Economic Horizons

Faculty of Economics, University of Kragujevac, Serbia
ISSN 1450-863X eISSN 2217-9232 2020 *22* (3)

Jakopin, E.
Lee, C-W. *Huruta, A. D.*
Okoro, E. G. *Ihenyen, C. J.*
Lukovic, S.
Nguyen, L. T. *Tran, T. Q.* *Tran, H. M.*
Mitrasevic , M. *Bardarova, S.*

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Contact
Faculty of Economics University of Kragujevac,
Liceja Knezevine Srbije 3, 34000 Kragujevac, Serbia;
Tel. +381 34 303 546
www.horizonti.ekfak.kg.ac.rs horizonti@kg.ac.rs

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The Journal is abstracting and indexing in:

SCOPUS, EconLit, Cabell's Directories, EBSCO, DOAJ, Index Copernicus, ProQuest - ABI/INFORM, Ulrich's Web

THE JOURNAL IS PUBLISHED THREE TIMES A YEAR - in April, August and December

ISSN 1450-863X eISSN 2217-9232 UDC 33 COBISS.SR-ID 158022663

Economic Horizons

Faculty of Economics
University of Kragujevac, Serbia

CONTENTS

Volume 22 Number 3 **September - December 2020**

EDITORIAL

Vlastimir Lekovic ..... 177-178.

ORIGINAL SCIENTIFIC PAPERS

Effects of structural changes in the economy of the Republic of Serbia: Old problems, new reform challenges

Edvard Jakopin ..... 179-196.

doi:10.5937/ekonhor2003191E

Revisiting the foreign direct investment-led and export-led growth hypotheses in ASEAN+3 countries

Cheng-Wen Lee and Andrian Dolfriandra Huruta ..... 197-206.

doi:10.5937/ekonhor2003209L

Does earnings management exert pressure on firms' return on assets and equity? The case of Sub-Saharan Africa

Edesiri Godsday Okoro and Confidence Joel Ihenyen ..... 207-218.

doi:10.5937/ekonhor2003221O

The performance of dynamic and static investment strategies in pension funds

Stevan Lukovic ..... 219-231.

doi:10.5937/ekonhor2003235L

REVIEW PAPERS

The impact of foreign aid on household income among ethnic minority groups in Vietnam

Luan Thanh Nguyen, Tuyen Quang Tran and Hang Minh Tran ..... 233-243.

doi:10.5937/ekonhor2003251N

Measuring the risk of lending to small and medium-sized enterprises in the Republic of Serbia in light of modern banking regulations

Mirela Mitrasevic and Snezana Bardarova ..... 245-258.

doi:10.5937/ekonhor2003263M

SUBJECT INDEX

Nenad Stanisic ..... 259-260.

THE LIST OF AUTHORS AND TITLES ..... 261-262.

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Economic Horizons, September - December 2020, Volume 22, Number 3, 177 - 178
UDC: 33 ISSN: 1450-863 X
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EDITORIAL

We hereby inform our domestic academic community and the foreign academic community that the *Economic Horizons* scientific journal, which is published by the Faculty of Economics of the University of Kragujevac, has been referenced in the Scopus Base since October 2020 after many years of its pre-evaluation and final evaluation by the Scopus Content Selection and Advisory Board. The fact that the journal is referenced in Scopus, one of the most referenced scientific journals bases, has enabled the scientific papers published in the *Economic Horizons* to be considerably more visible, which is of exceptional importance not only for the Journal, but for the authors of the published journals as well.

Apart from the abovesaid, worthy of attention is also the information that the mark of the Index Copernicus Journals Master List (ICV) that is used to evaluate journals based upon bibliometric indicators increases from one year to another when the *Economic Horizons* journal is in question, namely: 2017-81.01; 2018-83.87; 2019-87.57.

As a result of the continuous endeavor of the Journal's Editorial Board to increase the Author Internationality Index together with the improvement of the quality of the published papers, we also point to the fact that a total of nine scientific papers authored by foreign authors (from Nigeria, Indonesia, Taiwan, Vietnam, Bosnia and Herzegovina, and North Macedonia), which all account for 50% of the total number of the published scientific papers in the Journal in the year 2020, have been published in Volume 22 Year 2020 of the *Economic Horizons*.

Issue 3 of Volume 22 Year 2020 of the *Economic Horizons* scientific journal contains four original scientific papers and two review papers, the Paper Subject Index and the Overview of the Authors and Titles of all the contributions published in the Journal in 2020.

Starting from the attitude that structural changes directly impact macroeconomic and financial stability, revenue growth, productivity and economic efficiency, the improvement of the quality of life and social inclusion, *Edvard Jakopin* indicates the fact that he biggest consequences of global contraction for the economy of the Republic of Serbia caused by COVID-19 will reflect on slowing down structural reforms. The research study has shown that positive economic conjecture in the period from 2015 to 2019 did not contribute to the expected structural changes, given the fact that they had not been led by research and development and innovations as the drivers of economic growth. The structural reforms implemented so far have been insufficient and slow, due to which fact old problems still cause low competitiveness. Because of that, it is necessary for new reform processes to direct activities towards the creation of a stimulating ambience for the development of domestic entrepreneurship and private investments growth in order to increase trust between entrepreneurship and institutions.

Based on the panel data for the 13 ASEAN+3 countries for the period from 2008 to 2018, the coauthors *Cheng-Wen Lee* and *Andrian Dolfriandra Huruta* conduct a research study on the role of foreign direct investments and exports when speaking about economic growth. Based upon the results of the research study obtained by applying the Lagrange Multiplier Test, referring to the results of the Wald and Hausman and Chow tests as well, the coauthors' attitude implies the fact that in the case of the ASEAN+3 countries foreign direct investments have a positive impact on economic growth. Given the fact that exports have a positive and significant impact on economic growth, the coauthors simultaneously confirm the hypothesis that foreign direct investments and exports are significant for encouraging the economic growth of the ASEAN+3 countries, due to which fact this region is an attractive destination for international companies.

Indicating the fact there is no study in which research has been done in the influence of earnings management on return on the total assets and capital

* *Correspondence to*: V. Lekovic, Faculty of Economics, University of Kragujevac, Liceja Kneževine Srbije 3, 34000 Kragujevac, Republic of Serbia; e-mail: lekovic@kg.ac.rs

of an enterprise, the coauthors *Edesiri Godsday Okoro* and *Confidence Joel Ihenyen* do research in this relevant problem in the case study of Sub- Saharan Africa. Based upon the data collated from the database of the Stock Exchange of the Sub-Saharan African Countries by using the statistical technique of fixed and random effects, the coauthors develop an earnings management model which respects the peculiarities of Sub-Saharan Africa. Based upon the conducted research activities, the study indicates the fact that earnings management does exert significant pressure on an enterprise's performances, and also that the size of an enterprise plays an important role in mediating in the relationship between earnings management and the performances of the enterprises operating in Sub-Saharan Africa.

Pursuant to the wish of the members of pension funds to form a monetary amount which will be sufficient to pay out a satisfactory amount of the pension from the moment of retirement, the author *Stevan Lukovic* considers accumulated funds investment strategies. Bearing in mind growing and frequent fluctuations on the financial market, he indicates that static investment strategies are not a satisfactory solution for insurees. Based upon a comparative analysis of the performances of the dynamic and static forms of strategies and using bootstrap resampling to simulate investment returns, the author concludes that the lifecycle dynamic strategies generate more favorable financial results in relation to the lifecycle static strategies, with but a slightly greater probability of the realization of extremely unfavorable outcomes.

Starting from the data that the level of the poverty of the ethnic minority in Vietnam exceeds 70% of the national poverty rate, the coauthors *Luan Thanh Nguyen, Tuyen Quang Tran* and *Hang Minh Tran* carry out research in the contribution of foreign aid to the social-economic development of the ethnic minorities. Based upon the empirical research in the households of the ethnic minorities carried out in the nine provinces of this country, by applying the OLS regression model, and based upon the assessment of the effects of foreign aid on household income, the coauthors point to different effects with respect to the size and significance of such aid inside different ethnic groups. Foreign aid has significantly improved the existence of the populations of *Cham* and *Xtieng*, which is not the case when the inhabitants of *Hmong* are concerned, due to which fact aid and the ethnic policy need to be reconsidered.

By measuring the risk of lending to small and medium-sized enterprises (SMEs) by banks in the Republic of Serbia, the coauthors *Mirela Mitrasevic* and *Snezana Bardarova* endeavor to determine the fact whether greater transparency in the credit risk measuring process enables us to detect a problem in SME management and the provision of the sources of their funding or not. Based upon the Altman Z-Score model for the estimation of the probability that enterprises will not be adhering to their contractual obligations, a conclusion is drawn that the said model does enable the detection of the companies which may declare bankruptcy in the period of two years after such an assessment, on the one hand, but the same model cannot help to estimate a probability of the occurrence of bankruptcy, either, on the other.

On behalf of the Editorial Board of the Journal and on my own behalf, I would first of all like to thank the authors of the contributions published in this Issue of the Journal. At the same time, our special gratitude goes to the reviewers, whose constructive and critical comments and suggestions addressed to the authors of the submitted contributions contributed to raising the level of the quality of the published papers.

Issue 3 Year 2020 contains an all-inclusive Subject Index of the scientific papers, as well as the Overview of the Authors and Titles of all the contributions published in the *Economic Horizons* in the year 2020.

Editor-in-Chief

Vlastimir Lekovic

Vlastimir Lekovic is a full professor of the Faculty of Economics of the University of Kragujevac, in retirement. He earned his Ph.D. at the Faculty of Economics of the University of Kragujevac in the scientific field of general economics and economic development. He teaches the teaching disciplines of Institutional Economics in the master's studies, and Scientific Research Methodology and Market Regulation Policy in the doctoral studies. The key areas of his scientific-research interest are the economic system, the economic policy, and institutional economics.

Economic Horizons, September - December 2020, Volume 22, Number 3, 179 - 196
UDC: 33 ISSN: 1450-863 X
© Faculty of Economics, University of Kragujevac
www. ekfak.kg.ac.rs

Original scientific paper
UDC: 332.1(497.11)
doi:10.5937/ekonhor2003191J

EFFECTS OF STRUCTURAL CHANGES IN THE ECONOMY OF THE REPUBLIC OF SERBIA: OLD PROBLEMS, NEW REFORM CHALLENGES

Edvard Jakopin*

Faculty of Economics and Finance, Union University Nikola Tesla, Belgrade, The Republic of Serbia

Structural changes in the economy directly affect macroeconomic and financial stability, income growth, productivity and economic efficiency, social inclusion, and the improved quality of life. The global contraction in 2020, caused by COVID-19, the deepest since the Second World War, will cause a great global economic reset, extreme poverty will increase, and the biggest permanent loss will be in human capital. The biggest consequences for the Serbian economy will be a slowdown in structural reforms. The key performance of the economy in the conjunctural period was positive and affected the growth of the resilience of the economic system, but the research showed that the implemented structural reforms were insufficient and slow, that the old problems are still the causes of low competitiveness. In the context of new reform challenges, the focus of activities needs to be shifted towards creating a stimulating environment for the development of domestic entrepreneurship and the growth of private investment in order to increase trust in the entrepreneurship-institution relationship.

Keywords: the macroeconomic and reform balance of the economy, effects of the structural performance of the economy and the manufacturing industry, qualitative indicators, structural problems, reform challenges

JEL Classification: L32, M21, O11, P11

INTRODUCTION

Structural reforms and the economic recovery of the Republic of Serbia have been stopped as a result of the economic shock caused by the 2020 global pandemic. An economic recession, the largest since World War II, has affected all segments of public life all over the world (IMF, 2020, 10-12). The focus of the government's economic interventions was directed toward the measures for encouraging enterprise liquidity (in order to avoid bankruptcy and provide support to workers in attenuating the loss of income), preventing an increase in unemployment, and avoiding a financial crash. The old structural problems in the economy have escalated, and the economy has faced new challenges.

* *Correspondence to:* E. Jakopin, Faculty of Economics and Finance, Union University Nikola Tesla, Belgrade, Cara Dušana 62-64, 11000 Beograd, The Republic of Serbia; e-mail: edvard.jakopin@stat.gov.rs

The subject of this study are the effects of structural changes in the economy of the Republic of Serbia on economic growth, i.e. a dynamic structural analysis of the economy's qualitative performance in the period of conjuncture over the last five years. Based on a critical review of the effects of the key structural performance of the economy, the aim of the research is to point out the reform bottlenecks to economic policy makers, as well as the need to implement structural reforms in those areas whose segments constantly make losses and burden the rest of the economy. The structural analysis included an overview of the economy's performance according to the size, ownership and the technological structure. A special analytical point of view was directed toward the process industry.

The study tests the hypotheses which originate from the very purpose of the study:

H1: The economic situation did not contribute to the expected structural changes. Structural changes in certain economic segments have yielded positive results and contributed to faster economic growth and macroeconomic stability.

H2: The private sector operations are more efficient than the state sector operations, and within it, the operations of majority foreign-owned enterprises are more efficient than the operations of majority domestic-owned enterprises.

Within these hypotheses, the following sub-hypotheses were analyzed:

H11: In the boom period, the qualitative performance of certain economic structures, primarily profitability, liquidity and indebtedness, improved.

H21: Within the manufacturing industry, the technological structure improved in favor of more technologically intensive branches.

The methodological instrumentarium was based on the structural and dynamic analysis of the key indicators from the economic-financial analysis of the final accounts of the Republic of Serbia's companies in the period of the economic conjuncture 2015-2019.

The basic coordinates of the research determined the structure of the paper. The paper consists of the three interrelated units: the first gives a brief theoretical and methodological context of structural changes; in addition to the macroeconomic and reform cross-section, the second contains the results of the research of the complex and comprehensive structural analysis of the Serbian economy, while the third analyzes the key (old) problems n the economy. Finally, the reform structural challenges in and priorities of the economy of the Republic of Serbia are given in the Conclusion.

THE THEORETICAL-METHODOLOGICAL CONTEXT

The analysis of the effects of structural changes in the economy includes the qualitative and quantitative transformations of the economy. In the theoretical context, the basic methodological characteristic of structural analysis refers to the notion of the "relative structural immutability" that is essential for determining a set of the possible transformations that a particular economic system can go through. "Relative structural immutability" enables the study of structural changes through a "time-differentiated" description of the interrelationships between the elements of the economic system (Schilirò, 2012, 20-21).

Structural changes in the economy essentially point to the degree of the economic system's qualitative transformation, which is determined by different factors, primarily by technological innovations and changes in the organizational structure. Structural changes in the economy are the generator of the strengthening of macroeconomic performance and the provision of strong, sustainable and balanced growth (IMF, 2015, 6).

Over the past several decades, the trends have suggested that reform efforts are often narrowly related to macroeconomic conditions, development stages, and global integration. Basically, it is difficult to measure structural reforms because they often

include the policies or questions not easy to quantify. The most powerful momentum of the reforms overlapped with the periods of economic stress or turbulences. The acceleration of structural reforms in several fields is influenced by the processes of economic integration.

Any discussion on macroeconomic policies lays special stress on structural policies (IMF, 2014, 5-6). Policy makers are becoming ever more focused on the complementary role of structural policies in the promotion of sustainable and balanced growth, which provides new jobs.

Structural policies may affect macroeconomic stability in several ways (IMF, 2015, 12):

- the prevention of the efficient allocation of resources could bring about the creation of imbalances, for example obstacles to the competition and the protection of the non-tradable sector may prevent the development of the tradable sector, or the implications of inadequate income redistribution may cause economic inequalities (Lekovic, 2015, 92) and so on;
- the limitation of flexibility might prevent timely adaptation to shocks and might weaken the resistance of the economy, for example the rigidity of the labor market, say, in terms of determining salaries, unemployment compensation or severance pay, may contribute to high unemployment and the low growth of productivity. In a similar fashion, the balance sheets (with nonperforming loans and an excessive debt) of the weakened state sector may prevent loans and investments, thus limiting the passage of easy financial conditions;
- the limitation of potential growth affects macroeconomic stability - for instance, investment bottlenecks, which limit productivity and the growth of production, may contribute to an increase in the debt, the worsened conditions of financing, and the growing instability of the financial sector; and
- the creation of an imbalance in a member-state or a group of states that affect global economic and financial stability.

Structural changes affect the basic macroeconomic outcomes:

- an increase in revenue, productivity and economic efficiency (Foster-Mcgregor & Verspagen, 2016, 92-93);
- the promotion of equity (e.g. the reforms of taxes and subsidies, social spending, gender equality);
- economic and financial stability (e.g. the diversification of export, financial supervision, the regime of insolvency, the management of capital flows); and
- the improvement of the quality of life (e.g. education, healthcare, ecological issues).

A more powerful impact of structural reforms on macroeconomic performance began with the intensification of the transitional processes during the 1990s, when many countries commenced broad programs of economic reforms, often initiated by the worsening of the economic conditions (Drazen & Easterly, 2001). The 2008 global recession and the escalation of the external debt gave an additional emphasis to the theoretical momentum of the significance of structural reforms (Agnello, Castro, Jalles & Sousa, 2015, 134). Numerous theoretical papers emphasize the fact that there is no strict relatedness between the initiators of structural reforms and their actual application, or in other words, every country's experience reflects its own institutional characteristics, history and political systems, interest groups, and the like (Haggard & Vebb, 1993).

The theoretical perspective on structural changes was gradually being directed toward the analyses of growth and toward the microanalyses which explain causality more clearly.

The theoretical considerations of individual reform segments are mostly focused on reforms in the financial sector and their positive effects (Galindo,

Schiantarelli & Weiss, 2005, 87), foreign-trade liberalization (Dollar & Kraay, 2004; Vacziarg & Velch, 2008; Estevadeordal & Tailor, 2013, 1669), and investment policies (Acemoglu, Johnson & Robinson, 2002; Bekaert, Harvey & Lundblad, 2005, 35, 37, 41). Many papers emphasize the fact that the effects of structural changes depend on the attained level of the development of a country (Klein & Olivei, 2008, 862). Institutions are an important factor of the dynamics of structural changes (Acemoglu *et al*, 2002), long-term sustainable growth, and investments, in relation to which the paper shows the latest reform comparative section of the situation in the countries of the region. It is shown by many studies that the focus of structural changes is directed toward structural changes at the local level and their importance for labor productivity (Bouis & Duval, 2011, 6, 8, 25).

An ever-increasing number of studies are directed toward the complementarity of structural changes and the significance of the so-called waves of (multiple) structural reforms for labor productivity (Christiansen, Schindler & Tressel, 2013; Prati, Onorato & Papageorgiou, 2013, 947, 967).

Studies on the priorities of reforms are still in the initial phase - allow us to say that trade reforms have a tendency to precede domestic financial reforms (Hauner, Prati & Bircan, 2013, 896). Depending on economic cycles, some structural reforms have a more powerful effect, whereas others have a weaker effect - for instance, structural reforms on the labor market in the period of conjuncture have more powerful effects and smaller costs in comparison with a period of recession (Bouis & Duval, 2012, 15, 25).

Transition reform experiences show that the determination of priorities is a central issue when efficient application is in question. Studies have shown differentiated priorities in the fields of reforms, depending on the degree of development and the phase of development in different countries (Table 1). Nevertheless, some shared reform priorities appear, where there is a probability of a broader interest across the membership.

Table 1 The priorities of structural reforms depending on the level of development

REFORMS	Underdeveloped countries	Developing countries	Developed countries
Technology & Innovation			
Industry regulation			
Job market			
Business regulation			
Fiscal structural reforms			
Infrastructure			
Banking sector			
Other finance and capital market			
Legal System & Property Law			
Trade liberalization			
Agriculture			

Note: The darker shadow indicates that the reform areas most often rank among the three main reform priorities within each group of countries.

Source: IMF, 2015, 30

THE MACROECONOMIC AND REFORM BALANCES OF THE REPUBLIC OF SERBIA IN THE PERIOD OF ECONOMIC CONJUNCTURE

In the period 2015-2018, conjuncture at the global level contributed to the acceleration of growth. As early as in 2019, however, the first signals of slowing growth appeared, the global GDP growth of 2.9% being the lowest since the global financial crisis. The global stagnation in 2019 hit the most developed economies the most (the USA and the Eurozone) and Asian developed economies to a somewhat lesser extent, primarily due to the slowdown in industrial

production due to weaker external demand, trade tensions and increasing uncertainty in terms of trust and investment (World Bank, 2020). The economies of the European Union and the Eurozone recorded an average growth of over 2% by 2019 (except for Italy and France), when recession signals appeared (first in Germany, then in Italy and France).

In the boom period (2015-2019), the countries of our region had average economic growth rates exceeding 3% (except Croatia), the fastest growth having been achieved by Romania (5%). However, they also noticed a slowdown in growth in 2019 (Table 2).

In the same period, Serbia's economic growth was cumulatively 14.6%, the average rate 3.5% (Table 3). Thanks to the high rate of economic growth in 2019 of 4.2% of the GDP, Serbia reached EUR 45.9 billion.

Based on the trend of the key macroeconomic aggregates (Table 3) it can be concluded:

- From the point of view of the contribution of expenditure aggregates to economic growth, the largest contribution to growth was made by investments and personal consumption. The investments increased by an average 11.5% per year, and personal consumption by 2.4%. In 2019, the investment growth of 15.6% and the personal consumption growth of 3.1% influenced domestic demand so that it contributed to the GDP growth of 5.8 percentage points. The net exports made a negative contribution.
- The most important effect of the implemented fiscal consolidation in the period 2015-2019 is the reduction of the internal and external macroeconomic imbalances. For the first time since 2005, a fiscal surplus was recorded in 2017 (1.1% of the GDP), whereas in 2019, an almost zero fiscal result (-0.2% of the GDP) was registered.

Table 2 Regional economic growth

	Average GDP growth rate 2015-2019
Albania	3.3
Bosnia and Herzegovina	3.1
Bulgaria	3.4
Hungary	4.1
Romania	5.1
Northern Macedonia	2.3
Slovakia	2.8
Slovenia	3.6
Serbia	3.5
Croatia	3.0
Montenegro	4.1

Source: European Commission, 2020

Table 3 The macroeconomic balance 2015-2019

	2015	2016	2017	2018	2019
GDP (in billion EUR)	35.7	36.7	39.0	42.9	45.9
GDP (rates in %)	1.8	3.3	2.0	4.4	4.2
GDP/capita in EUR	5,034	5,203	5,581	6,138	6,610
Manufacturing industry	5,7	6.0	6.3	1.9	0.2
Registered employment, total (thousands)	1,990	2,010	2,063	2,131	2,173
Net earnings (real growth, %)	-2.1	2.5	0.9	4.4	8.5
Gross investment (% of GDP)	16.8	16.9	17.7	20.1	22.4
Exports of goods and services (in billion EUR)	15.7	17.4	19.3	21.2	23.4
Imports of goods and services (in billion EUR)	18.6	19.6	22.3	25.3	28.0
Current account of the balance of payments (% of GDP)	-3.5	-2.9	-5.2	-4.8	-6.9
Fiscal deficit / surplus (% of GDP)	-3.5	-1.2	1.1	0.6	-0.2
Public debt (% of GDP)	70.0	67.8	57.9	53.7	52.0
External debt (% of GDP)	73.5	72.1	65.1	62.2	61.9
Inflation (the end of the period)	1.5	1.6	3.0	2.0	1.9

Source: Republički zavod za statistiku, 2020; Narodna banka Srbije, 2020; Ministarstvo Finansija, 2020.

The current account deficit increased due to the growth of the foreign trade deficit, amounting to 3.2 billion euros (6.9% of the GDP).

- FDIs made the key contribution to macroeconomic stability - the average net FDI inflow in 2015-2019 amounted to 2.6 billion euros, which provided the coverage for the current account deficit. The structural aspect of FDIs is especially important as the inflow was mainly directed to the export processing industry. Given the scale of the global recession in 2020, the findings of the research on FDI behavior in recession periods are important for Serbia, showing that FDIs in developing countries do not differ between the periods of crisis and normal periods (Alquist, Mukherjee & Tesar, 2016, 106, 112);
- Fiscal discipline and balanced public finances contributed to the reduction in the public debt (from the 70% share of the public debt in GDP in 2015 to 52% at the end of 2019). A similar positive trend is observed in the decrease in the share of the external debt.
- The positive macroeconomic results in the period 2015-2019 most reflected in the labor market. The number of employees increased, the unemployment rate decreased (from 17.7% in 2015 to 10.4% in 2019), and the average growth of net wages in 2015-2019 was 4.0%. Net wage growth in 2019 was 8.5%.

According to the Global Competitiveness Index (GCI), the Serbian economy fell by 7 places in 2019 (Table 4) compared to 2018 and ranked 72nd in the world (out of 141 countries) due to a reform backlog in certain areas. Of the transition countries in the region, the economies of Slovenia (35), Hungary (47), Bulgaria (49), Romania (51) and Croatia (65) are ahead of Serbia. The most problematic of the mentioned 12 pillars of competitiveness relate to institutions, ICT application (Zecevic, Radovic Stojanovic & Cudan, 2019, 289), the development of the financial market, health and the market size.

The structural reforms of the regulatory framework for business conditions are an extremely important

Table 4 The Global Competitiveness Index (GCI) for the countries in the region, 2019

Indicators	ALB	BUG	HUN	ROM	SLO	CRO	SERBIA		
							Rank	Value	Distance from the leader by value
GCI	81	49	47	51	35	63	72	60.9	24
Subindex: SUPPORTING ENVIRONMENT									
Pillar 1: Institutions (20 ind.)	76	57	63	52	33	77	75	52.5	29
Pillar 2: Infrastructure (12 ind.)	98	56	27	55	33	32	51	73.8	22
Pillar 3: ICT implementation (5 ind.)	75	30	54	32	40	60	77	52.6	40
Pillar 4: Macroeconomic stability (2 ind.)	104	43	43	56	1	43	64	75.0	25
Subindex: HUMAN CAPITAL									
Pillar 5: Health (1 ind.)	46	81	70	83	36	47	76	79.0	21
Subindex: MARKET									
Pillar 7: Commodity Market (8 ind.)	75	63	91	64	30	86	73	54.6	27
Pillar 9: Financial Market (9 ind.)	102	73	66	86	61	63	82	57.4	34
Pillar 10: Market size (2 ind.)	111	64	48	41	82	78	74	51.8	48

Source: The Global Competitiveness Report 2019

factor in investment activities and attracting FDIs. Serbia has made significant progress in this segment during the economic recovery period. The World Bank's Doing Business Report 2020 composite index ranks Serbia 44th out of 190 countries (Table 5). Serbia continues to record the most unfavorable rank in the area of obtaining electricity connections (94th position), obtaining loans (down from the 60th to the 67th), whereas the biggest setback in Serbia is registered in the field of starting a business (decrease for 33 positions).

THE EFFECTS OF STRUCTURAL CHANGES

The positive business performance of the economy in the period 2015-2019 are mostly the result of the more efficient business operations of the company in its core business, and partly due to external effects as well (conjuncture in global markets, falling interest rates, the exchange rate policy and the appreciation of the dinar). The key performance of the economy is positive: the growth of gross value added (GVA), employment, the net profit 2.4 times higher than the net loss, and a real decline in the cumulative loss. The net profit was realized by 60% of the companies in which 84% (i.e. 980 thousand) workers in the economy were employed, the net loss reported in 25% of the companies with 190 thousand employees, while 15% of the companies with 2.5 thousand employees showed a zero financial result. The business performance of large companies shows an increase in the number, employment and the total income, and a reduction in the accumulated loss. The MSME sector increased its resilience, especially medium-sized enterprises in all the segments: growth in the number, employment, a positive financial result, the growth of the GVA and capital, and a reduction in the total liabilities.

The net profit of the economy

Throughout the transition until 2015, the economy operated with a net profit only three times, namely in 2006, 2007 and 2011. For the first time in the two decades of the transition, the economy made a net profit for the four consecutive years (2015-2019), which was the result of the continuous economic growth and improvement of the performance of macro- and micro-businesses (Figure 1). The net financial result increased 6 times (in euros), i.e. 5.4 times in real terms.

In addition, the economic and financial analysis of the economy highlights the following trends:

- The real growth of the net profit of the economy in the period 2015-2019 amounted to 38% (the average annual 8.4%), while the net economic losses decreased by 30.9% in real terms (having decreased by 8.8% on average).
- The overall positive business image of the economy is disturbed by the trend of a gradual decline in the positive net financial result in 2018 and 2019. The real chain indices show a trend of a decline in the net profit, with the trend of the growth of the net loss, resulting in the lower positive financial result of the economy.
- In the period 2015-2019, Serbia's economy produced 85.8 billion euros of new value, i.e. the GVA of the economy increased by 35.3% in real terms, with an average annual rate of 7.8%.

Table 5 Business conditions - the most critical factors in 2020

Ease of doing business - ranking in the world	Starting a business	Paying taxes	Registration of property rights	Obtaining of electricity connection	Obtaining a loan	Execution of a contract
44	73	85	58	94	67	65

Source: Doing Business Report, 2020

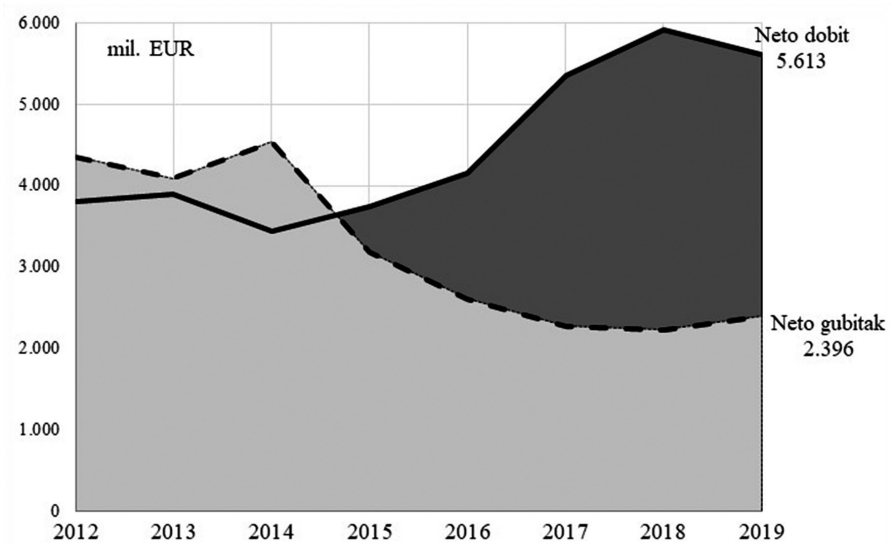

Figure 1 The positive net result of the economy in the period 2015-2019

Source: Author, based on the SBA data

The qualitative structural performance of the economy

The qualitative economic and financial performance of the economy shows a positive trend in the period of economic recovery from 2015 to 2019 (Table 6). Productivity (14.4%), the economy and solvency improved, profitability significantly increased (5 times), liquidity slightly improved, the net profit rate increased 4.5 times (the operating profit rate having slightly increased), and the increased net loss rate almost halved. The most significant is the fact that the rate of return on business assets (Return on Assets - ROA) doubled, and the rate of return on equity (Return on Equity - ROE) increased as much as 4.2 times.

The structural performance of the economy, depending on the size of the company

Conjuncture did not significantly improve the qualitative performance of the entrepreneurial sector (MSME). The structural analysis showed that the basic qualitative performances of the large enterprises were at a higher level than those in the MSME sector:

Table 6 The qualitative performance of the economy

	2015	2016	2017	2018	2019
Productivity (in thousand dinars)	1,662	1,827	1,888	1,977	2,067
Economy	1.01	1.03	1.05	1.05	1.04
Profitability	1.11	2.84	5.46	6.13	5.22
Solvency	1.54	1.57	1.59	1.63	1.63
General liquidity ratio	0.87	0.91	0.93	0.95	0.97
Reduced liquidity ratio	0.60	0.63	0.63	0.64	0.64
Net profit rate	0.79	2.07	3.83	4.29	3.47
Business profit rate	4.73	5.59	5.31	5.37	5.06
Net loss rate	4.21	3.26	2.60	2.40	2.41
ROA (rate of return on operating assets)	1.56	2.17	3.43	3.64	3.12
ROE (rate of return on equity)	1.65	3.96	7.36	8.06	6.91

A methodological note: For the period 2015-2018, the final financial reports of APR (Serbian Business Registers Agency) were used, and for 2019, financial reports for statistical purposes were used due to the comparability of profitability indicators. As a rule, a profit is always higher in statistical reports than in final ones.

Source: Author, based on the SBA data

- The productivity gaps between the MSME sector and the large enterprises sector did not change throughout the period - the productivity of large enterprises was continuously higher by 1/3 of the productivity of the MSME sector.
- The efficiency of micro-enterprises was constantly below the average of the economy, while the efficiency of the large enterprises was higher than the economy of the MSME sector.
- Except for the year 2016, the MSME sector was constantly below the average profitability, primarily due to the unprofitability of the micro-enterprises.
- The large enterprises were the most solvent, whereas the MSME sector was constantly solvent below the average, solely due to the low solvency of the micro-enterprises.
- The micro-enterprises had a chronic liquidity problem, and the medium-sized enterprises were the most liquid part of the economy, whereas the large ones had a pronounced liquidity problem.
- The micro-enterprises constantly operated unprofitably in the zone of the deep negative financial leverage. The small companies operated most profitably in the zone of the positive financial leverage (the rate of return on equity was constantly twice as high as the rate of return on business assets). The medium-sized companies operated profitably, with a positive financial leverage, but with unchanged ROA and ROE during the period 2016-2019. The large companies operated profitably on average, with a sharp decline in 2019 (Table 7).

Sectoral changes

The structural analysis showed that, in the structure of the GVA of the economy, in addition to the continuation of the trend of the strengthening of the service sector, which is the key determinant of the "structural change paradigm" (Islam & Iversen, 2018, 4), the growth of the construction sector growth of employees in the manufacturing industry and in some service activities (tourism, professional, scientific and innovation services and administrative services) is evident. There is an evident structural decline in the transport, agriculture, mining and electricity supply sectors.

The sectoral analysis of liquidity (Table 8), showed that the most liquid sectors were the mining sector (the general liquidity ratio 1.46 and the reduced ratio 0.75), the manufacturing sector (1.04 and 0.63) and the trade sector (1.11 and 0.68), whereas the most illiquid sectors of the economy were the traffic sector (0.75 and 0.66), the electricity sector (0.82 and 0.62) and the construction sector (0.94 and 0.60).

The sectoral analysis of profitability signals that the trade sector consistently had high business profitability, the manufacturing sector achieved high rates of return on equity, i.e. high business profitability, in the period 2016-2019, and the construction sector improved the performance of

Table 7 The profitability of the economy by the size of the company

	2015					2016					2017					2018					2019				
	P	Mk	M	S	V	P	Mk	M	S	V	P	Mk	M	S	V	P	Mk	M	S	V	P	Mk	M	S	V
Net profit	0.8	-3.0	3.1	-1.5	2.7	2.1	-3.6	3.0	4.0	2.8	3.8	-1.6	4.1	4.3	5.6	4.3	0.1	3.6	4.4	6.2	3.5	0.0	5.1	4.4	3.3
Business profit rate	4.7	2.7	5.1	4.5	5.5	5.6	3.2	5.7	5.6	6.6	5.3	3.3	5.3	5.2	6.2	5.4	3.7	5.2	5.4	6.1	5.1	4.4	5.8	5.8	4.4

Note: E - the economy; ME - micro-enterprises; SE - small enterprises; ME - medium-sized enterprises; LE - large enterprises

Source: Author, based on the SBA data

Table 8 The sectoral changes in liquidity in the period 2015-2019

	Opšti racio likvidnosti						Reducirani racio likvidnosti					
	2015	2016	2017	2018	2019	2015 2019	2015	2016	2017	2018	2019	2015 2019
Economy	0.87	0.91	0.93	0.95	0.97	0.06	0.60	0.63	0.63	0.64	0.64	0.04
Agriculture	0.90	0.95	0.97	1.00	1.05	0.15	0.53	0.57	0.56	0.58	0.61	0.08
Mining	0.70	0.95	0.97	1.26	1.46	0.76	0.53	0.72	0.69	0.74	0.75	0.22
Manufacturing	0.79	0.87	0.93	0.98	1.04	0.25	0.49	0.56	0.57	0.59	0.63	0.14
Electricity	0.73	0.68	0.62	0.60	0.82	0.09	0.57	0.57	0.51	0.48	0.62	0.05
Water supply	0.78	0.73	0.72	0.70	1.06	0.28	0.61	0.57	0.56	0.54	0.53	-0.08
Construction	0.74	0.77	0.80	0.84	0.94	0.20	0.45	0.48	0.45	0.52	0.60	0.15
Trade	1.01	1.02	1.05	1.08	1.11	0.10	0.63	0.62	0.63	0.66	0.68	0.05
Traffic and storage	0.89	0.84	0.78	0.96	0.75	-0.14	0.78	0.74	0.69	0.82	0.66	-0.12

Source: Author, based on the SBA data

both the total profitability and business profitability from year to year, but was still below the average of the economy. The electricity, agriculture and water supply sectors operated in the zone of low profitability and the negative financial leverage. The transport sector showed volatility (Table 9).

Structural changes in the manufacturing industry

The key lever in the new economic growth model is based on the performance improvements and structural changes in the manufacturing industry. In the period of economic recovery, the number of enterprises in the manufacturing industry increased by 5.1%, the number of employees increased 27.2%, income increased 17.9%, the net result increased 35.4%, the GVA increased 16.8%, capital increased 32.7%, while the cumulative loss (-18.6%), as well as the total liabilities (-1.7%), decreased (Table 10).

From the position of a net loser in 2015, the manufacturing industry entered the positive zone of net profits in the period 2016-2019, the net result in 2019 amounting to EUR 940 million, i.e. 28% of the net result of the economy. The metal product industry, the non-metal industry, the pharmaceutical industry, the beverage industry, the tobacco industry, the paper and paper product industry, the machinery and equipment industry and the wood industry were constantly net winners, without any major oscillations. The rubber and plastic industry recorded a record high net result in 2019 (EUR 282 million, i.e. 30% of the manufacturing industry), and the constant net losers were the coke and petroleum product industry and the metal industry. In the largest number of the areas of the manufacturing industry, the operating profit was higher than the net profit, which was mainly due to the negative financial result (the higher financial expenses than the financial income). The biggest disparities in the net results and the operating profit were registered with the food industry. Significant disparities between the core business and the total operating profit in favor of the core business were registered in the areas of the beverage industry, the clothing industry, the chemical industry, the paper and paper product industry, the non-metal industry, the metal product industry, the electrical equipment industry, and the machinery and equipment industry. In the period 2015 – 2019, the processing industry of Serbia produced EUR 24.8 billion of a new value, i.e. the GVA of the manufacturing industry increased by 16.8% in real terms, with an average annual rate of 4% (Table 11).

The qualitative economic and financial performance of the manufacturing industry shows a positive

trend in the period 2016-2019, with many oscillations. Solvency and profitability, and the net and operating profit rates improved, whereas the operating rate of return on operating assets (ROA) and the rate of return on equity (ROE) show oscillations. What was the most positive was the decline in indebtedness, especially the ratio of the total liabilities and the capital. The most liquid areas of the manufacturing industry were Pharmacy, Rubber and Plastics, Paper Industry, Tobacco, Leather, Clothing, Food Industry and Computers and Electrical Equipment. The biggest liquidity problems were present in the motor vehicle industry, Traffic Assets, Machinery and Equipment, Coke and Oil and the Metal industry. The most profitable areas of the manufacturing industry were Pharmacy, Rubber and Plastics, Machinery and Equipment, the paper industry and the tobacco industry. Pharmaceuticals, Rubber and Plastics, Paper and Tobacco had the highest ROA rates, whereas in addition to the mentioned areas, the highest rates of return on capital were those in the machinery and equipment industry and the non-metal industry.

In general, the structural changes in the economy were not effective, because they were not driven by drivers, primarily innovation and R&D (Mićić, 2017, 44). The technological structure of the processing industry

Table 9 The sectoral changes in profitability in the period 2015-2019

	ROA (rate of return on operating assets)					ROE (rate of return on equity)				
	2015	2016	2017	2018	2019	2015	2016	2017	2018	2019
Economy	1.56	2.17	3.43	3.64	3.12	1.65	3.96	7.36	8.06	6.91
Agriculture	59.92	1.95	1.42	0.25	1.06	119.08	2.39	1.58	-0.37	1.28
Mining	2.54	3.56	3.75	20.47	3.67	3.61	7.18	5.53	40.96	5.53
Manufacturing	0.40	3.60	5.67	3.78	3.82	-4.25	11.23	17.72	9.85	9.69
Electricity	2.08	1.69	2.31	0.82	0.85	2.37	1.95	3.37	0.72	0.62
Water supply	89.88	1.61	1.74	1.12	2.15	137.64	1.87	2.32	1.38	3.25
Construction	-0.13	0.00	1.05	2.10	2.49	-2.78	-2.30	0.83	4.50	6.37
Trade	2.98	2.31	3.80	3.12	3.55	8.49	7.20	12.93	9.88	11.18
Traffic and storage	3.30	2.74	2.82	7.34	2.84	5.25	3.80	4.10	12.96	5.34

Source: Author, based on the SBA data

Table 10 The performance of the manufacturing sector

	No Company	No Employees	Income	Net Profit	Net loss	Net result	GVA	Cumulated loss	Liability
2019 (million EUR)									
Economy	104,487	1,171,890	102,931	5,805	2,478	3,327	20,602	29,697	82,073
Manufacturing	17,548	381,012	27,476	1,674	734	940	5,681	8,375	18,889
2019/2015 (rates in %)									
Economy	10.4	18.3	20.9	38.0	-30.9	435.0	35.3	-8.6	6.9
Manufacturing	5.1	24.7	17.9	27.6	-52.2	35.4	16.8	-18.6	-8.8

Source: Author, based on the SBA data

Table 12 The performance of the technological structure of the manufacturing industry

	Enterprises		Employment		GVA		
	Number	%	Number	%	2017	2018	2019
Low-Tech	9,737	55.5	171,449	45.0	43.2	43.2	43.9
Medium-Low Tech	4,497	25.6	108,065	28.4	29.8	29.2	28.0
Medium-High Tech	2,404	13.7	89,372	23.5	22.3	22.5	22.6
High-Tech	910	5.2	12,126	3.2	4.7	5.1	5.5
Total	17,548	100.0	381,012	100.0	100.0	100.0	100.0

Source: Author, based on the SBA data

was constantly unfavorable and the low technological complexity branches were predominant (Table 12). Although there was a noticeable improvement in the technological structure in the high-tech branches in the period 2017-2019 namely the growth of participation in the structure of the GVA from 4.7% to 5.5%, in 2019, more than 80% of the companies employ 73.4% of workers in the areas of low and medium-low technological intensity, and create 73% of the GVA of the processing industry.

Changes in the ownership structure of the economy

The performance of the ownership structure of the economy (Table 13) shows a trend of strengthening the influence of the companies with majority foreign capital on the business of the economy. The research study shows that foreign acquisitions from multinational companies had better business performance, not only better than average domestic firms at the time of purchase, but they also improved their post-purchase performance faster than domestic firms did (Ragoussis, 2020, 77). Foreign private companies constantly increased their contribution to economic growth, increasing employment by more than 50%, their income, the GVA and capital having grown above the average, as well as their accumulated losses and liabilities. The domestic private sector improved its performance, achieved a significant net result, and reduced losses. The public sector reduced the number of employees by 1/5, as well as losses and liabilities, but still operated at a loss. The share of the majority foreign-owned companies in the GDP constantly increased from 12.3% in 2015 to 15.9% in 2019. The share of domestic private companies in the GDP increased from 17.5% to 21.4%, while the share of the state-owned enterprises simultaneously fell from 8.3% to 7.3%. In the period 2015-2019, the increase in the number of foreign private companies was 8.1% and the 18.3% increase in the number of employees in the economy mostly related to foreign companies (a 53.1% increase), in which about 300,000 workers work today. Foreign privately-owned enterprises (i.e. foreign POEs) increased the newly created value (GVA) by 50%, which was significantly more than the domestic privately-owned enterprises (41.1%) did. They increased capital twice as much as domestic POEs did (55% *versus* 27.8%).

The qualitative business performance of the ownership structure of the economy showed that the business performance of the foreign POEs was at a higher level than the business performance of the domestic POEs (Table 14). The productivity of the foreign private companies was constantly higher than the domestic ones, the economy was slightly higher with the foreign companies, the profitability of the foreign companies was 8 times higher in 2015, and the disparities in 2019 were reduced to 30%. The solvency of the private foreign sector was consistently higher than that of the domestic private sector. Also, the liquidity of the foreign companies was constantly at a higher level, especially if the sharper liquidity

through a reduced liquidity ratio is analyzed. The profitability of the foreign companies was higher, especially so the total profitability. The disparities in the return on business assets (ROA) of the foreign companies in relation to the domestic companies gradually decreased from year to year, but they were still significant (5.4% vs. 4.2%). The disparities in return on capital (ROE) were lower. The indebtedness of the foreign companies, with slight oscillations, was at a lower level than the indebtedness of the domestic private sector. The public sector operated unprofitably, with illiquidity and unprofitably.

Table 13 The performance of the ownership structure of the economy in the period 2015-2019

	No Company	No Employees	Income	Net Profit	Net loss	Net result	GVA	Capital	Cumulative loss	Liability
Economy	10.4	18.3	20.9	38.0	-30.9	187.0	35.3	13.6	-8.6	6.9
POE	10.4	29.9	28.0	51.6	-32.9	135.7	44.8	27.8	2.8	17.0
Foreign POE	8.1	53.1	36.4	67.5	18.8	95.2	50.0	55.0	25.6	31.5
Domestic POE	10.5	21.9	23.1	42.1	-45.0	183.0	41.1	15.4	-6.6	10.9
SOE	7.6	-20.3	-17.3	-39.4	-26.8	-	1,5	-6.1	-21.9	-16.1

Note: POE - privately-owned enterprises; SOE - state-owned enterprises

Source: Author, based on the SBA data

Table 14 The qualitative indicators of the ownership structure of the economy

	2018			2019		
	PS	PD	DP	PS	PD	DP
Efficiency	1.05	1.05	1.04	1.06	1.05	0.97
Profitability	9.6	9.1	1.0	10.4	8.0	-1.7
Solvency	1.6	1.5	1.9	1.7	1.5	1.9
General liquidity ratio	1.13	1.06	0.53	1.18	1.07	0.51
Reduced liquidity ratio	0.77	0.69	0.41	0.81	0.69	0.38
Net profit rate	4.1	4.7	2.8	4.9	3.9	-4.8
Business profit rate	5.8	4.6	8.7	5.7	5.4	0.2
ROA	4.8	4.8	1.1	5.4	4.2	-0.7
ROE	11.3	13.1	1.3	12.1	11.2	-2.4
Indebtedness 1	58.7	60.8	46.1	56.6	61.7	47.3
Indebtedness 2	141.9	154.9	85.4	130.3	160.8	89.6

Note: Foreign POE - foreign privately-owned enterprises; Domestic POE - domestic privately-owned enterprises; SOE - state-owned enterprises; ROA - rate of return on operating assets; ROE - return on equity; Indebtedness 1- the ratio of the total liabilities and the total sources of financing; Indebtedness 2 - the ratio of the total liabilities and capital.

Source: Author, based on the SBA data.

STRUCTURAL PROBLEMS IN ECONOMIC BUSINESS

The structural analysis of the performance of the economy pointed out the problems that continuously burdened the business of the economy and that related to the problems of illiquidity and indebtedness, i.e. the amount of losses and liabilities. The concentration of problems was found in the groups of the companies without employees and in the micro-companies. A significant group of the companies without employees, or with one employee, increasingly burden the business of the economy. Namely, more than 50% of companies in the economy without employees, or with one employee, constantly generate 1/3 of current and more than 40% of accumulated losses. All qualitative business performance of almost 90,000 micro companies (companies with up to 9 employees) is below the average of the economy and their business is insolvent, unprofitable, illiquid, low profitable and burdened with losses and indebtedness.

The growth trend of the total liabilities and the amount of indebtedness is the key problem in the business of the economy that has been present for decades. The total liabilities of the economy have, in the past five years, increased by 7% in real terms, the indebtedness of the economy is still high, despite a relative decrease due to favorable sources of financing. The accumulated losses of the economy are high - in 2019 they amounted to almost 30 billion euros. In the structure of accumulated losses, 48.6% are located in micro, 10% in small, 11.9% in medium and 29.4% in large enterprises. The fact that the rate of lost capital in the economy is constantly high (36.6%) should be noted as such.

The amount of the external debt narrows room for maneuvering intended to improve the performance of the economy, increase investment and increase the living standards. In the period 2015-2019, the external debt of Serbia increased by EUR 2.18 billion, the corporate debt by EUR 2.44 billion, the public sector reduced its debt by EUR 1.43 billion, whereas the bank debt increased by EUR 1.17 billion.

CONCLUSION

In the period 2015-2019, the global economy contributed to the acceleration of growth in Serbia, with the average GDP growth of 3.5% being higher than the average growth in the countries of the region, bearing in mind the fact that there were signs of slowing growth even before the global recession. The largest contribution to growth was made by macroeconomic aggregates, investment and personal consumption. The implemented fiscal consolidation contributed to the reduction in the internal and external macroeconomic imbalances. The budget has been balanced since 2017, but the chronic problem of the foreign trade deficit is still present. FDIs, especially their structural aspect, made a key contribution to macroeconomic stability, thus amortizing the problem of covering the current account deficit. It is extremely important that the increase in fiscal discipline and balanced public finance have contributed to a reduction in the public debt and the external debt. From the social point of view, the most important is the fact that the positive macroeconomic results had the greatest impact on the labor market.

Given the huge transition gap, as well as the peripheral status of the entire SEE area, the speed, commitment and capacity of the state to implement structural reforms in the past conjuncture were not in the function of economic catching up and strengthening economic competitiveness. The main contribution of the research to the effects of structural changes in the economy is the confirmation of the hypothesis that the implemented structural reforms in the boom period were insufficient, i.e. that the economic boom did not contribute to the expected structural changes (Hypothesis H1). The entrepreneurial sector slightly improved its performance, the resilience being mostly improved by the segment of medium-sized enterprises. The conjuncture had a positive effect on the business of large companies.

For the first time in two decades of transition, the economy of the Republic of Serbia have had a net profit for four years in a row, which is the result of continuous economic growth and the improvement of macro- and micro-business performance. The

additional contributions of the research study are the findings of the qualitative performance of the economy, which show that the key qualitative economic and financial performance of the economy has improved, namely productivity, the economy, solvency and profitability, while profitability has recorded a high growth, although a slight trend of positive improvements has been registered (H21).

On the one hand, the structural analysis of the economy showed the continuation of the strengthening trend of the GVA of the service sector and the construction sector, in the employee structure and growth in the manufacturing industry (Hypothesis H1), whereas on the other, there is a structural decline in Transport, Agriculture, Forestry and Water Management, Mining and Electricity Supply. The conjuncture had a positive effect on the growth of the profitability of the trade, manufacturing and construction sectors (H1). Since the key lever in the new model of economic growth is based on improving performance and structural changes in the manufacturing industry, the research study showed that, in the boom period:

- the most liquid areas were Pharmacy, Rubber and Plastics, Paper Industry, Tobacco, Leather, Clothing, the food industry, Computers and Electrical Equipment, and
- the most profitable were Pharmacy, Rubber and Plastics, Machinery and Equipment, the paper industry and the tobacco industry.

That structural changes in the economy were not driven by the factors driving economic growth (i.e. innovation and R&D) is shown by the findings of the research in the technological structure of the manufacturing industry, which is constantly unfavorable and in which low technological complexity has a dominant share (H21).

The research in the structural performance of the ownership structure shows a trend of strengthening the influence of companies with majority foreign capital on the economy and also that multinational companies have better business performance, not only better than an average domestic company at the time of purchase, but they also improve their performance faster than domestic companies do. The share of foreign POEs in the GDP constantly increases, foreign POEs having increased the newly created value by 50%, which is significantly more than in the domestic private sector (41.1%). The key qualitative business performance of foreign POEs is at a higher level than the business performance of the domestic private sector (H2). The public sector operates unprofitably, with illiquidity, and unprofitably.

The old structural problems that burden the business of the economy are related to the chronic problem of illiquidity and indebtedness, i.e. the amount of losses and liabilities. Companies without employees or with one employee constantly represent a transitional burden (generating more than 40% of cumulative losses). The qualitative performance of almost 90,000 micro-enterprises is below the average of the economy, they continuously operate insolvently, unprofitably, with illiquidity and low profitability, and they are burdened with losses and indebtedness. The rate of lost capital in the economy is still extremely high. The level of the external debt is one of the biggest challenges narrowing room for maneuvering intended to improve the performance of the economy and increase investment and the living standards.

The empirical research required going through complex databases and the classification of business entities according to different methodologies. The main limitation was the methodology for classifying business entities according to the ownership structure. Since the coverage of state-owned enterprises is a rather diversified category, the research applied the sectoral classification of institutional units, which included public, state-owned non-privatized and bankrupt or liquidated enterprises under the category of state-owned enterprises.

Given the unpredictability of the global recession caused by the consequences of COVID-19 (Guerrieri, Lorenzoni, Straub & Werning, 2020, 34), the focus of the economic policy in the forthcoming period will be directed towards a targeted aid package for the economy and health. The structural analysis of economic performance detected the key (old) problems

and the causes of low competitiveness. Priority reform activities should provide an environment conducive to the development of domestic entrepreneurship and the growth of private investment in order to increase trust between entrepreneurship and institutions. In this context, it is necessary to institutionally unite the key structural reforms that contribute to economic growth, which includes the transformation of public enterprises (Jakopin & Čokorilo, 2019, 66-67) and encouraging a faster development of domestic entrepreneurship.

Further research studies should be directed towards systemic reforms in the following areas: improving the efficiency of the management of state property; increasing the efficiency of public management through the introduction of an integrated system of strategic planning and the management of economic, regional and sectoral development (Ristic, Boskovic & Despotovic, 2019, 70); the formation of financial development institutions (the Developmental Bank of Serbia, the Guarantee Fund); encouraging the growth of those areas of the manufacturing industry and the specific domestic companies that have a potential for the growth of the core business; the formation of sectoral industrial zones; the improvement of the business environment in order to relieve entrepreneurs from administrative and financial burdens; an education reform in line with the needs of the economy; creating incentive packages for business entities and sectors in order to improve resource efficiency through the use of clean technologies and environmental protection. Progress in all relevant reform areas will primarily depend on institutional reforms, the biggest challenges being in the two reform areas, namely in the rule of law and the control of corruption.

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Received on 17th September 2020,
after revision,
accepted for publication on 18th December 2020.
Published online on 25th December 2020.

Edvard Jakopin is an associate professor at the Faculty of Economics and Finance at the Union-Nikola Tesla University in Belgrade and an advisor to the director at the Republic Bureau of Statistics for the preparation of strategic analyzes. He received his doctorate from the Faculty of Economics, University of Belgrade. He was the director of the Republic Bureau for Development and the assistant ministers for finance, economy and regional development. The primary areas of scientific research are: macroeconomics, economic and regional development planning and structural changes.

Economic Horizons, September - December 2020, Volume 22, Number 3, 197 - 206
UDC: 33 ISSN: 1450-863 X
© Faculty of Economics, University of Kragujevac
www. ekfak.kg.ac.rs

Original scientific paper
UDC: 339.727.2(5-12)
330.322(5 12)
doi:10.5937/ekonhor2003209L

REVISITING THE FOREIGN DIRECT INVESTMENT-LED AND EXPORT-LED GROWTH HYPOTHESES IN ASEAN+3 COUNTRIES

Cheng-Wen Lee[1] and Andrian Dolfriandra Huruta[2,3]*

[1]*Department of International Business, College of Business, Chung Yuan Christian University, Taiwan*
[2]*College of Business, Chung Yuan Christian University, Taiwan,*
[3]*Department of Economics, Faculty of Economics and Business, Satya Wacana Christian University, Indonesia*

In this paper, the effects of Foreign Direct Investments (FDIs) and exports on economic growth in the Association of Southeast Asian Nations Plus Three countries are explored. The panel data of a total of 13 countries pertaining to the period from 2008 to 2018 were analyzed. Based on the result of the Lagrange Multiplier (LM) test, the data fit to the random effect model. In a similar fashion, the Wald test suggests that there is no endogeneity problem in the given model. Furthermore, the results of the Hausman and Chow test also indicate that the random effect model is the most effective model to describe the effects of FDIs and exports on economic growth. The results prove that FDIs positively impact economic growth. In addition, exports also have a positive and meaningful effect on economic growth. Overall, the paper empirically confirms FDI-led growth and export-led growth. To conclude, the findings indicate the fact that FDIs and exports are crucial for boosting the economic growth of the ASEAN+3 countries. The ASEAN+3 region remains quite an attractive destination for international companies around the world when FDIs and trade are concerned.

Keywords: ASEAN+3, foreign direct investments, export, growth, panel data

JEL Classification: F15, F20

INTRODUCTION

Starting in July 1997, several East Asian and Southeast Asian countries began to suffer from the East Asian financial crisis that raised concerns about possible global economic meltdowns due to financial contagion. As such, the East Asian financial crisis gained in significance among and became focused on by policymakers and scholars (Miankhel, Thangavelu & Kalirajan, 2009). At the ministerial and head-of-government levels, the governments of the 10 Southeast Asian and three East Asian countries

* *Correspondence to*: A. D. Huruta, College of Business, Chung Yuan Christian University, 200 Chung Pei Road, Chung Li District, Taoyuan City, 32023, Taiwan; e-mail: g10804610@cycu.edu.tw

regularly met to discuss strategies to prevent potential financial crises and promote regional cooperation. A Joint Statement on the Cooperation of East Asia, recognized as ASEAN Plus Three (ASEAN+3 or APT), was issued by the 13 heads of government in 1999. It emphasized their dedication to deepening global, financial, social and political dialogues in order to foster cooperation in the areas of a mutual interest and concern, including the energy, transportation, information and communication infrastructures.

In 2017, a strong global economic growth of 3.7% positively influenced trade and investment growth between the ASEAN+3 countries (ASEAN Secretariat, 2020). The total trade increased by 16.1% to USD 807.3 billion, accounting for 31.6% of the total merchandise trade in ASEAN. In addition, the ASEAN+3 Foreign Direct Investments (FDI) flows were estimated at USD 29.9 billion, thus constituting 21.8% of ASEAN's overall FDI inflows (ASEAN Secretariat, 2018).

Trade with China, Japan, and the Republic of Korea helped ASEAN to gain a significant momentum during the global economic uncertainties. In 2018, the trade of ASEAN Plus Three increased by 6.8% to USD 869.1 billion, or 31.0% of ASEAN's total trade. The FDI flows from the Plus-Three nations to ASEAN were measured at USD 37.9 billion. ASEAN accounted for 24.5% of the overall FDI inflows, which increased by 9.9% compared to the previous year (ASEAN Secretariat, 2020). In a similar fashion, T. Widodo (2009) noted that the trends of the comparative advantage of the ASEAN+3 countries had changed. Therefore, the relationship between the growth of the economy, FDIs and exports in the ASEAN+3 countries should be recognized. To understand how these variables work from the point of view of the policy would improve economic growth.

In developing and developed countries, the relationship between FDIs, exports and economic growth remains scholars' significant theoretical and empirical interest (Acaravci & Ozturk, 2012). Recently researchs, Md. R. Sultanuzzaman, H. Fan, M. Akash, B. Wang and U. S. Md. S. (2018) and A. Jamal and M. A. Bhat (2019), have demonstrated the roles of both exports and FDIs in economic growth. Several previous studies suggest that FDIs are the key determinant of overall growth (see the review of the literature on FDI-led growth). However, the theory of export-led growth claims that exports are a significant predictor of overall growth (see the review of the literature on export-led growth). In a similar fashion, S. Sermcheep (2019) also empirically demonstrated ASEAN's export-led growth in services over the past decades. As such, this paper focuses on both the developing and the developed ASEAN and East Asian countries. Taking into consideration the fact that these countries are at various levels of development, the impact of exports and FDIs on growth in the different phases of growth are arguably established in this research study.

The issue is addressed in this paper in several sections. A literature review and the hypothesis development are established in the second section. In the third and fourth sections, the methodology is explained, the empirical results are presented, and a discussion is given. The last section of the paper addresses the drawbacks and ideas for future studies.

LITERATURE REVIEW

Foreign Direct Investments-led growth

The theoretical basis for the academic research in FDIs and growth originates from either neoclassical growth or endogenous growth model (Nair-Reichert & Weinhold, 2001). The neoclassical growth of the Solow growth model indicates the fact that FDIs increase capital stocks, as well as growth in the host economy, by financing capital formation (Brems, 1970). As countries shift towards a new steady state (domestic investment), FDIs only have a short-term impact on growth. However, the endogenous growth model explains that FDIs are widely acknowledged as more efficient than domestic investments, given the fact that they facilitate the inclusion of new technologies in the production function of the host economy (Borensztein, Gregorio, De & Lee, 1998).

The ultimate effect of FDIs on the production growth of the host economy depends on the extent of the

productivity spillovers of domestic companies (De Mello, 1997). It is possible due to the existence of a bidirectional statistical relationship between FDIs and production growth (Yalta, 2013). Based upon the FDI-led growth hypothesis, FDI inflows will stimulate development for host countries by raising capital stocks, establishing new employment opportunities and encouraging a technology transfer (Borensztein, Gregorio, De & Lee, 1998; De Mello, 1997). In other words, FDIs contribute to the enhancement of the returns of domestic outputs and the quality of the FDI-related value added of production. Additionally, current studies have shown the beneficial effects of FDIs on growth (Adams, 2009; Moudatsou & Kyrkills, 2011; Acaravci & Ozturk, 2012; Mahmoodi & Mahmoodi, 2016; Hussain & Haque, 2016; Jamal & Bhat, 2019). However, by crowding out domestic investments, growing external vulnerability and creating dependence, it is also anticipated that FDIs will adversely affect growth (Aitken & Harrison, 1997). Furthermore, as the neutrality hypothesis suggests, there seems to be no significant correlation between FDIs and growth, either (Yalta, 2013). For these reasons, the first hypothesis that can be proposed is as follows:

H1: ASEAN+3 countries demonstrate FDI-led growth.

Export-led growth

Early discussions on the export-led growth problem were only focused on the framework for correlation analysis and the simple regression model (Balassa, 1978; Heller & Porter, 1978). In stimulating economic development, an export-led growth strategy is a preferred policy prescription (Lim & Ho, 2013). The relationship between exports and economic growth is referred to as export-led growth, i.e. the situation that emerges from an increase in the export capacity of a nation. In the literature on international trade and development, studies with export-led growth hypotheses are hardly a new field of research (Tang, Lai & Ozturk, 2015). According to K. K. Gokmenoglu, Z. Sehnaz and N. Taspinar (2015), the theory of trade argues that exports support the domestic economy across many channels. They are the only part of demand that can compensate for growth in terms of requirements for the growth of imports (capital goods) (McCombie & Thirlwall, 1994). This is an important explanation of the reason why, by pursuing an export-led growth strategy, exports matter and provide a justification for why countries benefit. Exports improve the economic growth through adding to gross production across the efficient utilization of resources and the creation of the resources based on foreign exchange. The reciprocal relationship between exports and growth is also connected with the export-led growth hypothesis (Petchko, 2018). Export-led growth theory assumes that international trade policies focus on exports driving economic growth (Richards, 2010; Yamada, 1998). Moreover, recent research studies have also shown that exports have a positive impact on growth (Acaravci & Ozturk, 2012; Mahmoodi & Mahmoodi, 2016; Hussain & Haque, 2016; Priyankara, 2018; Sermcheep, 2019; Jamal & Bhat, 2019). However, no causal relationship is likely to exist between exports and economic growth (Ramos, 2001; Hsiao & Hsiao, 2006; Shawa & Shen, 2013). Therefore, the second hypothesis that can be proposed is as follows:

H2: ASEAN+3 countries demonstrate export-led growth.

METHODOLOGY

The three macroeconomic variables used in this study include economic growth, FDIs, and exports. Economic growth is the annual actual GDP growth rate, while FDIs are annual stock inflows. Lastly, exports apply to both the annual outflows of goods and the annual outflows of services. The data include the annual findings of the UNCTAD in 13 ASEAN+3 countries in the period from 2008 to 2018.

Moreover, R. C. Hill, H. E. Griffiths and G. C. Lim (2018) reveal that the stationarity test with one lagged difference eliminates the problem of autocorrelated residuals. The following equation 1 represents the stationarity test with a constant trend and no trend at all.

$$Y_{it} = \alpha_i + \gamma_i Y_{it-1} + \lambda_{it} + v_{it} \quad (1)$$

In addition, the models of the regression of the panel data are suggested in this paper. The following equations 2, 3, and 4 illustrate the three models (Hill, Griffiths & Lim, 2018), namely:

$$Y_{it} = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + e_{it} \quad (2)$$

$$Y_{it} = \beta_{0i} + \beta_1 X_{1it} + \beta_2 X_{2it} + e_{it} \quad (3)$$

$$Y_{it} = \overline{\beta}_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + v_{it} \quad (4)$$

where,

Y_{it}: the economic growth of the i country in the t period

x_{1it} : the FDIs of the i country in the period t

x_{2it} : the exports of the country i in the period t

β_0 : the intercept parameter

β_{0i} : the inndividual intercept

$\overline{\beta}_0$: the population average

β_1, β_2 : the regression coefficients

e_{it} : the error term of the country i in the period t

v_{it} : the composite error term*

Note: *In order to accommodate such heterogeneity, e is decomposed into two independent components or the composite error term ($v_{it} = \lambda_i + e_{it}$). It is assumed that e_{it} is i.i.d with the mean zero and variance (the remainder error term or the regular error term), λ_i refers to the individual-specific effect (unobserved heterogeneity) and is time invariant - it is constant across individuals (Law, 2018).

RESULTS AND DISCUSSION

The outcomes of several studies are discussed in this section. The descriptive statistics of the variables are found in Table 1.

Table 1 The summary of the descriptive statistics

Statistics	Y	X_1	X_2
Mean	3.522181	19169.04	45920.91
Median	3.801313	7600.000	20439.20
Maximum	9.844420	139043.5	266841.2
Minimum	-5.428591	-1758.334	5.766000
Std. Dev.	2.921867	34047.11	61878.69
Skewness	-0.705468	2.428814	1.450529
Kurtosis	3.727946	7.727336	4.191772
Jarque-Bera	15.01885	273.7512	58.60890
Probability	0.000548***	0.000000***	0.000000***
Sum	503.6719	2741173.	6566690.
Sum Sq. Dev.	1212.298	1.65E+11	5.44E+11
Observations	143	143	143

Note: *** p<1%

Source: Authors

As is shown in Table 1, the mean values are positive for all the variables. Meanwhile, the exports (X_2) and the FDIs (X_1) have the highest standard deviation (61,878.69 and 34,047.11, respectively), which represents the volatility of the observation values. Furthermore, economic growth (Y) has the lowest standard deviation (2.921867). Jarque-Bera's indicate that the residual values of all the variables are usually distributed at 1%. Next, the correlation findings are summarized in Table 2.

Table 2 shows that the correlations between these three variables vary from -0.097417 to 0.481866. Interestingly, the FDIs (X_1) and the exports (X_2) demonstrate the strongest correlation, while economic growth (Y)

Table 2 Correlation

Variable	Y	X_1	X_2
Y	1.000000		
X_1	0.309831	1.000000	
X_2	-0.097417	0.481866	1.000000

Source: Authors

and the exports (X_2) have the weakest correlation. Thus, the FDIs and the trade flows in the ASEAN+3 countries were closely associated. The influence of FDIs on economic growth does not necessarily have to be the result of the statistically significant coefficient of the FDIs in the growth equation. The positive correlation could also be consistent with the causality from growth to FDIs, provided that rapid economic growth typically created higher demand and better profit opportunities for FDIs (Nair-Reichert & Weinhold, 2001). With the level [I(0)] and the first difference [I(1)], the following Table 3 summarizes the results of the stationarity test.

Table 3 reveals the fact that the economic growth (Y) is stationary at the level of I(0), as can be seen from the statistics value of -18.5401 that is greater than the 99% confidence level and the probability value of 0.0000 ($p < 0.01$). In addition, the foreign direct investment (X_1) variable has the statistics value of -7.67164 that is greater than the 99% confidence level and the probability value of 0.0000 ($p < 0.01$). In a similar fashion, the export (X_2) variable has the Augmented Dickey-Fuller value of -6.70535 that is greater than the 99% confidence level and the probability value of 0.0000 ($p < 0.01$). According to N. R. Ericsson, J. S. Irons and K. W. Tryon (2001), the relationship between FDIs and growth was usually limited to the first differences [I(1)] by standard cross-country and panel studies on FDIs and growth. Based on the results, the panel stationarity test with the first difference also reveals that all the variables are stationary. The results of the Lagrange Multiplier and the Wald tests are shown in Table 4.

Table 3 Stationarity

Variable	Statistics		Probability		Conclusion
	Level	First Difference			
Y	-18.5401	-19.0857	0.0000***	0.0000***	Stationary
X_1	-7.67164	-9.54222	0.0000***	0.0000***	Stationary
X_2	-6.70535	-4.27350	0.0000***	0.0000***	Stationary

Note: *** p<1%

Source: Authors

Table 4 The results of the Lagrange Multiplier and the Wald Tests

Test Statistics	Value	df	Probability
t-statistic	2.036377	127	0.0438
F-statistic	4.146829	(1, 127)	0.0438
Chi-square	4.146829	1	0.0417
C(1)	6.14E-05		2.89E-05
Breusch-Pagan LM	229.4771		0.0000***
Pesaran scaled LM	12.12787		0.0000***
Pesaran CD	3.546466		0.0004***

Note: *** p < 0.01

Source: Authors

Table 4 shows that there is a random impact on the model, as suggested by the Breusch-Pagan value of 229.4771 (greater than the 99% confidence level) and the probability value of 0.0000 ($p < 0.01$). In a similar fashion, the Wald test has a probability value above the conventional significance level ($p > 0.01$). Wald tests suggest no endogeneity problem in the model. Table 5 displays the results of the pooled (OLS), fixed-effect and random-effect models.

Table 5 reveals that both the Hausman and the Chow tests suggest that the random effect model is best model. The table shows that the probability of the Hausman and the Chow tests is greater than 5%. The random-effect model shows that FDIs (DX_1) significantly affect economic growth (thus supporting H_1) with the probability value of 0.0438 ($p < 0.05$). In a similar fashion, exports (DX_2) significantly affect economic growth (thus supporting H_2). However, the $\overline{R}^2$ of the random-effect model is only 6.54%. It is worth noting that the $\overline{R}^2$ value is generally lower in panel models (PeiZhi & Ramzan, 2020).

The findings show that, in the ASEAN+3 countries, the FDI-led growth hypothesis is approved. Commitments to reduce the costs of doing business would arguably stimulate FDIs. In this respect, the ASEAN+3 countries had been improving their Ease of Doing Business (EoDB). The region was incorporated into the increasing regional production networks in East Asia by the growth of FDIs in ASEAN (Chen & Intal, 2017). According to A. Miankhel, S. Thangavelu and K. Kalirajan (2009), policymakers should remove the trade, fiscal, and financial barriers restricting exports and FDIs. Moreover, S. Adams (2009) revealed spikes in capital (FDIs) globalization in the last two decades. FDIs have been the most stable and the most important part of capital flows, indicating that they have been an effective alternative in the financial cycle in the developing countries. FDI inflows would enhance the growth of host countries by increasing their capital stocks, generating employment opportunities and allowing a transfer of technology (De Mello, 1997; Borensztein, De Gregorio & Lee, 1998). Several studies indicated that the effect of FDIs on economic growth depended on country-specific factors, such as the per capita income level of the host country, the human capital base, the degree of economic openness and the level of the development of the financial market (Blomstrom, Lipsey & Zejan, 1992; Balasubramanyam, Salisu & Sapsford, 1996; Borensztein, De Gregorio & Lee, 1998). In terms of the financial market, the ASEAN+3 Finance Ministers endorsed the creation of the ASEAN+3 Bond Market Forum at the 13th ASEAN+3 Finance Ministers' Meeting in Tashkent, Uzbekistan on May 2nd, 2010. It was a popular forum for promoting the standardization of business practices and the harmonization of cross-border bond transaction regulations in the country (Asian Development Bank, 2012). However, X. V. Vo (2009) stated that, due to inactive trading, many ASEAN+3 government bond

Table 5 Summary of Models

Variable	OLS		FEM		REM	
	β	*p*	B	*p*	β	*p*
C	-0.020949	0.9158	-0.027416	0.8945	-0.020949	0.9192
DX_1*	6.14E-05	0.0359	6.66E-05	0.0359**	6.14E-05	0.0438**
DX_2*	1.00E-05	0.0155	1.08E-05	0.0138**	1.00E-05	0.0201**
$\overline{R}_2$	0.065403		-0.013970		0.065403	
Hausman-Test					4.678010	0.0964
Chow-Test			0.171548	0.9992		

Note: *DX_1 and DX_2 are the FDIs and the exports at the first difference degree of integration. ** $p < 0.05$

Source: Authors

markets were still in the early stages of development with low liquidity, whereas, on the other hand, Asia's solid fiscal balances had not led to the growth of government bond markets.

Moreover, the export-led theory of growth is also empirically accepted in this study. As these countries had achieved remarkable economic growth led by exports, the economies of the ASEAN+3 countries were becoming more and more interesting. It could be understood that the theory of international trade and development implies that exports are a significant source of economic growth. The expansion of exports would lead to a better allocation of resources, the creation of the economies of scale and output through technological growth, the formation of capital and the generation of jobs (Shirazi & Manap, 2005). The parts and components that were also exported to the rest of East Asia and the world as intermediate goods led to the expansion of intra-ASEAN trade (Chen & Intal, 2017). However, the traditional services dominated the export of the services of ASEAN countries. The exports of these services reached the two-thirds of the total service exports, whereas the proportion of the export of modern services was relatively small (Sermcheep, 2019). Furthermore, there were changes in the comparative advantage patterns in the ASEAN+3 countries. According to V. V. Gavrilov (2011), the international capital acquisitions and security of the export markets remained crucial to the growth of the ASEAN countries. In this respect, the countries that were the most significant for the ASEAN countries were the three countries in East Asia, because they had economic and financial resources to provide the aid they needed.

CONCLUSION

This paper investigates the impact of FDIs and exports on economic growth for the ASEAN+3 countries, which includee Malaysia, Myanmar, the Philippines, Singapore, Thailand, Vietnam, Brunei Darussalam, Cambodia, Indonesia, the People's Democratic Republic of Lao, the People's Republic of China, Japan, and Korea. The results of this study demonstrate that the ASEAN+3 countries demonstrate the FDI-led and export-led growth hypotheses (thus supporting the hypotheses 1 and 2), which means that FDIs and exports are crucial in boosting the economic growth of the ASEAN+3 countries.

In attracting FDIs, ASEAN has been considered as successful. In recent years, it has been competing with China as the largest FDI investment destination in the developing world. It is important to understand that FDIs are an integral part of the global economy and that they will be built further in parallel with the social and economic development process of the ASEAN+3 countries. The policymakers in the ASEAN+3 countries need to establish the policies that create conducive environments for FDIs by improving the Ease of Doing Business (EoDB). A favorable environment will be created so as to attract FDIs, especially from the main companies in the ASEAN+3 countries. Due to the lack of domestic workforce with a technological potential, however, there are obstacles to attracting FDIs. Therefore, an extended period of time is needed to improve human capital. In order to enable the private sector and foreign investors to spend more funds on the emerging industries, labor policies should be implemented.

Furthermore, Intra-ASEAN merchandise trade had robustly grown, which was followed by equally robust growth in trade with non-ASEAN trading partners, especially so with China, Japan and the Republic of Korea (Chen & Intal, 2017). The ASEAN+3 countries boost the ability of small-scale enterprises to have greater opportunities to legally manufacture unlimited amounts for export. Therefore, the ASEAN+3 countries need to launch the policies that remove the trade, fiscal and financial barriers that restrict export. These policies also have to develop human capital and eliminate inefficiencies and develop the other activities that promote economic growth. Additionally, these policies should balance between enhancing the export of modern services as the new growth engine, on the one hand, and maintaining a contribution to the travel and transportation sectors as the main sectors of the Association of Southeast Asian Nations.

This study has several limitations that future studies should overcome. First, this study only focuses on the relationships between the three macroeconomic variables (economic growth, FDIs, and exports). It is suggested that future research studies should use more variables in the analysis, such as imports, transfers of new technologies and labor force from bilateral or multilateral cooperation (ASEAN+6, BRICS, EMU, and OECD). Second, this study only analyzes the macroeconomic data of the thirteen countries during the period from 2008 to 2018. Therefore, future studies are expected to include longer observation periods covering the major global economic events, such as the 1997 Asian crisis and COVID-19. Third, this paper only employs the standard panel data model. It is suggested that, as such, future research studies should expand the model by using dynamic panel data, panel granger causality and others.

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Received on 1th November 2020,
after revision,
accepted for publication on 18th December 2020.
Published online on 25th December 2020.

Cheng-Wen Lee Ph.D. is a Professor at the Department of International Business, College of Business, Chung Yuan Christian University (CYCU) Taiwan. Her research interests are in the areas of management (environmental or technological innovation and transfer), multinational or global strategies (M&A, strategic alliance, joint venture), and knowledge management. Currently, she is a director of the Ph.D. Program in Business at the Chung Yuan Christian University, Taiwan.

Andrian Dolfriandra Huruta, M.Si is a Lecturer at the Department of Economics, Faculty of Economics and Business, Satya Wacana Christian University, Salatiga, Indonesia. His research interests are in the areas of macroeconomics, spatial economics, applied econometrics, and international trade. Currently, he is a Ph.D. student of Ph.D. Program in Business at the Chung Yuan Christian University, Taiwan.

Economic Horizons, September - December 2020, Volume 22, Number 3, 207 - 218
UDC: 33 ISSN: 1450-863 X
© Faculty of Economics, University of Kragujevac
www. ekfak.kg.ac.rs

Original scientific paper
UDC: 005.337:657(66/69)
doi:10.5937/ekonhor2003221O

DOES EARNINGS MANAGEMENT EXERT PRESSURE ON FIRMS' RETURN ON ASSETS AND EQUITY? THE CASE OF SUB-SAHARAN AFRICA

Edesiri Godsday Okoro[1]* and Confidence Joel Ihenyen[2]

[1] *Department of Accounting and Finance, Faculty of the Social Sciences, Delta State University, Nigeria*
[2] *Department of Accounting/Finance, Faculty of Management Sciences, Niger Delta University, Nigeria*

Regardless of the viewpoints of prior studies on earnings management, no study has been carried out on whether earnings management exerts pressure on firms' return on assets and equity, particularly in Sub-Saharan Africa in a single study. Drawing inferences from the existing earnings management models, a dissimilar model of earnings management, unlike those used in prior studies, which may match the peculiarity of Sub-Saharan Africa is developed in this paper. The data used were obtained from the Stock Exchange database of Sub-Saharan African countries by employing the fixed and random effects statistical technique. Using the proposed earnings management model, the study finds the intriguing results that may contribute to knowledge and magnify the literature that, notwithstanding the fact that earnings management exerts significant pressure on firms' performances, it is even more so deemed as high in South Africa, only to be followed by West Africa, and low in East Africa. Interestingly, the study finds that the size of a firm plays a vital role in moderating the nexus between the earnings management and performances of Sub-Saharan African firms.

Keywords: earnings management, return on assets, return on equity, financial statements, Sub-Saharan Africa

JEL Classification: M41, M48

INTRODUCTION

In the accountancy literature, there is robust empirical evidence on earnings management, with various phrases used to depict the concept such as income smoothing, accounting hocus-pocus, aggressive accounting, engineering accounting, and creative accounting, among others. Conceivably, the widespread literature on earnings management may be associated with the varied usage of earnings management phrases together with cravings by firms to beat earnings management practices. Interestingly, the literature on earnings management is staggered by remarkable, but divergent results (Jones, 1991; Dechow, Sloan & Sweeney, 1995; Zunera,

* *Correspondence to*: E. G. Okoro, Department of Accounting and Finance, Faculty of the Social Sciences, Delta State University, Nigeria; e-mail: edesirioracle@yahoo.com

Farah & Muhammad, 2015; Gnyana, 2016; Cole, 2017; Grimaldi, 2019; Thenmozhi, Saravanan & Sasidharan, 2019; Boghdady, 2019; Augustia, Muhammad & Permatasari, 2020; Ali, Ismael & Ahmed, 2020; Hunjra, Perveen, Chani & Mehmood, 2020).

As R. E. Verrecchia (2009) sees it, earnings management infers the corporate entities assuming that the accounting measures of performance precisely replicate real performance, and do not assess the traits of accounting measures to assess whether that is actually the case. Alluding to the viewpoint expressed by R. E. Verrecchia (2009), earnings management denotes a seemingly magical process of transforming accounting figures into financial statements by management in order to disclose high-quality earnings. For instance, using fair value in determining accounting figures provides the users of financial statements with better information compared to the historical cost. However, there is a standpoint that fair value accounting decreases income when values decrease, on the one hand, and increases income volatility when value increases. Impliedly, accounting choices and methods (e.g. fair value) by firms may not portray real performance, so that it may have a significant impact on the usefulness of financial statements for users.

F. Dobre, L. Brad and R. Ciobanu (2015) and R. B. Gnyana (2016) remark that, as opportunism is circumscribed by the accounting regulatory framework for the accounting choices and methods to circumvent earnings management practices, there is much recent evidence that firms engage themselves in negative earnings management practices in order to disclose superior performance. The views expressed by F. Dobre *et al* (2015) and R. B. Gnyana (2016) are corroborated by positive accounting thinkers, such as R. L. Hagerman and M. E. Zmijewski (1979) and R. L. Watts and J. L. Zimmerman (1986), who advocate numerous rationales why management engage themselves in earnings management.

Predominant among the rationales comprised the disclosure of a superior management bonus (Gaver, Gaver, & Austin, 1995), tumbling the probability of the bond-covenant breach and contractual outcomes (DeFond & Jiambalvo, 1994; Ball & Shivakumar, 2006; Barth, Landsman & Lang, 2008) and slashing regulation and political scrutiny (Jones, 1991). More worrisome is how these may distort the stakeholders' perception of the underlying economic performance of the financial position of firms (Bartov, Gul & Tsui, 2000; Kothari, Leone & Wasley, 2005). Plausibly, there are two divides to earnings management, namely positive (which does not distort the underlying economic performance of firms) and negative (a repetition to avoid 'reporting red-ink') (Burgstahler & Dichev, 1997; Barth, 2010; Cole, 2017; Grimaldi, 2019; Thenmozhi *et al,* 2019; Hunjra *et al,* 2020)

Worthy of note is the fact that, regardless of the viewpoint of prior studies on earnings management, there has been no study on whether earnings management will exert pressure on firms' return on assets and return on equity, particularly in Sub-Saharan Africa in a single study. Drawing inferences from the existing models for detecting the application of earnings management by J. Jones (1991) and P. M. Dechow *et al* (1995), a dissimilar model for detecting earnings management, unlike those used in prior studies, which may match the peculiarity of the firms in Sub-Saharan Africa, is developed in this paper.

Using the proposed models for detecting earnings management advocated in this study, more intriguing results that will contribute to knowledge and magnify the literature on earnings management are offered, which requires the empirical scrutiny that the study attempts to satisfy. Thus, secondary data as its scientific instrument and the ordinary least square and fixed and random effects in assessing whether earnings management exerts pressure on the two indicators of performance (namely return on assets and return on equity) in the selected nations of Sub-Saharan Africa (Western - Nigeria), (Southern - South Africa) and (Eastern - Kenya) are used in the paper. The paper is structured as follows: Section 2 - Literature Review and Hypotheses Development, Section 3 - Theoretical Framework, Section 4 Data and Methods, Section 5 Results, Section 6 - Discussion and Section 7 - Conclusion.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Return on Assets

Undeniably, an entity's performance is predisposed to the level of earnings management by means of accrual accounting. Return on assets (ROA) is the fundamental performance metrics resulting from accrual accounting. Usually, ROA is estimated on the basis of net income divided by the total assets or the ratio of operating income to the total assets. These forms of estimations, however, have been broadly employed in the literature on earnings management (Kothari *et al*, 2005; Ayers, Jiang & Yeung, 2006; Lennox & Park, 2006; Gong, Li & Xie, 2008; Moradzadehfard & Nazari, 2013; Elshafie & Nyadroh, 2014; Dobre *et al*, 2015; Cole, 2017).

G. Gong *et al* (2008) find a significant positive association between earnings management and ROA, suggesting that entities management seems to over-extrapolate the past performance in forecasting future earnings. According to G. Gong *et al* (2008), high (low) earnings may result from superior (poor) ROA and the neutral application of accounting conventions and principles rather than the proactive choices made by the management with respect to the accounting methods striving to convey their personal judgment about the prospects the entity has. Besides, the majority of the studies on earnings management have included the performance metrics of ROA in their empirical models, claiming that ROA is one of the major performance metrics influenced by earnings management. Given the submission and empirical results of prior studies, ROA was included in our model. Hence, it was hypothesized as follows:

H1: Earnings management exerts no significant pressure on a firm's return on assets.

Return on Equity

Return on equity (ROE) is the reported performance that shareholders resort to when assessing how efficient management has performed over years. From shareholders' point of view, particularly from the point of view of internal stakeholders, retained earnings are a better source of funds than outside financing. ROE is the measure of the performance of an entity and the same is estimated as the value of the net income returned as a percentage of the shareholders' equity (the ratio of the profit after tax to equity). ROE shows how much of a profit entities generate from each monetary unit invested by the shareholders.

ROE has not been deeply used in the literature on earnings management. However, there are but the few studies (Rangan, 1998; Teoh & Wong, 1998; Boghdady, 2019) that have used these performance metrics. Moreover, prior studies find the evidence that earnings management significantly affects ROE. A study by S. Rangan (1998) and a study by M. A. Ali, H. R. Ismael and A. H. Ahmed (2020) find the evidence that equity-issuing entities on average tend to have greater positive accruals in the years surrounding the issue and these accruals can partially affect performance to such an extent that management are made to employ earnings management. Contrary to the results achieved by S. Rangan (1998), S. H. Teoh *et al* (1998) and A. B. A. Boghdady (2019) find the evidence that a negative association between accruals and ROE is more obvious for current accruals than for the total accruals. Based on these empirical results, ROE is included in our empirical model. Thus, the second hypothesis reads as follows:

H2: Earnings management does not exert significant pressure on a firm's return on equity.

THEORETICAL FRAMEWORK

In this paper, the theoretical underpinning is on the Theory of Accounting Discretion (TAD). TAD is a new theoretical archetype proposed by researchers, describing how management employ their Freedom of Choice (FOC) or Private Judgment (PJ) in adjusting entities' cashflows. When the adjustment of a firm's cashflow is concerned, the FOC or the PJ offer management diverse accounting treatments

and management techniques aimed at reporting accounting figures in financial statements in such a way that they reflect high-quality earnings for the firm. The discretion used by the management of an organization is usually created in compliance with the International Financial Reporting Standards (IFRS), which permit management to employ the dissimilar choices of and methods for accounting judgments in adjusting cashflows. The discretions accorded by the IFRSs are the drivers of earnings management.

The underlying philosophy of TAD is that an entity's cashflows are adjusted based on a human judgment, a personal decision and a normative choice. Consequently, the characteristics of a firm, such as its size, management interests and ownership structure, as well as other characteristics, should be considered as the fundamental elements of earnings management. The characteristics of a firm accord management with flexible opportunities to experiment or transform accounting figures. More importantly, TAD is a normative accounting theory that describes the diverse accounting choices and methods used by management since it informs us about how management employs discretion in reporting theoretical performance rather than real performance. However, it totally deviates from the perspective of positive accounting theory, where the prime concern deals with accounting judgment aimed at disclosing real performance.

DATA AND METHODS

In this paper, an ex post facto design was adopted. The design was adopted since the study seeks to establish the variables connected with a certain occurrence by studying the past events of the existing condition. According to F. Nachmias and D. Nachmias (2009), the design supports the fact that the variables (e.g. earnings management, return on assets and return on equity) employed in an ex post facto study cannot be manipulated since the event already exist. The study population comprised all the publicly quoted consumer and industrial goods companies on the recognized Stock Exchanges of Sub-Saharan Africa - Western (Nigeria), Southern (South Africa) and Eastern (Kenya).

In Nigeria, there are 41 publicly quoted consumer and industrial goods firms (Nigerian Stock Exchange, 2018), 23 in Kenya (Nairobi Securities Exchange, 2018) and 77 in South Africa (Johannesburg Stock Exchange, 2018), which makes a total of 141 publicly quoted consumer and industrial goods firms in the selected Sub-Saharan African countries.

A stratified random sampling technique was adopted. Sub-Saharan Africa was divided into the four regions: West Africa, South Africa, East Africa and Central Africa. All the regions of Sub-Saharan Africa are divided into the two strata (based on the robustness of the economy and the viability of the stock exchange), which results in the selection of the three regions/countries of Sub-Saharan Africa (Western: Nigeria, Southern: South Africa and Eastern: Kenya). After having selected the countries based on the robustness of their economies and the viability of their stock exchanges, a judgmental sampling technique was employed.

The employed judgmental sampling was premised on certain yardsticks: first, the most capitalized firms in each selected Stock Exchange of Sub-Saharan Africa were selected; second, the firms with a wide-ranging dataset required for the study were included, while those with an incomplete dataset were excluded, notwithstanding the first yardstick. The judgmental sampling technique became imperative at this stage since the researcher had limited access to the relevant dataset of all the publicly quoted firms of Sub-Saharan Africa.

Given the above frameworks, a total of 29 firms were selected in Nigeria, 56 in South Africa, and 17 in Kenya, totaling 102 firms in the selected countries of Sub-Saharan Africa. With respect to the sampling techniques employed, Central Africa was excluded from the study sample. Hence South Africa was the highest with the sampled firms, only to be followed by Nigeria and, finally, Kenya.

The study data were obtained from a secondary source, more precisely from the Stock Exchange

Fact Books, Annual Reports and Accounts and the Internet websites of the quoted firms operating in the Sub-Saharan African countries. The data comprised the performance measures comprising of Return on Equity (ROE), Return on Assets (ROA), and the earnings management components (net income, earnings before interest and taxes, cashflow from operations, the total assets and revenue) and the control measures (changes in the earnings before interest and taxes, a net profit after tax and the size of the firm). In the paper, a dissimilar model for predicting earnings management different from those employed in the existing studies and peculiar for Sub-Saharan Africa is proposed. Besides, the study drew inferences from the existing models for predicting earnings management proposed by J. Jones (1991) and P. M. Dechow *et al* (1995). Employing both models simultaneously, our earnings management model is given as follows:

$$EMT = \frac{NI - CFO}{TA} + \frac{EBIT - CFO}{REV} \quad (1)$$

where *EMT* is Earnings management, *TA* stands for the total assets, and REV means revenue. NI is used for net income, CFO stands for cashflow from operations, *EBIT* means earnings before interest and taxes. The literature on earnings management suggests that income, expenses and assets should be considered as the most manipulated accounting figures (Gong *et al*, 2008; Moradzadehfard & Nazari, 2013; Abdoli, Bakhtiarnezhad & Bakshi, 2012; Elshafie & Nyadroh, 2014; Cole, 2017).

The theoretical basis for the employed empirical model is premised on TAD. Said theoretical paradigm indicates that management may employ FOC when adjusting performance and cashflow, given the diverse accounting choices and methods availing them. J. Jones (1991) shows that a firm's management manipulates expenses/bad debts rather than revenue. Contrarily, P. M. Deschow *et al* (1995) say that the management of a firm manipulate revenue rather than expenses. In light of the said, the model used in this paper for predicting earnings management was re-estimated by incorporating the performance (OPF) measures, as shown in equation 2:

$$OPF = \frac{REV(NI - CFO) + TA(EBIT - CFO)}{TA(REV)} \quad (2)$$

Given equations 1 and 2, equations 3-6 were specified so as to validate the relevant hypotheses of the study. The *OPF* denotes performance (return on assets and return on equity).

Earnings Management and Return on Assets (ROA)

$$ROA = f\left\{\frac{REV(NI - CFO) + TA(EBIT - CFO)}{TA(REV)}\right\} \quad (3)$$

Earnings Management and Return on Equity (ROE)

$$ROE = f\left\{\frac{REV(NI - CFO) + TA(EBIT - CFO)}{TA(REV)}\right\} \quad (4)$$

In light of the equations 3-4, equations 5-6 are expressed in an explicit form and represented as equations 5-6:

$$ROA_{it} = \alpha_0 + \beta_1 EMT_{it} + \varepsilon_{it} \quad (5)$$

$$ROE_{it} = \alpha_0 + \beta_1 EMT_{it} + \varepsilon_{it} \quad (6)$$

where *i* represents the i^{th} observation of the dependent and independent variables; *t* denotes the timeframe; α_0 represents an intercept; β_1 denotes the slope coefficient; ε is the residual (the error term) for the ith observation.

In order to control for the relationship between the dependent and the independent variables, the characteristics of the firms (the size of the firm gauged by the total asset logarithm) was introduced, which, according to TAD, offers management flexible opportunities to experiment or transform accounting figures. Likewise, a change in the earnings before interest and taxes ($\Delta EBIT$) and the percentage change in the net profit after tax ($\Delta NPAT$) were introduced as the control variables, resulting in equations 7-8. $\Delta EBIT$ and $\Delta NPAT$ were initiated as suggested by M. Riley (2007); G. Gong *et al* (2008) and J. D. Gramlich and O. V. Sorensen (2010), who say that they can be employed to correct the error forecasts made by the

management, linked with the accounting figures. The aggregated earnings management models are presented in equations 7-8:

$$ROA_{it} = \alpha_0 + \beta_1 EMT_{it} + \beta_2 FSIZE_{it} + \beta_3 \Delta EBIT_{it} + \beta_4 \Delta NPAT_{it} + \varepsilon_{it} \quad (7)$$

$$ROE_{it} = \alpha_0 + \beta_1 EMT_{it} + \beta_2 FSIZE_{it} + \beta_3 \Delta EBIT_{it} + \beta_4 \Delta NPAT_{it} + \varepsilon_{it} \quad (8)$$

The study covers the period from 2012 to 2018 for the selected publicly quoted firms in Sub-Saharan Africa. The analysis of the data specifically encompass descriptive statistical tools (the mean, the standard deviation, the minimum and maximum values and the correlation matrix) and inferential statistical tools (the OLS, fixed and random effects, and the Hausman specification test). The analysis was done with the help of the STATA 13.0 version.

RESULTS

In Table 1, the descriptive results are presented, particularly the mean, the standard deviation, the minimum and maximum values of the analysed variables for Sub-Saharan Africa. The mean earnings management (*EMT*) score included was 20.0658, with the minimum and maximum *EMT* scores of -315.4260 and 422.4490, respectively. Similarly, return on equity (*ROE*), return on assets (*ROA*), the size of the firm (*FSIZE*), a change in the earnings before interest and taxes (*ΔEBIT*) and a change in the net profit after tax (*ΔNPAT*) had the mean scores of 44.9141, 19.3859, 46.1513, 0.8410 and -10.5011, respectively.

In addition, the standard deviation values for South Africa (25.8755), West Africa (22.1158) and East Africa (15.3964) supports the reasons why earnings management is predominant among Sub-Saharan African firms, particularly so South Africa (South Africa) and West Africa (Nigeria). Overall, there is a symptomatic significant difference between the mean

Table 1 The descriptive results of the analyzed variables for Sub-Saharan Africa

Countries	*EMT*	*ROE*	*ROA*	*FSIZE*	*ΔEBIT*	*ΔNPAT*
Mean (Nigeria)	7.0009	15.6704	6.7637	16.1021	0.2934	-3.6638
Mean (South Africa)	8.1911	18.3344	7.9135	18.8394	0.3433	-4.2867
Mean (Kenya)	4.8738	10.9093	4.7087	11.2098	0.2043	-2.5506
Grand Total	20.0658	44.9141	19.3859	46.1513	0.8410	-10.5011
Std. Dev. (Nigeria)	22.1158	104.0443	11.1076	104.0440	1.7094	53.2526
Std. Dev. (South Africa)	25.8755	121.7318	12.9959	121.7315	1.9999	62.3055
Std. Dev. (Kenya)	15.3964	72.4325	7.7328	72.4323	1.1900	37.0729
Grand Total	63.3877	298.2086	31.8363	298.2078	4.8993	152.631
Min. Val. (Nigeria)	-114.0300	-989.3800	-31.6000	-77.3800	-16.7928	-847.5000
Min. Val. (South Africa)	-122.0120	-1058.6400	-33.8120	-82.7966	-17.9683	-906.8250
Min. Val. (Kenya)	-79.3843	-688.7770	-21.9990	-53.8696	-11.6906	-590.0040
Grand Total	-315.4260	-2736.8000	-87.4110	-214.0460	-46.4517	-2344.3290
Max. Val. (Nigeria)	162.7200	1131.0100	61.8700	143.0000	15.4860	43.6451
Max. Val. (South Africa)	146.4482	1097.9100	55.6831	128.7001	13.9374	39.2806
Max. Val. (Kenya)	113.2808	787.3752	43.0720	99.5523	10.7809	30.3844
Grand Total	422.4490	3016.2950	160.6251	371.2524	40.2043	113.3101

Source: Authors

and the standard deviation, which implies significant dissimilarities in earnings management and the performance attributes of Sub-Saharan Africa, which may be a good indicator for assessing the extent to which earnings management may exert significant pressure on the performance measures of the study.

Table 2 accounts for the correlation matrix of the summarized variables. The correlation matrix of the summarized variables reveals that the performance variables (*ROE* and *ROA*) are positively correlated to *EMT, FSIZE, ΔEBIT* and *ΔNPAT*. According to D. N. Gujarati (2003), when the coefficient of two pairs of explanatory variables exceeds the value 0.8, then multicollinearity is present.

Given the foregoing results, not a single correlation coefficient of the explanatory variables exceeds 0.8. Consequently, the study concludes that there is no multicollinearity at all among the pairs of the explanatory variables. Impliedly, the earnings management, performance and control variables of the study are suitable for estimating a regression model.

The Shapiro-Wilk W data normality test is presented in Table 3, and the values W are the Shapiro-Wilk test statistics. S. S. Shapiro and M. B. Wilk (1965), and S. S. Shapiro and R. S. Francia (1972) suggest that the large values of V show the non-normality of data. However, the V values are small and fall within a range from 1.9 to 1.1, thus indicating the normality of the data. More so, the Prob. Z values provide sufficient evidence to accept the hypotheses that *ROE, ROA, EMT, FSIZE, ΔEBIT* and *ΔNPAT* are normally distributed.

In Table 4 the results of the OLS, the fixed and random effects of the entire panel data for Sub-Saharan Africa are presented. The result of the testing of the suitability of the models (the ordinary least square - OLS; the fixed effect - FE and the random effect - RE) show that the RE is more efficient than the FE, as is indicated in the result of the Hausman specification test of Chi2(3) = 0.34, p-value = 0.9529. The OLS model

Table 2 The correlation matrix of the Summarized Variables

Variable	*ROE*	*ROA*	*EMT*	*FSIZE*	*ΔEBIT*	*ΔNPAT*
ROE	1.0000					
ROA	0.4680	1.0000				
EMT	0.0487	0.0512	1.0000			
FSIZE	0.0398	0.0234	0.2008	1.0000		
ΔEBIT	0.0706	0.0552	0.0470	-0.0274	1.0000	
ΔNPAT	0.0384	-00015	0.0132	0.0326	0.0671	1.0000

Source: Authors

Table 3 The Shapiro-Wilk W data normality test

Variable	Obs.	W	V	Z	Prob. > Z
ROE	612	0.9528	1.9126	0.8310	0.9086
ROA	612	0.9839	1.3454	0.6401	0.2634
EMT	612	0.9533	1.7082	0.7134	0.9055
FSIZE	612	0.9892	1.1113	0.1959	0.4247
ΔEBIT	612	0.9246	1.4449	1.1254	0.8434
ΔNPAT	612	0.9640	1.9915	1.4419	0.2573

Source: Authors

Table 4 The OLS and the fixed and random effects of the summarized variables for Sub-Saharan Africa

Dependent Variable:	*ROA*	*OLS*	*FE*		*RE*	
Variable	Coef.	Prob.	Coef.	Prob.	Coef.	Prob.
EMT	0.4463* (18.48)	0.000	0.4640* (18.31)	0.000	0.4463* (18.48)	0.000
FSIZE	0.4035* (16.71)	0.000	0.4195* (16.55)	0.000	0.4035* (16.71)	0.000
ΔEBIT	0.1823 (0.71)	0.477	0.1966 (0.76)	0.448	0.1823 (0.71)	0.477
ΔNPAT	0.0780 (0.98)	0.330	0.0072 (0.89)	0.375	0.0078 (0.98)	0.329
R-Squared	0.5910					
R-Squared Adj.	0.5859					
Prob. F.	0.0000					
R-Squared (within)			0.5900		0.5900	
R-Squared (between)			0.8010		0.8073	
R-Squared (overall)			0.5910		0.5190	
Wald Ch2					345.38	
Prob. Ch2					0.000*	
Hausman Test			Chi2(2) = 0.34		Prob>Chi2= 0.9529	

Note: *significant at 1%; **significant at 5%; the items in parentheses are the t-values; F=115.13

Source: Authors

indicates that the *EMT* has a larger beta coefficient in absolute terms than the other variables (*FSIZE, ΔEBIT* and *ΔNPAT*) do.

Even more so, when the firms in Sub-Saharan Africa engage themselves in earnings management, such an engagement results in an approximately 44.6 percent change in the level of performance (*ROA*), and 40.4%, 18.2% and 7.8% change in the *FSIZE, ΔEBIT* and *ΔNPAT,* respectively. The Wald Ch2-statistics are 345.38, with a p-value 0.000, supporting the hypothesis that earnings management (*EMT*) exerts significant pressure on the return on assets (*ROA*) of the firms operating in Sub-Saharan Africa.

The results of the *OLS* and the fixed and random effects of the entire panel data for Sub-Saharan Africa are presented in Table 5. The results reveal the fact that *RE* is more efficient than *FE*, as is shown in the Hausman specification test result of Chi2 (3) = 0.44, p-value = 0.9311. The *OLS* model indicates that *EMT* has a greater beta coefficient in absolute terms than the other variables (*FSIZE, ΔEBIT* and *ΔNPAT*) do. Furthermore, the Wald Ch2-statistics are 8.88, with a p-value 0.0309, thus supporting the hypothesis that earnings management (*EMT*) exerts significant pressure on firms return on equity (*ROE*) in Sub-Saharan Africa

DISCUSSION

In the paper, whether earnings management exerts significant pressure on firms' returns on assets and equity in Sub-Saharan Africa is investigated. Particularly, the findings follow the a priori expectation: first, the study finds that the

Table 5 The LS and the fixed and random effects of the summarized variables for Sub-Saharan Africa

Dependent Variable:	*ROE*	*OLS*	*FE*		*RE*	
Variable	Coef.	Prob.	Coef.	Prob.	Coef.	Prob.
EMT	0.7950* (2.88)	0.004	0.7918* (2.84)	0.005	0.7950* (2.88)	0.004
FSIZE	0.7187* (2.60)	0.004	0.7158* (2.57)	0.005	0.7187* (2.60)	0.004
ΔEBIT	1.7199 (0.59)	0.558	0.1851 (0.63)	0.533	1.7199 (0.59)	0.557
ΔNPAT	0.0209 (0.23)	0.820	0.0120 (0.13)	0.897	0.0209 (0.23)	0.820
R-Squared	0.0358					
R-Squared Adj.	0.0237					
Prob. F.	0.0329					
R-Squared (within)			0.0357		0.0357	
R-Squared (between)			0.0578		0.0986	
R-Squared (overall)			0.0358		0.0358	
Wald Ch2					8.88	
Prob. Ch2					0.0309*	
Hausman Test			Chi2(2) = 0.44		Prob > Chi2= 0.9311	

Note: *significant at 1%; **5%; the items in parentheses are the t-ratios; the Z-test in parentheses bold face; F=2.96

Source: Authors

performance variables (*ROA* and *ROE*) are positively correlated with *EMT, FSIZE, ΔEBIT* and *ΔNPAT,* thus clearly indicating the fact that the developed earnings management prediction models positively show relationships with the performance variables of the study. Again, the normality test results provide adequate evidence for us to accept that earnings management (*EMT*), the performance variables (*ROE* and *ROE*) and the control variables (*FSIZE*, *ΔEBIT* and *ΔNPAT*) are normally distributed.

Moreover, the result of the random effect implies that the firms from which the measurements were drawn are not fixed and the variations between the firms in Sub-Saharan Africa may be of interest are perhaps one of the reasons why earnings management may be predominant in the other regions of Sub-Saharan Africa. Furthermore, the t-test result suggests that *ΔEBIT* and *ΔNPAT* do not account for the management error forecast linked with accounting figures, as is suggested by G. Gong *et al* (2008) and J. D. Gramlich and O. V. Sorensen (2010), but rather that the size of a firm largely explains changes in the level of performance.

Overall, this study has established the fact that earnings management exerts significant pressure on firms' performances. The results obtained herein are in part similar to the findings of prior studies on earnings management (Gong *et al,* 2008; Dechow, Hutton, Kim & Sloan, 2012; Dobre *et al,* 2015; Gnyana, 2016) that find the significant evidence of a significant positive relationship between earnings management and the performance variables of firms, thus implying an impartial application of the accounting principles, rather than the proactive choices of accounting methods made by management.

First, this study contributes to the accounting literature by reaffirming the position of prior studies on earnings management; second, this study contributes to the accounting literature in that it indicates the fact that, notwithstanding the fact that earnings management does exert significant pressure on firms' return on assets and equity, earnings management is high in South Africa, only to be followed by West Africa, and low in East Africa. Finally, this study contributes to knowledge, indicating the fact that the size of a firm plays a vital role in moderating the relationship between the earnings management and performance (return on assets and return on equity) of Sub-Saharan African firms. This may explain one of the rationales for the predominance of the use of earnings management among Sub-Saharan African firms, particularly those operating in South Africa (South Africa) and West Africa (Nigeria).

CONCLUSION

Within the milieu of the proposed earnings management model for Sub-Saharan Africa, it is discerned that it is not only earnings management that exerts significant pressure on the ROA/ROE of the firms operating in Sub-Saharan Africa, but the practice of earnings management conducted in these publicly quoted industrial/consumer goods firms in South Africa (South Africa) and Nigeria (West Africa) is also high, whereas that practice is low in Kenya (East Africa), which shows that the West African and South African nations are yet to fully comply with the global accounting principles and standards. Consequently, the South African and West African nations should consider encouraging firms to fully comply with the global principles and standards in order for the magnitude of earnings management to decrease.

The Wald Ch2-statistics for both models indicates the fact that earnings management exerts significant and positive pressure on the returns on asset and returns on equity of the publicly quoted industrial/ consumer goods firms in Sub-Saharan Africa, which, however, is also partly due to the size of the firms. Thus, the national agency of each nation should offer a more specific accounting guideline on the requirement for and the extent of earnings management practice to be conducted by the publicly quoted industrial/ consumer goods firms and by those quoted in the other sectors so as to ensure the transparency of the capital market and the albeit wrong practice of earnings management by firms in Sub-Saharan Africa.

Furthermore, the research has several limitations in terms of the sector covered and the extension of the study in order for it to cover the other regions of Sub-Saharan Africa. Consequently, future studies should consider investigating the other sectors as well and extend such investigations to the other regions of Sub-Saharan Africa. In fact, the model proposed in this study can be tested in the other regions of Sub-Sahara Africa. These limitations further open the questions as to whether earnings management may exert significant pressure on firms in the other sectors and regions of Sub-Saharan Africa.

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Received on 22nd September 2020,
after revision,
accepted for publication on 18th December 2020.
Published online on 25th December 2020.

Edesiri Godsday Okoro, Ph.D, is a lecturer at Delta State University, Abraka, Nigeria. He received his Ph.D. at the Department of Accountancy of the Faculty of Management Sciences, Nnamdi Azikiwe University, Awka, Anambra State, Nigeria. His field of study is accounting, with research interests in corporate reporting, accounting theory, earnings management and financial management.

Confidence Joel Ihenyen, Ph.D, is a senior lecturer at the Department of Accounting/Finance of the Faculty of Management Sciences, Niger Delta University, Amassoma, Bayelsa State, Nigeria. His field of study is accounting, with research interests in management accounting and corporate reporting.

Economic Horizons, September - December 2020, Volume 22, Number 3, 219 - 231
UDC: 33 ISSN: 1450-863 X
© Faculty of Economics, University of Kragujevac
www. ekfak.kg.ac.rs

Original scientific paper
UDC: 657.412.7
doi:10.5937/ekonhor2003235L

THE PERFORMANCE OF DYNAMIC AND STATIC INVESTMENT STRATEGIES IN PENSION FUNDS

Stevan Lukovic*

Faculty of Economics, University of Kragujevac, Kragujevac, The Republic of Serbia

The retirement savings process for the members of a pension fund involves regular contribution payments made by a member and/or his employer, and the investment earnings generated by following an investment strategy. After the Global Financial Crisis, the aspect of value preservation has become particularly important to members of a pension fund, thus affecting the selection of an investment strategy. In face of increasing fluctuations on the financial market, static lifecycle strategies have become an unsatisfactory solution for members of a pension fund given the absence of a response to shocks on the financial market. In the paper, a comparative analysis of the performance of dynamic and static lifecycle strategies is carried out using bootstrap resampling in order to simulate investment returns and VaR indicators so as to assess the risk of an adverse financial outcome at retirement. The results of the analysis indicate the fact that dynamic lifecycle strategies generate more favorable financial results than static lifecycle strategies do, with a slightly increased likelihood of generating extremely unfavorable outcomes.

Keywords: dynamic investment strategies, static investment strategies, pension funds, lifecycle strategy, bootstrap resampling

JEL Classification: G11, G17, J26, J32

INTRODUCTION

Members of a pension fund are primarily concerned with the realization of an individual retirement account balance sufficient to finance an adequate living standard in the period after retirement. The retirement account balance at the moment a member of a pension fund decides to retire is partly affected by the amount of the contributions paid during the working career, and mostly affected by the way the accumulated funds are invested on the financial market. If transaction costs and taxation are neglected, most economists concur that an investment strategy is the principal factor that provides portfolio return in the long run.

Static investment strategies have commonly been used by members of a pension fund. The implementation of these strategies implies a lack of the adjustment of a portfolio to short-term fluctuations on the financial market in order to generate value growth over a long period of time, rather than in a short

* *Correspondence to:* S. Lukovic, Faculty of Economics University of Kragujevac, Liceja Knezevine Srbije 3, 34000 Kragujevac, Republic of Serbia; e-mail: slukovic@kg.ac.rs

term. Consequently, it seems clear why the members of pension funds until the end of the 20th century were those investors who particularly followed these investment strategies. In the first decade of the 21st century, however, the two financial crises significantly influenced a fall in pension savings over a relatively short period of time (the dot.com crisis of 2001 and the Global Financial Crisis of 2008). In that period, the implementation of static strategies resulted in many pension fund members making huge losses without a possibility of a significant correction in the accumulated assets until retirement. The emerging circumstances clearly indicated the need for dynamic investment strategies focused on making multidecade investments and value growth, yet with the built-in flexibility to the changing conditions of the investment framework.

The implementation of dynamic strategies requires the adjustment of a portfolio to changes in asset prices in order to improve the probability of achieving the target amount of assets at retirement. With strictly static investment strategies, this possibility is ruled out since the initial portfolio is shaped according to long-term investment goals and the investor's tolerance to risk, while the adjustment of the portfolio is automatically performed according to a predefined schedule. As for the costs of the implementation of an investment strategy, static strategies are more attractive to individual investors since they do not have to engage themselves in the process of the continuous analysis of market trends and the evaluation of portfolio performance. Simplicity and low implementation costs are the two features that make static investment strategies appealing to individual investors.

In practice, investment strategies with similar targets and conceptual characteristics can be shaped so as to be both static and dynamic, depending on the existence of the financial market feedback. A lifecycle strategy is an investment strategy increasingly followed by members of a pension fund given the fact that such a strategy is oriented towards the generation of wealth in the long run and in the manner that follows the changing profile of the investor's tolerance to risk over time. This strategy can be both static and dynamic in character. The key feature of a lifecycle strategy is the investor's significant exposure to equities in the early years of their working careers, followed by a gradual transition towards less risky securities (corporate bonds, government bonds or money market instruments) as their retirement approaches. If the portfolio adjustments are made according to a predefined rule, the strategy is static; otherwise, if changes are made based on the assessment of market movements and the performance of different asset classes, the strategy becomes dynamic.

Accordingly, the subject matter of the research relates to the performance of dynamic and static investment strategies adhered to by members of pension funds. The starting point of the research study is to examine whether dynamic investment strategies can generate superior financial results in the long run over static investment strategies. Given the growing importance of a lifecycle strategy in pension funds, the question of the effectiveness of the various types of static and dynamic lifecycle strategies in generating enough funds at retirement may be an interesting research area.

Having in mind the defined subject matter of the research, this paper is aimed at determining the likelihood that a member of a pension fund will achieve superior financial results by following a dynamic investment strategy relative to a static investment strategy, as well as the quantification of a potential surplus and the riskiness of financial results. In accordance with the defined subject matter and the aim of the research study, the two research hypotheses have been defined:

H1: Members of a pension fund achieve superior financial performance by following dynamic investment strategies relative to static investment strategies.

H2: Dynamic investment strategies are riskier than static investment strategies in terms of the increased likelihood of extremely adverse outcomes.

The research is predominantly empirically oriented, with the application of the simulation techniques

common for this research area to data on stock and bond returns over a period of several decades. In this regard, quantitative research methods used to simulate and quantify financial results, and assess riskiness dominate in the paper.

The contribution of the research study reflects in of its complementing to the existing, mostly international research focused on the implementation of investment strategies in pension funds. According to the available information, no research that deals with the issue of investment strategy selection in pension funds has been conducted in the Republic of Serbia so far. Empirical results may be beneficial for investment managers in pension funds and other entities in companies managing pension funds responsible for creating an investment menu which is at pension fund members' disposal.

In addition to the Introduction and the Conclusion, the paper also consists of the four logically related parts. In the first part of the paper, the theoretical views relevant for the implementation of static and dynamic investment strategies in pension funds are presented. In the second part, the paper provides a review of the results and contributions of previously conducted empirical research studies in this field. The third part of the paper deals with the research methodology. In the fourth part, the results of the empirical research study are presented and discussed.

THEORETICAL BACKGROUND

As is pointed out in the Introduction, the paper focuses on the implementation of static and dynamic lifecycle strategies. A lifecycle strategy ensures the growth of the portfolio in the period that directly follows the enrolment in a pension fund and the preservation of the value of the portfolio in a period immediately prior to retirement. The proponents of this strategy particularly emphasize the value preservation argument as retirement approaches, recognizing that the adverse consequences of the negative rates of return during that period can hardly be eliminated until retirement. B. Malkiel (1990) found that an individual capacity to absorb risk decreased with aging, so the portfolio should become more conservative over time. Younger individuals can absorb a greater level of financial risk due to the fact that they are merely at the beginning of their working careers, and the period until retirement is extremely long. In addition, younger individuals have a greater potential for higher future earnings than older individuals do, which makes an appealing argument for an aggressive asset allocation.

A large body of research has shown that, over a long term, stock returns are superior to bond returns (Jagannathan & Kocherlakota, 1996; Campbell & Viceira, 2002; Siegel, 2008). From this point of view, a younger member of a pension fund should invest more in stocks, since the period until retirement is long, during which time the risk of a significant decline in stock returns in individual years can significantly be reduced (Lukovic & Marinkovic, 2019, 147). Given the fact that older members of pension funds do not have a long period of time at their disposal, stock investment is not adequate for them; an orientation towards government and corporate bonds is preferable instead.

The implementation of a lifecycle strategy in pension funds has been increasing over the last two decades. According to Vanguard (2018), one of the largest companies for the management of pension funds in the world, a total of 92% of the pension funds under their management had some lifecycle strategy in their menus of investment options in 2017. For the sake of comparison, only one-third of the Vanguard-managed pension funds had lifecycle strategies in their menus of investment alternatives offered to members in 2000.

It is important to note that the effects the rates of return have on the retirement account balance are not the same at different stages of an individual lifecycle. A. Basu and M. Drew (2009) pointed out the fact that the magnitude of the impact of the high rates of return on retirement account balance depended on the size of a portfolio. As a portfolio grows with the passage of time not only due to the accumulation of investment returns, but also due to the inflow of contributions, the high rates of return in the period preceding

retirement contribute to the final financial result to a higher extent than the same rates of return in the initial period of the working career. Hence, automatic transition from investing in equities in the early stage of working career to investing in bonds in the mid-career and later career stages may be inadequate.

Static Lifecycle Strategies (hereinafter referred to as SLSs) have an automated rule which adjusts a portfolio over time. According to D. Blake, A. Cairns and K. Dowd (2001), SLSs reduce the likelihood of adverse outcomes, as well as fluctuations in the final amount of assets at retirement, rejecting, however, the growth potential offered by aggressive investment strategies. Therefore, SLSs are not adequate for all individual investors, above all for the individuals who want to have a relatively accurate estimate of the amount of assets at their disposal before reaching the retirement age.

The major disadvantage of the implementation of SLSs lies in the aforementioned automatic path of the portfolio adjustment. In simpler terms, the investor may face the falling stock market that lasts for a very long time, causing the value of the portfolio to become significantly lower than expected. Simultaneously, a static strategy demands transferring to the conservative assets that generate low returns. In this manner, the investor cannot accumulate the expected amount of funds at the moment of reaching the projected retirement age. The only way for an investor to increase the value of the portfolio in the years immediately before retirement is to aggressively invest in the stock market, which is restricted by accepting SLSs.

Dynamic Lifecycle Strategies (hereinafter referred to as DLSs) suggest a built-in flexibility in adjusting a portfolio, depending on the level of the realization of the target retirement balance at the observed time. Thus, investment decision-making in the future is sensitive to the performance of the financial market in the past. Aggressiveness in investing at the beginning of the working career is common to both dynamic and static lifecycle strategies. However, transition to conservative assets at a later stage in the lifecycle is not automatic, as is the case with static strategies, but occurs provided that an individual has accumulated an amount greater than or equal to the target amount up to that moment instead. If the amount of assets is lower than expected, a member of a pension fund will continue to aggressively allocate until the next period of the assessment of the performance of the investment strategy. It should be emphasized that the adjustment of a portfolio is not permanent, i.e. there is a possibility of repeated transition to exposure in stocks if the amount of assets in any subsequent period is lower than the target amount.

OVERVIEW OF THE EMPIRICAL RESEARCH

Research work in analyzing the performance of dynamic and static investment strategies in pension funds has become particularly evident following the 2009 Global Financial Crisis, which has resulted in a significant decline in the amount of assets in retirement accounts. An increasing implementation of lifecycle strategies has just stemmed from the growing need of members of pension funds to protect themselves from the risk of the occurrence of adverse outcomes.

A large body of research studies indicate the fact that SLSs can reduce the risk of adverse outcomes and fluctuations in retirement savings (Blake, Cairns & Dowd, 2001; Poterba, Rauh, Venti & Wise, 2006; Antolin, Payet & Yermo, 2010). On the other hand, there are studies showing that, under the conditions of the increased fluctuations of the financial market, SLSs may be inadequate for members of pension funds (Basu & Drew, 2010; Basu, Byrne & Drew, 2011).

Most scientific efforts having dealt with the efficiency of lifecycle strategies were carried out in the United States (Poterba *et al*, 2006; Viceira, 2008; Basu & Drew, 2009; Pfau, 2010; Basu, Byrne & Drew, 2011). Given the growing importance of a lifecycle strategy in the international context, however, there are an increasing number of the studies analyzing the implementation of this strategy in other countries (Louw, Schalkwyk & Reyers, 2017; Manor, 2017; Medaiskis, Gudaitis &

Mechkovski, 2018). E. Louw, C. van Schalkwyk & M. Reyers (2017) analyzed the effectiveness of a lifecycle strategy in South African pension funds compared to more conservative balanced funds. The results of the analysis reveal that a lifecycle strategy can achieve more favorable financial results compared to balanced funds and that a higher level of protection against risk can be provided, yet with a significant loss in the potential growth of the final retirement balance. Also, the authors showed that a high stock exposure in the initial portfolio leads to a lifecycle strategy being superior to such balanced funds.

M. Manor (2017) analyzed the implementation of a lifecycle strategy in pension funds in Israel. The author used CVaR risk indicators, which are more suitable for measuring the risk of extremely adverse outcomes than standard VaR indicators. The Monte Carlo technique was used to simulate investment returns and other variables. The paper compared 15 investment strategies for 6 different representative agent profiles. The results of the analysis showed that SLSs were superior to a static constant mixed investment strategy. On the other hand, DLSs generated more favorable financial results than SLSs with a lower exposure to equity in the initial portfolio. The author concluded that static investment strategies with a low exposure to equity most commonly implemented in Israel should be replaced with the DLSs that provided high rates of return with a slight increase in risk.

The studies comparing the financial performance of static and dynamic lifecycle strategies are rare. In one of more important studies, A. Basu, A. Byrne and M. Drew (2011) conducted a comparative analysis of the two static (defined by the authors as conventional) strategies and two dynamic lifecycle strategies. The authors used a representative agent model to simulate investment returns by conducting bootstrap resampling. The analysis showed that dynamic strategies were superior to conventional lifecycle strategies in terms of the amount of accumulated assets at the moment of retirement. On the other hand, conventional strategies suffer from a less severe problem of the occurrence of extremely adverse outcomes than dynamic strategies.

On a sample of 17 countries, K. Wang (2012) conducted a comparative analysis of the financial performance of a number of different investment strategies, including one type of static lifecycle strategies and two types of dynamic lifecycle strategies. The author proved that dynamic strategies were superior to static strategies in terms of accumulated assets. Interestingly, the risk of an adverse outcome is lower for dynamic strategies than for static strategies, suggesting that a dynamic strategy represents an improvement over the implementation of traditional strategies.

DATA AND METHODOLOGY

The representative agent model previously used in A. Basu and M. Drew (2009), A. Basu, A. Byrne and M. Drew (2011) and K. Wang (2012) was used in the analysis. The representative agent has predefined economic and demographic characteristics. As far as the demographic profile is concerned, the focus of the analysis is on the individual who remains a member of the same pension fund during the entire working career. The individual's initial age at the time of joining the pension fund, retirement age and, therefore, working career length are predefined.

For the purpose of calculating the financial inflows into the retirement account, the following characteristics are of significance:

- the salary at the time of registration with the pension fund - Z_0;
- the salary growth rate during the working career - s;
- the length of the working career expressed in years - N;
- the assumed contribution rate - d.

the salary growth rate is fixed, which means that an increase in the salary of the member of a pension fund happens at the same rate throughout his/her working career. The length of his/her working career is fixed, assuming that the member of the pension fund spent his working career in the same company, that he/she

became a member of the pension fund immediately after starting employment and that he/she was continuously paying contributions until reaching the retirement age.

The contribution rate is constant over time. Contributions are credited to the retirement account balance at the end of each month, while investment returns are credited at the end of each year. This means that twelve monthly contributions are paid in each year, after which assets are invested in the portfolio of financial instruments, with the realization of investment returns at the end of the year. In the next year, the assets are again increased by contributions and investment returns, and so forth. Hence, Table 1 provides the values of the parameters that will be used in the further analysis.

Table 1 The values of the parameter for the simulation of the financial result

Parameter	Label	Initial value
Initial retirement account balance	B0	0
Initial salary	Z0	40000 monetary units
Salary growth	s	3%
Working career length	N	40 years
Contribution rate	d	10%

Source: Author

The following formula is used for the salary calculation:

$$Z_t=Z_{(t-1)}\,(1+s),$$

where Z_t is the salary in the year t, Z_{t-1} is the salary in the year t-1, and s is the constant growth rate of the salary.

In order to calculate the retirement account balance at the end of the year, the following formula is used:

$$B_t=(B_{(t-1)}+Z_t\,d_t\,)(1+r_t\,)=(B_{(t-1)}+Z0\,(1+s)^{(t-1)}\,d_t\,)(1+r_t),$$

where B_t and B_{t-1} are the retirement account balances at the end of the years t and t-1, respectively, Z_t is the member's salary in the year t, while r_t is the return of the portfolio in the year t and can be either positive or negative. The contribution rate d_t is expressed as a percentage. Since the working career length is 40 years, the retirement account balance at the time of reaching the retirement age equals as follows:

$$B_{40}=(B_{39}+Z_0\,(1+s)^{39}\,d_{40}\,)(1+r_{40}).$$

In the further analysis, the portfolio consists of the two asset classes: stocks as risky assets and long-term government bonds as risk-free assets. In line with the previously said, the four investment strategies are designed.

Following the static lifecycle strategy 30-10 (SLS 30-10), the portfolio is fully invested in equities for the first 30 years. After such 30 years, the exposure of the portfolio to stocks linearly decreases by 10% every year in the following period, whereas exposure to bonds increases by the same percentage. In the year preceding retirement, the portfolio is entirely invested in bonds.

The static lifecycle strategy 20-20 (SLS 20-20) suggests that the portfolio is fully invested in equities for the first 20 years. After such 20 years, in each of the following years stock exposure decreases by 5%, with a simultaneous linear increase in bond exposure in the same percentage.

According to the dynamic life-cycle strategy 30-10 (DLS 30-10), the portfolio is fully invested in stocks in the first 30 years. After such 30 years, instead of automatic gradual portfolio transition to conservative assets, the adjustment of the portfolio depends on the performance of the portfolio from the previous year. If the stock market return from the previous year is higher than 10%, the portfolio remains invested in stocks. On the other hand, if the stock market return from the previous year is negative and below -10%,

the portfolio is entirely invested in bonds. Finally, if the stock market return in the previous year is in the range from -10% to 10%, the portfolio is invested 50% in bonds and the remaining 50% is invested in stocks.

The dynamic 20-20 life cycle strategy (DLS 20-20) suggests that the portfolio remains fully invested in equities in the first 20 years. In the next 20 years, the adjustment of the portfolio in the current year depends on the stock market return from the previous year. If the stock market return from the previous year is higher than 10%, the portfolio remains invested in stocks, and if the stock market return from the previous year is negative and lower than -10%, the portfolio is invested in bonds. Finally, in a situation where the stock market return in the previous year ranges from -10% to 10%, the portfolio is invested 50% in bonds and 50% in stocks.

Given the fact that a portfolio consists of two asset classes, i.e. stocks and long-term government bonds, the data on the annual returns of these securities is required. S&P 500 annual returns are used to capture the stock market movements, and US 10-year government bond returns are used to capture the movements of government bonds in the market. The data on the annual returns of the S&P 500 index and the US long-term government bonds were collected by using an electronic database of U.S. stocks, bonds and treasury bills, periodically updated by Aswath Damodaran. The data are available for the period from 1928 to 2017, which means that a total of 89 observations on the annual returns of stocks and government bonds are available. The length of the investment period for the representative agent is 40 years. Hence, two non-overlapping 40-year time series of successive annual returns can be formed from the available data about annual return. No conclusion based on the two independent series of annual returns can be sufficiently reliable.

Past performance is not indicative of future results. Hence, series of returns over a specified period of time must be constructed in a different manner. The approach used to simulate investment returns is the bootstrap resampling method, previously applied in a number of papers dealing with the investment process in pension funds (Basu, Byrne & Drew, 2011; Wang, 2012; Wang, Li & Liu, 2017). A random selection of a large number of samples out of the 40 observations is performed for each asset class based on the existing data on the annual returns of different asset classes by using bootstrap resampling. The assumption is that the returns of different asset classes are independently distributed over time. Random sampling is performed with replacement, which means that the data from the basic population can appear more than once in the same sample. The return vectors obtained for the asset classes are multiplied by the appropriate portfolio weightings so as to generate portfolio returns for each year over the 40-year horizon. The simulated investment return series are credited to the retirement account at the end of each year, and the balance at retirement is ultimately calculated. The procedure is repeated a thousand times for each of the static and dynamic strategies and a population of thousands of simulated results is obtained.

A comparative analysis of the static and dynamic strategies is performed by comparing the corresponding pairs of investment strategies, i.e. the static and dynamic type 20-20 strategies, and the static and dynamic type 30-10 strategies. For each of the thousands of simulations, the retirement account balance is compared for both pairs of investment strategies. If the difference is positive, it means that the DLS is superior to the SLS, and vice versa. After thousands of simulations, the total number of the simulations in which the DLS generated larger accumulated assets at retirement than the SLS is recorded. The share of successful simulations represents the success rate, which is the basic criterion for comparing dynamic and static lifecycle strategies.

Assuming the target retirement account balance set by a member of a pension fund, it can be determined that a particular strategy will generate the same or more favorable financial outcome. Considering the fact that not only the balance at retirement is important for a member of a pension fund, the uncertainty of its realization also being of importance, the indicators of the risk of the occurrence of a loss will be used in the performance analysis of SLSs and DLSs. In

this case, the loss represents the amount of the funds lacking realization of the target at retirement. Traditional risk indicators are used to measure the risk of the occurrence of a loss: Value-at-Risk (VaR) and Expected Tail-Loss (ETL) for a given confidence level. By calculating these indicators, a more accurate picture can be provided of the magnitude of adverse outcomes for each strategy.

The VaR analysis involves choosing the confidence interval used to compare the financial results of different investment strategies. The basis for the comparison will be the investment goal achieved by applying the fixed 10% annual rate of return. By investing in any of Vanguard's index funds tracking Standard&Poor's 500, the investor can earn an average annual rate of return ranging between 11.30% and 16.64% over the previous 10 years (Vanguard, 2020). Taking into account the fact that the investment process in the pension fund is oriented towards a greater certainty, the target rate of return is set at a slightly lower 10% level. By using the target annual rate of return of 10%, the expected amount of assets at retirement is calculated. After the 40 years of investment, the final retirement account balance is calculated. The amount calculated by using the fixed 10% rate of return is subtracted from the simulated results and the difference represents a surplus or a shortfall relative to the target amount.

The VaR indicators for the given confidence level (90%, 95% and 99%) provide an estimate of a possible shortfall faced by a member of a pension fund. Consequently, VaR can be defined as potentially the largest loss over a period of time with the low probability that the actual loss will be greater than that value (Jorion, 2007, 17). In order to calculate VaR for the given confidence level (90%, 95% or 99%), all the data are ranked from the smallest to the highest. Then, with the confidence level (1-α) selected, it is necessary to find the simulated loss that will not be overcome in 1-α cases, namely the loss in comparison to which the simulated loss is greater in α cases. Selecting a higher confidence level provides fewer cases where losses are greater than VaR value, since VaR value increases.

In addition to VaR, the ETL is calculated. The ETL is calculated based on the previously calculated VaR for the confidence levels of 90%, 95% and 99%. Given the fact that VaR represents the outcome of the worst case for the given confidence level and the period of time, the ETL represents the expected loss after exceeding the VaR threshold, i.e. the average of the losses greater than VaR for the given confidence level weighted by the corresponding probabilities of realization. Given the fact that it is calculated for the losses greater than VaR, the ETL is always greater than VaR.

EMPIRICAL RESULTS

In Table 2, the descriptive statistics for the annual returns of the S&P 500 and the US long-term government bonds over a 40-year period are presented. Average return on stock investments is higher than the average government bond return accompanied by an increased risk, i.e. a standard deviation, which means that there is an equity risk premium. This return series is used as a sample to conduct bootstrap resampling. The simulation is performed a thousand times, resulting in a thousand simulated 40-year series of stock and bond returns.

The comparison of the performance of the DLS 20-20 and the SLS 20-20 involves the calculation of the surplus (shortfall) of the funds in the retirement account at the moment of retirement which in each simulation is realized by implementing a dynamic strategy versus a static strategy. The results of the simulation of the surplus of the DLS 20-20 against the SLS 20-20 are presented in Table 3.

As can be noted, the average and the median surpluses speak in favor of the superiority of the DLS 20-20 over the SLS 20-20, and of the 65.7% success rate as well. Simply said, a member of a pension fund is faced with the choice to achieve a superior result in 66 out of every 100 simulation cases by adhering to the DLS 20-20 than to the SLS 20-20. The kurtosis coefficient of approximately 13 indicates the tail data exceeding the tails of the normal distribution (fat tails), while the positive coefficient of asymmetry indicates a heavier

Table 2 The descriptive statistics for the stock and bond annual returns in the period 1979-2018

	Stocks (annual returns of S&P 500)	Government bonds (the annual return of the U.S. 10-year government bonds)
Mean	12.94%	7.61%
Median	15.22%	7.22%
Max	37.20%	32.81%
Min	-36.55%	-11.12%
Standard deviation	15.879%	10.132%
Asymmetry	-0.9334	0.3052
Kurtosis	1.2643	-0.1487
Number of observations	40	40

Source: Author

right tail than the left tail of the distribution. Hence, the probability of realizing outliers is significantly higher than in a normal probability distribution.

Table 4 shows the success rate of the DLS 30-10 versus the SLS 30-10. The success rate is high and approximately 64%. The average and the median surpluses speak in favor of the superiority of the DLS 30-10 over the SLS 30-10. The high value of the coefficient of variation of 259% suggests that it is a scattered probability distribution. In addition, based on the values of the kurtosis coefficient, it can be concluded that the distribution of the simulated surplus of the DLS 30-10 over the SLS 30-10 suffers from the problem of more extreme adverse outcomes.

The success rate for each of the observed strategies in the realization of the target amount is given in Table 5, from which it can be seen that the strategy with the highest success rate is the DLS 30-10 (approximately 74.3%), whereas the second most successful strategy is the DLS 20-20, with a slightly lower success rate of 73.7%. Both static strategies, the SLS 30-10 and the SLS 20-20 have lower success rates of 67.1% and 66.6%, respectively. In addition, the dynamic lifecycle strategies achieve more favorable average and median results than the static strategies. Based on these results, it can be said that there is sufficient evidence to support Hypothesis 1, i.e. that dynamic lifecycle strategies generate superior financial results compared to static lifecycle strategies.

Given a large number of the arguments in favor of the view that members of pension funds are more oriented towards the certainty of an outcome and that they are more willing to accept the lower rates of return, it is useful to consider the likelihood and size of adverse outcomes, i.e. the negative difference between the financial result and the target amount for each investment strategy (Table 6). As can be observed, the dynamic strategies are in this respect also superior to the static strategies, since the probabilities of a shortfall for the DLS 20-20 and the

Table 3 The simulation results of the DLS 20-20 surplus against the SLS 20-20

	Success rate	Average surplus	Maximum surplus	Maximum shortfall	Median surplus
DLS 20-20 vs. SLS 20-20	65.7%	13751223	305962619	-86034025	7081240
	oefficient of variation	Asymmetry	Kurtosis		
	237.05%	2.476	12.959		
	Percentiles				
	5^{th}	10^{th}	90^{th}	95^{th}	
	-22054614	-13775947	50255785	69553026	

Source: Author

Table 4 The DLS 30-10 surplus over the SLS 30-10 surplus

	Success rate	Average surplus	Maximum surplus	Maximum deficit	Median surplus
DLS 30-10 vs. SLS 30-10	64.1%	11865847	261026859	-81288035	5706873
	Coefficient of variation	Asymmetry	Kurtosis		
	259.590	2.163	10.865		
	Percentiles				
	5^{th}	10^{th}	90^{th}	95^{th}	
	-23991879	-14368908	45458802	67860100	

Source: Author

DLS 30-10 are 26.3% and 25.7%, respectively, whereas for the SLS 20-20 and the SLS 30-10, the probabilities of a shortfall are 33.4% and 32.9%, respectively.

In addition to the likelihood of the occurrence of negative outcomes, it is necessary to consider the size of potentially realized shortfalls. In this respect, the average deficit is greater for the dynamic strategies (14 mil. for the DLS 20-20 and 14.2 mil. for the DLS 30-10) than for the static strategies (12.5 mil. for the SLS 20-20 and 13 mil. for the SLS 30-10).

In order to more adequately analyze the potential shortfall that a member of a pension fund may experience, the VaR and ETL indicators for investment strategy shortfalls are calculated (Table 7). The VaR indicators are calculated for the 90%, 95% and 99% confidence levels. It can be observed that the values at risk differ for every given confidence level. VaR (90%) is the greatest for the DLS 30-10 (17.2 mil. monetary units) and the lowest for the DLS 20-20 (at approximately 16.57 mil. monetary units). For the static strategies, VaR is greater than in the case of the DLS 20-20, but lower than in the case of the DLS 30-10. The ETL (90%) is the greatest for the DLS 30-10 (23.6 mil.) and the lowest for the SLS 20-20 (22.4 mil.). The SLS 30-10 and the DLS 20-20 have a similar expected tail-loss, standing at 23.1 million. For this confidence level, VaR and the ETL do not provide sufficient evidence that dynamic strategies suffer from a more severe problem of the occurrence of an extreme adverse outcome compared to the static strategies.

For the 95% confidence level, the VaR differences are less noticeable. The DLS 20-20 has the greatest VaR (95%) and the SLS 20-20 has the lowest VaR (95%). The difference between the lowest and the greatest values is approximately 800 thousand monetary units. However, the SLS 20-20 strategy has the lowest ETL (95%) of approximately 25.6 million, followed by the SLS 30-10 (26.6 mil.), while the ETL for the dynamic strategies exceeds 27 million. The difference between

Table 5 The success rate of the static and dynamic lifecycle strategies in the realization of the target amount (the annual return rate of 10%)

	Success rate	Average surplus	Maximum surplus	Maximum shortfall	Median surplus
DLS 30-10	74.3%	40047972	546772373	-36847423	25083507
DLS 20-20	73.7%	39784410	551330151	-36133482	22535144
SLS 30-10	67.1%	27225561	295942691	-35691018	16025856
SLS 20-20	66.6%	28157148	453377902	-33336216	14497766

Source: Author

Table 6 The probability of the realization of a shortfall (compared to the target amount at the 10% annual return rate)

	Probability	Average shortfall
SLS 20-20	33.4%	-12549251
SLS 30-10	32.9%	-13052301
DLS 20-20	26.3%	-14022451
DLS 30-10	25.7%	-14262626

Source: Author

the highest and the lowest ETLs is almost 2 million monetary units, which clearly indicates the fact that the dynamic strategies show more extreme adverse outcomes than the static strategies.

For the 99% confidence level, the SLS 20-20 strategy has the lowest VaR (29.05 mil.), only to be followed by the DLS 20-20 (29.7 million), whereas the remaining two strategies (the SLS 30-10 and the DLS 30-10) have a VaR that exceeds 30 million. The difference between the highest and the lowest VaR is not negligible and amounts to approximately 1.6 million monetary units. As for the ETL, the lowest level refers to the SLS 20-20 (27.8 mil.), only to be followed by the SLS 30-10 (31.7 mil.), while the ETL is significantly higher for the dynamic strategies (32.1 and 33.5 million, respectively). At this confidence level, it seems that the dynamic strategies generate more extreme adverse outcomes compared to the static strategies.

Based on the calculated VaR and ETL risk indicators, it appears that at the 90% confidence level dynamic strategies do not demonstrate more extreme negative outcomes in comparison with static strategies. However, at higher confidence levels, when the analysis focuses on the most extreme adverse outcomes with a low probability of realization, static strategies become less risky than dynamic strategies, for which reason the most extreme results are significantly less favorable. Consequently, Hypothesis 2 can only be partly validated if riskiness is viewed from the point of view of rare, but extremely unfavorable financial results.

CONCLUSION

Based on the empirical results, it can be concluded that the amount of the assets produced by adhering to dynamic lifecycle strategies exceeds the amount obtained by adhering to static lifecycle strategies with a relatively high probability level. On the sample of the 1000 simulated financial results of the two corresponding pairs of static - dynamic lifecycle strategies, the approximately 66% and 64% probabilities were computed, showing that a dynamic strategy would generate results superior to a static strategy. The analysis also shows a higher probability that dynamic strategies will meet the requirement for the target amount compared to static strategies (74.3% and 73.7%, versus 67.1% and 66.6%). The average shortfall in terms of the funds lacking to reach the target amount is approximately the same

Table 7 VaR and the ETL for the 90%, 95% and 99% confidence levels

	VaR (90%)	ETL (90%)	VaR (95%)	ETL (95%)	VaR (99%)	ETL (99%)
SLS 20-20	16790873	22438830	22091216	25618711	29058691	27801338
SLS 30-10	17119000	23154552	22138414	26629800	30258657	31789598
DLS 20-20	16570058	23140558	22916031	27087658	29746585	32141383
DLS 30-10	17267245	23636473	22590397	27622495	30781384	33522190

Source: Author

for all the observed strategies. In this respect, there seems to be sufficient evidence to support the further affirmation of dynamic lifecycle strategies in pension funds. Given the fact that members of a pension fund may be deterred by the magnitude of the potential losses they may face, the VaR and ETL risk indicators are compared for the selected strategies. For both criteria, dynamic lifecycle strategies do not generate extremely unfavorable outcomes in comparison with static lifecycle strategies for a 90% confidence level. However, for higher confidence levels (95% and 99%), when the most extreme adverse outcomes with a low probability of occurrence are analyzed, dynamic lifecycle strategies generate riskier results than static lifecycle strategies.

It should be pointed out that the empirical results do not deviate from the findings of similar research studies conducted throughout the world (Basu, Byrne & Drew, 2011; Wang, 2012; Manor, 2017). Regarding the first hypothesis, there is sufficient evidence in favor of its validation, whereas the second hypothesis is partly validated, since dynamic lifecycle strategies do not generate more extreme adverse outcomes relative to static ones for a 90% confidence level, but this problem does become more evident for higher confidence levels. If riskiness is analyzed solely by comparing the magnitude of losses with an extremely low frequency of occurrence (5% and 1% of the observed cases), it could be said that dynamic strategies are riskier than static strategies.

The research results may have theoretical and practical implications. Taking into consideration a small number of the research studies in this area in the region, as well as in the Republic of Serbia, the paper contributes to filling gaps in the literature, highlighting the importance of investment decision-making in pension funds. As far as practical contributions are concerned, some guidelines for managers of pension funds can be derived in the sense of facilitating the investment process by linking the empirical results with the previously published research results.

The basic research limitation relates to the omission of the implementation costs of different investment strategies. Although the paper points out the advantages of adherence to dynamic investment strategies over static investment strategies, the analysis has neglected the increased costs of the implementation of dynamic strategies. The incorporation of the implementation costs in the analysis, as well as the benefits-to-costs ratio, would provide complete information about which investment strategy is the most suitable solution for members of pension funds. In addition, the analysis has focused on the profile of a single member of a pension fund, with the predetermined demographic and economic characteristics. Future research could provide more useful results by simulating the various aspects of the demographic profile of a member of a pension fund, which could answer the question of which investment strategy is best suited for members of a pension fund at different lifecycle stages and at the different levels of risk aversion.

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Received on 20th February 2020,
after revision,
accepted for publication on 18th December 2020.
Published online on 25th December 2020.

Stevan Lukovic is an Assistant Professor at the Faculty of Economics of the University of Kragujevac, the Republic of Serbia, where he obtained his Ph.D. degree, in the scientific field: Finance, Financial Institutions and Insurance. The key areas of his scientific interest are pension insurance, pension plans and pension funds and the investment policy of pension funds.

Economic Horizons, September - December 2020, Volume 22, Number 3, 233 - 243
UDC: 33 ISSN: 1450-863 X
© Faculty of Economics, University of Kragujevac
www. ekfak.kg.ac.rs

Review paper
UDC: 339.726.2:64.01:005.337(597)
doi:10.5937/ekonhor2003251N

THE IMPACT OF FOREIGN AID ON HOUSEHOLD INCOME AMONG ETHNIC MINORITY GROUPS IN VIETNAM

Luan Thanh Nguyen[1]*, Tuyen Quang Tran[2] and Hang Minh Tran[3]

[1] *University - Lao Cai Campus, Lao Cai, Vietnam*
[2] *Vietnam National University, Hanoi, Vietnam*
[3] *National Institue of Anthropology, Hanoi, Vietnam*

Ethnic minorities in Vietnam account for only 15% of the population, but their poverty levels total more than 70% of the national poverty rate. Foreign aid has been an important financial resource supporting the socioeconomic development of ethnic minorities in Vietnam. Based on the empirical research in ethnic households conducted in nine provinces throughout the country, the effect of foreign aid on household income was estimated using the OLS regression model. The results show varying effects in the magnitude and significance among different ethnic groups. Specifically, aid has significantly improved the livelihood of the Cham and Xtieng populations, whereas the results for the Hmong population are detrimental. Consequently, it is suggested that aid and the ethnic policy should be reconsidered in order to reduce inequality among ethnic groups.

Keywords: foreign aid, ethnic minorities, household income, rural Vietnam, OLS regression

JEL Classification: D31, D63, O12, O21

INTRODUCTION

Vietnam is considered to be a multiethnic country consisting of 54 ethnic groups. The Kinh group of 78.32 million people accounts for 85.4% of the population. The remaining 53 ethnic groups account for only 14.6% of the country's population. In 2016, 9.8% of the population, i.e. about 9 million people, lived in poverty. About 6.6 million of the 9 million poor people are of ethnic minority heritage, even though the latter account for only about 15% of the total population. Some ethnic minority groups have a poverty rate as high as 70% - 80%, including the Hmong, Kho Mu, and Xo Dang (Ngo, 2019).

Apart from government investments, foreign aid has been an important financial resource supporting the socioeconomic development of ethnic minorities in Vietnam. Due to the inflow of this support, Vietnam has become one of the fastest-growing economies in the world. The average GDP growth rate has constantly stood at approximately 7% for the last two decades. Vietnam has managed to achieve a per capita

* *Correspondence to*: L. T. Nguyen, Thai Nguyen University - Lao Cai Campus, Lao Cai, Vietnam;
e-mail: luannt@tnu.edu.vn

income of USD 2,300. Moreover, the nation completed its Millennium Development Goals (MDGs) before the deadline, with a high poverty reduction rate.

The positive effects of aid have been demonstrated in various studies (Hansen & Tarp, 2000; Dalgaard, Hansen & Tarp, 2004; Asiedu, Jin & Nandwa, 2008). However, foreign aid can jeopardize the health of an economy, because aid recipients may become dependent on this source of financial support (Moyo & Mafosu, 2017; Farah, Onder & Ayhan, 2018). P. Boone (1996) points out the two reasons for the inefficiency of foreign aid. First, poverty is not the result of financial shortages, and second, politicians alter their policies and the manner of their rule upon receipt of aid.

This paper has a goal to examine the effect of foreign aid on household income among ethnic minority groups in Vietnam. Using a unique dataset from a household survey, this study is the first to provide the empirical evidence of the impact of foreign aid at a household level. Using the OLS regression model, whether foreign aid affects ethnic household income or not is examined. The results obtained in this research study show that aid positively affects household income in general. However, further investigation reveals the varying impact of aid on household income in the different fields of investment and across different ethnic minority groups as well. The findings of this research study are in line with the previous work conducted in Vietnam, which was dedicated to the examination the effect of household characteristics on the income of ethnic households.

The study is organized as follows: the next section provides an overview of foreign aid and ethnic minorities in Vietnam. Section three outlines the data and the methodology. Section four provides the results and a discussion. Finally, Section five contains the conclusion and policy implications.

FOREIGN AID AND ETHNIC MINORITIES IN VIETNAM

Since the beginning of the ODA inflow, Vietnam received about USD 80 billion over the 1993-2019 period, thus becoming one of the largest ODA recipients in the world. Of the USD 80 billion, USD 7 billion consists of nonrefundable aid, over USD 70 billion comprises loans with the interest rates below 2%, as well as USD 1.62 billion in less preferential loans, but with the interest rates still lower than those of commercial loans. Some of the main donors are the World Bank (WB), the Asian Development Bank (ADB) and Japan, contributing about 29%, 20% and 34% of said aid, respectively. As of 2017, the Government's external debt was over USD 45.8 billion, and the foreign debt ratio was about 20.52% (Ministry of Planning and Investment, 2019).

Ethnic minorities in rural mountainous areas have been the subject of the major interest to aid donors. After five years of implementing the "Strengthening International Cooperation to Support Socioeconomic Development in Ethnic Minority Areas" Project under the Prime Ministerial Decision No. 2214 / QD-TTg as of 14th November 2013, nearly 2,000 programs and projects have been implemented through a number of ministries, government agencies and in a number of localities. Of these, nearly 200 poverty reduction and social security projects have been implemented in ethnic areas, ranging from the Northwestern Region to the Central Highlands. Further 252 projects dealt with education, vocational training and job creation for ethnic minorities. A total of 10 aid projects supported five Central Highlands provinces and included four grant projects sponsored by the Global Fund, the European Community (EC), and Global Alliance on Vaccines and Immunization (GAVI), in addition to the six aid projects financed by loans from the WB, ADB, Japan International Cooperation Agency (JICA), with a total investment and support budget for the whole region of about USD 88 million. Nine aid projects were distributed among the 16 provinces in the Northwestern Region, of which four nonrefundable projects were provided by the Global Fund and GAVI. Five projects were financed by the WB, ADB and JICA (Committee of Ethnic Affairs, 2018).

In the provinces included in the survey, the ODA is a very important financial resource. As H. M. Tran and L. T. Nguyen (2020) point out, the total ODA

invested in Vinh Phuc province by the year 2018 was approximately USD 177 million, of which the ODA capital received by the province was USD 123.7 million. In the Bac Kan province, a total of 80 programs and projects using the ODA and concessional loans from foreign donors were implemented from 1993 to 2018. Binh Phuoc is also a province which has received and managed many ODA-funded projects, including Japan International Bank (JBIC) projects, 10 in the field of the infrastructure, transportation and rural electricity, with a total investment of about USD 4.6 million. A project funded by the World Bank and the ADB for clean water supply, wastewater treatment, education, healthcare, the rural infrastructure and community development was also included, and the investment totaled about USD 51.3 million. The above-mentioned ODA funds have greatly contributed to the socioeconomic development and livelihoods of the households in the province.

Despite the essential role of aid, its implementation in ethnic minority areas showed some weaknesses from the beginning. Firstly, the capacity to absorb ODA capital is low and does not meet the requirements. Compared to the ODA capital signed for in the past 20 years for the whole country (including ethnic minority areas), the disbursement rate came to only about 67% (Ministry of Finance, 2019).

Secondly, when the nature of the locality and the ethnic group involved are taken into consideration, the foreign aid program and project design is sometimes impractical. A number of the projects implementing new models, such as microfinance, clean water management and business, and forest protection only remain active while funding is in place. Furthermore, the implementation of different models within a single area, for example in poverty reduction, led to overlapping, inefficiency and a waste of local and donor resources as well. Thirdly, the management of some aid projects was unprofessional due to the limited capability of project managers, especially at the local level. Project management personnel are often inconsistent, and in many cases work on a part-time basis. In a similar fashion, project management training was not regularly or professionally conducted. Last, but not least, a lack of participation and collaboration by the local community in the planning and implementation processes often led to the ineffectiveness of the project and failure to uphold the model after installation.

DATA AND METHODS

Data

In the research study, the data from the 2019 Household Survey (HS) conducted by the researchers of the Institute of Anthropology, Vietnam, were used. The 2019 HS covers the ethnic households sampled from six socioeconomic regions. In each region, a province was selected as representative of the amount of aid and the number of ethnic minority households. For the three regions, i.e. the Northern Midlands and Mountains, the Central Highlands, and the Southwestern regions, two provinces were selected as representative for a wide distribution of ethnic minorities in them. Thus, nine provinces were selected for the study. In each province, a district was selected, and each district chose two communes based on the criteria of income and the number of ethnic minority households. Households in each commune were randomly chosen for the survey. A summary of the sample included in the survey is presented in Table 1.

The household data include detailed information about demography, assets, health benefits and expenditures, education, employment and income, and foreign aid. The data were merged from the nine provinces into one cross-sectional dataset providing a subsample of 2,514 rural households. The combined data allowed to the examination of the factors influencing the effectiveness of foreign aid on a larger scale.

Methods

Following T. Q. Tran (2015), the Cobb-Douglass production function was used in the form of a semi-log function commonly used to analyze the factors

affecting household welfare. Our study assumed the log of per capital household income as the function of foreign aid, and the household characteristics. A general form of this specification can be expressed as follows:

$$LnY_i = \beta_0 + \beta_1 X_i + \beta_2 P_i + e_i \quad (1)$$

where LnY_i is the natural logarithm of the per capita income of the household i. X_i is the vector of the household characteristics (e.g. education, the gender, the marital status, the main job and the years of age of the household heads, the household size, the dependency ratio and household landholding). P_i is the vector of the foreign aid status as the proxy for the impact of foreign aid. e_i indicates the unobserved variables that follow the normal distribution with a zero mean. The standard assumptions were applied for the estimation by using Ordinary Least Squares (OLS) regression.

Table 1 The sample summary based on the region

Region/ provinces	Total sample	Recipient household	Nonrecipient household
Northern Midlands and Mountains			
Lao Cai	282	152	130
Bac Kan	285	145	140
Northeast			
Vinh Phuc	274	156	118
South Central Coast			
Ninh Thuan	276	129	147
Central Highlands			
Dak Lak	279	138	141
Kon Tum	282	136	146
Southeast			
Binh Phuoc	278	151	127
Southwest			
Tra Vinh	279	128	151
Soc Trang	279	132	147
	2.514	1,267	1,247

Source: Authors

RESULTS AND DISCUSSION

Descriptive statistics

According to the descriptive statistics reported in Table 2, the average years of the education of the household head are 5.33, varying between 0 and 16. Most household heads are men (75%), the majority of them are married (86%), and their average age is approximately 46.68 years, ranging between 19 and 94 years of age. Each household has an average of 4.29 members, but the household size may reach as many as 10 members, given the fact that the households often include relatives from the extended family. The average dependency ratio is 36.56%, ranging between 0% and 100%. The data show that the household heads are mostly farmers (81%). The average residential land and gardens owned by a household are 530.89 m^2, while the average agricultural land and forestland and the other land owned by a household total 3,595.94 m^2, 3,384.94 m^2, and 168.03 m^2, respectively. The results obtained are in agreement with the previous studies on ethnic households in Vietnam (Baulch, Hung & Reilly, 2012; Tran & Vu, 2019).

In Table 3, various demographic, educational and landholding characteristics across the families that receive foreign aid and across those that do not are compared. The results are almost the same across the two types of households and in comparison with the whole sample. There is a slight difference in terms of landholding, while the recipient families often acquire more agricultural and the other land, but less residential, garden and forest land.

Econometric analysis

Table 4 reports the results for the effect of foreign aid on household income by using an OLS estimator. The regression model used in this paper controls for the household characteristics such as the age, gender, education and main job of the household heads. In addition to the foreign aid variable, aid was divided into the subcategories of health and medical services, education and training, and the use and management of natural resources.

Table 2 The descriptive statistics of the household characteristics

Variables	Mean	Std Dev.	Min.	Max.
The education of the household heads (the years of schooling)	5.33	4.13	0	16
The Gender of the household head (1=male; 0=female)	0.75	0.43	0	1
The age of the household head (years)	46.64	14.15	19	94
The marital status of the household head (1=married; 0=single)	0.86	0.34	0	1
The household size (the total number of the family members)	4.29	1.50	1	10
The dependency ratio (%)	36.56	24.03	0	100
The main job of the household head (1=farmer; 0=other)	0.81	0.40	0	1
Residential land and gardens (m^2)	530.56	1,450.75	0	40,000
Agricultural land (m^2)	3,587.70	6,251.81	0	90,000
Forestland (m^2)	3,416.15	12,877.70	0	99,999
Other land (m^2)	167.01	1,266.34	0	30,000

Source: Authors, based on: HS, 2019

As has been mentioned earlier, one of the main purposes of this study is to examine the relationship between foreign aid and household income. Table 4 shows the OLS estimates for the effect of foreign aid on household income. The foreign aid coefficient variable is positive and statistically significant, with a 95% confidence interval. This result indicates the fact that a household benefiting from any aid acquires 1.14 times greater income than the one that has never received any aid at all. Thus, access to foreign aid projects partly explains the income difference between the beneficiary group and the control group.

Table 3 The descriptive statistics of the household characteristics by groups

Variables	Recipient of Foreign Aid		Nonrecipient of Foreign Aid	
	Mean	SD	Mean	SD
The education of the household heads (the years of schooling)	5.27	4.13	5.39	4.13
The gender of the household head (1=male; 0=female)	0.73	0.38	0.77	0.42
The age of the household head (years)	46.09	13.17	47.27	15.11
The marital status of the household head	0.87	0.38	0.86	0.35
The dependency ratio	35.26	22.97	37.88	24.99
The household size (the total number of the family members)	4.30	1.49	4.29	1.51
The main job of the household head (1=farmer; 0=other)	0.82	0.38	0.79	0.41
The residential land and gardens acquired (m^2)	486.23	875.50	576.17	1,865.82
The agricultural land acquired (m^2)	3,873.55	6,143.52	3,314.52	6,387.89
The forestland acquired (m^2)	3,144.07	11,578.94	3,629.11	13,951.41
The other land acquired (m^2)	234.80	1,359.90	100.35	1,169.77

Source: Authors, based on: HS, 2019

Table 4 The OLS estimates of the effect of foreign aid on household income by the subcategories of aid

Independent variables	Dependent variable: Log MPCHI
Foreign aid	0.109**
	(0.047)
The age of the household head	0.016***
	(0.002)
The education of the household head	0.033***
	(0.005)
The gender of the household head	0.158***
	(0.050)
The main job of the household head	-0.264***
	(0.053)
Subcategories of foreign aid	
Health and medical services	-0.107**
	(0.054)
Cultural preservation	0.072
	(0.272)
Education and training	-0.289**
	(0.120)
Nonfinancial educational support	-0.624***
	(0.082)
Employment and job search	0.101*
	(0.058)
Natural resource use and management	-0.331***
	(0.063)
Constant	4.335***
	(0.110)
R-squared	0.1941
Observations	1,754

Standard errors (SE) are given in parentheses.
***, **, * Statistically significant at the 0.01, 0.05 and 0.1 levels, respectively.

Source: Authors, based on: HS, 2019

The study finds a negative relationship between the log of household income and foreign aid for several subcategories, including health and medical services, education and training, and nonfinancial educational support. The results suggest that these aid subcategories do not have a direct impact on household income. The reason for this is that support for these subcategories is still small, and the projects included in the survey mainly focus on the solutions related to livelihoods and economic development. The statistical results show that only 4% of the households believe that the expenditure for education and household training comes from foreign aid, whereas most of the costs are borne by the family (39%). On the other hand, said aid does go to the deserving poor.

Unsurprisingly, the study confirms the fact that the occupation of the household heads plays a major role in household income. The result shows that the occupation of a farmer significantly reduces household income by around 23%. This result is confirmed by the previous studies (Tran, 2015) that found that participation in nonfarm activities, such as wage-earning employment, alleviates the poverty of an ethnic household. The gender of the household heads also greatly contributes to household income. Per capita income is about 17% higher for the household whose head is male than for the female-led household. This result is corroborated by the previous studies (Buvinic & Gupta, 1997; Biyase & Zwane, 2018) that found a similar link between poverty and female-led households across developing countries. The education of the household heads also has a positive influence on household income, and an additional year of formal schooling increases per capita income by 3%, ceteris paribus. Finally, the age of the household heads positively affects household income. Per capita income is 1.6% higher for each additional year of age, ceteris paribus.

The impact of foreign aid is further decomposed by using the OLS estimators separately for each ethnic minority group. Table 5 shows the OLS estimates of the effect of foreign aid on household income by ethnic groups. The direction and significance of the foreign aid coefficient variable vary across different ethnic minority groups. While aid shows a positive effect among the San Diu, Khmer and Cham groups, it has a negative effect among the Nung, Hmong and Ede groups. However, the effect of aid is only significant for the Hmong and Cham groups.

Different subcategories of aid also show a varying impact and significance across the ethnic groups. Specifically, foreign aid for health and medical

Table 5 The OLS estimates of the effect of foreign aid on household income by ethnic groups

	Log MPCHI							
	Nung	Hmong	San Diu	Khmer	Cham	Ede	Mnong	Xtieng
Foreign aid	-0.091 (0.127)	-0.230*** (0.070)	0.003 (0.156)	0.023 (0.107)	0. 764*** (0.124)	-0.151 (0.119)	-0.105 (0.131)	0.338*** (0.101)
The age of the household head	0.018 (0.005)***	-0.001 (0.003)	-0.009 (0.005)	-0.003 (0.003)	-0.001 (0.004)	0.004 (0.004)	0.001 (0.005)	-0.003 (0.004)
The education of the household head	0.053*** (0.018)	0.008 (0.009)	0.036* (0.019)	0.031*** (0.011)	0.018 (0.012)	-0.001 (0.010)	0.018 (0.014)	0.021 (0.016)
The gender of the household head	0.448*** (0.168)	0.116 (0.080)	0.258 (0.158)	-0.012 (0.096)	0.222** (0.110)	0.131 (0.096)	-0.116 (0.120)	0.099 (0.138)
The main job of the household head	-0.890*** (0.184)	-0.289** (0.145)	-0.155 (0.150)	0.155* (0.083)	-0.04 (0.114)	-0.043 (0.206)	-0.738 (0.743)	0.347*** (0.105)
Subcategories of foreign aid								
Health and medical services	-0.605** (0.333)	0.502 (0.318)	-0.426 (0.375)		0. 210* (0.126)	0.029 (0.449)	0.365*** (0.141)	0.315 (0.309)
Cultural preservation	-0.808 (0.817)		0.478* (0.268)	-0.228 (0.401)				
Education and training	0.375 (0.585)		-1.016 (1.086)		-0.289** (0.120)	0.672 (0.537)	-0.186 (0.155)	-2.427*** (0.793)
Nonfinancial educational support	-0.244* (0.146)	0.180 (0.275)	-0.238 (0.285)	-0.214 (0.282)	-0.624*** (0.082)	-0.256 (0.221)	0.308** (0.133)	-0.171 (0.404)
Employment and job search	-0.110 (0.134)	-1.284** (0.608)	0.359** (0.166)	-0.084 (0.114)	0.101* (0.058)	0.019 (0.130)	0.123 (0.143)	0.259 (0.798)
The use and management of natural resources	0.168 (0.127)	0.291** (0.129)	0.147 (0.580)	-0.115 (0.109)	-0.331*** (0.063)	0.292** (0.131)	-0.061 (0.108)	
Constant	3.989*** (0.436)	5.706*** (0.234)	5.035*** (0.332)	5.414*** (0.212)	4.335*** (0.110)	4.319*** (0.277)	4.225*** (0.764)	4.287*** (0.362)
R-squared	0.2573	0.1161	0.1008	0.0453	0.2514	0.0410	0.1348	0.1269
Observations	269	282	265	415	245	269	256	255

Standard errors (SE) are given in parentheses.

***, **, * Statistically significant at the 0.01, 0.05 and 0.1 levels, respectively.

Source: Authors

services positively contributes to household income among the Hmong, Cham, Ede, Mnong and Xtieng groups, whereas it has a negative effect on household income among the Nung and San Diu groups. The effect of foreign aid on health and medical services only shows highly statistical significance among the Nung and Mnong groups.

Foreign aid for education and training is often found to negatively contribute to the household income of the ethnic minority groups. Specifically, the recipients of aid for education and training among the Cham and Xtieng groups have, respectively, 0.75 and 0.09 times lesser household income than the nonrecipients. The results are highly significant, with a 99% confidence interval.

In a similar fashion, foreign nonfinancial aid for education is often found to negatively contribute to the household income of the ethnic groups. Specifically, nonfinancial aid for education has a negative effect on the household income of the Nung, San Diu, Khmer,

Cham, Ede and Xtieng groups, and a positive effect only for the Hmong and Mnong groups. With a 95% confidence interval, the household income level of the recipients of nonfinancial aid for education is 0.54 times lower than for nonrecipients among the Cham group, while it is 1.36 times higher among the Mnong group.

Foreign aid for employment and job searching positively contributes to the household income of the San Diu, Cham, Ede, Mnong and Xtieng groups, whereas it negatively contributes to the household income of the Nung, Hmong and Khmer groups. Statistical significance at a 95% confidence level is found only for the Hmong and San Diu groups. While the household income of the Hmong recipients of employment and job search aid is 0.28 times lower than that of the nonrecipients, the household income of the San Diu recipients of employment and job search aid is 1.43 times higher than that of the nonrecipients.

Foreign aid for the exploitation and management of natural resources increases the household income of the Nung, Hmong, San Diu and Ede groups, while it reduces the household income of the Cham and Mnong groups. Specifically, with a 95% confidence level, the Hmong and Ede recipients of aid enjoy 1.34 times greater household income than the nonrecipients do. On the other hand, with a 95% confidence level, the Cham recipients of aid earn 0.72 times lesser household income than the nonrecipients do.

Finally, the intercept coefficients show inequality in the level of household income across different ethnic groups. The Hmong and San Diu ethnic groups are among the better-off groups, with a higher level of household income, whereas the Nung ethnic group find themselves among the disadvantaged groups, with the lowest level of household income.

CONCLUSION

Vietnam is a particularly interesting case for estimating the impact of foreign aid as it is a multiethnic country. Foreign aid is considered to be the major financial source for social development, especially in developing countries. Although there have been various studies investigating whether aid and other remittances hinder or are beneficial for growth, only a few examine the impact at the household level. Thus, our study fills the gap by investigating the consequences of foreign aid for household income.

This study provides the empirical evidence of the impact of foreign aid on ethnic household income. Using a unique dataset from a household survey, this study is the first to provide the empirical evidence of the impact of foreign aid at the household level. The results indicate the fact that foreign aid has a positive effect on household income, even after controlling for the other factors in the model. In other words, the probability that a household will achieve higher income is greater for those who are recipients of foreign aid than for those who are not. This suggests the continuation of capital inflows to eradicate poverty among ethnic households in the rural and mountainous regions of Vietnam.

In order to answer the question: What may be the potential cause of the negative effect of foreign aid on household income? the impact of different types of aid projects is further examined. The results show the areas where aid has a negative effect on household income, including:

- health and medical services,
- education and training (both financial and nonfinancial support), and
- aid projects relating to the use and management of natural resources.

The findings, however, do not indicate the ineffectiveness of aid in these areas; they rather show the indirect consequences and the absence of the benefit of these types of aid for household income. More studies should be carried out to further investigate the reasons for the negative effect of foreign aid on ethnic household income in such fields.

This study has identified a number of the other factors substantially contributing to household income.

Specifically, the occupation of household heads is found to play the major role in explaining income differentials. The household heads who are farmers earn significantly less than those in other occupations. Unfortunately, access to off-farm jobs is quite limited for ethnic households in rural mountainous areas (Nguyen, Tran & Vu, 2017). The other household characteristics, such as education and the gender and age of household heads, also play an important role in increasing household income. The results imply that the policies improving the access of rural households to better education, together with the efforts to diversify the structure of labor towards higher skilled jobs, should improve the livelihood of households in these rural areas.

This study provides the first evidence that foreign aid has varying effects on household income across ethnic minority groups. Using OLS regression for separate ethnic groups, aid is found to increase the household income of the Cham and Xtieng groups at a highly significant level. These are the groups that have received support from foreign aid projects, effective in improving their living conditions and increasing their income. The empirical evidence shows that a high proportion of the respondents from these ethnic groups reported that the foreign aid projects implemented among them were suited to the needs of the beneficiaries. In particular, a total of 92.4% of the Cham households participating in the survey and being the recipients of foreign aid indicated the fact that they had experienced a significant improvement in their living conditions and an increase in income.

The Xtieng ethnic group also noted that 90.8% of the households receiving aid had experienced an improvement in their living conditions and other benefits, such as better jobs, higher income and better access to education. These two ethnic groups have seen the greatest improvement in their living conditions. On the other hand, aid was found to have a negative impact on the household income of the Hmong ethnic group. The reason for this negative effect may be the inadequacy of the foreign aid projects implemented in the project area, resulting in the ineffectiveness of aid. Many Hmong households believed that foreign aid projects were unsuitable for local conditions (36%) or that, although the projects were suitable, new technology was not, or the breed of livestock was not well-adapted to development in the project area (64%).

The subcategories of foreign aid also show varying effects on household income across different ethnic groups. The findings thus suggest that the approach to aid where the models show negative or insignificant results should be reconsidered. At the same time, the good implementation where aid has greatly improved people's livelihoods, as in the case of the Cham people, should be acknowledged.

Vietnam is still a developing country with a large measure of poverty and limited financial resources. Therefore, foreign aid is a critical financial resource supporting the socioeconomic development of ethnic minorities in rural and mountainous areas. However, critical conditions would have to be met in order to ensure the effectiveness of aid and reduce inequality across different ethnic groups. Firstly, donors need to closely adhere to their pro-poor growth policy by targeting the neediest and the most deserving. Simultaneously, the authorities have to ensure that aid actually reaches the poor. As suggested by D. King (2004), raising people's awareness and increasing the role of the local community through a collaborative model would also contribute to the success of projects. Finally, B. Baulch, T. T. K. Chuyen, D. Haughton and K. Haughton, (2007) suggest that the diversity in socioeconomic development experiences among different ethnic minorities indicates the need for a similar diversity in the policy interventions specifically designed for each particular group.

This study has its limitations. Due to the fact that the survey evaluating foreign aid was only conducted in 2019 and that, therefore, longitudinal or panel data were lacking, it was not possible to examine the effect of foreign aid over time. Using panel data to formulate the household income equation would reduce the bias, as this method accounts for time-invariant unobservable household characteristics. This suggests that further research is needed to address this issue, assuming the availability of said panel data.

ACKNOWLEDGEMENTS

This paper is the result of the project entitled Evaluating the effectiveness and impact of programs and projects implemented by international organizations in ethnic minority and mountainous areas since 1990, code CTDT.40.18 /16-20, Dr. Hang Minh Tran is the Project Manager. The project has been conducted in Vietnam and managed by the Institute of Anthropology.

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Received on 3rd July 2020,
after revision,
accepted for publication on 18th December 2020.
Published online on 25th December 2020.

Luan Thanh Nguyen is a lecturer in economics at Thai Nguyen University - Lao Cai Campus, Lao Cai City, Vietnam. He is a Ph.D. student in Economic Management at Vietnam National University of Economics and Business. His research interests include household economics, money demand and inflation, and tourism economics.

Tuyen Quang Tran is a lecturer at International School, Vietnam National University, Hanoi. He is the member of the NAFOSTED Scientific Council (Economics). He received his doctorate degree in economics at the University of Waikato, Hamilton, New Zealand. His research interests include applied economics and policy impact evaluation.

Hang Minh Tran graduated Master of International Health at the University of Copenhagen and Ph.D. of Medical Anthropology at the Australian National University. She is a senior researcher at the Institute of Anthropology, Vietnam Academy of Social Sciences and a lecturer at the University of Social Sciences and Humanities. She has held a number of consultancy, research and teaching positions in anthology and development fields. Her main research interests are livelihood, gender, health and eco-health, medical anthropology. She has done extensive researches and has published various articles on these issues.

Economic Horizons, September - December 2020, Volume 22, Number 3, 245 - 258
UDC: 33 ISSN: 1450-863 X
© Faculty of Economics, University of Kragujevac
www. ekfak.kg.ac.rs

Review paper
UDC: 334.72:658.148(497.11)
doi:10.5937/ekonhor2003263M

MEASURING THE RISK OF LENDING TO SMALL AND MEDIUM-SIZED ENTERPRISES IN THE REPUBLIC OF SERBIA IN LIGHT OF MODERN BANKING REGULATIONS

Mirela Mitrasevic[1*] and Snezana Bardarova[2]

[1] *Faculty of Business Economics, Bijeljina, University of East Sarajevo, Bosnia and Herzegovina*
[2] *Faculty of Tourism and Business logistics, Gevgelija, University Goce Delcev, Stip, Republic of North Macedonia*

The subject matter of this paper is measuring the risk of lending to Small and Medium-sized Enterprises (SMEs) from the point of view of the existing banking regulations. The paper starts from the hypothesis that an increase in the transparency of the credit risk measurement process would enable the timely detection of problems and leave room for the actions necessary for the management of small and medium-sized enterprises, as well as all creditors, and generate an opportunity for SMEs to provide more favorable sources of financing. In the research study, the well-known Altman Z-Score model was used to assess the probability of default and rank a company. The results of the application of the Z-Score model indicate that, to a certain extent, they can detect the companies in which bankruptcy may occur in the two years following the assessment, on the one hand, but they cannot be considered as reliable for the assessment of the probability of the bankruptcy of SMEs in the Republic of Serbia, on the other.

Keywords: SME financing, credit risk, capital requirements, credit scoring, bond rating equivalent

JEL Classification: G21, G28

INTRODUCTION

Small and Medium-sized Enterprises (SMEs) represent the most efficient segment of the economy in almost all countries of the world. These companies usually face limited access to the favorable sources of financing in both the money market and the capital market, especially in terms of the conditions and price of their use. It is precisely the difficult financing that is the biggest obstacle to the growth and development of SMEs. As SMEs usually have no access to organized capital markets, bank financing often remains the only alternative. Banks' biggest problems when granting loans to SMEs are related to

* *Correspondence to*: M. Mitrasevic, Faculty of Business Economics, Semberskih ratara, 76300 Bijeljina, University of East Sarajevo, Bosnia and Herzegovina; e-mail: mirela.mitrasevic@fpe.ues.rs.ba

a lack of adequate loan collateral and the unfavorable credit rating of companies, which increases credit risk and requires that these loans, with long and expensive claim processing procedures, should be offered at high interest rates.

The subject matter of this paper is to measure the risk of lending to SMEs from the aspect of the existing banking regulations.

The main goal of the research is to examine, on the example of the SMEs operating on the territory of the Republic of Serbia (RS), the extent to which the well-known Altman Z-Score model can be considered reliable for the purpose of assessing the probability of default. The paper uses the methodological approach of linking Z-score results with the equivalent of bond ratings, which allows us to determine the probabilities of default in a transparent way.

Our research is based on the following hypothesis:

H: Increasing the transparency of the credit risk measurement process would allow for the timely detection of problems and leave room for the actions necessary for the management of SMEs, as well as all creditors, and generate an opportunity for SMEs to provide more favorable sources of financing.

The paper is divided into four parts. The first part of the paper emphasizes the role of banks in financing small and medium-sized enterprises. The second part of the paper is focused on calculating capital requirements when using an advanced approach based on internal rating. In the third part of the paper, the way how credit scoring models can be used to assess the probability of default is presented. In the fourth part of the paper, the example of the companies registered for the production of cocoa, chocolate and confectionery products is examined, and whether Z-score models can be considered as reliable for assessing the probability of the bankruptcy of the small and medium-sized enterprises operating in RS in the observed period is investigated. Also, the extent to which the allocation of SMEs in the category of exposure to individuals affects capital adequacy requirements is shown.

THE ROLE OF BANKS IN FINANCING SMALL AND MEDIUM-SIZED ENTERPRISES

Financing is a significant factor determining the survival and growth of SMEs. SMEs usually face limited access to favorable sources of financing in both the money market and the capital market, especially in terms of the conditions of and the price for their use (Erić, Beraha, Đuričin, Kecman i Jakišić, 2012, 64). The availability of different sources of financing changes during the lifecycle of a company, depending on the stage of its growth, goals and growth potential, the sector in which the company operates and the relationship of management to risk. The range of possible sources of financing largely depends on the degree of economic development, especially the development of the financial system and financial markets (Erić, 2003). Developed systems are those that have developed the mechanisms of the so-called indirect financing (Mishkin & Eakins, 2006), where there are several financial institutions and intermediaries.

Difficult financing is the biggest obstacle to the growth and development of SMEs. Therefore, a particular problem for entrepreneurs and SME owners is to provide sources for financing their investments, especially so for innovation, research and development.

Bank loans are the most important source of external financing during the lifetime of the largest number of SMEs. There are various bank loans that can be short- and long-term from the aspect of their maturity, with either a fixed or a variable interest rate. Loans can also be divided according to the purpose, the method of security, the method of repayment, and so on. For the SME sector, when very small businesses are started or run, a microcredit is the most suitable.

Each bank defines the loan offer and the manner of their approval is in accordance with its internal regulations and procedures. In order for SMEs to receive a loan, they must submit a loan application, from which the bank should consider the credit potential of the company and determine the

company's ability to repay the borrowed funds within the prescribed period. In order to protect the bank from credit risk, it often asks for various additional security mechanisms, such as mortgages, guarantors, and so forth. This is a big problem for SME owners in the initial stages of the lifecycle of a company, because these are young and small businesses without a credit history of a sufficient quality or the adequate payment security instruments that qualify them for loan approval.

Lending conditions for SMEs vary from country to country, but they are always less favorable than those under which large companies borrow. The reasons for this lie in the fact that the credit needs of these two groups of companies are very different, i.e. the fact that smaller loan amounts granted to SMEs necessarily require higher interest rates in order for banks to provide the desired profitability.

The biggest problems banks are faced with when granting loans to SMEs are related to:

- the problem of securing a loan, i.e. an insufficient financial capacity (inadequate cashflow, insufficiently capitalized companies, i.e. a low share of own funds, the high competition that affects a decline in profit margins, high refinancing risk),
- a lack of adequate collateral,
- owner and management risk (i.e. a lack of an adequate corporate governance system),
- a lack of quality business plans,
- a lack of a credit history, and
- the unfavorable credit rating of the company.

The biggest problems SMEs are faced with when using bank loans as a source of financing are:

- high interest rates,
- limited loan amounts, which often do not meet the needs of the project being financed,
- inflexibility,
- long, complicated and expensive loan processing and approval procedures, and
- problematic collateral.

A survey conducted by the auditing and consulting company EY (2019) indicates the problems related to financing the operations of SMEs. Namely, as many as 77 percent of the respondents pointed out the fact that they financed the business and development of their companies from their own funds. Although, in addition to their own funds, which are absolutely at the forefront of financing fast-growing entrepreneurial companies, banks represent the leading source of credits for SMEs, their services are not used to the extent that could be expected given their market dominance. Banks are still not exposed to the risk of lending to small businesses. Many do not either recognize the fact that small portfolios can be of a high quality and are concerned about transaction costs, as these two factors greatly affect return on investment in a situation where there are strong pressures to make a profit and preserve capital.

Undoubtedly, bank loans are a very expensive and limited source of financing for the SME sector in the Republic of Serbia. Restrictions on the granting of bank loans are related to macroeconomic and financial developments in the country, where long-term sources of funds for banks themselves are quite limited, which is why there is particularly a lack of long-term loans. The restrictive credit and monetary policy that has continuously been implemented in RS in the last ten years with a high level of required reserves reduces the credit potential of banks and limits their lending to the SME sector. In addition, one of the reasons for the reduced interest in financing SMEs is the choice of the quality government securities that offer relatively high, but unlike placement in the SME sector, secure earnings.

Given the high degree of uncertainty regarding the business results of SMEs, banks face credit risk, i.e. the probability that the borrower will not be able to repay the borrowed funds within the defined repayment schedule. Since the capital requirements in terms of credit risk have an impact on the price at which banks are willing to lend to SMEs, the methodological aspect of capital calculation in accordance with the Basel standards will be presented in the next part of the paper.

CAPITAL REQUIREMENTS FOR CREDIT RISK EXPOSURE TO SMALL AND MEDIUM-SIZED ENTERPRISES

According to the existing banking regulations, a bank may use the standardized approach and the Internal Rating-Based approach (IRB) in order to calculate a capital requirement for the credit risk related to its exposure to SMEs. In addition, the calculation of the capital requirement differs depending on whether the bank classifies the exposure to small and medium-sized enterprises in the category of exposure to companies or exposure to natural persons.

In the standardized approach, banks must classify their exposures according to different risk categories and determine the weights based on the credit rating that the small and medium enterprise received from the external credit assessment institution that received the consent of the National Bank of Serbia. The selection of a rating agency and the use of credit ratings to assign credit risk weights are regulated by the Decision on the Capital Adequacy of the Bank (Official Gazette of the RoS, no. 46/2011, 6/2013 and 51/2014). At the time of writing, Moody's Investor Service Ltd. was on the list of eligible rating agencies (NBS, 2020).

In the approach based on internal rating, banks use internal rating systems when calculating capital requirements for credit risk. There are two variants of the internal ratings approach:

- the basic approach based on internal rating (IRB - FIRB), within the framework of which banks use their own estimates of the probability of default (PD), whereas the values of other parameters, i.e. risk components (LGD - loss due to default, EAD - current exposure arrears, and M - effective maturity), are determined by the supervisor.
- the advanced IRB approach based on which banks use their own estimates for all risk components, as well as conversion factors, while meeting the minimum standards and, if applicable, their own estimates of effective maturity.

In the next part of the paper, the focus is on the formulas used to calculate capital requirements when using the AIRB approach. Under this approach, a regulatory capital charge is designed to cover a bank's unexpected credit loss, which is denoted as the difference between Value-at-Risk (VaR) at a confidence level of 99.9% as a measure of a potential portfolio loss over time and the expected loss (Hurlin, Leymarie & Patin, 2018).

For all SMEs, risk-weighted assets are determined as follows:

$$Risk\ value\ assets = K \cdot 12.5 \cdot EAD \quad (1)$$

where:

K is the capital requirement for credit risk, and

EAD is exposure at default.

In the event that an SME, which is not in the default status, is classified into the category of exposure to natural persons (SME Other Retail), the capital requirement for credit risk (K) depends on the assessment of the probability of the occurrence of the default status (the probability of default (PD), a loss given default (LGD), and exposure at default (EAD); and in case SME is classified into the category of exposure to companies (SME Corporate), it also depends on the effective maturity (M) for the given exposure.

In accordance with Basel II, if an SME is classified into the category of exposure to natural persons, a capital requirement for credit risk (K) is determined based on the following formula:

$$K = \left\langle LGD * \mathrm{N}\left[\frac{G(\mathrm{PD}) + \sqrt{R} \cdot G(0.999)}{\sqrt{1-R}}\right] - PD \cdot LGD \right\rangle \cdot 1.06 \quad (2)$$

where:

$N(x)$ stands for the function of the cumulative probability distribution for the standard normal random variable,

$G(Z)$ is the inverse function of the cumulative probability distribution for the standard normal random variable,

$LGD = 1 - RR$ denotes the loss given default,

RR is the recovery rate, and

R is the correlation for exposures to individuals:

$$R = 0.03 \cdot \frac{1-e^{-35 \cdot PD}}{1-e^{-35}} + 0.16 \cdot \left(1 - \frac{1-e^{-35 \cdot PD}}{1-e^{-35}}\right) \quad (3)$$

If an SME is classified into the category of exposure to companies, a capital requirement for credit risk (*K*) is determined as follows:

$$K = \left\langle LGD * \mathrm{N}\left[\frac{G(\mathrm{PD}) + \sqrt{R} \cdot G(0.999)}{\sqrt{1-R}}\right] - PD \cdot LGD \right\rangle$$

$$\left\langle \frac{1+(M-2.5) \cdot b}{1-1.5 \cdot b} \right\rangle \cdot 1.06 \quad (4)$$

$$b = \left[0.11852 - 0.05478 \cdot \ln(PD)\right]^2,$$

where:

R is the correlation for exposures to companies:

$$R = 0.12 \cdot \frac{1-e^{-50 \cdot PD}}{1-e^{-50}} + 0.24 \cdot \left(1 - \frac{1-e^{-50 \cdot PD}}{1-e^{-50}}\right) -$$

$$- 0.04 \cdot \left(1 - \frac{(S-5)}{45}\right) \quad (5)$$

For exposures to small and medium-sized enterprises, i.e. the companies belonging to the group whose total annual income (*S*) at the consolidated level is less than or equal to EUR 50 million in the dinar equivalent, the expression *0.04 * [1 - (S - 5) / 45]*, is added when calculating the correlation, where 5 million euros ≤ S ≤ 50 million euros.

For exposures in default, capital requirements (*K*) are determined as follows (Basel Committee on Banking Supervision, 2006):

$$K = Max\left\{0; (LGD - EL_{BE})\right\} \quad (6)$$

where EL_{BE} is the bank's best estimate of the expected loss for exposure in the default status.

Assessing the probability of default as a multiyear average of one-year default rates for each rating category of debtors is the first step in quantifying and assessing credit risk in the RBI approach and is the key aspect of banking regulation (Cardone-Riportella, Trujilo-Ponce & Briozzo, 2011).

In the next part of the paper, the way how Z-score models can be used to estimate the probability of default is shown.

THE APPLICATION OF THE CREDIT SCORING MODEL FOR ESTIMATING THE PROBABILITY OF THE DEFAULT STATUS

The development of relevant models for quantifying the probability of the default status is the subject matter of numerous modern studies, many of them using logistic regression or logit regression, as well as discriminant analysis, which allows us to make a distinction between high- and low-risk borrowers. The following section provides an overview of some of these studies.

Literature Review

E. Altman and G. Sabato (2005) investigate the effects of applying the RBI approach on banks' capital requirements for exposures to small and medium-sized enterprises in the United States, Italy, and Australia. Using logistic regression on data obtained from over 2,000 U.S. companies (with the sales of less than $ 65 million) in the period from 1994 to 2002, they developed a one-year bankruptcy prediction model. Taking into account the rules of the international agreement on bank capital (Basel Capital Accord) for small and medium-sized enterprises, they examined the ability of the model to lower capital requirements.

Based on the previous study, C. Cardone-Riportella, A. Trujilo-Ponce and A. Briozzo (2011) analyze 24 financial indicators in the year before bankruptcy and, using logistic regression, they develop a special model for estimating the one-year probability of the nonpayment of small and medium-sized enterprises for Spanish firms. They also examine the impact of the Internal Ratings-Based approach (IRB) on a bank's

capital requirements in the portfolios of Spanish SMEs.

O. M. Dănilă (2012) deals with the application of credit scoring in order to quantify the probability of the bankruptcy of bank clients in Romania, highlighting the Z-score model and Moody's KMV EDF RiskCalc Model. Also referring to the paper written by E. Altman and G. Sabato (2005), logistic regression is used to estimate the probability of bankruptcy on the example of the 2,800 small and medium-sized enterprises that went bankrupt within 12 months.

Based on the unique set of data on the loans granted to German small and medium-sized enterprises, P. Behr and A. Güttler (2007) apply the logistics trend so as to assess the credit scoring model, the aim of which is to enable small and medium-sized enterprises to assess the expected probability of default. According to the authors, banks lack adequate incentives to increase the transparency of the credit risk measurement process, as their superiority in having customer information gives them an advantage over competing banks.

E. Altman, M. Esentato and G. Sabato (2018) point to the problems of information asymmetry in the financing of small and medium-sized enterprises by issuing bonds (in Italy, the SME bond market is known as "mini-bonds"). In order to achieve the required transparency of risk assessment, the authors of this study develop a model for assessing the creditworthiness of Italian small and medium-sized enterprises based on logistic regression and test it on the companies that issued mini-bonds. To assess the probability of the occurrence of the default status, they use the so-called Bond Rating Equivalents (BRE) and Mortality Rate Approach, which will be explained later.

Based on the above research, the next part of the paper deals with the assessment of the probability of the occurrence of the default status of small and medium-sized enterprises.

A Methodological Approach to Estimating the Probability of Bankruptcy by Using the Z-Score Model

In this part of the paper, the way how the well-known Altman Z-Score model can be used for the purpose of estimating the probability of the occurrence of the default status is presented. The process involves the following three steps:

- determining credit scores for a new debt or for the existing debt,
- determining the so-called Capital market risk equivalents - most often bond rating equivalents (BRE),
- assessing the probability of the default status by determining the "mortality rate" or by using the average probability of the default of the companies published by credit rating agencies.

To create the Z-Score model, E. Altman (1968) used the discriminant function that transforms individual variables into a single discriminant score, or the *Z* value:

$$Z = V_1X_1 + V_2X_2 + V_nX_n \tag{7}$$

where:

V_1, V_2, V_n = the discriminant coefficients, and

X_1, X_2, X_n = the independent variables.

Having applied discriminant analysis, E. Altman obtained the following linear equation based on the five financial indicators: liquidity, profitability, indebtedness, solvency and the sales activity:

$$Z = 1.2\ X_1 + 1.4\ X_2 + 3.3\ X_3 + 0.6\ X_4 + 1.0\ X_5 \tag{8}$$

where:

X_1 = net working capital/total assets,

net working capital = (current assets – short-term liabilities)

X_2 = retained earnings/total assets,

X_3 = earnings before interest and taxes/total assets,

X_4 = the market value of equity/total liabilities, and

X_5 = sales/total assets.

The classification of whether a corporate entity will go bankrupt or not was made based on the results of determining the "safe" zone for the values of the Z indicators greater than 2.99, and the "financial problems" zone or the "bankruptcy" zone ("Distress") for the Z values of less than 1.81, between which there was the middle, "Gray" zone, which included the companies whose Z value was within the range from 1.81 to 2.99 ($1.81 < Z < 2.99$). The zones were selected by Altman based on the results obtained on a sample of 66 manufacturing firms (33 in the bankrupt group and 33 in the nonbankrupt group) observed in the period from 1946 to 1965. E. Altman (2018) emphasizes the fact that the model shows high accuracy in predicting bankruptcy (between 82% and 94%) one year after the assessment based on the original data, as well as on the data pertaining to 86 problematic companies in the period from 1969 to 1975, the 110 companies that went bankrupt in the period from 1976 to 1995, and 120 companies in the period from 1997 to 1999.

E. Altman (1983) revised the Z-Score so as to adjust it for the assessment of non-joint stock companies. Said revision included changes in the indicator X4, so that it was determined on the basis of the book value of capital instead of being determined based on the market, which enabled the inclusion of non-joint stock companies whose shares were not listed on the stock exchange. This change is particularly important in the markets where the market price is not considered as the good indicator of value due to the market size, the low trading volume, or illiquidity. The Z′-score model was developed, which took the following form:

$$Z' = 0.717\,X_1 + 0.847\,X_2 + 3.107\,X_3 + 0.420\,X_4 + 0.998\,X_5 \quad (9)$$

If the value of Z' is greater than 2.9, the company is in the "safe" zone, and if it is less than 1.23, the company is in the "financial problems" zone.

E. Altman, J. Hartzell and M. Peck (1995) conducted another revision of the model applied to emerging market corporations, which could be used to assess the ratings of private manufacturing and non-manufacturing companies in developed and emerging markets. In addition to the previous change made in the indicator X_4, which in that version of the model was not determined based on the market value of capital, but based on the book value of capital, in this version of the model they excluded the indicator X_5, because it was particularly sensitive to differences in certain manufacturing and non-manufacturing sectors when retail or service companies were compared with certain manufacturing companies.

As a result, they obtained the Z″-score model in the form of the following linear equation:

$$Z'' = 3.25 + 6.56\,X_1 + 3.26\,X_2 + 6.72\,X_3 + 1.05\,X_4 \quad (10)$$

A Z''-score less than 4.35 indicates the fact that the company is in the "financial problems" zone, and a Z''-score greater than 5.85 indicates the fact that the company is in the "safe" zone.

When calculating the Z″-score in emerging markets, E. Altman, J. Hartzell and M. Peck (1995) proposed that a constant (+3.25) should be added in order to standardize the results, so that a score equal to or slightly below or above 0 would be equivalent to the situation in which the default status occurred, i.e. in the D rating category, in accordance with the Standard and Poor rating marks. The D rating is assigned when S&P Global Ratings believe that bankruptcy will happen and that the debtor will not pay all or substantially all the amount of his obligations as they fall due.

E. Altman, A. Danovi and A. Falini (2013) applied the Z″-score model in order to predict the corporate failure of the Italian banks in which extraordinary administration was introduced. The model showed great accuracy in predicting bankruptcy (in as many as 95.5% of the cases) in the year preceding the declaration of bankruptcy. These results determined J. R. Chieng (2013) to apply this model to the banks of the Euro Area, and the results of the research showed that the Z″-score model was a reliable indicator of the failure of the banks in the Euro Area within five years before bankruptcy. However, as the author himself stated, this model might not be as precise in another industry or institution not operating in the Euro Area.

Table 1 shows the different rating categories according to the Standard and Poor average Z-scores, the average Z''-scores in emerging markets (Average EM Score),

Table 1 The relationship between the results of the Z-score, the Standard and Poor ratings, and the probability of the default of companies in emerging markets

Zone	S&P Rating	The amount of credit risk	Average Z-Score 1996 - 2001*	Average Z''-score in emerging markets*	The average probability of the default of a company during one year (1981-2019)**
Safe	AAA	minimal	6.20	8.15	0.00%
	AA	very low	4.73	7.30	0.00%
	A	low	3.74	6.65	0.03%
Gray	BBB	moderate	2.81	5.85	0.12%
	BB	considerable	2.38	4.95	0.53%
	B	high	1.80	4.15	3.03%
Distress	CCC	very high	0.33	2.50	18.25%
	D	bankruptcy		0	

Source: Altman, Hotchkiss & Wang, 2019; Default, Transition and Recovery, 2019.

and the historical average cumulative probabilities of the default of companies during one year in emerging markets.

The bond rating equivalent allows Z-score models to be used to assess the probability of default. In the markets with a long history and a fairly large number of the rated bonds that have found themselves in the default status, Z-score results can be linked to their ratings and based on the updated databases of the so-called "static pools". S&P rating agencies or dynamic-cohort rating agencies Moody's (Hamilton & Cantor, 2006) obtain PD values over a period of time staring from the rating date. For the companies that are not rated, the results of the Z-score can be linked to the bond rating equivalent. Comparing the values of the Z-score results and S&P ratings, E. Altman demonstrated a decline in the value of the Z-score results, which was most dominant in the companies with the AAA and AA ratings - the average Z-score decreased to 4.13 in 2013 from the high 5.20 in the period from 1996 to 2001, but it was even more significant for the companies with the single B rating - the average Z-scores decreased from 1.87 in the period from 1992 to 1995 to 1.70 in 2017. These changes led to an increase in the Type II Error, i.e. the companies were classified into the bankruptcy zone without the occurrence of that; therefore, E. Altman proposed that the equivalent to the bond rating should be used instead of the limit 1.8 based on the original sample.

An alternative to the above-described approach is to use the E. Altman "Mortality Rates" approach based on the estimate of the expected bankruptcy rate from the original bond issuance date. E. Altman and H. J. Suggit (2000) also apply this concept to bank loans and estimate annual mortality rates and compare these results with the mortality rates of the publicly traded bonds during the sample period (1991-1996). Following this work, J. Fidrmuc, C. Hainz and A. Malesich (2007) set a Marginal Mortality Rate (MMR) for the 700 short-term loans granted to Slovakian small and medium-sized enterprises between January 2000 and June 2005.

The following analysis is focused on the application of the Z-score model in order to assess the probability of default, and it demonstrates the impact of this parameter on the assessment of credit risk within the Basel II concept.

CREDIT RISK ASSESSMENT ON THE SELECTED SAMPLE OF SMES IN SERBIA

The website of the Business Registers Agency, which provides information on the business entities

registered within a certain group of the activities and a public information portal to promote transparency in conducting the bankruptcy proceedings of the Bankruptcy Trustee Licensing Agency was used as a source of necessary financial data on the small and medium-sized enterprises operating in the territory of the Republic of Serbia for the purpose of assessing credit risk.

Since the formation of the database of the necessary data required considerable manual work, our paper is limited to the analysis of the companies registered in accordance with the Statistical Office of the Republic of Serbia (Official Gazette of the RoS, no. 54/2010), whose activities imply the production of cocoa, chocolate and confectionery (Group 10.82).

In July 2020, a total of 39 companies were registered for the production of cocoa, chocolate and confectionery products with the Business Registers Agency (Group 10.82). As many as 13 bankruptcy proceedings of the companies registered in this group of activities were registered on the public information portal promoting transparency in conducting bankruptcy proceedings in the period from 2010 to July 2020.

As displayed on the website of the Register of Financial Statements that started operating within the Business Registers Agency on 1st January 2010, starting from 2016, publicly available financial reports will be based on the three small and medium-sized companies in which bankruptcy proceedings were initiated in 2019 and 2020 and which had performed business activities in 2017 (namely Vekić Chocolate Ltd from Temerin, Tomaco Line Ltd from Leskovac, and Dunja Ltd from Belgrade). The sample of the companies that operated in 2020 consists of the randomly selected 10 small and medium-sized enterprises from this group of activities.

The goal of the following analysis is not only to check the accuracy of the Z-score model in predicting bankruptcy, but also to look at the financial health of this segment of the industry and demonstrate how Z-score results can be related to the equivalent of bond rating.

Given the fact that Z-score methods are based on accounting data, the accuracy of financial statements is extremely important. Therefore, it should be noted that one of the selected companies in bankruptcy is not subject to audit, and one received a qualified opinion in 2017. Also, only two of the selected 10 active companies were classified into the category of medium-sized legal entities and were subject to audit.

A comparative presentation of the capital and liabilities based on the long- and short-term bank loans of the selected companies in 2017 and 2018 indicates the presence of over-indebtedness in some companies and confirms the fact that loans from commercial banks are the most important external source of financing for small and medium-sized enterprises in this group in the Republic of Serbia (Figure 1).

Based on the balance sheets of the three companies in bankruptcy, it can be noticed that the two companies, namely Vekić Chocolate and Tomaco Line, borrowed long-term loans, and the largest part of the liabilities were liabilities to suppliers. Unlike these two companies, the company Dunja Ltd Belgrade did not have long-term credit arrears, and on 31st December 2017, the short-term loan approved by Direktna banka JSC Kragujevac accounted for 79% of all the liabilities of the company. As far as active companies are concerned, these recorded an increase in credit indebtedness in 2018 compared to 2017, namely Paraćinka, Bg produkt 1996 and Kondiva, which are classified in the following analysis into the group of the companies with a high and very high credit risk.

Because the equivalent bond rating is not determined in the literature on the basis of the results of the Z′-score model, the values of the Z″-score were first calculated, for whose calculation the book value of capital was also used. However, the results of the Z″-score model obtained based on the annual financial statements for the year 2017 showed that the company Dunja, which was in bankruptcy, had operated in the safe zone, and based on the equivalent bond rating the company was assigned the BBB rating, so it is believed that this indicator cannot be considered as reliable for assessing the credit risk of the SMEs belonging to the Activity Group 10.82 in the observed period. A decision was brought to analyze the results of the application of the Z-score model if the book value of capital was included instead of the market value

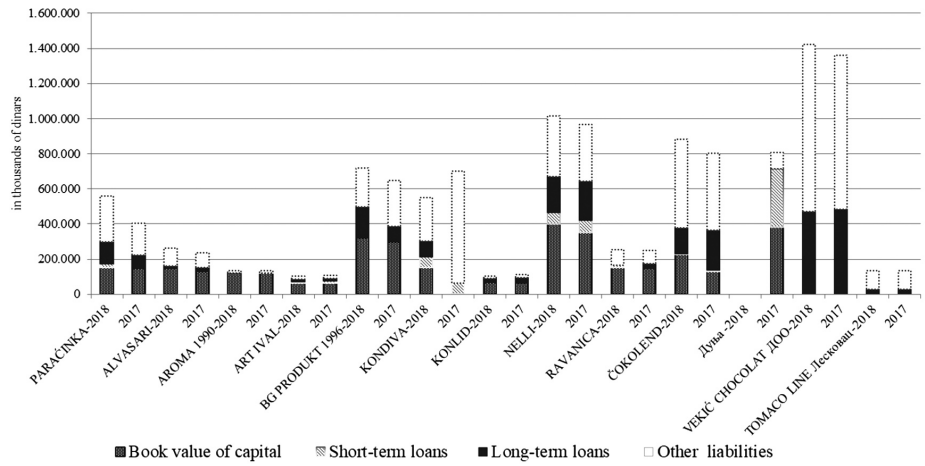

Figure 1 The ratio of the capital and liabilities of the selected companies in 2017 and 2018

Source: Serbian Business Registers Agency, 2020.

of capital and if that was compared with the results of the application of the Z'-score model, because it involved the use of the book value of capital. The results of the application of the Z-score, Z'-score, and Z'-score models for the years 2017 and 2018 are shown in the following (Table 2 and Table 3).

The application of the results of the Z-score models shows that, in 2017, a total of six companies were classified in the category of the companies with financial problems based on the bond rating equivalent of the three companies classified into the group assigned the D rating, and the other three companies with the CCC rating. All the three companies in which bankruptcy was initiated in 2019 and 2020 are classified into the "financial problems" zone.

In the period of two years after the assessment, the companies classified into the safe zone did not went bankrupt, while the three companies classified into the "financial problems" zone did not go bankrupt.

The following part of the paper shows the extent to which the allocation of SMEs into the category of exposure to individuals affects the capital adequacy requirements. As in E. Altman and G. Sabato (2005), the LGD of 45% is used, as suggested for the basic approach, based on the internal rating for the older claims that are either unsecured or secured by unrecognized collateral. According to (OECD, 2020), the share of the loans granted to small and medium-sized enterprises in Serbia that required collateral in 2018 was 53.1%. To calculate the cumulative weighted capital requirement for credit risk, the previously presented average probabilities of the default of the company during one year estimated by the S&P rating agency were used and that the company's share in each rating category was identical to our sample was assumed.

When calculating a capital requirement for credit risk when an SME is classified into the category of exposure to companies, the effective maturity of the credit exposure is assumed to be three years (Table, 4). In 2018, the long-term loans accounted for 77.2% of the total loans granted to small and medium-sized enterprises in Serbia, and for about 87% in the selected sample of companies.

Increasing effective maturity by one year in the given example would increase capital requirements by about 2.75% (Table 5).

The preliminary results show that, if SMEs are classified into the category of exposure to natural persons, a capital requirement will amount to 3.96% according to the assumptions, whereas if SMEs are

Table 2 The results of the application of the Z-score, Z′-score and Z″-score models for 2017

Name	Z"-score	Rating	PD	Zone	Z'-score	Zone	Z-score	Rating	PD	Zone
AROMA 1990	16.67	AAA	0.00%	Safe	5.33	Safe	7.36	AAA	0.00%	Safe
CONLID	10.62	AAA	0.00%	Safe	2.95	Safe	3.78	A	0.03%	Safe
ALVASARI	10.24	AAA	0.00%	Safe	3.01	Safe	3.78	A	0.03%	Safe
ART IVAL	8.24	AAA	0.00%	Safe	2.54	Gray	3.24	BBB	0.12%	Safe
BG PRODUCT 1996	5.72	BB	0.53%	Gray	1.85	Gray	2.19	B	3.03%	Gray
PARAĆINKA	5.17	BB	0.53%	Gray	1.60	Gray	1.82	B	3.03%	Gray
RAVANICA	4.58	B	3.03%	Gray	1.37	Gray	1.80	B	3.03%	Gray
NELLI	5.31	BB	0.53%	Gray	1.46	Gray	1.76	CCC	18.25%	Distress
DUNJA *	5.93	BBB	0.12%	Safe	1.13	Distress	1.44	CCC	18.25%	Distress
CHOCOLATE	3.27	CCC	18.25%	Distress	1.03	Distress	1.05	CCC	18.25%	Distress
VEKIĆ CHOCOLAT doo *	1.92	D		Distress	0.19	Distress	0.11	D		Distress
TOMACO LINE Leskovac *	1.13	D		Distress	0.01	Distress	0.00	D		Distress
KONDIVA	-5.30	D		Distress	-1.36	Distress	-1.93	D		Distress

* Bankrupt company

Source: Authors

Table 3 The results of the application of the Z-score, Z′-score and Z″-score models for 2018

Name	Z"-score	Rating	PD	Zone	Z'-score	Zone	Z-score	Rating	PD	Zone
AROMA 1990	16.78	AAA	0.00%	Safe	5.27	Safe	7.33	AAA	0.00%	Safe
CONLID	10.73	AAA	0.00%	Safe	3.34	Safe	4.27	A	0.03%	Safe
ALVASARI	10.32	AAA	0.00%	Safe	2.94	Safe	3.74	A	0.03%	Safe
ART IVAL	8.52	AAA	0.00%	Safe	2.51	Gray	3.24	BBB	0.12%	Safe
BG PRODUCT 1996	6.76	A	0.03%	Safe	1.93	Gray	2.34	B	3.03%	Gray
RAVANICA	5.62	BB	0.53%	Gray	1.72	Gray	2.18	B	3.03%	Gray
NELLI	5.72	BB	0.53%	Gray	1.77	Gray	2.12	B	3.03%	Gray
KONDIVA	4.99	BB	0.53%	Gray	1.72	Gray	1.89	B	3.03%	Gray
CHOCOLATE	4.61	B	3.03%	Gray	0.95	Distress	1.64	CCC	18.25%	Distress
PARAĆINKA	3.38	CCC	18.25%	Distress	1.50	Gray	1.02	CCC	18.25%	Distress
TOMACO LINE Leskovac *	2.03	D	100%	Distress	0.02	Distress	0.04	D	100%	Distress
VEKIĆ CHOCOLAT doo *	1.66	D	100%	Distress	-0.07	Distress	-0.18	D	100%	Distress
DUNJA *										

* Bankrupt company

Source: Authors

Table 4 The capital requirement for exposure to individuals

Rating	PD	LGD	R	K	Weight	Total weighted K
AAA	0.00%	45%	0.15995	0.00022	0.1	0.00%
AA	0.00%	45%	0.15995	0.00022	0	0.00%
A	0.03%	45%	0.15864	0.00377	0.2	0.08%
BBB	0.12%	45%	0.15465	0.01081	0.1	0.19%
BB	0.53%	45%	0.13799	0.02835	0	0.19%
B	3.03%	45%	0.07502	0.05332	0.4	2.32%
CCC	18.25%	45%	0.03022	0.08183	0.2	3.96%

Source: Authors

Table 5 The capital requirement for exposure to companies

Rating	PD	LGD	R	b	M	K	Weight	Total weighted K
AAA	0.00%	45%	0.20438	0.56130	3	0.00325	0.1	0.03%
AA	0.00%	45%	0.20438	0.56130	3	0.00325	0	0.03%
A	0.03%	45%	0.20266	0.31683	3	0.01093	0.2	0.25%
BBB	0.12%	45%	0.19746	0.23711	3	0.02382	0.1	0.49%
BB	0.53%	45%	0.17651	0.16449	3	0.05033	0	0.49%
B	3.03%	45%	0.11082	0.09614	3	0.08650	0.4	3.95%
CCC	18.25%	45%	0.08446	0.04482	3	0.16095	0.2	7.17%

Source: Authors

classified into the category of exposure to companies, a capital requirement will be 1.81 times as high if the effective maturity of such credit exposure is three years.

CONCLUSION

The presented results of the research study show that, to some extent, Z-score models can detect the companies in which bankruptcy may occur in the two years after an assessment, but they cannot be considered as reliable for assessing the probability of the bankruptcy of the small and medium-sized enterprises engaged in the production of cocoa, chocolate and confectionery in Serbia. When interpreting the obtained results, we should bear in mind the fact that Z-score models are based on data from the past and that the environment in which SMEs operate has recently been exposed to dramatic changes. In addition to the above-said, one of the most important limitations of the research study is the fact that, at the time of writing the paper, only financial statements starting from 2016 to 2018 were publicly available on the website of the Register of Financial Statements, for the reason of which fact it was impossible to cover the research study for a longer period of time and thus provide a more reliable assessment and the development of a more adequate model by increasing the sample size.

The contribution made by this paper reflects in the fact that, regardless of the above-mentioned data limitations and the limitations regarding the applied method, a comparative overview of the companies and their ranking in accordance with the assessed credit risk is provided, simultaneously giving a more transparent insight into the state of this segment of

the industry as well. This research study is based on the hypothesis that an increase in the transparency of the credit risk measurement process is in the interest of SMEs and that a greater transparency is also in the interest of all creditors, primarily banks, because untimely noticed problems might have unforeseeable consequences for the entire banking sector, depending on the concentration of the loans granted to SMEs. As in P. Behr and A. Güttler (2007), it is considered that increasing the transparency of the credit risk measurement process and reducing the asymmetry of information will provide borrowers with the ability to negotiate loan terms based on more information and that it will also increase the likelihood of a successful change of one bank for another that provides better terms. It will also create the opportunities for using alternative sources of financing, thus expanding the scope of financing opportunities for companies.

Given the fact that the results of the research study show that Z-score models cannot be considered as reliable for assessing the probability of the bankruptcy of small and medium-sized enterprises, directions for further research will be focused on the development of the credit scoring models adapted to the market of the small and medium-sized enterprises of the Republic of Serbia, which will enable greater transparency in credit risk assessment.

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Received on 28th September 2020,
after revision,
accepted for publication on 18th December 2020.
Published online on 25th December 2020.

Mirela Mitrasevic is employed at the Faculty of Business Economics, University of East Sarajevo, where she is engaged as an associate professor of Financial Mathematics, Insurance and Risk Management in banks and insurance companies in full-time studies and Financial Mathematical Analysis and Insurance Analysis in master studies. She is a member of the Association of Actuaries of the Republic of Srpska and the Association of Actuaries of Serbia.

Snezana Bardarova is Assistant profesor at the Faculty of Tourism and Business Logistics, Department of Business Logistics and Business Administration at University Goce Delcev, Stip, Republic of North Macedonia. She is Assistant profesor from the field of economics of enterprises and economics of public sector. Her professional occupation are economics of enterprises, management and entrepreneurship.

Economic Horizons, September - December 2020, Volume 22, Number 3, 259 - 260
UDC: 33 ISSN: 1450-863 X
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www. ekfak.kg.ac.rs

THE SUBJECT INDEX

(This Index includes all papers published in the Volume 22 of the Journal.)

Accounting principles 172, 215, 216
Accounting standards 44, 47, 139, 140, 147, 148, 217
Africa 2, 3, 4, 8, 9, 10, 11, 12, 13, 34, 41, 43, 44, 45, 47, 48, 50, 51, 53, 115, 178, 204, 207, 208, 210, 211, 212, 213, 214, 215, 216, 242
Asean 177, 197, 198, 199, 201, 202, 203, 204, 205, 206
Asia 52, 76, 155, 198, 202, 203, 204, 205, 206
Asian 52, 53, 54, 115, 157, 183, 195, 197, 198, 202, 203, 204, 205, 206, 234

Banks 1, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 47, 53, 54, 115, 178, 246, 247, 248, 250, 252, 253, 257, 258
Behavior 2, 4, 5, 7, 12, 13, 14, 40, 44, 59, 67, 68, 69, 75, 76, 81, 121, 122, 126, 128, 129, 130, 132, 133, 136, 137, 138, 142, 143, 145, 146, 147, 162, 184, 218
Bootstrap resampling 178, 219, 223, 225, 226
Budget deficit 15, 16, 17, 18, 20, 21, 23, 24, 25, 26
Business cycle 84, 87, 95, 96
Business environment 62, 76, 79, 80, 81, 119, 161, 163, 164, 166, 167, 168, 194

Capital adequacy 1, 29, 30, 31, 34, 35, 36, 39, 40, 246, 254
Capital requirements 245, 246, 248, 249, 250, 256, 257
China 53, 82, 86, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 198, 203, 205, 206, 218
Companies 2, 8, 43, 45, 46, 47, 48, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 67, 74, 80, 99, 100, 102, 103, 109, 110, 115, 139, 140, 143, 156, 157, 162, 163, 165, 168, 169, 170, 171, 177, 178, 180, 185, 187, 190, 191, 192, 193, 194, 197, 199, 203, 210, 217, 218, 221, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 256, 257, 258
Company 33, 45, 46, 48, 52, 55, 56, 58, 59, 60, 61, 62, 63, 64, 65, 68, 69, 70, 74, 75, 102, 103, 106, 132, 134, 139, 143, 144, 161, 162, 169, 173, 185, 187, 193, 223, 245, 246, 247, 251, 252, 253, 254, 255, 256
Competitiveness 19, 57, 67, 81, 99, 100, 101, 102, 103, 104, 106, 107, 109, 110, 111, 112, 113, 114, 115, 116, 154, 177, 179, 185, 193, 194
Construction sector 53, 55, 56, 57, 58, 59, 65, 187, 188, 193
Corporate governance 42, 43, 44, 46, 51, 52, 53, 54, 205, 216, 247
Corporate social responsibility 52, 119, 130, 132, 161, 172
Credit risk 29, 30, 31, 32, 33, 34, 35, 39, 40, 41, 42, 178, 245, 246, 247, 248, 249, 250, 252, 253, 254, 256, 257
Credit scoring 245, 246, 250, 257
Crisis 15, 16, 17, 20, 24, 25, 26, 27, 34, 57, 86, 96, 99, 183, 184, 194, 196, 197, 204, 217, 220
CSR 52, 53, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172
Culture 1, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 52, 59, 75, 76, 124, 126, 127, 129, 130

Disclosure requirements 43, 52, 138

Earnings 34, 56, 59, 101, 105, 127, 138, 143, 177, 178, 183, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 221, 248, 251
Earnings management 34, 138, 143, 177, 178, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218
Economic crisis 99
Economic growth 17, 18, 19, 21, 24, 27, 30, 31, 32, 35, 57, 65, 82, 94, 97, 100, 149, 150, 151, 153, 154, 156, 157, 160, 177, 180, 183, 185, 188, 190, 193, 194, 195, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206
Education 12, 18, 56, 60, 67, 68, 70, 71, 73, 74, 82, 114, 119, 121, 126, 130, 134, 181, 194, 234, 235, 236, 237, 238, 239, 240, 241
Environmental management 43, 46, 54
Ethnic minorities 178, 233, 234, 235, 241, 242
EU 15, 16, 17, 20, 21, 22, 23, 24, 25, 26, 27, 95, 96, 130, 149, 152, 153, 154, 155, 158, 159, 165, 204, 205
EU27 82, 149, 150, 151, 152, 153, 154, 157, 158
European union 1, 15, 25, 26, 82, 139, 183, 196

FDI 154, 155, 156, 184, 194, 197, 198, 199, 202, 203, 204, 205, 206
Financial reporting 42, 43, 44, 46, 51, 137, 138, 139, 140, 143, 147, 148
Fiscal consolidation 1, 15, 16, 17, 18, 19, 20, 21, 23, 24, 25, 26, 27, 184, 192
Fiscal policy 15, 16, 18, 19, 20, 21, 24, 25, 26, 27
Fiscal rules 15, 16, 20, 21, 25
Foreign aid 178, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242
Foreign direct investments 177, 197

GDP 4, 6, 9, 11, 15, 16, 18, 20, 21, 23, 24, 25, 33, 34, 57, 60, 82, 84, 89, 95, 105, 106, 107, 108, 130, 149, 150, 151, 152, 153, 154, 156, 157, 158, 160, 183, 184, 190, 192, 193, 199, 205, 233

GDP growth 15, 21, 23, 34, 57, 130, 151, 152, 153, 156, 157, 183, 184, 192, 199, 205, 233
Government 17, 18, 34, 40, 56, 99, 100, 101, 103, 104, 105, 109, 111, 112, 113, 114, 130, 132, 143, 151, 156, 157, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 180, 197, 198, 202, 203, 220, 221, 224, 225, 226, 227, 233, 234, 248

Household income 178, 233, 234, 236, 237, 238, 239, 240, 241, 242
HRM 81, 119, 120, 121, 122, 123, 124, 125, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136
Human capital 70, 125, 127, 136, 179, 202, 203
Human resource management 81, 119, 120, 122, 124, 134, 135

Inflation 31, 33, 34, 36, 37, 39, 40, 81, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 99, 100, 101, 103, 104, 105, 109, 112, 113, 130, 157, 243
Inflation rate 31, 34, 36, 37, 39, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 103, 104, 130
Informal institutions 81, 137, 138, 140, 145
Information 6, 16, 30, 32, 33, 39, 41, 44, 45, 46, 47, 51, 53, 54, 55, 58, 59, 60, 81, 106, 122, 129, 130, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 162, 166, 171, 177, 196, 198, 208, 218, 221, 230, 235, 250, 253, 257
Institutions 5, 27, 33, 57, 61, 79, 81, 137, 138, 140, 145, 158, 160, 162, 177, 185, 194, 246
Interest rate 17, 19, 31, 34, 36, 37, 39, 94, 103, 114, 157, 247
Investment strategies 178, 219, 220, 221, 222, 223, 224, 225, 226, 230, 231

Job satisfaction 2, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76

KM 55, 56, 58, 59, 60, 61, 62, 63, 64, 65
Knowledge management 2, 55, 65, 119, 122, 206

Lifecycle strategy 219, 220, 221, 222, 223, 224
Loans 1, 20, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 56, 57, 151, 157, 181, 185, 234, 235, 246, 247, 250, 252, 253, 254, 256, 257

Manufacturing industry 179, 180, 187, 188, 189, 190, 193, 194
Monetary policy 25, 27, 81, 84, 86, 94, 95, 96, 153, 157, 247

Nigeria 1, 2, 3, 4, 8, 9, 10, 12, 13, 14, 29, 30, 31, 35, 37, 39, 40, 41, 42, 43, 47, 48, 50, 51, 52, 53, 54, 81, 99, 100, 103, 104, 112, 113, 114, 115, 116, 137, 138, 147, 148, 177, 207, 208, 210, 212, 216, 218
Nigerian 1, 12, 14, 29, 31, 32, 33, 34, 37, 38, 39, 40, 41, 47, 53, 99, 100, 102, 103, 110, 113, 115, 148, 210, 218
Nonperforming loans 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 181

Organizational design 81, 119, 120, 124, 125, 126, 128, 129, 130, 133, 136
Output gap 34, 81, 83, 84, 85, 86, 87, 88, 89, 90, 92, 93, 94, 95, 96, 98

Pension funds 178, 219, 220, 221, 222, 223, 225, 227, 230, 231
Performance 101, 102, 104, 135, 136, 195, 217
Phillips curve 83, 86, 87, 90, 92, 94, 95, 96, 97, 98
Public debt 1, 15, 16, 17, 18, 19, 20, 21, 23, 24, 25, 26, 27, 184, 192

Recycling 82, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 173
Reform challenges 179
Reforms 20, 24, 26, 84, 157, 177, 179, 180, 181, 182, 185, 192, 193, 194, 195
Retirement savings 219, 222
Return on assets 33, 34, 102, 207, 208, 209, 210, 211, 212, 214, 216
Return on equity 102, 186, 187, 188, 189, 191, 207, 208, 209, 210, 211, 212, 214, 216
ROA 31, 33, 34, 35, 36, 37, 38, 47, 186, 187, 189, 190, 191, 192, 209, 211, 212, 213, 214, 215, 216
ROE 34, 186, 187, 189, 191, 192, 209, 211, 212, 213, 214, 215, 216

Service orientation 2, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76
South africa 2, 4, 8, 9, 10, 43, 47, 48, 50, 51, 53, 115, 207, 208, 210, 212, 216, 242
Structural problems 155, 179, 180, 193
Sub-saharan africa 2, 34, 41, 43, 44, 45, 178, 204, 207, 208, 210, 211, 212, 213, 214, 215, 216

Tax 6, 8, 13, 18, 26, 31
Taxation 12, 14, 40
Taxes 1, 7, 9, 12, 14, 18, 19, 23, 25, 56, 105, 181, 185, 211, 212, 251
Tourism 2, 13, 57, 67, 68, 70, 71, 73, 74, 75, 77, 187, 196, 243
Travel agencies 67, 68, 70, 74, 75

Unit labor costs 83, 87, 88, 89, 90, 91, 92, 93, 94, 95, 98

Vietnam 47, 53, 64, 177, 178, 203, 233, 234, 235, 236, 240, 241, 242, 243

Wages 19, 55, 56, 62, 63, 64, 65, 130, 184

Economic Horizons, September - December 2020, Volume 22, Number 3, 261 - 262
UDC: 33 ISSN: 1450-863 X
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CIP - Каталогизација у публикацији
Народна библиотека Србије, Београд

33

EKONOMSKI horizonti / glavni i odgovorni urednik Vlastimir Leković. - God. 1, br. 1/2 (1999)- . - Kragujevac: Ekonomski fakultet Univerziteta u Kragujevcu, 1999 - (Kragujevac: Kg Digital press doo). - 26 cm

Tri puta godišnje. - Tekst na srp. i engl. jeziku. - Drugo izdanje na drugom medijumu : Ekonomski horizonti (Online) = ISSN 2217-9232
ISSN 1450-863X = Ekonomski horizonti (Štampano izd.)
COBISS.SR-ID 158022663

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