial reporting prompted the authors of this paper to address the importance of the application of traditional accounting principles, especially the principle of prudence (conservatism), and the concept of fair value for the accounting information relevance. The most important business decisions in the entity are made on the basis of information produced by the accounting information system, based on which we see how important it is for this information to be up to date. The relevance of the information of the accounting system of first-class importance is the basis of evaluation, which is the subject of research in this paper. More precisely, the paper examines the methods of measurement after initial recognition of fixed assets on the example of a group of business entities operating on the Serbian capital market. The results of empirical research are of a twofold nature. Namely, for measurement after initial recognition of intangible assets, plant and equipment, as well as other property, plant and equipment, the concept of historical cost and the traditional accounting principles immanent to it are primarily used. For measurement after initial recognition of buildings, land, investment property and biological assets, the concept of fair value is more often used. In other words, using a practical example, we have shown that the combined basis of financial reporting is the dominant feature of modern financial reporting of entities operating in the Serbian capital market.

Key words*: traditional principle of prudence (conservatism), valuation concepts, Serbian capital market, fixed assets*

JEL classification: M41, M42

ПРИМЕНА ПРИНЦИПА КОНЗЕРВАТИВИЗМА НАСУПРОТ ПРИМЕНИ КОНЦЕПТА ФЕР ВРЕДНОСТИ - ПРИМЕР СРПСКОГ ТРЖИШТА КАПИТАЛА

Апстракт

Карактеристика тежње ка примени новог концепта вредновања, насупрот примени традиционалних рачуноводствених принципа, савременог финансијског извештавања нагнала је ауторе овог рада да се позабаве

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питањем значаја примене поменутих традиционалних рачуноводствених принципа, пре свега принципа опрезности (конзервативизма), и концепта фер вредности по релевантност рачуноводствених информација. Најбитније пословне одлуке у ентитету доносе се на бази информација које продукује рачуноводствени информациони систем, на основу чега видимо колико је битно да те информације буду ажурне. На релевантост информација рачуноводственог система од прворазредног значаја је примењена основа вредновања која представља предмет истраживања овог рада. Прецизније, овај рад се бави испитивањем примењених метода накнадног вредновања сталне имовине на примеру групе пословних ентитета који послују на српском тржишту капитала. Резултати емпиријског истраживања двојаке су природе. Наиме, за накнадно вредновање нематеријалне имовине, постројења и опреме, као и осталих некретнина, постројења и опреме, превасходно се користи концепт историјског трошка и њему иманентни традиционални рачуноводствени принципи. За накнадно вредновање грађевинских објеката, земљишта, инвестиционих некретнина и биолошких средстава, чешће се користи концепт фер вредности. Другим речима, на практичном примеру утврђено је да комбинована основа финансијског извештавања представља доминантну карактеристику савременог финансијског извештавања ентитета који послују на српском тржишту капитала.

Кључне речи: *традиционални принцип опрезности (конзервативизма), основе вредновања, српско тржиште капитала, стална имовина*

Introduction

The principle of prudence (conservatism) has long been considered as one of the most important accounting principles. It belongs to the group of traditionally applied accounting principles aimed at reducing the risk of overestimation of results, which directly contributes to the long-term survival, growth and development of the entity's business. However, regardless of its undoubted benefits for business stability, it is criticized for the insufficient relevance of the information produced. Namely, in modern business, there is a need to determine the real value of entities' net assets at a given time. This is benefit to modern financial reporting that the concept of fair value provides. That everything has its price is shown by the fact that the relevance of information produced by the concept of fair value is compromised due to insufficient reliability and verifiability of this information.

Business communication between the entities and a number of stakeholders takes place through financial statements that are published as part of the annual report. The conducted research is based on accounting data published in the individual financial statements of the entities from the Belgrade Stock Exchange for a period of three years (2016-2018). Our sample includes entities whose securities are listed on the Prime Listing, Standard Listing and Open Market. Our research aims to determine the attitude of entities that list their securities on the Serbian capital market (Belgrade Stock Exchange) towards the application of the principle of conservatism under the concept of historical

cost versus the application of the fair value concept for valuation of fixed assets.

Theoretical background

Some theorists believe that the emergence of accounting conservatism is associated with the first years of trade relations. For example, Watts (2003) believes that the very basis of accounting is the contractual relationship between two stakeholders and that this fact in itself indicates the need for conservatism. The principle of conservatism is an essential accounting construction that can be described as a pervasive concept of accounting valuation (Sterling, 1967). In other words, this principle implies the choice of accounting policies that determine the most appropriate terms and amounts of recognition of the effects of certain business transactions in order to "avoid artificial hypertrophy of net assets and net profit when these amounts are uncertain" (Savić, 2014, p. 29-30).

The principle of conservatism represents a complex whole of four interconnected principles: the principle of realization, the imparity principle, the principle of lower value and the principle of higher value. The principle of realization helps cover income that actually arose in the accounting period (i.e. income from realized products and services) and ensures that the impact of production results that are not realized on the market is made neutral in terms of financial result. The imparity principle recognizes as realized the expected negative contributions to success, i.e. losses from unrealized, but actual business activities and allows their inclusion in the income statement together with realized expenses and income. In other words, future positive and negative contributions to success are treated unequally, i.e. unrealized gains are viewed from the aspect of the realization principle and unrealized losses from the aspect of the imparity principle, which in this domain limits the principle of realization. The lower value principle is the requirement that assets be valued on the basis of the purchase price (cost price), only provided that the purchase price (cost price) is not higher than the current market price, while the higher value principle is the requirement to balance liabilities at a higher value between nominal values and effective values.

Hidden reserves, as a manifestation of the principle of conservatism, are most often created by "underestimating assets items, but also by overestimating liabilities items, with the aim of creating a certain degree of protection against numerous business risks" (Savić, 2014, p. 33). Uncertainty is immanent to modern business. In this regard, investors are interested in applying conservatism as a way to monitor bad news in a timely manner (Arsenijević, 2020b, p. 376). Shareholders and future investors "use information from financial statements to make strategic decisions regarding the purchase and sale of shares, which have a direct impact on the market price of shares" (Georgescu, Pavaloaia, & Robu, 2014, p. 828). Untimely disclosure of "bad news" reduces the quality of information directed at the users of financial statements, which can potentially result in a significant reduction in the market price of shares when the data is published after a certain period of time. Greater business uncertainty leads to more conservative reporting (Hsieh, Ma & Novoselov, 2019, 41) and affects the need to control the activities of managers. In this matter, accounting conservatism helps investors and other interest groups (Hsieh, Ma & Novoselov, 2019, 44). "In order to make rational decisions, it is necessary to present the effects of past transactions through general purpose financial reports not only on a neutral basis, but also on the basis of careful measurement of net assets" (Denčić-Mihajlov, Krstić & Spasić, 2016, p. 641).

Standard setters, on the one hand, and theorists and practitioners, on the other, have differing views on the need of applying accounting conservatism. Standard setters believe that the principle of conservatism does not adequately reflect the business risk and therefore promote the concept of fair value in the new IFRS and revised IAS. The knowledge of market opportunities, which in the form of anticipated financial data provides the concept of fair value, contributes to the appropriation of anticipated profits (Richard, 2015, 24). However, numerous studies show that theorists and practitioners still see this principle as a basic characteristic of financial reporting (Arsenijević, 2020b, 376). In other words, emphasizing the futuristic character of the accounting system and the information it produces aims to fulfill the wishes of ambitious shareholders in terms of very high profits and dividends that should be realized as soon as possible.

Observing the relevance of information from the market aspect has influenced the further development of accounting theory and its orientation towards the concept of fair value (Hitz, 2007). We are of the opinion that it is expedient to emphasize the existence of a difference between the use of fair value and the concept of fair value (Škarić-Jovanović, 2015b, p. 329-330). Specifically, it is common to use fair value in both the initial and measurement after initial recognition of certain forms of assets within the concept of historical cost. Within the concept of historical cost, market value is treated as a type of fair value, so the assets acquired through exchange are initially valued at fair value, while in the case of measurement after initial recognition, assets are valued at a lower value between book and market value at the reporting date. Unlike the historical cost concept, the fair value concept is based on the assumption of continuous application of fair value for valuation of assets and liabilities and on the assumption of the result as the difference between the fair value of net assets stated at the end and beginning of the reporting period in the balance sheet. Continued use of fair value implies its initial and ex-post use for the purpose of valuing assets and liabilities, regardless of whether the carrying amount of assets and liabilities is higher or lower than fair value. The last determined fair value is taken as the book value of assets, and if it is a fixed asset, then the book value is obtained when the last fair value is reduced by systematic write-offs made in the reporting period. The financial result of operations presented "simply as a change in the fair value of assets and liabilities presented in the balance sheet" (Škarić-Jovanović, 2009, 422) between the two reporting periods is the goal of financial reporting according to the concept of fair value.

By reading and analyzing financial statements, a wide range of stakeholders can gain insight into the economic history of the entity and profile its future performance expressed in terms of future earnings levels and cash flow dynamics. The quality of the information presented in the financial statements is best reflected in the assessment of the fulfillment of requirements regarding their qualitative characteristics. The conceptual framework of financial reporting divides all qualitative characteristics of information into two groups: 1) fundamental characteristics and 2) improving characteristics. The first group consists of relevance and faithful representation, while the second group includes comparability, verifiability, timeliness and understandability. On this occasion, we will pay more attention to the characteristic of information relevance. Relevant financial information is information that may lead to differences in the decisions of users of financial statements and which may perform the function of predicting future results or the function of confirming and assessing the effects of past events or both. Therefore,

"predictability and reversibility are cited as secondary elements of relevant information" (Đukić & Pavlović, 2014, p. 107). "Whether financial information will be relevant or not depends primarily on its nature and importance, which actually means that if it is omitted or misinterpreted, it can in some way affect the business decision maker" (Lalević-Filipović & Lakićević, 2011, p. 73). However, the Conceptual Framework largely neglects the qualitative characteristic of information reliability. The reason for this is the change in the purpose of the preparation of accounting information, which is now directed towards the faithful representation of relevant financial information. When it is applied to the whole of the assets and liabilities of the entities from period to period, concept of fair value ensures the realization of the mentioned goal (Arsenijević, 2020b, p. 380).

Methodology

The central institution of the Serbian capital market is the Belgrade Stock Exchange. According to the Rules of Procedure of the Belgrade Stock Exchange a.d. Belgrade, the stock exchange organizes and manages a regulated market and a multilateral trading platform (MTP Belex). There are three segments of the regulated market on the Belgrade Stock Exchange (Prime Listing, Standard Listing and SMart Listing) and one non-listing segment – Open Market (Rules of Procedure of the Belgrade Stock Exchange, Article 58). Securities included in the regulated market and MTP are grouped according to certain criteria, types of securities, trading methods, phases and duration of trading phases, as well as other market elements (Rules of Procedure of the Belgrade Stock Exchange, Article 60).

Data collection for the purposes of this research is based on a sample method whose representativeness is ensured by taking into account the nature of the problem, the purpose of the research and the available data collection options. The conducted research (Arsenijević, 2020a, p. 224-277) is based on accounting data published in the individual financial reports of the entities from the Belgrade Stock Exchange for a period of three years (2016-2018). Our research was performed on a sample of 27 entities whose securities are listed on the regulated market of the Belgrade Stock Exchange. The total sample of entities according to the segment of the regulated market has the following structure: 4 entities (15% of the sample) are listed on the Prime Listing, 3 entities (11% of the sample) on the Standard Listing, while securities of 20 entities (74% of the sample) are listed on the Open Market. The research was conducted by collecting and arranging data on the application of the concept of historical cost and the concept of fair value for the valuation of fixed assets. Given the well-known fact that fixed assets represent a significant item of total assets in almost all business entities, the consequences of valuing assets at fair value can best be seen in this group of assets.

The following part of the paper focus on the determination of tangible, intangible and financial items of fixed assets that are valued, first, by the concept of historical cost (in accordance with the principle of conservatism) and, secondly, by the concept of fair value, all in order to determine the prevailing asset valuation concept of entities listed on the regulated market of the Belgrade Stock Exchange.

Research results and Discussion

Of the 27 entities in the sample, 23 entities published detailed data on the structure of fixed assets, on the basis of which an analysis of individual subgroups within this asset group was performed. The material form of fixed assets consists of land, buildings, plant and equipment, investment property, biological assets and other tangible assets. These items have different effects on the total value of fixed assets according to their share in total fixed assets. Intangible form of fixed assets is an increasingly important asset component in modern entities. It consists of: investment in development, concessions, patents, licenses, software and other rights, goodwill and other intangible assets. Due to the insufficient importance of intangible assets in our entities, as well as the insufficient legal regulation of this area in our country, it cannot be said that the previous statement is valid for Serbian entities included in the sample.

I) Information on the application of the historical cost concept or the fair value concept for the valuation of fixed assets is not in itself sufficient. It is necessary to know the share of an individual item in the total fixed assets in order to determine the level of impact that a particular item has on the total value of fixed assets and thus on the value of the entire assets of the entity. Given that the range of share of certain types of fixed assets is from 0% in some entities to 100% in other entities, we believe that it is appropriate not to attach importance to the extreme values of the data set in order to draw correct conclusions at the sample level. The measure of the central tendency that enables us to observe a large series of data, while excluding the extreme values of the observed data, is the median. The median shows the percentage that is in the middle of a series of data sorted by size.

The following table presents the absolute and relative number of entities in the sample that value a) plant and equipment, b) other property, plant and equipment, and c) intangible assets at historical cost or fair value.

Table 1: Measurement after initial recognition of a) plant and equipment, b) other property, plant and equipment and c) intangible assets

Basis of measurement	A) Plant and equipment		B) Other real estate, plant and equipment		C) Intangible assets	
	Number of entities	% of entities	Number of entities	% of entities	Number of entities	% of entities
Historical cost	18	67%	12	44%	21	78%
Fair value	9	33%	8	30%	2	7%
Not dislosed	0	0%	4	15%	0	0%
Entity does not have this type of assets	0	0%	3	11%	4	15%
Total	**27**	**100%**	**27**	**100%**	**27**	**100%**

Source: Arsenijević, 2020a, p. 244-259.

The table shows that the concept of historical cost is used for measurement after initial recognition of plant and equipment (A) in 67% of the sampled entities that disclosed data on the structure of fixed assets, and that the concept of fair value is used in 33%. Also, the table indicates a lower percentage of entities using the historical cost concept to value (B) other property, plant and equipment (44%) and almost the same percentage of entities applying the fair value concept (30%) compared to the previous item of tangible assets. When we include in the analysis the share of these tangible items of fixed assets in total fixed assets, we obtain more detailed data. On the one hand, plant

and equipment in some entities have a 100% share in the total value of tangible fixed assets, which with a median of 24.44% indicates a large impact of valuation of this subgroup of fixed assets on the total value of fixed assets and indirectly on the value of total entity assets. On the other hand, the share of other real estate, plant and equipment in some entities reaches a maximum of 34.52%, but with a median of 3.64% indicates a relatively low ability of the applied concept of measurement after initial recognition of this type of tangible assets to affect the total value of fixed assets.

In the previous table, we could see a high percentage of sampled entities using the historical cost concept for measurement after initial recognition (C) of intangible assets (78%), while the percentage of entities using the fair value concept is only 7%. However, a very small number of sampled entities own intangible fixed assets. More precisely, the situation looks like this: one half of the sampled entities has a share of this type of fixed assets less than 0.62%, and the other half of the entities a share of more than 0.62%, while the maximum share of intangible assets in one entity was 11.78%. The sampled entities did not disclose information on the valuation of individual items of intangible assets, so we presented the data on the measurement after initial recognition of this type of fixed assets in aggregate form. How difficult it is to measure intangible assets best shows Thijssen & Iatridis's research (2016, p. 50) in which we can see that a result of conservatism can be decrease of the value of accounting information. Also, there are several methods of assessing the value of individual items of intangible assets, where as an example we can cite the assessment of the value of the brand. Yield methods of valuation are the most suitable for estimating the value of a brand, while the method of saving in royalties is the most common, although the method of excess yield and the method of incremental cash flow can also be used (Spasić, 2012, p. 259).

Kousenidis, Ladas & Negakis research (2009) shows a positive interconnection between the conservatism and accounting information value for persons who make decisions. But Basu's research (1997) shows a negative interconnection between the conservatism and the relevance of information. In other words, regardless of its numerous benefits, the application of the concept of historical cost has its shortcomings which, precisely, have decisively influenced the emergence of a new accounting concept – the concept of fair value.

II) Of tangible forms of fixed assets, sampled entities used the concept of fair value to a greater extent for the valuation of land, buildings and investment property. The level of impact of the measurement after initial recognition of these forms of tangible fixed assets based on the concept of fair value will be seen below.

Table 2: Measurement after initial recognition of d) land, e) buildings and f) investment property

Basis of measurement	D) Land		E) Buildings		F) Investment real estate	
	Number of entities	% of entities	Number of entities	% of entities	Number of entities	% of entities
Historical cost	10	37%	10	37%	7	26%
Fair value	12	44%	16	59%	19	70%
Not dislosed	1	4%	0	0%	0	0%
Entity does not have this type of assets	4	15%	1	4%	1	4%
Total	**27**	**100%**	**27**	**100%**	**27**	**100%**

Source: Arsenijević, 2020a, p. 244-259.

The table shows that the measurement after initial recognition of land (D) by 44% of the entities in the sample was performed on the basis of the concept of fair value, while 37% of the entities used the concept of historical cost. Despite the high share

of land in the fixed assets of some sampled entities (61.74%), the median of 5.65% indicates a relatively small impact of measurement after initial recognition of this item of fixed assets on the total value of fixed assets. Ex-post evaluation of buildings (E) has the opposite effect. Specifically, we see in the table that measurement after initial recognition of buildings by 59% of the entities in the sample was performed on the basis of the concept of fair value, while 37% of the entities used the concept of historical cost. The share of buildings in the total value of tangible fixed assets in one half of the sampled entities is less than 36.37%, while in the other half of the entities the share is higher than 36.37%, which (with a maximum share of 86.65%) makes this subgroup of fixed assets the most represented tangible assets in the sample. In other words, measurement after initial recognition of buildings at fair value has the potential to significantly affect the value of total fixed assets, and indirectly the value of total entity assets.

The item of tangible fixed assets that in the convincingly largest percentage of sampled entities (70%) is valued in accordance with the concept of fair value is investment property (F). In some entities, the share of these fixed assets in total assets is 70.35%, while the median is 11.11%, which is not a negligible figure when we know that all investment property is valued using the same method. Specifically, IAS 40 "Investment Property" for measurement after initial recognition allows a choice between the fair value method and the historical cost method, provided that the chosen method is indicated by the entity's accounting policy to be applied to all investment property (IAS 40, Paragraph 30). In addition to the above, the concept of fair value is used to value another item of fixed assets. These are biological assets that 7% of the sampled entities value at fair value. However, as only 0.004% is the maximum share of this type of tangible fixed assets in the total fixed assets of individual entities, we decided not to tabulate measurement after initial recognition of biological assets.

The financial form of fixed assets includes long-term financial investment and long-term receivables. The share of long-term receivables in the total fixed assets of the sampled entities is relatively low in the observed period and refers, above all, to receivables from parent and dependent legal entities, receivables based on sales on commodity credit and other long-term receivables. Some entities included in the sample have a significant share of long-term financial investment (some up to 100%) in total fixed assets, with one half of the sampled entities having a share of this type of fixed assets less than 13% and the other half more than 13% in total fixed assets. Our research came to the findings that show that almost half of the total number of sampled entities show the effects of changes in the fair value of long-term financial investments, which directly indicates the presence of the application of the concept of fair value for valuing this form of fixed assets. Given the share of this type of fixed assets in total fixed assets, the impact of the fair value concept on the total value of an entity's assets can be significant.

The weakness of the practical use of the concept of fair value refers to the lack of the market inputs due to the imperfection of an active capital market in developing countries such as our country. When it comes to our country, the quoted prices of shares and bonds from the Prime Listing of the Belgrade Stock Exchange are considered the first hierarchical level inputs. When we take into account that only four entities are listed on the Prime Listing, and that the volume of securities trading on this capital market is very low, we conclude that it is very difficult to expect first level input for many assets. However, to some extent there is an alternative. Specifically, "quoted prices of

agricultural products from the Product Exchange in Novi Sad, media publicly available real estate prices, catalog assessment of motor vehicles of the Auto Moto Association of Serbia" can be qualified as inputs of the first level (Negovanović, 2014, p. 182). For the aforementioned reasons, inputs from the second and third levels have been used more in the practice (Arsenijević, 2020b, p. 380). "An example of second-level input in our country is the market price of the company's share located on the multilateral trading platform (MTP)" (Rupić & Bonić, 2015, p. 136), while the inputs of the third level of the theoretical construction are in accordance with IFRS 13.

III) A significant dimension of our research is to consider the impact of the method of measurement after initial recognition of fixed assets on the value of total assets of the entity based on the affiliation of the entity to a particular activity. Specifically, the entities from the total sample are divided by affiliation into 10 activities. The largest number of entities performs activities within (1) manufacturing industry (37% of the sample) and (2) from financial activities and insurance activities (25% of the sample), then (3) in the field of real estate and (4) construction (7% each) and, finally, one entity from each of the remaining six activities – (5) transport and storage, (6) wholesale and retail trade and repair of motor vehicles, (7) accommodation and food services, (8) education, (9) mining and (10) electricity, gas and steam supply (4% of the sample each). The largest share of fixed assets in the total assets is with entities engaged in transport and storage, wholesale and retail trade and repair of motor vehicles, manufacturing and real estate – more than 85%. The following are the entities that perform the activities of accommodation and food services, mining and financial activities and insurance activities – 77.59%, 75.24% and 76.66%, respectively. Entities from education (45.74%) and construction (36.96%) also have a significant share of fixed assets, while the entity in the field of electricity, gas and steam supply is the only one with a very low share of fixed assets in total assets (0, 92%). The foregoing statements support the representativeness of our sample to consider the impact of measurement after initial recognition of fixed assets on the value of the total assets of the entities and to draw relevant conclusions.

Empirical research has shown that when it comes to certain forms of fixed assets, most entities use historical cost only for certain items of these assets (for example, in measurement after initial recognition of intangible assets, plant and equipment, as well as other property, plant and equipment), while fair value is more often used for measurement after initial recognition of buildings, land, investment property and biological assets. In other words, on a practical example, we have shown that the mixed basis of financial reporting is the reality of the financial reporting of entities operating on the Serbian capital market. This conclusion is in line with the opinions of some theorists that "prudence and neutrality in the presentation of information in financial statements do not have to be mutually exclusive" (Škarić-Jovanović, 2015a, p. 80), and speaks of the real aspect of observing by accounting standards and market regulators who, knowing the relationship between the concept of historical cost and the concept of fair value, believe that the permeation of their requirements in utilization of combined basis of financial reporting results in increasing the usefulness of financial statements (Barth, 2014). "Loss of user confidence in the information presented in the financial statements would have unforeseeable consequences for the global financial market, and thus the global economy, because quality financial reporting is considered a basic prerequisite for stability and competitiveness of the global financial market" (Arsenijević & Đukić, 2017, p. 171).

Conclusion

Accelerated globalization of business and the formation of the world capital market have imposed transparency and timeliness of financial reporting as important issues. Business entities are facing increasing market uncertainty, but also less and less patience of their shareholders to achieve the highest possible dividends and capital gains in the shortest possible time. However, these are two mutually divergent demands placed on the entities. On the one hand, in order to survive on a dynamic market, it is necessary for entity managers to adhere to caution in decision-making, i.e. to base their decisions on the application of the principles of conservatism. On the other hand, the wishes of their shareholders can be realized only by applying the concept of fair value and recognizing unrealized gains. In other words, the survival of the entities and the growth and development of the entities are imposed on managers as alternative options. Therefore, the simultaneous use of the two concepts is a reality of current financial reporting, because growth and development are unthinkable without prior fulfillment of the conditions for the survival of the entity's business. The results of our research show that combined basis of financial reporting has been used by entities operating on the Serbian capital market.

Although future-oriented, the concept of fair value exhibits certain anomalies that prevent accountants from fully turning to the application of this principle alone. In that matter, positive aspects of the practicing of the conservativism "far outweigh its weaknesses" (Škarić-Jovanović, 2015a, p. 63), in the sense that, because of the conservatism, information value increasing instead of decreasing (Kousenidis, Ladas & Negakis, 2009, p. 220).

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POSITIVE FINANCIAL ASPECTS OF MIGRATIONS AND THE DIASPORA FOR THE PEOPLE AND ECONOMY OF SERBIA

Abstract

The subject of the paper is the analysis of economic and social advantages of remittance inflows from the Serbian diaspora. Remittances are important for domestic economy and people for several reasons. First and foremost, these remittances are at a high level because of a large number of Serbs that have emigrated in the decades behind us. Even though the exact amount of these remittances cannot be precisely calculated, due to the fact that a great portion of remittances comes to Serbia via informal channels, remittance inflows can have positive effects on many economic aspects of receiving countries, especially in the case of transitioning countries that have gone through difficult periods of economic and political crises, war crisis and devastations. Inflows from diaspora can affect the reduction of poverty, development of economic entities, and even the exchange rate of the country and economic development as a whole, and the diaspora can influence the improvement of political climate and economic relationships with foreign countries. In this paper, we wanted to examine the correlation and strength of the relationship (if any) between the trends of Serbia's GDP and remittances, as well as the relationship between GDP per capita in Serbia and remittances. The correlation procedure was performed in the IBM SPSS 21 program, and the World Bank data were used as a basis. It was concluded that the trend ratio of the GDP of Serbia and remittances is characterized by a positive correlation which was observed in the trend of the GDP of Serbia and remittances.

Key words: *remittances, inflows from abroad, diaspora, migrations, foreign direct investments*

JEL classification: F22, F24

ПОЗИТИВНИ ФИНАНСИЈСКИ АСПЕКТИ МИГРАЦИЈА И ДИЈАСПОРЕ ЗА СТАНОВНИШТВО И ПРИВРЕДУ СРБИЈЕ

Апстракт

Предмет рада је анализа економских и социјалних предности прилива дознака из српске дијаспоре. Дознаке за домаћу привреду и становништва значајне

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су из више разлога. Пре свега, ови приливи су на високом нивоу јер је у претходним деценијама велики број домаћег становништва емигрирао у иностранство. Иако се тачан износ ових прилива не може са сигурношћу израчунати, због тога што велики део дознака стиже у Србију неформалним путевима, приливи од дознака позитивно могу утицати на многе економске аспекте земаља прималаца дознака, поготово ако се ради о транзиционим земљама које су прошле кроз тешке периоде економских, политичких, ратних криза и разарања. Приливи који потичу од дијаспоре могу утицати на смањење сиромаштва, развој привредних субјеката, па чак и девизни курс земље и сам економски развој, а дијаспора може допринети побољшању политичке климе и економских односа са иностранством. У овом раду, желели смо да испитамо корелисанаост и јачину везе (уколико она постоји) између кретања БДП-а Србије и дознака, као и везу БДП-а по становнику Србије и дознака. Процедура корелације урађена је у програму ИБМ СПСС 21., а као основа коришћени су подаци Светске банке. Закључено је да однос кретања БДП-а Србије и дознака карактерише позитивна корелација која је уочена и у кретању БДП-а Србије и дознака.

Кључне речи: *дознаке, приливи из иностранства, дијаспора, миграције, стране директне инвестиције*

Introduction

The Ministry of Religion and Diaspora was established in 2004 and it operated until 2012. After the cessation of this ministry, activities related to relations with the diaspora were led by the Office for Cooperation with the Diaspora and Serbs in the Region. The Directorate for Cooperation with the Diaspora and Serbs in the Region has existed since 2014 within the Ministry of Foreign Affairs. On January 21, 2011, the Government of the Republic of Serbia adopted the Strategy for Preserving and Strengthening Relations between the Homeland and the Diaspora, as well as the Homeland and Serbs in the Region ("Official Gazette of the RS", No. 4/11 and 14/11). The diaspora is a significant factor in the growth and development of Serbian economy. The activities of the diaspora, which are manifested in the form of trade exchanges, direct investments, green-field investments, remittances, have positive effects on economic growth, budget, employment and stability of the dinar (RSD). The Diaspora also provides significant funds through co-financing of projects, thus developing better economic relations with foreign countries. In order to better direct the funds of the diaspora, certain working bodies have been established. The Economic Council of the Diaspora, as a working body established by the Assembly, aims to protect the interests of the Diaspora and propose measures to create conditions for the inclusion of members of the Diaspora in the economic and business life of the home country, create conditions and favourable environment for investment programs and projects in the diaspora and individuals from the diaspora, and to work on the development and improvement of cooperation with local self-government units and regional chambers of commerce. (Law on Diaspora and Serbs in the Region)

Economic migrations and the diaspora phenomenon

Under the notion of migration, the International Agency for Migrations implies "the movement of an individual or a group of individuals across international borders or within one state. It is a movement of one population that entails every type of movement of people, regardless of length, structure and causes; it includes the migration of refugees, displaced persons, economic migrants and people moving for other purposes, including the re-joining of families." (Perruchoud & Redpath-Cross, 2011, p. 62)

Migrants are not faced with any kind of obstacles preventing them from returning to their homeland or domicile states and that is the primary difference between migrants and refugees. The first type of migrations most often refers to temporary migrations of rich individuals or groups of individuals migrating in search for higher profits, cheaper labour and cheaper resources. Such migrations have positive effects for both countries: for the homeland because profits made in foreign countries return as profits which can be directed towards profitable projects, and for the migration country because migrations influence the reduction of unemployment and social benefits, the increase of public incomes, the conquering of new technologies and so forth. Additionally, it influences the inward migration of workers and population growth in specific areas and it attracts inward investments. (Todorov, Petar, & Miladinoski, 2018). Surely, this form of migrations can have negative consequences as well, such as environmental pollution caused by outdated technologies and such. The fact is that technological development has improved many aspects of our lives, but at the same time, on the principle of double-edged sword, it has created justified fear considering the numerous negative consequences of its misuse. (Spasojevic & Miladinovic Bogavac, 2018) The second type of migrations refers to the middle class migrants migrating in search for a better economic status and standard of living. This type of migrations also carries both positive and negative effects. Firstly, the domicile population gain significant competition with the arrival of a larger number of migrants, especially in terms of labour costs. However, the competitiveness of the labour force is desirable from the aspect of state and economic entities, because competition has a positive effect on the quality of work and productivity. Numerous changes in the market caused by industrialization have led to a significant trend – migration of inhabitants from villages to towns, resulting in the problem or deagrarization of numerous rural areas (Grubor, Lekovic & Tomic, 2019). Secondly, migrants benefit in this sense because, despite being cheaper labour than the domicile population, they still earn higher levels of income in the country of migration. The third type of migrants refers to the most uneducated and poorest migrants, who represent a desirable group to the domicile population, as well as economic entities, because they perform the most difficult and lowest paid jobs in which the domicile population is not interested. However, until they start working, from an economic point of view, they are not desirable because they come to another country with very little or no funds. Of particular importance for the consideration of this paper is the second type of migration.

Migrations have many common characteristics, but their causes and the characteristics of migrants, such as the level of education, financial status, ethnicity, geographical origin, age or gender, often differ. (Grecic, Yugoslav Foreign Migrations, 1998, p. 17). The number of migrants and refugees is increasing year after year. According to the report published by the UN Department of Economic and Social Affairs for 2017 (International Migration Report 2017), it is estimated that the number of international migrants (persons born in a country

other than the one in which they live) globally reached almost 258 million, unlike 1990, when the number was 152.5 million. (United Nations, Department of Economic and Social Affairs, 2017) Migrations are caused by various factors, which can be divided into several groups: economic factors, conflicts, demographic factors, environment, form and manner of governance, migration promotion and communication systems.

Serbian population, historically speaking, is constantly migrating to many countries around the world, and the intensity of migration at a given time depends on many factors. (Grecic, 2016) For many years, Serbia has been characterized by a negative migration balance, i.e. a much larger number of people migrating from the country than the number of people migrating to the country. The consequences of such a migration balance in regards to countries of origin are generally rarely fully considered and analysed, most likely because such developments are most often and most strongly faced by developing and underdeveloped countries, which are generally limited in terms of research capacity and funding necessary for a comprehensive analysis of this issue. Of course, this also applies to Serbia, where the analysis of this topic is difficult due to the lack of records and data on the number and characteristics of the diaspora. During the 1990s, due to political instability and war, a large number of citizens, minority communities and religious groups were forced to leave their residences and republics within the former SFRY. In this way, many Serbs and other refugees emerged from these areas during the first half of the 1990s, and later internally displaced persons – Serbs, Montenegrins and other non-Albanians from Kosovo and Metohija around 1999. (Bobic, 2009)

Some international reports rank Serbia among the top 50 countries in the world (ranked 31st) when it comes to the intensity of population migration. According to the World Bank estimates, Serbia had 1,292,900 migrants in 2013, which is about 18% of the total population of Serbia. The most important destinations for the migration of Serbian population are: Germany, Austria, Switzerland, Croatia, the USA, Turkey, France, Italy, the Netherlands and Australia. (The World Bank, 2016, p. 221) According to the International Organization for Migration, the net migration rate in Serbia for the period 2015-2020 is 1.1 (per thousand inhabitants). (International Organization for Migration, 2020) Recently, when talking about Serbia, economic factors of migration prevail as well as "brain drain" migrations, which represent the departure of young, highly educated professionals to Western countries. Such movements warn us that Serbia has lost a large part of its future due to great losses of educated people. There has been less talk about the return of highly educated people to the country after their education and training abroad, although there was optimism that a number of people would return to Serbia after the democratic changes in 2000, but this did not happen. What's more, the departure of educated people is becoming more frequent. Some estimates point to the fact that Serbian diaspora numbers about 7,000 individuals with PhDs. (Vasojevic, Kirin, & Markovic, 2018)

Significance and economic effects of remittances from the diaspora

The term diaspora is difficult to define, because characteristics such as time, place of birth, citizenship, identity and sense of belonging are not strictly defined in this context, so the most important determinant of the diaspora is the willingness to contribute to the development of the country of origin. (Pavlov, Kozma, & Velev, 2012, p. 5)

The most important drivers of migration are income and employment inequality between the destination country and the country of origin, economic and social inequality, demographic imbalances and climate change. Other drivers may include social exclusion and discrimination, corruption, lack of education, the health care system, social security and marriage opportunities. Also, the diaspora network is an important factor in migration. (The World Bank, 2016, p. 5) The efficiency and effectiveness of remittances, i.e. the effects of remittances on the economy of the recipient country depend mostly on whether they are spent on investment or personal consumption. In the case of investment consumption, remittances can contribute to the growth of production directly, and in the case of personal consumption, through the multiplier effect of consumption, or demand for domestic goods and services, they can indirectly contribute to increasing production. (Amidzic, Kurtes, & Rajcevic, 2016) However, remittances also have negative consequences, such as passivation and dependence of remittance recipients, and even the state, on this type of money transfer. In this paper, the focus is on the positive aspects of remittances from abroad, but the following table briefly presents some of the benefits and some of the disadvantages of remittance.

Table 1. Potential advantages and potential disadvantages of remittances for the recipient country

Potential advantages	Potential disadvantages
□ Stable source of foreign exchange inflow which helps finance the external deficit □ Source of savings and investments for development □ A means of investing in children's education and the formation of human capital □ A source of improving the living standards of recipients □ Reduce income inequality □ Reduce poverty	□ Reduce pressure on the state to implement necessary reforms and reduce external imbalances (moral hazard) □ Reduce recipient savings and thus affect negative growth and development (moral hazard) □ Reduce the work effort of recipients and thus have a negative impact on growth and development (moral hazard) □ Migrations additionally affect the "brain drain" and thus negatively affect the economy, which cannot be compensated by remittance inflows

Izvor: Vasiljević, 2009

In the last thirty years or so, remittances have become increasingly important for developing countries, as remittances in most of these countries have outpaced export earnings, foreign direct investment, various types of development aid, and other forms of capital inflows. With the reduction of money transfer costs, more affordable transfer methods and a further increase in labour migration from less developed to developed countries, there will be a further increase in remittance inflows (Djekic, 2018). In order to determine the amount and significance of remittances, it is necessary to define exactly what is meant by remittances. Opinions vary, and remittances sometimes include labour remittances, migrant transfers and compensation for employees. (The moral hazard in the table refers to the change in behaviour or passive behaviour of the state and individuals who are recipients of remittances, in relation to the behaviour and activities that would exist if such inflows did not exist. Hence, we are here talking about not undertaking

certain socially useful and socially desirable activities or activities that are desirable in the life and work of individuals.) However, according to the IMF methodology, compensation for employees who have spent less than a year abroad should be shown as income from abroad, while remittances should include only income from permanent employees abroad (Nikolic, 2006, p. 14) Economic migrants, i.e. migrants who have migrated abroad in recent decades due to economic needs and the search for better working conditions, make up the predominant contributions to remittance inflows.

Inflows based on remittances are undoubtedly of high importance for developing countries. However, it is difficult to determine the exact amount of these inflows, and the data available are often far below the true amount. There are several reasons for this, and the most important is that when calculating the amount of remittances, the central bank receives data only from commercial banks. In this sense, the data on the money that does not come through formal banking channels, for example, sending money by bus and similar ways of transferring cash, cannot be obtained. Also, in most countries, when calculating the amount of remittances, transfers that bypass commercial banks are omitted, i.e. they are delivered, for example, through money transfer companies. In addition to the above, it is necessary to have data on the exact number of migrants. According to the World Bank estimates, in 2018, the total number of international migrants and refugees amounted to 266 million, or 3.5% of the world's population. Of that number, as many as 240 million were economic migrants (The World Bank, 2019, p. 3)

The latest estimates of the World Bank from April 2020 (i.e. The Global Knowledge Partnership on Migration and Development) slightly differ, and what is interesting is that an estimate of remittance inflows for 2020 and 2021 is provided, with a noticeable decline in the amount of remittances expected in 2020, and the explanation lies mostly in the current situation caused by COVID-19. These data are shown in the following table.

Table 2: Estimates and projections of remittance inflows for the period 2009-2021

	2009	2016	2017	2018	2019	2020	2021
Amount in billions of $	437	597	643	694	714	572	602
Growth rate in %	-5.1	-0.9	7.7	8.0	2.8	-19.9	5.2

Source: The Global Knowledge Partnership on Migration and Development (KNOMAD), 2020, p. 8

Note: estimates are shown for 2019, and forecasts for 2020 and 2021

According to the World Bank, the highest amount of remittance inflows in Serbia for the period from 2009 to 2019 were realized in 2009, when they amounted to about 4.65 billion dollars. Also, estimates for 2019 state that remittance inflows in Serbia will amount to about 4.163 billion dollars. Data for this time period are shown in the following table. According to the same source, it is estimated that remittance inflows from 2019 make up as much as 8.1% of GDP.

Table 3. Trends of remittance inflows from abroad into Serbia in millions of dollars from 2009 to 2019

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019*
Remittance in millions of dollars	4.650	4.117	3.961	3.546	4.025	3.696	3.370	3.205	3.590	4.324	4.163

Source: World Bank, 2020
Note: estimates for 2019.

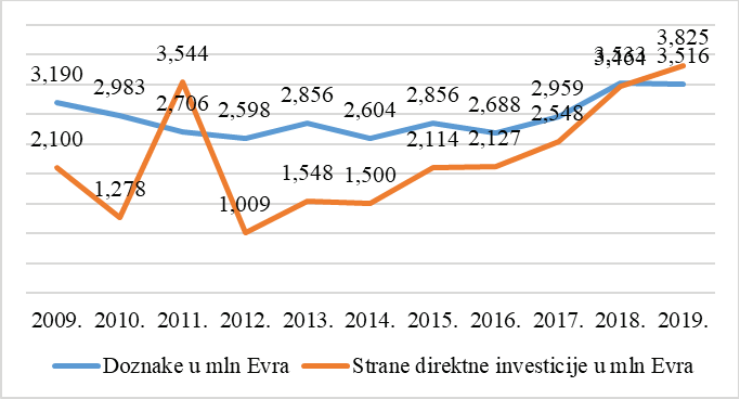
As already mentioned, a high amount of remittance from abroad comes to Serbia through informal channels. That amount cannot be determined with certainty, so many countries are trying to estimate these amounts in different ways. The National Bank of Serbia is increasing the total inflows of remittances, which commercial banks submit, by the estimated amounts of informal remittances from the data on purchased foreign currency funds in exchange offices. Of course, other problems arise here, so remittance data can only give approximate amounts or trends in remittance inflows. Due to these differences in the methodology used, the data of the National Bank of Serbia and the World Bank differ in terms of total remittance inflows in Serbia.

Table 4. Remittance inflow into Serbia for the period 2009-2019 according to the calculations made by the National Bank of Serbia and World Bank

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019*
NBS in millions of euros	3.190	2.983	2.706	2.598	2.856	2.604	2.856	2.688	2.959	3.533	3.516
World Bank in millions of dollars	4.650	4.117	3.961	3.546	4.025	3.696	3.370	3.205	3.590	4.324	4.163

Source: the National Bank of Serbia, 2020 and World Bank, 2020

Chart 1. Comparative overview of the FDI and remittance inflows into Serbia for the period 2009-2019



Source: the National Bank of Serbia, 2020

Table 5: The share of remittance (personal transfers) and FDI in the GDP of Serbia for the period 2009-2018

	Year									
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Share of remittances in GDP	10.3	9.8	8.0	8.2	8.3	7.9	8.5	7.9	8.1	8.5
Share of FDI in GDP	6.5	4.0	10.0	2.9	4.3	4.2	5.9	5.8	6.6	8.1

Source: World Bank, 2020

Results of statistical analysis

Assuming that the growth of remittances is in line with the growth of the nominal GDP of the countries from which remittances are sent, it is predicted that the amount of remittances globally will reach as much as 574 billion dollars by 2020 and as much as 594 billion dollars by the end of 2020. (The World Bank, 2017, p. 2). However, in this paper, we wanted to examine the correlation and strength of the relationship (if any) between the trend of Serbia's GDP and remittances, as well as the relationship between GDP per capita in Serbia and remittances. It is common knowledge that remittances are a means of reducing poverty and fostering social peace in society, a source of foreign exchange inflows into the domicile country and an important source of GDP growth. The following table shows the trend of GDP, GDP per capita and the amount of remittance inflows for the period from 2010 to 2019 for the Republic of Serbia.

Table 6: Trends of observed indicators for Serbia in the period from 2010 to 2019.

Year	GDP (current US$)	GDP per capita (current US$)	Personal remittances, received (current US$)
2010	41819468691.8	5735.4	4117446496.1
2011	49258136129.0	6809.2	3960970272.2
2012	43309252921.1	6015.9	3546455139.9
2013	48394239474.7	6755.1	4024794307.0
2014	47062206677.7	6600.1	3696031997.2
2015	39628550868.8	5585.1	3370435504.1
2016	40630392018.5	5756.4	3205371733.8
2017	44120424391.9	6284.2	3589629282.4
2018	50597289146.7	7246.2	4445606867.1
2019	-	-	4237925900.8

Source: Author's calculation based on (World Bank, 2020)

The correlation procedure was done in IBM SPSS 21, on the data for the years shown in the table above. The results of the application of this procedure are presented in the following tables, and above all, descriptive statistics for the observed variables are further on presented.

Table 7: Descriptive statistics for the observed indicators

	Minimum	Maximum	Mean	St. Dev.
GDP (current US$)	39628550869	50597289147	44979995591	3983172785
GDP per capita (current US$)	5585.1	7246.2	6309.733	576.3268
Personal remittances, received (current US$)	3205371734	4445606867	3772971289	394478780.2
Valid N (listwise)				

Source: Author's calculation based on (World Bank, 2020)

The table below shows the results of the correlation analysis for the GDP variables and remittances received. The relationship between the two observed variables is characterized by a positive correlation, i.e. a positive value of the Pearson correlation coefficient. This coefficient is 0.744, which represents a strong relationship between the variables. Also, the value of Sig. in the table shows that the relationship of the variables is statistically significantly different from zero. Thus, the variables are highly positively correlated.

Table 8: Correlation between remittances and GDP

		Personal remittances, received (current US$)	GDP (current US$)
Personal remittances, received (current US$)	Pearson Correlation	1	.744*
	Sig. (2-tailed)		0.022
	N	9	9
GDP (current US$)	Pearson Correlation	.744*	1
	Sig. (2-tailed)	0.022	
	N	9	9
* Correlation is significant at the 0.05 level (2-tailed).			

Source: Author's calculation based on (World Bank, 2020)

The results of the correlation analysis for remittances and GDP per capita also show that there is a positive correlation between these two variables. This result is logical, given that GDP per capita is directly derived from GDP. The results are statistically significant, and the value of the Pearson correlation coefficient is 0.711, so even in this case, the relationship between the variables is strong.

Table 9: Correlation between remittances and GDP per capita

		Personal remittances, received (current US$)	GDP per capita (current US$)
Personal remittances, received (current US$)	Pearson Correlation	1	.711*
	Sig. (2-tailed)		0.032
	N	9	9
GDP per capita (current US$)	Pearson Correlation	.711*	1
	Sig. (2-tailed)	0.032	
	N	9	9
* Correlation is significant at the 0.05 level (2-tailed).			

Source: Author's calculation based on (World Bank, 2020)

Social effects of remittances with the look at poverty reduction

According to a study conducted in Morocco, the volume of inflows from remittances increases with the decline in the economic performance of the country to which remittances are sent, due to the fact that remittance senders seek to compensate for the decline in consumption of remittance users. Also, better economic performance of the country from which remittances are sent is in positive correlation with the growth of remittance-based inflows. (Bougha-Hagbe, 2004)

Remittances measured by share in GDP have a strong impact on poverty reduction, given that a 10% increase in the share of remittances reduces the number of people living in poverty by 1.6%. (Richard, 2003) According to some research, remittances are often used to eliminate income restrictions in the households that received them, and they are directed to current consumption. According to the structure of consumption, remittances were mainly used to meet the most basic necessities of life. It is difficult to establish a direct link between remittance inflows and poverty reduction in underdeveloped regions, but it is certain that remittances contribute to poverty reduction through raising income levels in the families that received them. (Vasiljevic, 2009)

It is important to note that the Serbian diaspora often buys or builds real estate in Serbia. These facilities, which are often a form of exposure and competition among members of the diaspora from certain parts of Serbia, are most often left abandoned without no one actually living there. An example is the area of Eastern Serbia, from Pozarevac to Kladovo and Veliko Gradiste. Although these facilities do not serve a purpose, in terms of living in them, they still represent a form of investment in Serbia and in some way have positive effects, for example, in terms of foreign exchange inflows. Often these facilities are given to friends or family members, which in turn in some way affects the improvement of the living conditions of these people.

Conclusions

In recent years, the importance of improving relations with the diaspora has been increasingly recognized. Some steps towards achieving this goal have been identified, but there is still much room for improvement. First of all, it is necessary to provide good strategic and institutional frameworks for the effective use of remittances from the diaspora. In order to better use the capacity of the Serbian diaspora and Serbs in the region in the direction of stimulating the economic development of Serbia, it is necessary to take the following measures (Ministry of Religion and Diaspora, 2011, p. 27):

- In cooperation with the competent ministries, create an adequate basis and environment for the activities of investors from the diaspora, primarily in the direction of restoring the trust of the diaspora in financial institutions in the Republic of Serbia. It is necessary to create an efficient business environment, whereas it is also necessary to work on improving political, economic and legal security;
- Improve the conditions for money transfer and inflow of remittances to the home country, by facilitating transfers and encouraging cheaper, faster and safer ways of transfer and promotion of new banking products among remittance

recipients. It is necessary to fully harmonize the domestic legal framework for money transfers with the legislation of countries sending those remittances;
- Organize annual gatherings and meetings of businessmen from the diaspora and businessmen from Serbia, such as business forums or fairs dealing with Serbian business;
- Prepare project proposals for the development of local self-governments in order to present them to investors from the diaspora;
- Provide incentives for job creation in terms of personal income tax exemption in the first years (first five years);
- Provide tax exemption of corporate income tax for returning entrepreneurs for a period of five years from the date of registration of the business entity.

Previous results of the correlation analysis show a high correlation in both pairs of observed indicators. The Pearson correlation coefficient gives a measure of the association between two variables, but does not determine the cause-and-effect relationship between these variables. This means that the impact of GDP growth on remittance growth and vice versa, as well as the relations of other economic indicators and remittances, should be determined in more detail. Also, in future research it would be advisable to take a larger sample, in the context of the time period or the number of countries being analysed (for example, to take data for several countries in the region).

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