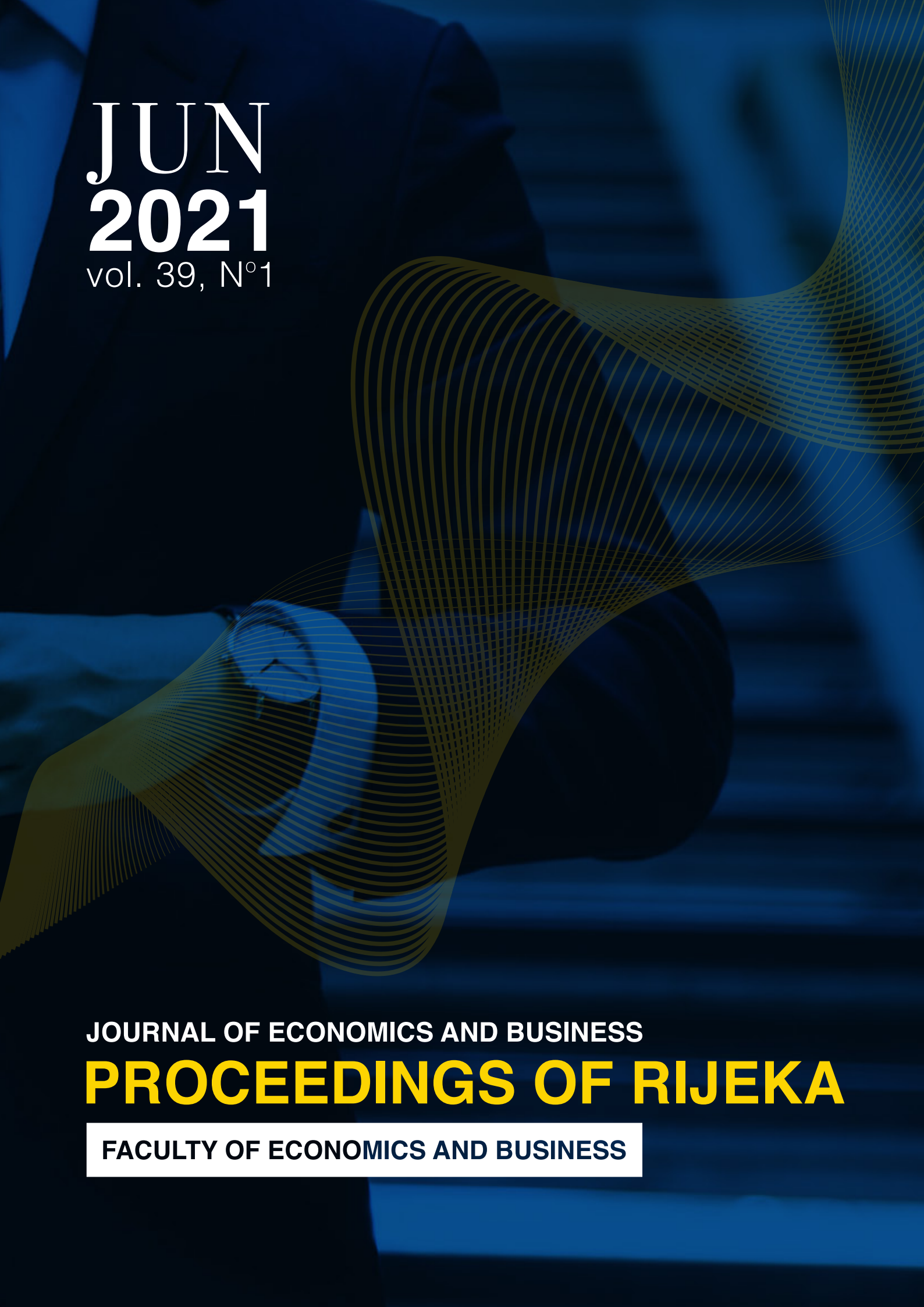


JUN
2021
vol. 39, N°1

JOURNAL OF ECONOMICS AND BUSINESS

PROCEEDINGS OF RIJEKA

FACULTY OF ECONOMICS AND BUSINESS

UNIVERSITY OF RIJEKA
FACULTY OF ECONOMICS
AND BUSINESS

JOURNAL OF ECONOMICS AND BUSINESS

PROCEEDINGS OF RIJEKA

FACULTY OF ECONOMICS AND BUSINESS

SVEUČILIŠTE U RIJECI
UNIVERSITY OF RIJEKA

Izdavač – Published by
SVEUČILIŠTE U RIJECI
EKONOMSKI FAKULTET
UNIVERSITY OF RIJEKA
FACULTY OF ECONOMICS AND BUSINESS
Ivana Filipovića 4, 51000 Rijeka
Hrvatska – Croatia
telefon: +385 51 355 111

Za izdavača – For the Publisher
ALEN HOST
Dekan – Dean

Priloge objavljene u časopisu referiraju baze – Abstracted and indexed in
EconLit – American Economic Association's electronic database, JEL – Journal of Economic Literature, Pittsburgh, Pennsylvania, USA. IBSS – International Bibliography of the Social Sciences, ProQuest, Cambridge, UK. DOAJ – Directory of Open Access Journals, Lund University, Sweden. CAB Abstracts, Wallingford, Oxfordshire, UK. ESCI – Emerging Sources Citation Index (Clarivate Analytics), from July 31, 2008 until December 2018 the Journal was included in SSCI. SocINDEX (Abstracts&Indexing) with references, EconLit with Full Text (EBSCO), Ipswich, MA, USA. Proquest – ABI/INFORM Global, Ann Arbor, Michigan, USA. SCOPUS, Elsevier B.V., Amsterdam, The Netherlands. ERIH PLUS, Bergen, Norway.

Časopis izlazi dva puta godišnje – Proceedings is issued twice a year

Zbornik radova Ekonomskog fakulteta u Rijeci tiskan je uz potporu –
Proceedings of Rijeka Faculty of Economics and Business is published being supported by

Sveučilišta u Rijeci
University of Rijeka

i/and

Zaklade Sveučilišta u Rijeci
University of Rijeka Foundation

Grafička priprema – Prepress
Tempora, Rijeka

Adresa uredništva – Address of the Editorial Board
Ekonomski fakultet u Rijeci – Zbornik radova, Ivana Filipovića 4, 51000 Rijeka, Hrvatska – Croatia
tel.: +385 51 355 116; fax: +385 51 212 268; e-mail: zbornik@efri.hr; www.efri.uniri.hr

Zbornik radova Ekonomskog fakulteta u Rijeci • Časopis za ekonomsku teoriju i praksu •
ISSN 1331-8004 • ISSN 1846-7520 (Online) • Vol. 39 • Sv. 1 • Rijeka • 2021.
Proceedings of Rijeka Faculty of Economics • Journal of Economics and Business •
ISSN 1331-8004 • ISSN 1846-7520 (Online) • Vol. 39 • No. 1 • Rijeka • 2021

CONTENTS – SADRŽAJ

ARTICLES – ČLANCI

Original scientific paper
UDC: 001.895:502.12(510)
https://doi.org/10.18045/zbefri.2021.1.9

Policy orientation, knowledge dynamic ability and green innovation: A mediation model based on China provincial panel data*

Li Fang[1], *Zhang Sheng*[2]

Abstract

Environmental supervision and government subsidy are important tools for government to promote green innovation. The influence of these two policy orientations on green innovation performance is spreading widely, but the specific indirect mechanism of policy orientation inducing green innovation needs further exploring. This paper introduces the knowledge-dynamic ability (knowledge production ability, knowledge acquisition ability, knowledge integration ability) into the analysis framework of enterprise green innovation, and studies the mediating effect of the knowledge-dynamic ability on policy orientation and green innovation. Based on the panel data of 30 provinces in China from 2000 to 2015, the empirical findings are as follows: Firstly, the knowledge-dynamic ability plays a remarkable mediating role in promoting between policy orientation and green innovation, which indicates that improving the knowledge-dynamic ability is a core mechanism of policy orientation to induce enterprise green innovation. Secondly, the knowledge-dynamic ability plays a complete mediating role in the relationship between environmental supervision and green innovation. Environmental supervision promotes green process innovation by enhancing knowledge acquisition ability and induces green product innovation by enhancing knowledge production ability. Thirdly, the knowledge-dynamic ability plays a partial mediating role in the relationship between government subsidy and green innovation. Government subsidy improves enterprise green process innovation by

* Received: 18-11-2020; accepted: 15-06-2021

[1] *Instructor, Nanjing University of Science and Technology, School of Intellectual Property, science technology policy and management, No. 200, Xiaolingwei Street, Nanjing, Jiangsu Province, China, 210094, Scientific affiliation: innovation management, intellectual property right, science technology policy. Phone: +86 15829715128. E-mail: 532296776@qq.com.*

[2] *Full professor, Xi'an Jiaotong University, School of Public Policy and Administration, science technology policy and management, NO. 28, Road Xianning West, Beilin District, Xi'an City, Shannxi Province, China, 710049, Scientific affiliation: science technology policy, government governance. Phone: +86 02982665254. E-mail: xjtuppasci@163.com. (Corresponding Author).*

enhancing knowledge acquisition ability and knowledge integration ability, and induces enterprise green product innovation by enhancing knowledge production ability and knowledge integration ability.

Key words: *policy orientation, knowledge dynamic ability, green innovation, environmental supervision, government subsidy*

JEL classification: *Q55, Q58, O32, O38*

1. Introduction

With the increasing environmental pressure of economic development, green innovation has increasingly become the focus of regional development. The green innovation technology market is facing the dual externalities of pollution and technology spillover. It leads to the serious shortage of green innovation performance. The government needs to stimulate enterprises to start with green innovation via policy tools, such as environmental supervision, government subsidy, etc. The existing literature deals in detail with the direct impact of government policy orientation on green innovation but neglects the specific incentive mechanism of these policy orientations on green innovation. Research on the inducing mechanism of policy orientation to green innovations will help to better play the guiding role of policy tools, and promote firm green innovation performance and regional sustainable development.

Existing research lays particular emphasis on the identification of the direct influence of policy orientation on green innovations, and have no unified understanding. Many studies support the induced innovation effect of government policies. An appropriate design of policy tools will stimulate firmsto implement green innovation strategies to strengthen investment in green technology and offset the cost of environmental protection. However, in empirical tests, the influence of policy orientation on green innovation may vary according to different periods, regions and industries, etc. No matter which kind of policy tools impact green innovation, different literature has found different impact relationships, such as promotion, inhibition, inverted U-shaped relationship or uncertainty relationship (Peuckert, 2014; Rexhäuser and Rammer, 2014; Bronzini and Piselli, 2016; Leeuwen and Mohnen, 2017). Guo et al. (2018) also study the impact of two policy orientations concurrently and find environmental supervision policy has a U-shaped impact on green innovation, and government subsidy policy promotes green innovation in China.

But these existing researches focus too much on the empirical test of the direct influence of policy orientation on green innovation and neglected the exploration of the indirect inducing mechanism of policy orientation to green innovation. It is worth noting that the different or even contrary relationships found in relevant studies may also mean that there are still undiscovered indirect inducing

mechanisms of policy orientation to green innovation. Whether the indirect mechanism works effectively or not has an inherent influence on the action direction of policy orientation to green innovation. Different from these existing researches, this paper focuses on the indirect influence mechanism of policy orientation inducing green innovation, and hopes to identify and explain the induced innovation effect of policy orientation on green innovation more clearly.

While opening the black box of the indirect inducing mechanism, this paper introduces knowledge dynamic ability into the analysis framework of green innovation. Dynamic ability is the enterprises' ability to cope with the dynamism of complex environments and obtain a sustainable advantageous position in the market, which is embodied in the capability of enterprises to discoverand realize opportunities (Teece et al., 1997; Teece, 2010). Zheng et al. (2011) extend the dynamic ability to knowledge management research and put forward the concept of knowledge-dynamic ability. They define it as the capability of enterprises to perceive, produce and integrate knowledge resources in the dynamic environment. Knowledge dynamic ability is the embodiment of enterprise dynamic ability in the field of knowledge and technology innovation.

Under the framework of green innovation, knowledge dynamic ability is more embodied in the ability of enterprises to discover, acquire and apply innovative knowledge. Policy orientation will affect the construction of knowledge dynamic capability of enterprises, and the promotion of knowledge dynamic capability will promote green innovation. Therefore, it is necessary to study knowledge dynamic capability as the core mechanism of policy orientation impact on green innovation. To examine the mechanism, we propose three following research hypotheses:

H1: Policy orientation has a significant positive impact on green innovation.

H2: Policy orientation has a significant positive impact on enterprise knowledge dynamic ability.

H3: Knowledge dynamic ability mediates the relationship between environmental supervision and green innovation.

This paper divides green innovation into green process innovation and green product innovation, and studies the mediating effect of the three dynamic abilities of knowledge production ability, knowledge acquisition ability and knowledge integration ability, in the relationship between the two policy orientations of environmental supervision, government funding and green innovation.

Taking the data of 30 provinces in China from 2000 to 2015 as samples, this paper uses step by step test and panel fixed effect regression method and finds that knowledge dynamic ability plays an intermediary role in the relationship between policy orientation and green innovation.

The innovation of this study is mainly in the following three aspects: First, this paper introduces knowledge dynamic ability and finds that policy orientation can improve an enterprise's green innovation by promoting knowledge- dynamic ability. This indirect incentive mechanism of policy orientation is a powerful supplement to the existing literature focusing on the direct influence mechanism. Second, environmental supervision has a direct- inhibitory effect and an indirect promotion effect on green product innovation through knowledge dynamic ability, which leads to the total effect not significant. This result provides a new explanation for the controversial conclusion in the existing literature. Third, government subsidy has a direct promoting impact on green innovation. It also improves enterprise green innovation by enhancing knowledge dynamic ability.

The main chapters of this paper are arranged as follows: Section 2 reviews the existing research; Section 3 constructs the theoretical model and empirical model; Section 4 presents research data and empirical analysis process; Section 5 provides the results and discussion, and Section 6 reports the findings and conclusion.

2. Literature review

Some studies have focused on the effect of the policy orientation on green innovation. However, the existing literature reveals that empirical evidence remains far from the consensus view. There is also some literature focus on the effect of dynamic ability on enterprise innovation. This section reviews the existing literature from three aspects.

2.1. Policy Orientation and Green Innovation

The government is committed to resolving the local green innovation market failure by making and implementing an effective environmental supervision policy and government subsidy policy.

Environmental supervision is an important policy tool to control the negative externality of green innovation. Environmental supervision policies set some rules and standards that will limit and guide the direction of green innovations of enterprises. Enterprises choose green innovations to deal with the high standards and strictness of environmental supervision acquiring the leader advantage and innovation benefits in the market. Therefore, well designed and suitable environmental supervision policy will effectively guide firms to engage in technology R&D and innovation, and partly, sometimes even completely offset the additional regulatory costs (Porter and Linde, 1995). Based on Porter and Linde (1995), Ambec and Barla (2002) further demonstrate the theoretical basis of the hypothesis and find that environmental supervision can reduce agency costs,

promote enterprises to increase R&D investment, strengthen pollution-reducing innovation, and improve corporate profits. This hypothesis on the green innovation compensation effect of environmental supervision became the main theoretical basis of the induced innovation effect of environmental supervision policy on green innovation (Hanamoto, 2006). A large number of empirical literature have tested this standpoint. Villegas-Palacio and Coria (2010) study the impact of emission tax and emission permit trading on enterprises' innovation performance and find that although different market incentive policy tools have different impacts on innovation, they all show obvious incentives effect. Based on the statistics and investigation of numerous firms in the EU, Lanoie et al. (2011) conclude that under reasonable environmental regulations enterprise's environmental innovation will be effectively promoted and help to reduce the corresponding production costs. Based on the data of different enterprises in China, Zhao and Sun (2016) and Zhang et al. (2018) find similar conclusions. In addition, Chen et al. (2017) point out that compared with western China, the impact of environmental supervision policy on green innovation is more significant in eastern and central China. Based on regulatory data of seven pilot listed companies, Zhang et al. (2019) study the impact of carbon emissions trading system on green innovation and find that carbon emissions trading mechanism was significantly positively correlated with green innovation.

Some studies have found different conclusions. Environmental supervision may increase enterprises' investment in environmental governance, squeeze out the R & D funds in the field of green innovation, and may also strengthen the constraints of production and management, thus limiting the green innovation activities of enterprises. Therefore, under different market structures, environmental regulation tools have differential incentives for green technology R&D (Montero, 2002). Focusing on German manufacturing enterprises, Wagner (2007) examines the interaction between environmental supervision, environmental innovation and patents, and finds that environmental supervision policy strength has a negative impact the number of patents related to green technological innovation. Chintrakarn (2008) examines the influence of environmental supervision policy on technological efficiency of American manufacturing firms, and finds that environmental regulation has nothing to do with technological efficiency of American manufacturing sector. Perino and Requate (2012) point out that the relationship between environmental supervision policy strictness and the adoption rate of green technology is inverted U-shaped. Guo et al. (2018) use the data of 30 provinces in the period of 2009-2015 in China and find a U-shaped relationship between environmental supervision policy and green innovation.

Government subsidy is an important policy tool to correct the positive externality of green innovation. Government subsidy will raise the R&D funds of enterprise green innovation, guarantee enterprises to maintain a high standard of R&D input, and promote green innovation of enterprises. The "increment" of firm technology

R&D investment represents the level of government subsidy guides and generates additional technology R&D activities (Buisseret et al., 1995). Meanwhile, government subsidies could reduce the risk of enterprises investing in innovation activities, help enterprises invest more funds in new activities, and accelerate the completion of existing projects (Görg and Strobl, 2007). Aiming at the empirical test of the influence of government subsidy on green innovation, David et al. (2000) find that the roles of financial subsidies on various levels of the country, industry and enterprise are different. At the national and industrial levels, government subsidies can promote R&D investment. Based on the perspective of organizational theory, Clarysse et al. (2009) introduce the "learning" process of enterprises in innovation management and explains empirically how the learning process affects the behavior increment of enterprises through the empirical study of IWT plan in Finland. Czarnitzki et al. (2014) have studied the EU Framework Plan, the Cohesive Fund and other government science and technology projects and finds that besides patent quantity, the number of patents cited by subsidized enterprises has also been significantly increased. Guo et al. (2016) use the propensity score matching method and two-stage estimation to study innovation fund of Chinese technology based SMEs and the result shows that technology plan has a major influence on patent quantity and the value of new products of subsidized enterprises. Wang et al. (2017) find that although China's Innovation Fund for technology-based SMEs has improved the survival rate of subsidized enterprises, its effect is not significant on whether the enterprises apply for patents and whether they can get external equity investment.

2.2. Policy Orientation and Knowledge Dynamic Ability

The foundations of dynamic ability theory were set by Teece et al. (1997), which propose dynamic ability as the ability of enterprises to integrate, construct and centralize interior and outside resources to gain competitive advantage so as to fit in with dynamic and complex environment. By defining dynamic ability from the perspective of collective behavior patterns, Zollo and Winter (2002) improve the operability and availability of this concept. Teece (2010) define dynamic capabilities as intangible assets that enterprises can create, deploy and protect long-term competitive advantages. Enterprises with strong dynamic capabilities have strong innovative capabilities and entrepreneurship.

Furthermore, for the knowledge dynamic ability, Zheng et al. (2011) elaborate the concept of dynamic ability from the perspective of knowledge base, and propose three kinds of knowledge dynamic abilities. Knowledge production ability refers to the ability of a company to develop and improve actions and processes that contribute to discover and create new knowledge. Knowledge acquisition ability means the ability of enterprises to distinguish and gain useful exterior knowledge. Knowledge integration ability is the ability of enterprises to blend and utilize interior and outside knowledge. Similarly, Monferrer et al. (2015) divide knowledge

dynamic ability into knowledge adaptability, knowledge absorptivity and knowledge innovation capability. Cheng et al. (2016) divide knowledge dynamic ability into knowledge acquisition and sharing ability.

Aiming at the impact of policy orientation on knowledge dynamic capability, current findings show that policy orientation of government will create an institutional environment, and a good external institutional environment will strengthen the knowledge dynamic ability within enterprises, and a bad one will restrict correspondingly (Delmas, 2002). Based on 200 Spanish enterprise data, Barrales-Molina et al. (2010) study the impact of managers' environmental management concepts on the dynamic capabilities of enterprises and find that managers' environmental awareness has a significant role in promoting dynamic capacity building. Salazar and Peláez (2012) point out that policy orientation related to resource and capacity constraints will affect the dynamic capabilities of technological innovation, and the establishment of information technology innovation centers will help promote the organic growth of the dynamic capabilities of innovation. Using cross-sectional industry data of 188 Russian SMEs, Volchek et al. (2013) study the relationship between policy orientation, innovation capability and internationalization of enterprises, and find that external policy orientation will affect the dynamic innovation capability of enterprises.

Specifically, new environmental rules and standards require enterprises to understand and master the new knowledge of relevant technology and management and guide and promote the improvement of enterprise knowledge dynamic ability. Based on a resource-based view, government subsidy strengthens enterprise innovation resources and urges enterprises to transform innovation resources into knowledge dynamic ability, and then improves knowledge dynamic ability of enterprises (King and Tucci, 2002). Russo (2010) studies the impact of the implementation of the ISO14001 environmental management standard on the improvement of the enterprise production process and finds that the new environmental management standard promotes the knowledge dynamic ability of the enterprise. Based on the survey data of the Emilia-Romagna region in Italy, Antonioli et al. (2014) find a similar conclusion for government fund policy.

2.3. The Mediating Role of Knowledge Dynamic Ability

Existing literature has recognized the important part of dynamic ability played in promoting green innovation and started exploring the mediating role of dynamic ability.

Dynamic ability ensures the advantages of enterprises in the complex competitive environment, enables enterprises to identify and seize the opportunities of green innovation, allocates resources to carry out innovation activities, realizes green innovation, and improves the green innovation ability and performance of

enterprises (Ellonen et al., 2009; Chen and Chang, 2013; Weerawardena et al., 2015). Focus on Taiwanese lighting manufacturers, Wu et al. (2016) put forward that dynamic organizational capability will reduce the impact of environmental changes on enterprises, increase the perception and integration ability of enterprises' green innovation opportunities, and advance enterprises' green innovation.

Policy environment, industrial market, organization, managers and other factors will affect the dynamic ability and enterprise performance (Deeds et al., 2000), dynamic ability play an important intermediary role between these factors and enterprise performance. Based on the data of Italian manufacturing enterprises, Dangelico et al. (2017) find that the sustainable dynamic capabilities such as resource integration and re-allocation are significantly correlated with the green product design capability, and only the external resource integration capability is positively and significantly correlated with the green product innovation capability. Combining sustainable supply chain management with dynamic theory, Hong et al. (2018) test the mediating effect of dynamic capability of supply chain between supply chain management practice and firm performance.

To summarize, the direct impact of policy orientation on green innovation has been widely discussed and the mediating role of dynamic ability has been concerned by the existing literature. However, the indirect impact of policy orientation on green innovation and the role of knowledge dynamic ability have been ignored by existing literature. Therefore, this paper aims to contribute to the literature by introducing knowledge dynamic ability into the research of the relationship between policy orientation and green innovation. This paper tries to demonstrate the mediating role of knowledge dynamic ability on policy orientation and green innovation, and to clarify the inducing mechanism of policy guidance for green innovation.

3. Methodology

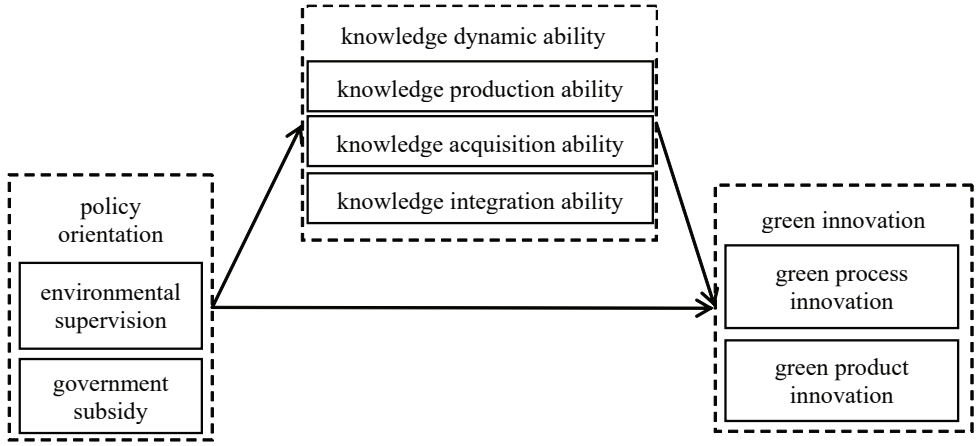
In this section, the theoretical model and empirical model are constructed. Based on reviewing existing research, a theoretical model of the mediating effect of knowledge dynamic ability on policy orientation and green innovation is establishedTo validate the theoretical model and related hypotheses constructed in this paper, an econometric model is established by step by step test and panel fixed effect regression method. In addition, variable design and data collection are presented in this section.

3.1. Theoretical model

By introducing knowledge dynamic ability into the relationship between policy orientation and green innovation, the mechanism of policy orientation inducing

green innovation is studied. Based on the above research concerning the correlation between policy orientation, knowledge dynamic ability, and green innovation, a theoretical model of the mediating effect of knowledge dynamic ability on policy orientation and green innovation is established, as shown in Figure 1.

Figure 1: Mediating Model of Knowledge Dynamic Ability in the Relationship between Policy Orientation and Green Innovation



Source: Authors' concept

According to the model, government policy orientation includes environmental supervision and government subsidy. Knowledge dynamic ability includes knowledge production ability, knowledge acquisition ability, and knowledge integration ability. Green innovation includes green process innovation and green product innovation. Policy orientation will promote green innovation. Knowledge dynamic ability has a mediating effect between them, that is, policy orientation promotes green technological innovation by promoting enterprise knowledge dynamic ability.

3.2. Empirical model

In order to validate the theoretical model and related hypotheses constructed above, an econometric model is established to empirically test the mediation effect.

Step-by-step method put forward by Baron and Kenny (1986) is the most popular method to verify the mediation effect. Firstly, it measures the effect of the independent variable on dependent variable and observes the significance of the regression results; secondly, it measures the influence of independent variable on the mediating variable and observes the significance of the results; thirdly, it

measures the influence of both independent variable and mediating variable on the dependent variable, and observes whether both variables, the independent and mediating are significant. If the test results are significant, it implies the significant part of the mediation effect; if in the third step test, theindependent variables are not significant, but all the others are, then it shows , that there is a complete mediation effect.

This sequential test is more effective than other methods, although it has lower test power. Therefore, this paper examines the mediating role of knowledge dynamic ability by step-by-step method.

The panel data regression method was used for empirical test. In order to decrease the heteroscedasticity of the regression and the multi-collinearity between variables, most variables are logarithmically entered into the model. The empirical model to test the mediation effect is as follows:

$$Y_{it} = \alpha_0 + \alpha_1 \ Env_{it} + \alpha_2 \ Gov_{it} + Control_{it} + \varepsilon_{it} \quad (1)$$

$$Find_{it} = \beta_0 + \beta_1 \ Env_{it} + \beta_2 \ Gov_{it} + Control_{it} + \varepsilon_{it} \quad (2)$$

$$Acqu_{it} = \beta_0 + \beta_1^{'} \ Env_{it} + \beta_2^{'} \ Gov_{it} + Control_{it} + \varepsilon_{it} \quad (3)$$

$$Comb_{it} = \beta_0 + \beta_1^{''} \ Env_{it} + \beta_2^{''} \ Gov_{it} + Control_{it} + \varepsilon_{it} \quad (4)$$

$$Y_{it} = \alpha_0 + \alpha_1^{'} \ Env_{it} + \alpha_2^{'} \ Gov_{it} + \gamma_1 \ Prod_{it} + \gamma_2 \ Acqu_{it} + \gamma_3 \ Inte_{it} + Control_{it} + \varepsilon_{it} \quad (5)$$

In the above model, i represents regions and t represents years. Y_{it} represents the green innovation level of region i in t year, including green process innovation $Process_{it}$ and green product innovation $Product_{it}$.

Model (1) examines the impact of policy orientation on green innovation, model (2) - (4) examines the impact of policy orientation on knowledge dynamic ability, and model (5) examines the impact of policy orientation and knowledge dynamic ability on green innovation.

3.3. Variable design

3.3.1. Dependent Variables

Green innovation means that enterprises can save resources and reduce emissions by researching and developing processes, technologies and products that meet the requirements of environmental protection (Wong, 2013). In empirical research, green innovation is generally measured from two dimensions: process innovation and product innovation.

Green process innovation focuses on technological optimization and equipment improvement in production process (Lin et al., 2014). As for the measurement of green process innovation, existing studies usually choose technical transformation investment or pollution intensity of unit output value to indicate enterprise innovation activities in production process (Xie et al., 2016; Feng and Chen, 2018; Guo et al., 2018). Draw on the experience of Feng and Chen (2018), the level of green process innovation is measured by enterprise technology transformation fund. The more funds enterprise invested in technological renovation, the higher the degree of green process innovation.

Green product innovation focuses on technological innovation investment and activities in product development process (Wong, 2012). As for the measurement of green product innovation, existing studies usually choose share of sales of newly created green product, new product income unit energy consumption, eco-labeling product certification to indicate enterprise in product development process (Chen et al., 2006; Stucki et al., 2018; Feng and Chen, 2018; Guo et al., 2018). Refer to this train of thought, green product innovation is measured in terms of enterprise new product development fund. The more funds enterprise invested in new product development, the higher the degree of green product innovation.

3.3.2. Independent Variables

Because of the particularity of green innovation, there are two main aspects of the government policy orientation: environmental supervision and government subsidy.

As for the measurement of environmental supervision, most of the existing studies choose industrial pollution control investment, operation cost of pollution control facilities, sewage discharge fee and other indicators to indicate the cost of pollution treatment of enterprises (Lanoie et al. 2008; Walker, 2011; Rubashkina et al., 2015). On the basis of this line of thought, the degree of environmental supervision is measured by the ratio of industrial pollution treatment investment to industrial main business income. The greater the investment in environmental treatment of unit business income, the higher the degree of local environmental supervision.

Government subsidy represents the degree of local government financial input for enterprises' scientific and technological activities (Zhu et al., 2006; Czarnitzki and Lopesbento, 2014). Industrial firms are the principal part of green technology innovation in a region. On the basis of Guo et al. (2018), the level of government subsidy is measured by the part of funds for scientific and technological activities of industrial firms comes from government funding.

3.3.3. Mediator variables

Knowledge dynamic capability refers to the knowledge production capacity, knowledge acquisition ability and knowledge integration ability of enterprises during the green innovation course, focusing on discovering technological opportunities, acquiring technological opportunities, realizing technological innovation respectively. According to the definition, the three dimensions of knowledge dynamic ability is measured.

Enterprises mainly discover opportunities for technological innovation by carrying out knowledge R&D activities (Chaminade and Vang, 2008). This paper measures knowledge production ability based on internal R&D expenditure. By means of internal R&D, enterprises acquire technology by introducing external innovations (Cassiman and Veugelers, 2006). Therefore, knowledge acquisition ability is measured by the sum of technology funds introduced by enterprises and domestic technology funds purchased. After introducing technology, enterprises realize the integration and application of technology by digesting and absorbing technology knowledge (Boer et al., 1999). Therefore, the ability of knowledge integration is measured by digesting and absorbing technology funds.

3.3.4. Control Variables

The effect of policy orientation on green innovation is influenced by regional, industrial and resource endowments. In order to control the influence of these factors, local economy, industrial structure, technological market development and local openness are selected as control factors. Local economy is measured by GDP per capita, the industrial structure is measured by the ratio of the secondary industry added value to GDP, the level of technological market development is measured by the amount of technology market contract transactions in that year, and the degree of local openness is measured by foreign investment in the region.

3.4. Data collection

Because of the availability and stability of data, we have selected China's provincial data as samples for empirical testing. The policy orientations such as environmental supervision and government subsidies have obvious regional heterogeneity on green innovation. The use of provincial statistics can effectively control the heterogeneity caused by regional differences. According to the statistical data, the measurement data of knowledge dynamic ability of enterprises and the measurement data of green innovation are from 2000 to 2015. The research interval of sample selection is 2000-2015, and the relatively long-time interval of sample data can obtain more stable and reliable analysis results. The panel data of 480 samples from 30 provinces in 2000-2015 were obtained after eliminating the missing provinces.

The main data sources include: Statistical Yearbook of Scientific and Technological Activities of Industrial Enterprises, China Scientific and Technological Statistical Yearbook, China Environmental Statistical Yearbook and China Statistical Yearbook.

4. Empirical data and analysis

This section shows the results of empirical analysis, including descriptive statistics of sample data, correlation coefficient test and panel data regression model.

4.1. Descriptive statistics of sample data

Firstly, descriptive statistical analysis of sample data, including sample number, average, standard deviation, maximum and minimum, is presented in Table 1. In order to reduce heteroscedasticity as much as possible, logarithmic data of variables such as green process innovation, green product innovation, government R&D funding, knowledge dynamic ability and per capita GDP are taken.

Table 1: Descriptive statistical analysis of sample data

Variable	Sample Size	Average	Standard Deviation	Minimum	Maximum
Process	480	13.27639	1.340362	6.813445	15.78666
Product	480	12.82482	1.781359	7.302496	16.72298
Env	480	0.008357	0.0342817	0.000563	0.613932
Gov	480	10.32511	1.577602	2.70805	13.10724
Prod	480	12.81263	1.708944	7.212295	16.53717
Acqu	480	11.25991	1.527597	4.543295	14.06392
Inte	480	9.165372	2.062116	0	12.56639
pGDP	480	9.932681	0.811097	7.922624	11.58952
Indu	480	46.12949	7.754637	0.1329	19.760
Mar	480	12.49155	1.760505	6.395262	17.3576
Open	480	4.636202	6.299516	0.01283	35.75956

Source: Authors' calculation

4.2. Statistical test

Using Pearson correlation coefficient to test the correlation between variables, the specific coefficients are shown in Table 2. From Table 2, we can see that there are significant correlations among variables.

After correlation coefficient test, variance expansion factor test is used. The average variance expansion factor of the model is 4.93, which indicates that does not exist multiple-collinearity among the variables.

Table 2: Pearson correlation coefficient

Variable	1	2	3	4	5	6	7	8	9	10	11
Process	1										
Product	0.7773***	1									
Env	-0.3504***	-0.3915***	1								
Gov	0.7853***	0.8746***	-0.3448***	1							
Prod	0.7907***	0.9757***	-0.3496***	0.8982***	1						
Acqu	0.7730***	0.7078***	-0.3073***	0.6268***	0.7142***	1					
Inte	0.7358***	0.7996***	-0.3871***	0.7072***	0.7833***	0.7633***	1				
pGDP	0.3953***	0.7797***	-0.2618***	0.6300***	0.7781***	0.4137***	0.5730***	1			
Indu	0.4775***	0.3569***	-0.1149***	0.3567***	0.3998***	0.2932***	0.3786***	0.2071***	1		
Mar	0.5666***	0.7490***	-0.3178***	0.7126***	0.7659***	0.6494***	0.6383***	0.6737***	0.1153***	1	
Open	0.4893***	0.7227***	-0.1584***	0.6027***	0.7316***	0.5475***	0.5421***	0.6149***	0.2138***	0.6117***	1

Note: a. Table headers 1-9 correspond to variable names in the first column, respectively. b. In the superscript of coefficient, * means $p<0.1$, ** means $p<0.05$, *** means $p<0.01$.

Source: Authors' calculation

4.3. Empirical results

Before regression analysis, the Hausman test of panel data is used to determine to select a fixed-effect model or random-effect model. The results show that the Hausman test of all models rejects the original hypothesis, as shown in Table 3. Therefore, the fixed-effect model is used for panel regression analysis.

Table 3: Results of the regression model of the mediating effect of knowledge dynamic ability

Variable	Model 1-1	Model 1-2	Model 2	Model 3	Model 4	Model 5-1	Model 5-2
Dependent Variable	*Process*	*Product*	*Find*	*Acqu*	*Comb*	*Process*	*Product*
Env	1.893*** (0.704)	-0.295 (0.527)	1.733*** (0.412)	3.762*** (1.103)	-0.656 (1.775)	1.310* (0.692)	-1.034** (0.485)
Gov	0.227*** (0.044)	0.252*** (0.033)	0.231*** (0.026)	0.136** (0.070)	0.348*** (0.112)	0.197*** (0.046)	0.112*** (0.032)
Prod						-0.027 (0.078)	0.504*** (0.054)
Acqu						0.174*** (0.031)	-0.022 (0.022)
Inte						0.036** (0.018)	0.076*** (0.013)
pGDP	0.308*** (0.088)	1.408*** (0.066)	1.359*** (0.051)	0.118 (0.138)	0.800*** (0.222)	0.295** (0.136)	0.665*** (0.095)
Indu	0.033*** (0.006)	0.002 (0.004)	-0.002 (0.003)	0.013 (0.009)	0.051*** (0.015)	0.029*** (0.006)	-0.001 (0.004)
Mar	-0.036 (0.034)	-0.076*** (0.025)	-0.070*** (0.020)	0.015 (0.053)	-0.001 (0.085)	-0.040 (0.032)	-0.040* (0.023)
Open	-0.015** (0.007)	0.018*** (0.005)	0.021*** (0.004)	-0.012 (0.011)	-0.018 (0.018)	-0.011 (0.007)	0.009* (0.005)
Constant	6.854*** (0.413)	-2.993*** (0.309)	-2.218*** (0.241)	7.948*** (0.646)	-4.642*** (1.040)	5.582*** (0.525)	-1.344*** (0.367)
Sample Size	480	480	480	480	480	480	480
F Statistic	32.67	42.71	48.41	23.79	8.75	15.34	9.78
P Value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R Square	0.488	0.756	0.747	0.231	0.512	0.675	0.930
Hausman Test Statistic	66.86***	60.48***	96.51***	109.34***	35.72***	40.59***	44.63***
Regression Model	Fixed Effect	Fixed Effect	Fixed Effect	Fixed Effect	Fixed Effect	Fixed Effect	Fixed Effect

Note: Significance test: * means p<0.1, ** means p<0.05, *** means p<0.01.

Source: Authors' calculation

The step-by-step method is intended to examine the mediating effect of knowledge dynamic ability. The results of regression analysis were shown in Table 3. Model 1-1 and 1-2 are policy orientation impact analysis on green process innovation and green product innovation, model 2, 3, and 4 are policy orientation impact on knowledge dynamic ability, model 5-1 and 5-2 are policy orientation and knowledge dynamic ability impact on green process innovation and green product innovation.

Model 1-1 and model 1-2 respectively test the impact of environmental supervision and government subsidy on green process innovation and green product innovation. The results of model 1-1 show that environmental supervision and government subsidy have significant positive effects on green process innovation, with influence coefficients of 1.893 and 0.227, respectively. Model 1-2 shows that environmental supervision has a negative but non-significant impact on green product innovation. Government subsidy has a significant positive impact on green product innovation, and the impact coefficient is 0.252.

Model 2, 3, and 4 test the effects of policy orientation on knowledge production ability, knowledge acquisition ability and knowledge integration ability, respectively. The results of model 2 show that environmental supervision and government subsidy have significant positive effects on knowledge production ability, with influence coefficients of 1.733 and 0.231, respectively. The results of model 3 show that environmental supervision and government subsidy have significant positive effects on knowledge acquisition ability, and the influence coefficients are 3.762 and 0.136, respectively. The results of model 4 show that environmental supervision has a negative and non-significant impact on knowledge integration ability, and government subsidy positively and significantly correlates with knowledge integration ability, and the impact coefficient is 0.348.

Models 5-1 and 5-2 simultaneously test the impact of policy orientation and knowledge dynamic ability on green innovation.

The results of model 5-1 show that environmental supervision is positively correlated with green process innovation, but only significantly at the level of 1%, while government subsidy is positively and significantly correlated with green process innovation, with an impact coefficient of 0.197. Knowledge acquisition ability and knowledge integration ability are both positively and significantly correlated with green process innovation, with the influence coefficients of 0.174 and 0.036, respectively. Knowledge production ability has no significant impact on green process innovation.

The results of model 5-2 show that environmental supervision is negatively and significantly correlated with green product innovation, with an impact coefficient of -1.034, and government subsidy is positively correlated with green product innovation, with an impact coefficient of 0.112. Knowledge production ability and knowledge integration ability are both positively and significantly correlated

with green product innovation, with the influence coefficients of 0.504 and 0.074, respectively. Knowledge acquisition ability has no significant impact on green product innovation.

5. Results and discussion

This paper empirically examines the mediating role of knowledge dynamic ability in the relationship between policy orientation and green innovation, and indicates the inducing mechanism of policy orientation. The results show that knowledge dynamic ability plays a complete mediating role in the relationship between environmental supervision and green innovations play a significant part in mediating the relationship between government funding and green innovation.

5.1. Impact of Policy Orientation on Green Innovation

(1) Environmental supervision is positively and significantly correlated with green process innovation and is negatively correlated with green product innovation, but not significant. It shows that environmental supervision has obvious inductive influence on green process innovation, but has potential inhibition influence on green product innovation. Under the supervision of government environmental department, enterprises adopt more technological innovations to realize the goal of environmentally friendly and green development. However, environmental supervision increases the operating expenses of enterprises, even squeezes the financial arrangements of enterprises in product innovation, resulting in negative correlation between environmental supervision and green product innovation. Therefore, in order to handle the supervision of local government's environmental department, enterprises choose more ways of process innovation to reduce the resource consumption of manufacturing technique and environmental pollution of production and processing links, while ignoring or strategically abandoning the way of green product innovation.

From the perspective of strategic choice, enterprises are facing more and more stringent environmental supervision in the daily operation process. The increasing policy pressure and environmental protection standards mean that enterprises must alleviate or eliminate the pressure of environmental supervision through green technology innovation. However, on account of the limited capital and technology resources of enterprises, it makes hard to put green process innovation and green product innovation into effect at the same time, so enterprises are facing the strategic choice of innovation strategy. Compared with process innovation, product innovation faces not only the uncertainty of technological innovation, but also the uncertainty of market. If enterprises choose green product innovation, they will face higher risks. Moreover, the existing environmental supervision attaches

importance to the pollution control of manufacturing technique and technological process, and guides enterprises to choose technological renovation and upgrading for green technological innovation. Therefore, when choosing innovation strategy, enterprises will take green process innovation seriously and ignore the innovation of green products.

At the same time, in the case of limited resources, after choosing green process innovation as innovation strategy, enterprises invest more personnel and funds in green process innovation, crowding out the resources for the innovation of green products, resulting in environmental supervision promoting green process innovation and inhibiting green product innovation.

(2) Government subsidy is positively and significantly correlated with green process innovation and green product innovation, indicating that government subsidy has a powerful inductive effect on green innovation. The effect of government subsidy is greater than that of crowding out, which shows the effectiveness of government governance of technology market. Whether or not the government subsidy squeezes out some enterprises' investment, R&D funding objectively increases the level of enterprise innovation funds, compensates for the loss of enterprise innovation caused by technology spillover, improves enterprise innovation incentives, and promotes enterprise green innovation activities and output.

This promotion role is comprehensive, which is the same for green process or product innovation. Government subsidy can help enterprises break through the constraints of limited resources to a certain degree, disperse the potential risks of green innovation, and ensure that enterprises have sufficient funds for green process and product innovation activities. Moreover, government R&D investment can improve enterprise green innovation by creating and upgrading enterprise technology and equipment, training and introducing high-level technologically innovative talents, reducing fixed R&D cost and manpower cost.

5.2. Impact of Policy Orientation on Knowledge Dynamic Ability

(1) Environmental supervision is positively and significantly correlated with knowledge production ability and knowledge acquisition ability, but has no significant impact on knowledge integration ability.

Environmental supervision requires enterprises to carry out environmental governance, which adds additional operating costs to enterprises. For the sake of it making up for the cost of environmental governance, enterprises will choose green technology innovation strategy to cut down resource consumption and pollutant emission. Under the pressure of environmental governance cost, in order to achieve green innovation, enterprises will choose two strategies: independent R&D innovation and external innovation. Enterprises' independent innovation requires them to enlarge

their own R&D input in green innovation, enhance their R&D capability of green technology knowledge and enhance their knowledge production ability. Introducing external innovation requires enterprises to increase investment in technology import funds, purchase green innovation that meets the technological needs of enterprises at home and abroad through technology market, and improve knowledge acquisition ability. Therefore, environmental supervision promotes the improvement of knowledge production ability and knowledge acquisition capacity of enterprises.

The effect of environmental supervision on knowledge integration ability is not significant, which indicates that environmental supervision promotes the innovation ability of enterprises and does not affect the integration and digestion of technology. Enterprises absorb and utilize green innovation through technology integration, and then promote the level of green innovation. However, knowledge integration ability is mainly affected by technological factors, such as technological knowledge stock, R&D investment, learning mechanism, organizational climate, etc. The impact of non-technological policy environment on knowledge integration ability is not significant.

(2) Government subsidy is positively and significantly correlated with knowledge production ability, knowledge acquisition ability and knowledge integration ability, indicating that government subsidy has a significant induced effect, which comprehensively improves the knowledge dynamic ability of enterprises.

Government subsidies compensate for the potential loss of innovation income caused by technology spillovers and improve the enthusiasm of enterprises to go in for R&D activities. At the same time, the government subsidies will increase the social capital's expectation on the success probability of enterprise innovation and the quality of achievements, and improve the possibility of external financing of enterprises, and then promote enterprises to engage in R&D activities and improve their knowledge production ability. The government subsidy enriches the technological capital of enterprises, enhances the negotiating power and purchasing power of enterprises in the technological market, and improves the knowledge acquisition ability of enterprises. Government subsidy directly promotes the overall R&D efforts of enterprises, promotes the technological innovation activities and reserves of enterprises, improves the ability of enterprises to absorb and absorb technology, and improves the ability of enterprises to integrate knowledge.

5.3. Mediating Effect of Knowledge Dynamic Ability

The regression results show that knowledge dynamic ability has a mediating effect between policy orientation and green innovation.

The results of model 5-1 show that environmental supervision is significantly related to green process innovation. The influence of government subsidy on green process

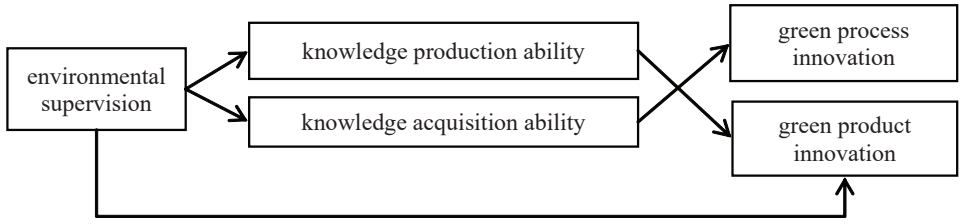
innovation is remarkable and positive. Knowledge acquisition ability and knowledge integration ability are positively related to green process innovation. By comparing the results of models 1-1 and 5-1, we could find that the regression coefficient of environmental supervision is 1.893>1.310, the regression coefficient of government subsidy is 0.227>0.197, and the regression coefficient of policy orientation is reduced. R-square of model is 0.488<0.675. The degree of model-fitting has been improved significantly, which indicates that knowledge dynamic ability has a mediating effect between policy orientation and green process innovation.

Correspondingly, the results of model 5-2 show that environmental supervision is negatively and significantly correlated with green product innovation, and government subsidy is positively and significantly related to green product innovation. Knowledge production ability and knowledge integration ability are positively related to green product innovation. Comparing the results of model 1-2 and model 5-2, we find that the regression coefficient of environmental supervision is -0.295>-1.034, the regression coefficient of government subsidy is 0.252>0.112, and the regression coefficient of policy orientation is reduced. R-square of the model is 0.756<0.930. The degree of model-fitting has been significantly improved, which indicates that knowledge dynamic ability has a mediating effect between policy orientation and green product innovation.

(1) The mediating effect of knowledge dynamic ability on environmental supervision and green innovation

The mediating role of knowledge dynamic ability between n environmental supervision and green innovation is shown in Figure 2.

Figure 2: The mediating role of knowledge dynamic ability in the relationship between environmental supervision and green innovation



Source: Authors' summary based on the above empirical results

According to the results of model 1-1, 3 and 5-1, knowledge acquisition ability has a significant complete mediating effect between environmental supervision and green process innovation. Environmental supervision has a remarkable positive overall effect on green process innovation, but after introducing knowledge dynamic ability,

the influence of knowledge acquisition ability is significant, and the direct effect of environmental supervision is no longer remarkable. It shows that the promotion of environmental supervision on green process innovation is mainly embodied by improving knowledge acquisition ability.

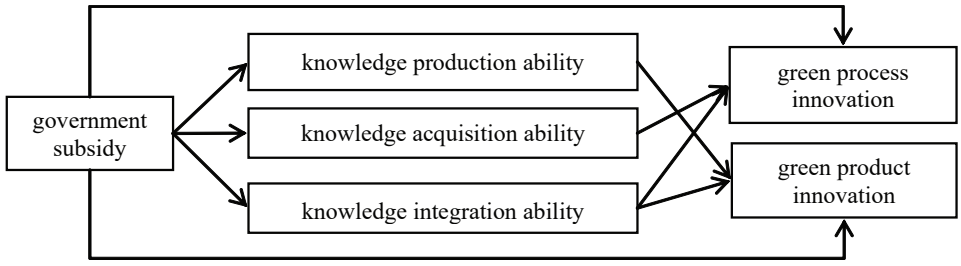
According to the results of model 1-2, 2 and 5-2, knowledge production ability has a significant mediating effect between environmental supervision and green product innovation. Environmental supervision has a remarkable and inhibitory impact on green product innovation directly. Different from the conclusion of Guo et al. (2018), due to the mediating role of knowledge production capacity, environmental supervision plays a remarkable role in promoting green product innovation indirectly. Direct negative impact and indirect positive impact coexist, which lead to the overall influence of environmental supervision on green product innovation is not remarkable. This means that in the study of the relationship between environmental supervision and green product innovation, it is of great theoretical value and practical significance to distinguish the direct effect and indirect effect and explore the guiding mechanism of environmental supervision on green innovation.

From Figure 2, we can see that environmental supervision induces green innovation. Environmental supervision improves green process innovation by enhancing enterprise knowledge acquisition ability and green product innovation by enhancing enterprise knowledge production ability. Environmental supervision will directly inhibit green product innovation, which will offset the indirect effect.

(2) The mediating effect of knowledge dynamic ability on government subsidy and green innovation

The mediating role of knowledge dynamic ability in the relationship between government subsidy and green innovation is shown in Figure 3.

Figure 3: The mediating role of knowledge dynamic ability in the relationship between government subsidy and green innovation



Source: Authors' summary based on the above empirical results

According to the results of model 1-1, 3, 4 and 5-1, knowledge acquisition ability and knowledge integration ability play a significant part in mediating the relationship between government subsidy and green process innovation. Government subsidy plays a remarkable role in promoting green process innovation directly, and also has an indirect promoting impact on green process innovation through knowledge acquisition ability and knowledge integration ability.

According to the results of model 1-2, 2, 4 and 5-2, knowledge production ability and knowledge integration ability have significant partial mediating effect on government subsidy and green product innovation. Government subsidy plays a remarkable role in promoting green product innovation directly, and also has an indirect promoting impact on green product innovation through knowledge production ability and knowledge integration ability.

According to Figure 3, government subsidy induces green innovation: government subsidy can promote green process innovation and green product innovation directly. At the same time, it will improve enterprise green process innovation by improving enterprise knowledge acquisition ability and knowledge integration ability, and green product innovation by improving enterprise knowledge production ability and knowledge integration ability.

6. Conclusions

By introducing knowledge dynamic ability into the framework of enterprise green innovation, and by analyzing the intermediary role of knowledge dynamic ability, this paper studies the induction mechanism of two policy orientations of environmental supervision and government subsidy on green innovation. Based on 480 data samples from 30 provinces in China in the period of 2000-2015, using the panel fixed effect regression model, the empirical tests show that knowledge dynamic ability has a remarkable mediating effect between policy orientation and green innovation. The specific results are as follows:

Firstly, knowledge acquisition ability has a remarkable and complete mediating effect between environmental supervision and green process innovation, and knowledge production ability has a remarkable mediating effect between environmental supervision and green product innovation. In particular, environmental supervision has concurrently direct inhibition and indirect promotion on green product innovation, resulting in no significant overall effect.

Secondly, knowledge acquisition ability and knowledge integration ability have a remarkable and complete mediating effect between government subsidy and green process innovation. Knowledge production ability and knowledge integration

ability have a remarkable and complete mediating effect between government subsidy and green product innovation.

The incentive mechanisms of these two policy tools, environmental supervision and government subsidy, effect on green process innovation and green product innovation, can be concluded as follows:

Firstly, environmental supervision improves enterprise green process innovation by enhancing knowledge acquisition ability. Environmental supervision has a direct inhibition of green product innovation. It also promotes green product innovation by enhancing knowledge production ability. The direct inhibitory effect is offset by the indirect promoting effect.

Secondly, government subsidy has a direct promoting impact on the green process and product innovation. It also improves enterprise green process innovation by enhancing knowledge acquisition ability and knowledge integration ability and promotes enterprise green product innovation by enhancing knowledge production ability and knowledge integration ability.

The above conclusions indicate that the knowledge dynamic ability of enterprise is a core mechanism for government policy to guide green innovation. Therefore, under the supervision of government environmental department or with the support of the government subsidy, enterprises should attach importance to the cultivation of knowledge dynamic ability. Through improving knowledge production ability, knowledge acquisition ability, and knowledge integration ability, green innovation can be effectively promoted.

This paper finds out the policy-oriented inducing mechanism of knowledge dynamic ability and has a clearer understanding of the relationship between environmental supervision, government subsidy, and green innovation. However, this study also has several limitations, which should be solved in future research. First, based on the statistical data sample at the regional level, this paper only puts full attention to the mediating effect of knowledge dynamic ability. Future research can use enterprise-level statistical data and survey data to explore more incentive mechanisms at the micro-level. Second, the data sample only includes provincial data in China, which means the conclusions may be peculiar and suitable to China or developing countries and regions. Replications of this study in other countries are necessary, and future studies would further discuss the universality of these conclusions. Third, this study examines the mediating role of knowledge dynamic ability, while moderating effects are not a consideration in the model. the mediating effect of knowledge dynamic ability may be moderated by factors of institutional context and enterprise characteristics, such as policy stability and enterprise ownership type. Future research can examine these moderating effects by establishing a moderated mediation model.

References

Ambec, S., Barla, P. (2002) "A theoretical foundation of the Porter hypothesis", *Economics Letters*, Vol. 75, No. 3, pp. 355–360, doi: 10.1016/s0165-1765(02)00005-8.

Antonioli, D., Marzucchi, A., Montresor, S. (2014) "Regional Innovation Policy and Innovative Behaviour: Looking for Additional Effects", *European Planning Studies*, Vol. 22, No. 1, pp. 64–83, doi: 10.1080/09654313.2012.722977.

Baron, R., Kenny, D. (1986) "The moderator-mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations", *Journal of Personality and Social Psychology*, Vol. 51, No. 6, pp. 1173–1182, doi: 10.1037/0022-3514.51.6.1173.

Barrales-Molina, V., Benitez-Amado, J., Perez-Arostegui N. M. (2010) "Managerial perceptions of the competitive environment and dynamic capabilities generation", *Industrial Management and Data Systems*, Vol. 110, No. 9, pp. 1355–1384, doi: 10.1108/02635571011087437.

Boer, M.D., Bosch, F.A.J.V., Volberda, H.W. (1999) "Managing Organizational Knowledge Integration in the Emerging Multimedia Complex", *Journal of Management Studies*, Vol. 36, No. 3, pp. 379–398, doi: 10.1111/1467-6486.00141.

Bronzini, R., Piselli, P. (2016) "The impact of R&D subsidies on firm innovation", *Research Policy*, Vol. 45, No. 2, pp. 442–457, doi: 10.1016/j.respol.2015.10.008.

Buisseret, T. J., Cameron, H. M., Georghiou, L. (1995) "What difference does it make? Additionality in the public support of R&D in large firms", *International Journal of Technology Management*, Vol. 10, No. 4-5, pp. 587–600.

Cassiman, B., Veugelers, R. (2006) "In Search of Complementarity in Innovation Strategy: Internal R&D and External Knowledge Acquisition", *Management Science*, Vol. 52, No. 1, pp. 68–82, doi: 10.1287/mnsc.1050.0470.

Chaminade, C., Vang, J. (2008) "Globalisation of knowledge production and regional innovation policy: Supporting specialized hubs in the Bangalore software industry", *Research Policy*, Vol. 37, No. 10, pp. 1684–1696, doi: 10.1016/j.respol.2008.08.014.

Chen, J., Cheng, J., Sheng, D. (2017) "Regional eco-innovation in China: An analysis of eco-innovation levels and influencing factors", *Journal of Cleaner Production*, No. 153, pp. 1–14, doi: 10.1016/j.jclepro.2017.03.141.

Chen, Y. S., Lai, S. B., Wen, C. T. (2006) "The Influence of Green Innovation Performance on Corporate Advantage in Taiwan", *Journal of Business Ethics*, Vol. 67, No. 4, pp. 331–339, doi: 10.1007/s10551-006-9025-5.

Chen, Y., Chang, C. (2013) "The Determinants of Green Product Development Performance: Green Dynamic Capabilities, Green Transformational Leadership, and Green Creativity", *Journal of Business Ethics*, Vol. 116, No. 1, pp. 107–119, doi: 10.1007/s10551-012-1452-x.

Cheng, C. C. J., Yang, C., Sheu, C. (2016) "Effects of open innovation and knowledge-based dynamic capabilities on radical innovation: An empirical study", *Journal of Engineering & Technology Management*, No. 41, pp. 79–91, doi: 10.1016/j. jengtecman.2016.07.002.

Chintrakarn, P. (2008) "Environmental regulation and U.S. states' technical inefficiency", *Economics Letters*, Vol. 100, No. 3, pp. 363–365, doi: 10.1016/j. econlet.2008.02.030.

Clarysse, B., Wright, M., Mustar, P. (2009) "Behavioral additionality of R&D subsidies: A learning perspective", *Research Policy*, Vol. 38, No. 10, pp. 1517–1533, doi: 10.1016/j.respol.2009.09.003.

Czarnitzki, C., Lopesbento, C. (2014) "Innovation Subsidies: Does the Funding Source Matter for Innovation Intensity and Performance? Empirical Evidence from Germany", *Industry & Innovation*, Vol. 21, No. 5, pp. 380–409, doi: 10.1080/13662716.2014.973246.

Czarnitzki, D., Etro, F., Kraft, K. (2014) "Endogenous Market Structures and Innovation by Leaders: An Empirical Test", *Economica*, Vol. 81, No. 321, pp. 117–139, doi: 10.1111/ecca.12061.

Dangelico, R. M., Pujari, D., Pontrandolfo, P. (2017) "Green Product Innovation in Manufacturing Firms: A Sustainability-Oriented Dynamic Capability Perspective", *Business Strategy and the Environment*, Vol. 26, No. 4, pp. 490–506, doi: 10.1002/bse.1932.

David, P. A., Hall, B. H., Toole, A. A. (2000) "Is public R&D a complement or substitute for private R&D? A review of the econometric evidence", *Research Policy*, Vol. 29, No. 4-5, pp. 497–529, doi: 10.1016/s0048-7333(99)00087-6.

Deeds, D. L., Decarolis, D., Coombs, J. (2000) "Dynamic capabilities and new product development in high technology ventures: An empirical analysis of new biotechnology firms", *Journal of Business Venturing*, Vol. 15, No. 3, pp. 211–229, doi: 10.1016/s0883-9026(98)00013-5.

Delmas, M. A. (2002) "Innovating against European rigidities: Institutional environment and dynamic capabilities", *Journal of High Technology Management Research*, Vol. 13, No. 1, pp. 19–43, doi: 10.1016/s1047-8310(01)00047-5.

Ellonen, H., Wikström, P., Jantunen, A. (2009) "Linking dynamic-capability portfolios and innovation outcomes", *Technovation*, Vol. 29, No. 11, pp. 753–762, doi: 10.1016/j.technovation.2009.04.005.

Feng, Z., Chen, W. (2018) "Environmental Regulation, Green Innovation, and Industrial Green Development: An Empirical Analysis Based on the Spatial Durbin Model", *Sustainability*, Vol. 10, No. 1, p. 223, doi: 10.3390/su10010223.

Guo, D., Guo, Y., Jiang, K. (2016) "Government-subsidized R&D and firm innovation: Evidence from China", *Research Policy*, Vol. 45, No. 6, pp. 1129–1144, doi: 10.1016/j.respol.2016.03.002.

Guo, Y. et al. (2018) "Environmental Regulation, Government R&D Funding and Green Technology Innovation: Evidence from China Provincial Data", *Sustainability*, Vol. 10, No. 4, p. 940, doi: 10.3390/su10040940.

Görg, H., Strobl, E. (2007) "The Effect of R&D Subsidies on Private R&D", *Economica*, Vol. 74, No. 294, pp. 215–234, doi: 10.1111/j.1468-0335.2006.00547.x.

Hamamoto, M. (2006) "Environmental regulation and the productivity of Japanese manufacturing industries", *Resource & Energy Economics*, Vol. 28, No. 4, pp. 299–312, doi: 10.1016/j.reseneeco.2005.11.001.

Hong, J., Zhang, Y., Ding, M. (2018) "Sustainable supply chain management practices, supply chain dynamic capabilities, and enterprise performance", *Journal of Cleaner Production*, No. 172, pp. 3508–3519, doi: 10.1016/j.jclepro.2017.06.093.

King, A. A., Tucci, C. L. (2002) "Incumbent Entry into New Market Niches: The Role of Experience and Managerial Choice in the Creation of Dynamic Capabilities", *Management Science*, Vol. 48, No. 2, pp. 171–186, doi: 10.1287/mnsc.48.2.171.253.

Lanoie, P., Patry, M., Lajeunesse, R. (2008) "Environmental regulation and productivity: testing the porter hypothesis", *Journal of Productivity Analysis*, Vol. 30, No. 2, pp. 121–128, doi: 10.1007/s11123-008-0108-4.

Lanoie, P. et al. (2011) "Environmental Policy, Innovation and Performance: New Insights on the Porter Hypothesis", *Journal of Economics & Management Strategy*, Vol. 20, No. 3, pp. 803–842, doi: 10.1111/j.1530-9134.2011.00301.x.

Leeuwen, G. V., Mohnen, P. (2017) "Revisiting the porter hypothesis: an empirical analysis of green innovation for the Netherlands", *Economics of Innovation & New Technology*, Vol. 26, No. 1-2, pp. 63–77, doi: 10.1080/10438599.2016.1202521.

Lin, H. et al. (2014) "Can political capital drive corporate green innovation? Lessons from China", *Journal of Cleaner Production*, Vol. 64, No. 2, pp. 63–72, doi: 10.1016/j.jclepro.2013.07.046.

Monferrer, D., Blesa, A., Ripollés, M. (2015) "Born globals trough knowledge-based dynamic capabilities and network market orientation", *Business Research Quarterly*, Vol. 18, No. 1, pp. 18–36, doi: 10.1016/j.brq.2014.04.001.

Montero, J. (2002) "Market Structure and Environmental Innovation", *Journal of Applied Economics*, Vol. 5, No. 2, pp. 293–325, doi: 10.1080/15140326.2002.12040581.

Perino, G., Requate, T. (2012) "Does more stringent environmental regulation induce or reduce technology adoption? When the rate of technology adoption is inverted U-shaped", *Journal of Environmental Economics & Management*, Vol. 64, No. 3, pp. 456–467, doi: 10.1016/j.jeem.2012.03.001.

Peuckert, J. (2014) "What shapes the impact of environmental regulation on competitiveness? Evidence from Executive Opinion Surveys", *Environmental*

Innovation and Societal Transitions, No. 10, pp. 77–94, doi: 10.1016/j. eist.2013.09. 009.

Porter, E. M., van der Linde, C. (1995) "Toward A New Conception of the Environment-Competitiveness Relationship", *Journal of Economic Perspectives*, Vol. 9, No. 4, pp. 97–118, doi: 10.1257/jep.9.4.97.

Rexhäuser, S., Rammer, C. (2014) "Environmental Innovations and Firm Profitability: Unmasking the Porter Hypothesis", *Environmental & Resource Economics*, Vol. 26, No. 1, pp. 145–167, doi: 10.1007/s10640-013-9671-x.

Rubashkina, Y., Galeotti, M., Verdolini, E. (2015) "Environmental regulation and competitiveness: Empirical evidence on the Porter Hypothesis from European manufacturing sectors", *Energy Policy*, Vol. 83, No. 35, pp. 288–300, doi: 10.1016/j.enpol.2015.02.014.

Russo, M. V. (2010) "Explaining the Impact of ISO 14001 on Emission Performance: A Dynamic Capabilities Perspective on Process and Learning", *Business Strategy & the Environment*, Vol. 18, No. 5, pp. 307–319, doi: 10.1002/bse.587.

Salazar, Á. J., Peláez, E. (2012) "The organic growth of dynamic capabilities for innovation within resource constrained environments", *International Journal of Technology Management & Sustainable Development*, Vol. 10, No. 3, pp. 231–250, doi: 10.1386/tmsd.10.3.231_1.

Stucki, T. et al. (2018) "How different policy instruments affect green product innovation: A differentiated perspective", *Energy Policy*, No. 114, pp. 245–261, doi: 10.1016/j.enpol.2017.11.049.

Teece, D. J., Pisano, G., Shuen, A. (1997) "Dynamic capabilities and strategic management", *Strategic Management Journal*, Vol. 18, No. 7, pp. 509–533, doi: 10.1002/(sici)1097-0266(199708)18:7<509::aid-smj882>3.0.co;2-z.

Teece, D. J. (2010) "Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance", *Strategic Management Journal*, Vol. 28, No. 13, pp. 1319–1350, doi: 10.1002/smj.640.

Villegas-Palacio, C., Coria, J. (2010) "On the interaction between imperfect compliance and technology adoption: taxes versus tradable emissions permits", *Journal of Regulatory Economics*, Vol. 38, No. 3, pp. 274–291, doi: 10.1007/s11149-010-9125-0.

Volchek, D., Jantunen, A., Saarenketo, S. (2013) "The institutional environment for international entrepreneurship in Russia: Reflections on growth decisions and performance in SMEs", *Journal of International Entrepreneurship*, Vol. 11, No. 4, pp. 320–350, doi: 10.1007/s10843-013-0115-z.

Wagner, M. (2007) "On the relationship between environmental management, environmental innovation and patenting: Evidence from German manufacturing firms", *Research Policy*, Vol. 36, No. 10, pp. 1587–1602, doi: 10.1016/j. respol.2007. 08.004.

Walker, W. R. (2011) "Environmental Regulation and Labor Reallocation: Evidence from the Clean Air Act", *American Economic Review*, Vol. 101, No. 3, pp. 442–447, doi: 10.1257/aer.101.3.442.

Wang, Y., Li, J., Furman, J. L. (2017) "Firm performance and state innovation funding: Evidence from China's innofund program", *Research Policy*, Vol. 46, No. 6, pp. 1142–1161, doi: 10.1016/j.respol.2017.05.001.

Weerawardena, J. et al. (2015) "The role of the market sub-system and the socio-technical sub-system in innovation and firm performance: a dynamic capabilities approach", *Journal of the Academy of Marketing Science*, Vol. 43, No. 2, pp. 221–239, doi: 10.1007/s11747-014-0382-9.

Wong, S. K. S. (2012) "The influence of green product competitiveness on the success of green product innovation: Empirical evidence from the Chinese electrical and electronics industry", *European Journal of Innovation Management*, Vol. 15, No. 4, pp. 468–490, doi: 10.1108/14601061211272385.

Wong, S. K. S. (2013) "Environmental Requirements, Knowledge Sharing and Green Innovation: Empirical Evidence from the Electronics Industry in China", *Business Strategy & the Environment*, Vol. 22, No. 5, pp. 321–338, doi: 10.1002/bse.1746.

Wu, K. et al. (2016) "Exploring eco-innovation in dynamic organizational capability under incomplete information in the Taiwanese lighting industry", *International Journal of Production Economics*, No. 181, pp. 419–440, doi: 10.1016/j.ijpe.2015.10.007.

Xie, X. et al. (2016) "Green Process Innovation and Financial Performance in Emerging Economies: Moderating Effects of Absorptive Capacity and Green Subsidies", *IEEE Transactions on Engineering Management*, Vol. 63, No. 1, pp. 1–12, doi: 10.1109/tem.2015.2507585.

Zhang, L. et al. (2019) "Does China's emissions trading system foster corporate green innovation? Evidence from regulating listed companies", *Technology Analysis & Strategic Management*, Vol. 31, No. 2, pp. 199–212, doi: 10.1080/09537325.2018. 1493189.

Zhang, Y. et al. (2018) "Impact of environmental regulations on green technological innovative behavior: An empirical study in China", *Journal of Cleaner Production*, No. 188, pp. 763–773, doi: 10.1016/j.jclepro.2018.04.013.

Zhao, X., Sun, B. (2016) "The influence of Chinese environmental regulation on corporation innovation and competitiveness", *Journal of Cleaner Production*, Vol. 112, No. 4, pp. 1528–1536, doi: 10.1016/j.jclepro.2015.05.029.

Zheng, S., Wei, Z., Jian, D. (2011) "Knowledge-based dynamic capabilities and innovation in networked environments", *Journal of Knowledge Management*, Vol. 15, No. 6, pp. 1035–1051, doi: 10.1108/13673271111179352.

Zhu, P., Weimin, X.U., Lundin, N. (2006) "The impact of government's fundings and tax incentives on industrial R&D investments—Empirical evidences from industrial sectors in Shanghai", *China Economic Review*, Vol. 17, No. 1, pp. 51–69, doi: 10.1016/j.chieco.2005.04.002.

Zollo, M., Winter, S. G. (2002) "Deliberate Learning and the Evolution of Dynamic Capabilities", *Organization Science*, Vol. 13, No. 3, pp. 339–351, doi: 10.1287/orsc. 13.3.339.2780.

Usmjerenost prema politici, dinamička sposobnost znanja i zelene inovacije: medijacijski model temeljen na panel podacima kineskog provincijskog odbora

Li Fang[1]*, Zhang Sheng*[2]

Sažetak

Nadzor okoliša i vladine subvencije važni su alati vlade za promicanje zelenih inovacija. Utjecaj tih dviju smjernica politike na rast zelene inovacije se širi, ali potrebno je dodatno istražiti specifične neizravne mehanizme usmjerenosti politike koje potiču zelene inovacije. U ovom radu uvodi se dinamička sposobnost znanja (sposobnost proizvodnje znanja, sposobnost stjecanja znanja, sposobnost integracije znanja) u okvir analize poduzeća zelenih inovacija i proučava posrednički učinak sposobnosti dinamike znanja na usmjerenost politike i zelene inovacije. Empirijski nalazi koji se temelje na panel podacima 30 kineskih provincija za razdoblje od 2000. do 2015. su slijedeći: Prvo, dinamička sposobnost znanja ima značajnu posredničku ulogu između promicanja usmjerenosti prema politici i zelenih inovacija, što ukazuje na to da je poboljšanje dinamičke sposobnosti znanja temeljni mehanizam usmjeravanja politike za poticanje zelenih inovacija u poduzeću. Drugo, dinamička sposobnost znanja igra potpunu posredničku ulogu u odnosu između nadzora okoliša i zelenih inovacija. Nadzor okoliša promiče inovacije zelenih procesa povećavajući sposobnost stjecanja znanja i potiče inovacije zelenih proizvoda poboljšanjem sposobnosti proizvodnje znanja. Treće, dinamička sposobnost znanja ima djelomično posredničku ulogu između državnih subvencija i zelenih inovacija. Državne subvencije poboljšavaju inovacije zelenog procesa u poduzeću povećavanjem sposobnosti stjecanja znanja i sposobnosti integracije znanja, te potiču inovacije zelenih proizvoda u poduzeću povećavanjem sposobnosti proizvodnje znanja i sposobnosti integracije znanja.

Ključne riječi: *usmjerenost na politiku, dinamička sposobnost znanja, zelene inovacije, nadzor zaštite okoliša, državna subvencija*

JEL klasifikacija: *Q55, Q58, O32, O38*

[1] *Predavač, Nanjing University of Science and Technology, School of Intellectual Property, science technology policy and management, No. 200, Xiaolingwei Street, Nanjing, Jiangsu Province, Kina, 210094. Znanstveni interes: upravljanje inovacijama, pravo intelektualnog vlasništva, politika znanstvene tehnologije. Tel.: +86 15829715128. E-mail: 532296776@qq.com.*

[2] *Redoviti profesor, Xi'an Jiaotong University, School of Public Policy and Administration, science technology policy and management, NO. 28, Road Xianning West, Beilin District, Xi'an City, Shannxi Province, Kina. Znanstveni interes: politika znanstvene tehnologije, državno upravljanje 710049. Tel.: +86 02982665254. E-mail: xjtuppasci@163.com. (Osoba za kontakt).*

Original scientific paper
UDC: 334.722-055.2(497.11)
https://doi.org/10.18045/zbefri.2021.1.39

Woman's entrepreneurship – female participation in loss-making SMEs*

Tatjana Janovac[1], *Verica Jovanović*[2], *Pavle Radanov*[3], *Saša Virijević Jovanović*[4]

Abstract

The paper explores the ownership structure of small and medium-sized enterprises (SMEs), which fell into a debt crisis due to business failures, in order to indicate the differences between male and female entrepreneurs. We conducted the empirical research on a sample of 186 small and medium-sized loss-making enterprises in the Republic of Serbia. The results obtained by descriptive statistical analysis of the observed sampleshow that the participation of female companies among loss-making enterprises is considerably low. The ratio of companies owned by women and those owned by men was 18.8%: 81.2%. Furthermore, we have recorded a significant difference in the amounts of debt, indicating that female companies have significantly lower debt rates when compared to those owned by men. The findings of this research can be applied as a strategic framework for policymakers to encourage female entrepreneurship.

Key words: *SMEs, owners, female entrepreneurs, loss-making enterprises, capital*

JEL classification: *D24, J16, L26*

* Received: 08-03-2021; accepted: 15-06-2021

[1] *Associate Professor, University Business Academy, Serbia, Faculty of Applied Management, Economics and Finance, Jevrejska 24, Belgrade, Serbia. Scientific affiliation: leadership, human resource management, entrepreneurship. Phone: +381637235232. E-mail: tatjana.janovac@mef.edu.rs.*

[2] *Professor of vocational studies in College of Economics and Administration, Imotska 1, Belgrade, Serbia. Scientific affiliation: entrepreneurship, business planning, company development. Phone: +381654443552. E-mail: ekomen.pancevo@gmail.com.*

[3] *Associate Professor, University Business Academy, Serbia, Faculty of Applied Management, Economics and Finance, Jevrejska 24, Belgrade, Serbia. Scientific affiliation: entrepreneurship, business planning, company development. Phone: +381637235232. E-mail: pavle.radanov@mef.edu.rs.*

[4] *Full Professor, University Business Academy, Serbia, Faculty of Applied Management, Economics and Finance, Jevrejska 24, Belgrade, Serbia. Scientific affiliation: marketing, brand management and digital branding. Phone: +38163259083. E-mail: sasa.virijevic@mef.edu.rs.*

1. Introduction

The history of entrepreneurship in the Republic of Serbia is relatively short and without continuity. After the initial process of entrepreneurship development in the first half of the 20th century, further progress was interrupted with the advent of socialism. The change of the political regime in 2000 affected the business climate in the country. The period afterward has faced the intensification of the reforms, restructuring of the economy, and a significant increase in entrepreneurship. Besides numerous changes, entrepreneurs are still too weak a social stratum that could significantly encourage socio-economic development (Serbian Association of Employers, 2013) due to the transition difficulties that burden the Serbian economy.

The development of women's entrepreneurship during all these years took place in even more unfavorable conditions, marked primarily by ingrained patriarchal values, according to which women take on most of the household and family responsibilities. However, after years of visible progress and emancipation, especially in the field of education and the inclusion of women in the labor market, the trend of female self-employment began to increase.

In recent years, the importance of women's entrepreneurship has been recognized in numerous studies around the world, indicating that SMEs owned by women are achieving significant business results (Kelley et al., 2010; Henry et al., 2016; Khan et al., 2021). Although they are still far from the amount of total income reached by their male counterparts, female entrepreneurs are recognized as the fastest-growing category of entrepreneurship (Cardela et al., 2020) and appreciated for their ability to deliver higher returns (Boston Consulting Group, 2018).

The fact that women can manage their invested capital better and that they are less likely to fall into debt, the theory explains by their specific leadership traits, more restrained and realistic attitude to risk, as well as their commitment to lead firms that will do responsible and long- term business (Janovac, 2020:202). These reasons, in particular those related to the way women take risks and make decisions, are the key factors that have made women-owned businesses profitable today. The statement that the majority of female entrepreneurs run profitable businesses and generate lower debt rates was examined in this paper on the example of the Republic of Serbia. The verification process was based on the analysis of the ownership structure of loss-making SMEs, with an assumption that the share of women-owned firms is a minority.

An additional reason for this research was the fact that such analysis has not been made in the Republic of Serbia. However, the research on business failures has been conducted by Nikolic et al. (2018) who classified the factors that lead to SME failure, without further analyzing of ownership structure. Also, authors Ivanovic-Djukic and Lepojevic (2017) explored the influence of various factors on the

preferences of men and women towards entrepreneurship. Another motive for this research came from the real need for the development of women's entrepreneurship, having in mind the official data showing that the share of female entrepreneurship in the total number of active enterprises in Serbia is only 33% (Serbian Business Registers Agency, 2020)**.** In addition, considering the unemployment rate of 9.7% in Q4 2019 (The Statistical Office of the Republic of Serbia, 2020), there is a strong need to encourage the development of women's entrepreneurship and to increase the level of employment. SME sector in 2018 accounted for 65.7% of employment and contributed 57.4% of Serbia's GDP (The Ministry of Economy of the Republic of Serbia, 2020). According to the European Commission (2019), similar data were recorded in the EU countries. Therefore, 34.4% of the total European population are self-employed and 30% are entrepreneurs in the start-up stage.

Many authors shave provided a solid theoretical foundation in the field of female entrepreneurship, including Radovic-Markovic (2013), who believes that women's entrepreneurship has led to a "new revolution" in the business world and industries where they were not active before. Despite this fact, female creativity and entrepreneurial potential have remained an underutilized source of economic and employment growth that need to be developed in the future. According to the European Commission, the main challenges for female entrepreneurs are the following : insufficient financial capital; lack of access to information and networks for business purposes; lack of training; reconciling business and family concerns; as well as relying on stereotypes that are still present in society.The limiting elements and factors regarding women's entrepreneurship have been demonstrated by Pérez-Pérez and Avilés-Hernández (2016) who indicated in their study that the lack of entrepreneurial culture and social support can be a limiting factor.

One of the key factors that affects the startup process of women-owned businesses is the source of financing. Many authors agree that the main reason for this is the bankers' mistrust towards female entrepreneurs (Radovic-Markovic, 2013; Pérez-Pérez and Avilés-Hernández, 2016; European Commission, 2019). Furthermore, legal and regulatory barriers can affect female entrepreneurship development, especially the hereditary law that can inhibit women in deciding to start their own businesses.

In the Serbian National Strategy for Improving the Status of Women and Promoting Gender Equality one of the key strategic goals is the improvement of the economic position of women and the achievement of gender equality in the field of economic participation. Within this strategic goal, the strategy involved the objective to encourage employment, women's entrepreneurship and self-employment.

Entrepreneurship in Serbia faces many problems such as the lack of favourable sources of funding in SME sector; high costs (fiscal and parafiscal) that burden the business and reduce the competitiveness due to complicated procedures, excessive

administration; low purchasing power of the population, etc. (Serbian Association of Employers, 2013). At the same time, women's entrepreneurship is only sporadically recognized as an underdeveloped and under-exploited potential, which stays without systematic and comprehensive support. Although legal solutions prohibit gender discrimination, which sometimes prevents the development of women's entrepreneurship (e.g. granting specific loansfor women entrepreneurs), stereotypes related to women are still present in society.

The paper aimed to examine the ownership structure of small and medium-sized enterprises within the list of loss-making enterprises to determine the frequency of the firms owned by women. In addition, the paper analysed the influence of the owner's structure, the region and the size of the enterprise on the debt rate.

Regarding the theoretical background and research aim, the authors developed the main hypothesis and two auxiliary ones:

> Hypothesis H1: Small and medium enterprises whose owners are women are less represented among loss-making enterprises.
>
> Hypothesis H2: There is a statistically significant difference in the debt rates between enterprises owned by women and men. Women-owned enterprises have lower debt rates in comparison to men–owned enterprises.

The third hypothesis is based on the assumption that the amounts of debts incurred between enterprises differ depending on the enterprise size and operating regions.

> Hypothesis H3: There is a statistically significant difference between the influence of the owner's structure, the size of the enterprise and the region of operation on SME debt rate.

Testing Hypothesis H1 was made by determining the relative frequency of male and female enterprises in total observations. Hypothesis H2 was examined by using at-test of independent samples, while testing the Hypothesis H3 was performed by three-way factorial analysis of variance. The statistical software IBM SPSS (version 21) was applied in data processing in order to examine the hypothesis.

The findings presented in this paper can serve policymakers to prepare incentive measures, remove obstacles to provide adequate assistance and support female entrepreneurship development.

The remainder of this paper is structured as follows: Section 2 deals with the literature review; Section 3 presents the research methodology; Section 4 provides the empirical data and analysis; Section 5 provides the results and discussion, and Section 6 summarizes the conclusion.

2. Literature review

Small and medium-sized enterprises are considered as an important factor of national economic development. Depending on the country's level of development, the share of these enterprises in gross domestic product ranges from 10 percent in underdeveloped countries up to 70 percent in highly developed countries (Kumar, 2017).

The contribution of SMEs to employment is utterly high on a global level as well, with a difference that their share in the overall employment rate in underdeveloped countries is much higher, reaching over 80% of total employment, unlike the contribution to GDP. In developed countries, SMEs employ more than 50% of working population. Generally speaking, small and medium-sized enterprises account for 90% of firms, generate 40% of the global GDP and engage half of all employees in the world. The World Bank estimates that additional 600 million jobs will be needed by 2030 in order to absorb the global workforce. (The World Bank, 2020).

Although the importance of SMEs for the overall economy is beyond doubt, their establishment, growth and survival are accompanied by many difficulties. The number of SMEs, which managed to survive by the 10 Th year of doing business is even smaller than 1/3 in the most developed economies. Particularly critical are the first years of work, which is confirmed by the fact that in the period 2012-2015, 9 out of 10 newly established small companies in the European Union failed to get their first birthday (European Commission, 2018). The reasons behind the low survival of start-up companies are numerous. More than 30 years ago, Michael Ames (1983) identified 8 factors that most often lead to the early failure of a small business: lack of experience, insufficient financial capital, poor location, poor inventory management, over-investment in fixed assets, unfavorable loans, the use of business assets for personal needs and unexpected growth. Almost all of these factors are still considered to be important causes of small companies failure, whereby the most commonly placed in the first place is poor financial management. According to U.S. Bank's research, poor cash flow management, or a poor understanding of cash flow in 82% of cases, is the cause of the small business collapsing. In the second place (79%) is insufficient financial capital for starting a business, followed by inappropriate design of a business plan, which implies insufficient market research of the business (78%), inadequate pricing of products (77%), but also excessive optimism regarding the volume of sales and revenues (73%), as well as the failure to recognize the signs that business is not doing well and the lack of professional assistance to repair it (Flint, 2018).

An interesting fact is that a high level of responsibility and some other factors such as flexible working time are not as important as used to be considered for influencing the start-up of a small business, evidenced in research conducted by Mihić et al. (2015) on the example of Serbian small and medium-sized enterprises. Another significant result obtained in this study is that a presence of large number

of family members as employees, and the unclear hierarchy among them, may jeopardize the success of the company in terms of annual revenue and turnover.

In order to find a way to reduce the high failure rate of newly established companies, many studies have been carried out. For instance, Robb et al. (2014) indicated that SMEs owned by men have had poor business performance in recent years, while the companies owned by women show a higher trend of revenue growth and higher stability (Centre for entrepreneurs 2015; Fetsch et al., 2015). The reasons that led to the fact that women-owned companies show better business results are often explained by the personal characteristics of their owners (Du Rietz and Henrekson, 2000; Veena and Nagaraja, 2013; Bouzekraoui and Ferhane, 2017). Women are considered more responsible, and more exposed to the pressure and driven by the desire to be successful concurrently in business and family roles. Additional support to this consideration is an extensive survey carried out a few years ago by the American Centre for Entrepreneurship, together with Barclays Financial Services. It gives at least five reasons why women are considered better and more promising than men (Fink, 2018). The first reason is that women are better-calculated risk-takers, emphasizing that this does not mean that women give up challenges, but better assess the danger and make more realistic decisions. Another feature that is considered as a comparative advantage of female entrepreneurs is that women are less prone to over-confidence, unlike male entrepreneurs who are prone to overestimate their opportunities. The third reason is that women are more ambitious and express more than their male colleagues the intention to launch a new business or expand the existing business. The fourth comparative feature highlighted in the survey is that women are more likely to take the long-term view, which is reflected in the greater orientation of women towards a slower, but more secure and longer-lasting growth, while male entrepreneurs are mostly prone to high risk for a quicker profit. The fifth reason why most experts see the future of business in women entrepreneurship is that women succeed despite facing more barriers than their male counterparts (Centre for entrepreneurs, 2015).

In addition to this,many other studies examine the reasons for expansion and success of women's entrepreneurship. Some of them agree with the list of factors that place the women in the center of future economic development (Robb et al*.,* 2014; Fetsch et al*.,* 2015), while other studies step further to expand the list with ten or even more than twenty comparative advantages that define women entrepreneurs. Women as business owners are commonly stated to be more willing to accept hard work, have more optimism, and create a better working climate (Bank of America, 2018).

Most of these characteristics typical for women, especially those related to the way women take risks and make decisions, are the key factors that have influenced the fact that women - owned companies nowadays are more profitable, since a greater number of them is either doing business positively, or achieves a higher rate of return on invested capital (Zenger and Folkman, 2012).

The very claim that most women's businesses are with positive performance appraisal (Xavier et al*.,* 2012) has solid proof in many studies, further tested in this work on the example of Serbia. The testing conducted to analyze the ownership structure of small and medium-sized enterprises loss-making assumes that, in this structure, the share of SMEs owned by women is a minority.

3. Methodology

The research question related to whether small and medium enterprises owned by women are smaller losers than companies owned by men will be examined based on the analysis of the SME owner's structure within the list of large tax debtors recorded by The Republic of Serbia Tax Administration on November 30 th 2019 (Neobilten, 2019).

The initial list included 194 small and medium-sized debt companies that were 100% in the form of limited liability companies. Given that the sample was made based on the official list of The Republic of Serbia Tax Administration and that it included all the SMEs from the list, the sample may be considered relevant for the survey. Regarding gender, the sample was divided into women-owned and men-owned SMEs. According to size, companies were divided into two groups: micro / small and medium-sized companies. Another classification was made by region of operation. The first group consisted of companies from Belgrade and Vojvodina, while the second group included companies from Sumadija, Eastern, Western and Southern Serbia. Finall, based on industry sectors, the sample included companies from the primary, secondary and tertiary sectors.

A t-test of independent samples was used to determine whether women-owned enterprises are smaller losers than men-owned enterprises. In this research, independent samples have unequal variance ($\sigma_1^2 \neq \sigma_2^2$), and the following formula (Ho, 2014) was used to determine t-statistics:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S_1^2}{N_1} + \frac{S_2^2}{N_2}}} \tag{1}$$

where:

x_1 is the mean of first data set
x_2 is the mean of first data set
S_1^2 is the standard deviation of first data set
S_2^2 is the standard deviation of first data set
N_1 is the number of elements in the first data set
N_2 is the number of elements in the first data set

A three-factor analysis of variance was used in order to determine whether there is a significant influence of the owner's structure, the region of operation and the size of the enterprise on the debt rate. In this regard, the owner's structure is marked as A, the company size is denoted as B, the region as C, while the debt rate is marked as Y. Consequently, there were three main effects of A, B and C that have been tested in the research. In addition, there is a significant influence between the tested effects (AB, BC, AC and ABC). The procedure is based on the concept of general linear model (GLM), which is used in order to explain each individual influence and interaction of effects on the dependent variable (Y) (Sarma and Vishnu Vardhan, 2019):

$$Y = Constant + \alpha_i + \beta_{ij} + random\ error \quad (2)$$

where

α_i = effect of the i^{th} factor,

β_{ij} = interaction of the i^{th} and j^{th} factors

Constant = the baseline value of *Y*.

3. Empirical data and analysis

The aim of the paper was to examine the ownership structure of small and medium-sized enterprises within the list of loss-making enterprises in order to determine the frequency of the firms owned by women, as a debt ratio created by female enterprises in comparison to those which were in the ownership of men. In addition, the paper analyzes the influence of the owner's structure, the region of operation and the size of the enterprise on the SME debt rate. Bearing in mind the robustness of debt data, the logarithmic value of debt as a dependent variable is used.After the additional analysis of the initial sample (N=194), all the untypical points were scattered, so the survey sample was reduced to 186 debt companies (N=186). To obtain descriptive statistical indicators of the debt rate (logarithmic value), the minimum, maximum, mean value, standard deviation and variance were used, as can be seen in Table 1.

Table 1: Descriptive layout of the debt rate

	N	Minimum	Maximum	Mean	Std. Deviation	Variance	Shapiro-Wilk
Debt rate	186	4.30	5.44	4.869	0.255	0.065	0.134

Source: Calculation by the authors, SPSS exit table

The range of obtained results ranges from 4.30 to 5.44, while the average value of debt is 4.869. The result of the normal distribution test based on the Shapiro-Wilkes test indicates that the assumption about the distribution normality is confirmed, p> 0.05, which requires the parametric statistical techniques application.

Descriptive statistical indicators of the effects (the owner's structure and the size of enterprises, the owner's structure and the region of operation, the owner's structure and the economy sector) on the debt rate are shown in Table 2.

Table 2: Descriptive layout of effects on debt rate

Dependent variable: Debt rate		SMEs owners								
		Male			Female			Total		
		Mean	Std. Dev.	N	Mean	Std. Dev.	N	Mean	Std. Dev.	N
Enterprise size	Micro	4.933	.216	138	4.565	.218	34	4.860	.261	172
	Small	4.974	.129	8	5.103	-	1	4.988	.128	9
	Medium-size	4.970	.098	5	-	-	-	4.970	.098	5
	Total	4.936	.209	151	4.581	.233	35	4.869	.255	186
Region	Belgrade	4.917	.189	69	4.557	0.226	13	4.860	.235	82
	Vojvodina	4.893	.234	32	4.600	0.264	10	4.823	.270	42
	Sumadija and West Serbia	4.840	.134	27	4.592	0.265	8	4.784	.198	35
	South and East Serbia	5.167	.135	23	4.586	0.185	4	5.081	.252	27
	Total	4.936	.209	151	4.581	0.233	35	4.869	.255	186
Sector of the economy	Primary	4.896	.166	6	5.103	-	1	4.926	.171	7
	Secondary	4.922	.219	58	4.570	0.139	9	4.875	.241	67
	Tertiary	4.949	.206	87	4.564	0.243	25	4.863	.268	112
	Total	4.936	.209	151	4.581	0.233	35	4.869	.255	186

Source: Calculation by the authors, SPSS exit table

The highest debts are generated by small companies from Southern and Eastern Serbia operating in the primary sector. Within the men-owned companies, the highest debts are generated by small companies from Southern and Eastern Serbia operating in the tertiary sector of the economy. When considering the companies owned by women, the largest debts are generated by small companies from Vojvodina operating in the secondary sector of the economy.

Based on the results obtained by descriptive statistical analysis of the sample, it was evidenced that the participation of women among the loss-making enterprises in the Republic of Serbia is quite low. The share of women-owned companies in the sample was only observed at 18.8%, while the proportion of men–owned companies was 81.2% (see Table 3), which confirmed *Hypothesis H1* in this paper.

Table 3: Descriptive layout of companies according to ownership structure

	Frequency	Percent	Valid Percent	Cumulative Percent
Male	151	81.2	81.2	81.2
Female	35	18.8	18.8	100.0
Total	186	100.0	100.0	

Source: Calculation by the authors, SPSS exit table

An additional analysis in this paper examined the debt factor in order to determine whether there is a difference in the debt rates between genders or there is an interaction between the debt rate, the company size and the region of operation. The first analysis applied the t-test of independent samples in order to monitor the debt-to-equity ratio and the type of enterprise based on the male / female ownership structure. In this test, it was necessary to prove whether there was a statistically significant difference in the debt rates in relation to the ownership structure of SMEs (men and women), that is, whether men and women as SME business owners differ significantly in relation to the debt rates, as can be seen in Table 4. The T-test of independent samples compares the results of testing the difference in the male and female SME owner's debt rates (Green and Salking, 2014).

Table 4: Test of independent samples

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Debt rate	.418	.519	8.851	184	.000	.356	.0402	.276	.435

Source: Calculation by the authors, SPSS exit table

A statistically significant difference was found in male owners (M = 4.936, SD = 0.209), and female owners (M = 4.581, SD = 0.233); t (184) = 8.851, p = 0.000. The difference between the mean values of the statistical characteristics by groups (average difference = 0.356, 95% CI: 0.276 to 0.435) was very large (eta square = 0.2986) (Cohen, 1988), indicating that the difference between the male and female owners of SMEs explains 29.86% of the debt variance. Regarding that the mean value of the debt rate is lower within the women –owned companies and higher for the enterprises owned by men, it can be concluded that *Hypothesis 2* is adopted. Therefore, it was proved that there is a statistically significant difference in the

debt rates between enterprises owned by women and men and that women-owned enterprises have lower debt rates in comparison to men –owned enterprises.

A three-way factorial analysis of variance was used to test *Hypothesis 3*. The analysis was supposed to determine whether there were differences in the ownership structure (men/ women), in the company size (micro and small enterprises, medium-sized enterprises), as well as differences in the regions of operation according to SME debt rates. The objective of the analysis was to determine whether the size of the company has a different influence on the debt rates generated by men and women, and whether the region in which the enterprise operates has a different influence on the debt rate generated by specific gender.

The findings indicated the interaction between the enterprise size and the region of operation in relation to the debt rate, that is, the region of operation has a different influence on the micro, small and medium-sized enterprises debt rate (Table 5).

Table 5: A three-way factorial analysis of variance

	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected model	3.835[a]	5	.767	16.826	.000	.319
Intercept	597.567	1	597.567	13108.194	.000	.986
Owners	3.408	1	3.408	74.768	.000	.293
Size	.001	1	.001	.031	.861	.000
Region	.001	1	.001	.014	.907	.000
Owners * Size	.000	0	.	.	.	.000
Owners * Region	.031	1	.031	.681	.410	.004
Size * Region	.016	1	.016	.347	.556	.002
Owners * Size * Region	.000	0	.	.	.	.000
Error	8.206	180	.046			
Total	4422.306	186				
Total corrected	12.041	185				

Note: a. R Squared = .319 (Adjusted R Squared = .300)

Source: Calculation by the authors, SPSS exit table

According to the size, we have divided SMEs into two groups (Group 1: micro and small companies, group 2: medium-sized). Since the sample did not include medium enterprises owned by women, we have excluded the impact of the enterprise size on the owner's structure. According to the region of operation, we have divided enterprises into two groups (Group 1: Belgrade and Vojvodina, Group 2: Sumadija and Western Serbia, and Eastern and Southern Serbia). Preliminary

testing has verified the assumptions about the normal distribution and homogeneity of variance (Coakes, 2013:99). We have not noticed any serious violation of the assumptions. The influence of the owner's structure and the operating region interaction was not statistically significant, F (1, 180) = 0.681, p = 0.410. Therefore, the debt rates of male and female enterprises are not statistically different depending on the region in which they operate. The influence of the size and region was not statistically significant, F (1, 1 80) = 0.347, p = 0.556, that is, it is noted that there is no significant difference in the influence of the region of operation on the debt rate in micro, small and medium-sized enterprises.

The analysis determined the statistically significant different influence of the owner's structure, F (1, 180) = 74.768, p = 0.000; (partial eta square = 0.293). It means there is a statistically significant difference in the debt rates between the male and female SME owners. However, the individual effects of enterprise size, F (1, 180) = 0.031, p = 0.861, and the region of operation F (1, 180) = 0.014, p = 0.907 did not achieve statistical significance. Therefore, we conclude that *Hypothesis 3*: There is a statistically significant difference between the influence of the owner's structure, the size of the enterprise, and the region of operation on SME debt rate cannot be accepted.

4. Results and discussion

The assumption that the female owners of SMEs in Serbia generate lower debt rates in comparison to their male counterparts, which was proven in this research paper, has additionally confirmed what many previous studies had found (Ayyagari et al., 2014; Bouzekraoui and Ferhane, 2017) – the majority of women-owned SMEs operate positively and have higher returns.

The results of this paper, obtained by descriptive statistical analysis of the ownership structure in the sample, have shown that the percentage of women's enterprises among loss-making firms was very low (18.8%) compared to the percentage of men-owned enterprises which was 81.2%. Similar findings have been made during the analysis of the ownership structure regarding the debt rates. It was noted that the debt rates of women-owned enterprises were significantly lower in relation to the debts created by men-owned enterprises.

According to The Statistical Office of the Republic of Serbia (2019), the total number of SMEs in 2019 was 88,224 companies, of which 33% were women-owned, while 69% were owned by men.

By analysing the ownership structure of the observed sample, the share of debt companies owned by women was 0.13% in relation to the total number of women-owned SMEs while the share of debt companies owned by men was 0.25% in the

total number of men-owned SMEs. These findings confirm that the participation of women's companies among loss-making companies is quite low and that they generally operate positively.

Furthermore, many studies have analysed the success rates of the companies, and their relations with female or male leadership, indicating that companies led by women achieve better overall success (Applegate et al., 2016; Paustian-Underdahl et al., 2014). In addition, the research, which included 7.280 leaders, showed that companies run by women were efficient in 67% of the cases, which was a 10% higher result than the companiesrun by top men managers (Zenger and Folkman, 2012).

Even though women bring higher returns to their businesses, they also encounter numerous problems, not least of which is an average level of financial support. (Calderon et al., 2013; Dawson and Henley, 2015; Bank of America, 2018). Boston Consulting Group's most recent research evidenced that the average level of investment into female-founded (or cofounded) companies is $ 935,000, while the average level of investment into male-founded counterpart is 2.1 million dollars, which represents a difference of more than 100%. Despite this unequal investment base, women-owned enterprises inthefive-year business period generate an average of 10% more cumulative revenue. The average was $ 730,000 for women-owned firms, compared to $ 662,000 for men-owned firms (Abouzahr et al., 2018). Women were more successful in terms of profitability, returns on invested capital, as they generated 78 cents for each dollar invested, while companies owned by men generated less than half, only 31 cents of return on the invested dollar. It is therefore difficult to explain why women, even if they earn a higher return on invested capital, when starting their business, receive, on average,$1million fewer funds than male founders to support their entrepreneurial ideas from investors.

Some theorists explain the groundless favouring of men-owned enterprises with the axiomatic hypothesis of the so-called underperformance, which is based on the idea that women entrepreneurs are equal in everything, except that they tend to be less successful than their male counterparts by conventional measures of economic performance (Du Rietz and Henrekson, 2000). Nowadays, this thesis is usually taken for granted. Its long existence, despite the numerous evidence of women entrepreneur's success, can be explained by the hidden influence of metanarrative economic growth as well as the continuous playback image of the inferiority of women entrepreneurs (Dean et al., 2019).

In the United States of America male entrepreneurs are still preferred in the business spheres because, although they do not achieve higher profitability and profitability rates than women entrepreneurs, they still generate higher incomes in nominal terms (Bank of America, 2018). The growth of women's founding firms increased by 45% between 2007 and 2016. During this period, the growth

rate of these enterprises was 6 times higher than the growth rate of the men-owned companies. (Score Spring, 2017). This trend continued in the next two years as well. According to the recent American Express data presented in „The 2018 State of the Women-Owned Businesses Report", between 2017 and 2018 an average of 1,821 women-founded businesses annually was established in the United States. In 2018 there were 12,3 million women-founded firms with 9,2 million employees and a revenue of $ 1.8 trillion (American Express Open, 2018). However, according to the same report, the total revenue earned by women entrepreneurs in the United States, although it sounds impressive, represents only 4.3% of the total revenue of all companies. This figure certainly justifies the views of those who believe that men are more successful employers, forgetting that most of the total revenue is generated by large multinational companies that still rarely place women as top managers. Additionally, women entrepreneurs continue to face numerous obstacles in their business, of which the most obvious is the unequal treatment in obtaining loans and the acquisition of founding capital (Sarfaraz et al., 2014).

Nevertheless, the situation is improving in this field for the benefit of women. According to the recent American Express report,the number of women-owned businesses that earn income over $ 1 million within the 2011-2018 period increased by 46%. It is significantly above 12% for the total number of such companies.

Numerous studies on female entrepreneurship show that the processes characterized by the increasing number of newly established companies, increased employment, and profitability growth are intensifying. Therefore, it is not surprising that entrepreneurship development in the future will depend more on women (Brooks et al.,2014; Sarfaraz et al.,2014).

5. Conclusion

The findings presented in this paper indicated thatwomen's small and medium-sized enterprises in the Republic of Serbia, although the economy, still burdened with numerous transitional difficulties, have characteristics similar to those of their counterparts in the world. The analysis of the ownership structure of small and medium-sized enterprises, which fell into a debt crisis due to business failure, has shown that the majority of these companies were men-owned. The percentage of observed loss-making SMEs whose owners were women is less than 19%, while the total participation of women's SMEs is about 33%. These results confirm the assumption that companies owned by women generally operate positively as proved in the studies presented in the literature review.

Even though the number of new enterprises established by women is significantly increasing, which undoubtedly represents an increase in female entrepreneurship,

the statistics show that the share of women in the business sector is still at a low level. The figures are significantly below the expectation concerning the sector of small and medium-sized firms in Serbia, otherwise considered the backbone of economic development. The main reasons for such problems are related to stereotypes about women that are still present in the society. In addition to this, we can note that women usually take greater responsibilities in family lives, which affect their working experience and longer breaks in career paths. Therefore, the majority of women have never even tried to fight for ideas in order to start their own businesses. The most likely scenario is that women accept jobs with less responsibilities due to the "maternal role" they have. The disbalance occurs between women's roles in private and business lives: it supports prejudices towards female entrepreneurs that are usually judged and valued with a more negative connotation when compared to their male counterparts.

The fact remains that women everywhere, even in the world's most developed countries, are still encountering many difficulties in business. Although they achieve higher returns on invested capital, women still have many problems in collecting start-up capital to finance new ideas. The reason for such unequal treatment could be in a long-built and still-wired attitude of male superiority in business sphere. The only aspect that still justifies this opinion is the amount of revenue generated by the companies owned by men. However, for all other business performances, such as the number of newly established companies, the number of jobs, profitability, growth dynamics and business duration, women have, without a doubt, outperformed male colleagues.

The results obtained during the empirical research of women entrepreneurship in Serbia are closely correlated to previous studies conducted in different countries worldwide. However, the prejudice that business is reserved only for men is hard to eradicate. The women entrepreneurs still do not have equal treatment in business environment, often forced to show additional effort in order to deserve the trust of business partners.

Despite the evidence that women-owned enterprises are more profitable and long-lasting, up to this moment, women entrepreneurs tackle a rudimental problem: how to get their startup capital. Therefore, one of the goals of this study was to make a change in such practice and to reassure the investors that their financial resources would be safer and more profitable if invested in women owned businesses.

This research also presents a scientific basis for further studies related to SMEs in times of crisis caused by the covid-19 virus, as well as comparing the business results between men-owned and women-owned companies.

References

Abouzahr, K. et al. (2018) "Why women-owned startups are a better bet", *A report published by Boston Consulting Group, Boston*., https://image-src.bcg.com/Images/BCG-Why-Women-Owned-Startups-Are-a-Better-Bet-May-2018-NL_tcm98-193585.pdf, [Accessed: October 12, 2020].

American Express Open (2018) "Number of Women-Owned Businesses Increased Nearly 3,000% since 1972", https://about.americanexpress.com/press-release/research-insights/number-women-owned-businesses-increasednearly-3000-1972-according [Accessed: February 19, 2020].

Ames, M. (1983) *Small Business Management, Houston*, TX: West Publishing Company.

Applegate, L., Kraus, J., & Butler, T. (2016) "Skills and Behaviors that Make Entrepreneurs Successful". In Working Knowledge Business Researche for Business Leaders, Harvard Business School, https://hbswk.hbs.edu/item/skills-and-behaviors-that-make-entrepreneurs-successful [Accessed: February 20, 2020].

Ayyagari, M., Demirguc-Kunt, A., Maksimovic, V. (2014) "Who creates jobs in developing countries?" *Small Business Economics*, Vol. 43, No. 1, pp. 75–99, https://doi.org/10.1007/s11187-014-9549-5.

Bank of America (2018) "Women Business Owner Spotlight", Bank of America Business Advantage, https://newsroom.bankofamerica.com/system/files/2018 Women Business_Owner Spotlight _0.pdf, [Accessed: February 17, 2021].

Boston Consulting Group (2018) "Why women-owned start-ups are a better bet"; retrieved from: https://www.bcg.com/en-be/publications/2018/why-women-owned-start-ups-are-better-bet.aspx, [Accessed: May 20, 2020].

Bouzekraoui, H., Ferhane, D. (2017) "An exploratory study of women's entrepreneurship in Morocco", *Journal of Entrepreneurship: Research & Practice*, Vol. 2017, https://www.researchgate.net/publication/341976894_An_Exploratory_Study_of_Women's_Entrepreneurship_in_Morocco_Journal_of_Entrepreneurship_Research_and_Practice_USA.

Brooks, A. W. et al. (2014) "Investors prefer entrepreneurial ventures pitched by attractive men", *Proceedings of the National Academy of Sciences*, Vol. 111, No. 12, pp. 4427–4431, https://doi.org/10.1073/pnas.1321202111.

Calderon, G., Cunha, J. M., De Giorgi, G. (2013) "Business literacy and development: Evidence from a randomized controlled trial in rural Mexico", Working Paper No. w19740, National Bureau of Economic Research, https://www.nber.org/papers/w16320.pdf, [Accessed: February 25, 2020].

Cardella, G. M., Hernández-Sánchez, B. R., Sánchez-García, J. C. (2020) "Women Entrepreneurship: A Systematic Review to Outline the Boundaries of Scientific Literature", *Frontiers in psychology*, Vol. 11, No. 1557, doi: https://doi.org/10.3389/fpsyg.2020.01557.

Centre for entrepreneurs (2015) "Shattering for Stereotypes, Women in Entrepreneurship", available at: https://centreforentrepreneurs.org/wp-content/uploads/2015/11 /Shattering _Stereotypes_Women_in_Entrepreneurship.pdf, [Accessed: February 2, 2020].

Coakes, S. (2013) *SPSS 20.0 for Windows: Analysis without anguish*, New Jersey: Wiley Publishin, Inc.

Cohen, J. (1988) *Statistical power analysis for the behavioral science.* New York: Lawrence Erlbaum Associates: pp. 284–287.

Dawson, C., Henley, A. (2015) "Gender, risk, and venture creation intentions", *Journal of Small Business Management*, Vol. 53, No. 2, pp. 501–515, https://www.tandfonline.com/doi/abs/10.1111/jsbm.12080.

Dean, H. et al. (2019) "Female entrepreneurship and the metanarrative of economic growth: A critical review of underlying assumptions", *International Journal of Management Reviews*, Vol. 21, No. 1, pp. 24–49, https://doi.org/10.1111/ijmr.12173.

Du Rietz, A., Henrekson, M. (2000) "Testing the female underperformance hypothesis", *Small Business Economics*, Vol. 14, No. 1, pp.1–10, https://link.springer.com/article/10.1023/A:1008106215480.

European Commission (2018) *Annual Report on European SMEs 2017/2018, SMEs growing beyond borders*, edited by K. Hop. European Commission, https://op.europa.eu/hr/publication-detail/-/publication/a435b6ed-e888-11e8-b690-01aa75ed71a1, [Accessed: February 12, 2020].

European Commission (2019) *Internal Market, Industry, Entrepreneurship and SMEs, Female entrepreneurs*, European Commission, https://ec.europa.eu/growth/smes/promoting-entrepreneurship/we-work-for/women_en, [Accessed: February 25, 2020].

Fetsch, E., Jackson, C., Wiens, J. (2015) "Women entrepreneurs are key to accelerating growth. Kauffman Foundation", https://www.kauffman.org/resources/entrepreneurship-policy-digest/women-entrepreneurs-are-key-to-accelerating-growth, [Accessed: February 17, 2020].

Fink, J. (2018) "Gender sidelining and the problem of unactionable discrimination", *Stanford Law & Policy Review*, Vol. 29, No. 57, https://law.stanford.edu/wp-content/uploads/2018/03/29.1_Fink_57-106.pdf.

Flint, M. (2018) "Cash Flow: The Reason 82% of Small Businesses Fail, from J. Hagen of U.S. Bank", https://www.preferredcfo.com/cash-flow-reason-small-businesses-fail, [Accessed: February 23, 2020].

Green, M., Salking, N. (2014) *Using SPSS for Windows and Macintosh: Analyzing and Understanding Data,* New York: Pearson Education, Inc.

Henry, C., Foss, L., & Ahl, H. (2016) "Gender and entrepreneurship research: A review of methodological approaches", *International Small Business Journal*, Vol. 34, No. 3, pp. 217–241, doi: https://doi.org/10.1177/0266242614549779.

Ho, R. (2014) *Handbook of Univariate and Multivariate Data Analysis with IBM SPSS,* New York: CRC Press.

Ivanović-Đukić, M., Lepojević, V. (2017) "Preferences in self-employment and entrepreneurship in the Republic of Serbia: Gender analysis", *Teme*, Vol. 51, No. 3, pp.731–746, http://teme2.junis.ni.ac.rs/index.php/TEME/article/view/474.

Janovac, T. (2020) *Savremeno liderstvo,* Beograd: Fakultet za primenjeni menadžment, ekonomiju i finansije.

Kelley, D. J., Bosma, N., Amoros, J. E. (2010*) Global entrepreneurship monitor: 2010 global report.* Santiago: Universidad del Desarrollo, Babson College.

Khan, R. U. et al. (2021) "Factors affecting women entrepreneurs' success: a study of small-and medium-sized enterprises in emerging market of Pakistan". *Journal of Innovation and Entrepreneurship*, Vol. 10, No. 1, pp. 1–21, doi: https://doi.org/10.1186/s13731-021-00145-9.

Kumar, R. (2017) *Targeted SME Financing and Employment Effects: What Do We Know and What Can We Do Differently?,* World Bank, https://documents.worldbank.org/en/publication/documents-reports/documentdetail/577091496733563036/targeted-sme-financing-and-employment-effects-what-do-we-know-and-what-can-we-do-differently.

Mihic, M. M., Arsic, S. M., Arsic, M. Z. (2015) "Impacts of entrepreneurs' stress and family members on SMEs' business success in Serbian family-owned firms", *Journal of East European Management Studies*, Vol. 20, No. 4, pp. 452–483, doi: https://www.jstor.org/stable/24573642.

National Strategy for Improving the Status of Women and Promoting Gender Equality – *Nacionalna strategija za rodnu ravnopravnost za period od 2016. do 2020. godine sa Akcionim planom za period od 2016. do 2018.godine* (Službeni glasnik RS, broj 4/2016).

Neobilten (2019) *Spiskovi najvećih poreskih dužnika sa 30.11.2019.god,* https://www.neobilten.com/spiskovi-najvecih-poreskih-duznika-sa-30-11-2019-godine/, [Accessed: January 10, 2020].

Nikolić, N. et al. (2018) "Investigation of the factors influencing SME failure as a function of its prevention and fast recovery after failure", *Entrepreneurship Research Journal*, Vol. 9, No. 3, doi: https://doi.org/10.1515/erj-2017-0030.

Paustian-Underdahl, S. C., Walker, L. S., Woehr, D. J. (2014) "Gender and perceptions of leadership effectiveness: A meta-analysis of contextual moderators", *Journal of applied psychology*, Vol. 99, No. 6, pp. 1129–1145, doi: https://doi.org/10.1037/a0036751.

Pérez-Pérez, C., Avilés-Hernández, M. (2016) "Explanatory factors of female entrepreneurship and limiting elements", *Suma de Negocios*, Vol. 7, No. 15, pp. 25–31, doi: https://doi.org/10.1016/j.sumneg.2015.12.004.

Radović-Marković, M. (2013) "Female entrepreneurship: Theoretical approaches", *JWEE*, No. 1-2, pp.1–9, https://www.researchgate.net/publication/304248621_

Female_Entrepreneurship_Theoretical_Approaches. [Accessed: February 12, 2020].

Robb, A., Coleman, S., Stangler, D. (2014) "Sources of economic hope: Women's entrepreneurship", Report by Kauffman Foundation (November 2014), https://www.kauffman.org/wpcontent/uploads/2019/12/sources_of_economic_hope_womens_entrepreneurship.pdf, [Accessed: February 25, 2020].

Sarfaraz, L., Faghih, N., Majd, A. A. (2014) "The relationship between women entrepreneurship and gender equality", *Journal of Global Entrepreneurship Research*, Vol. 4, No. 1, doi: https://doi.org/10.1186/2251-7316-2-6.

Sarma, K.V.S, Vishnu Vardhan, R. (2019) *Multivariate statistics made simple: a practical approach,* Boca Raton: CRC Press.

Serbian Association of Employers (2013) *Procena okruženja za žensko preduzetništvo u Republici Srbiji. Belgrade*, Unija poslodavaca Srbije, https://www.poslodavci.rs/wp-content/uploads/2015/11/pozzps_k_ser.pdf, [Accessed on December 15, 2020].

Serbian Business Registers Agency (2020) *Zastupljenost žena u vlasničkoj strukturi privrednih subjekata,* https://www.apr.gov.rs/%D0%B8%D0%BD%D1%84%D0%BE%D0%B3%D1%80%D0%B0%D1%84%D0%B8%D0%BA%D0%B5.4318.html?infoId=54, [Accessed: February 20, 2021].

Score Spring (2017) *The Megaphone of Maine Street: Small Business Jobs Report* https://s3.amazonaws.com/mentoring.redesign/s3fs-public/SCORE-Megaphone-Main-Street-Small-Business-Jobs-Report-Fall-2017_2.pdf, [Accessed: February 25, 2020].

The Ministry of Economy of the Republic of Serbia, (2020) *Izveštaj o MSP i preduzetništvu za 2018. Godinu*, Beograd, https://privreda.gov.rs/wp-content/uploads/2021/05/Izvestaj-MSPP-2018_FIN.pdf, [Accessed: February 11, 2021].

The Statistical Office of the Republic of Serbia (2020) *Bilten: Anketa o radnoj snazi u Republici Srbiji 2019. Godine*, Belgrade: Statistical Office of the Republic of Serbia.

Veena, M., Nagaraja, N. (2013) "Comparison of male and female entrepreneurs-an empirical study", *International Journal of Engineering and Management Research (IJEMR)*, Vol. 3, No. 6, pp. 138–143, https://www.ijemr.net/DOC/ComparisonOfMaleAndFemaleEntrepreneursAnEmpiricalStudy(138-143)b0cf8fa0-84b1-4ff7-bcb6-b3dbba4969fc.pdf, [Accessed: February 11, 2020].

World Bank (2020) *Small and medium enterprises finance,* https://www.worldbank.org/en/topic/smefinance, [Accessed: February 10, 2020].

Xavier, S. R. et al. (2012) "Women entrepreneurs: Making a change from employment to small and medium business ownership", *Procedia Economics and Finance*, Vol. 4, No. 1, pp.321-334, doi: https://doi.org/10.1016/S2212-5671(12)00347-4.

Zenger, J., Folkman, J. (2012) "Are women better leaders than men", *Harvard Business Review*, Vol. 15, pp. 80–85, https://hbr.org/2012/03/a-study-in-leadership-women-do [Accessed: February 10, 2020].

Žene u poduzetništvu- ženski udio u stvaranju gubitka u srednjim i malim poduzećima

Tatjana Janovac[1], *Verica Jovanović*[2], *Pavle Radanov*[3], *Saša Virijević Jovanović*[4]

Sažetak

Rad istražuje vlasničku strukturu malih i srednjih poduzeća, koja su upala u dužničku krizu uslijed propusta u poslovanju, kako bi se ukazalo na razlike između muških i ženskih poduzetnika. Empirijsko istraživanje je sprovedeno na uzorku od 186 malih i srednjih poduzeća, koja su poslovala s gubitkom u Republici Srbiji. Na osnovu dobivenih rezultata primjenom deskriptivne statističke analize posmatranog uzorka, dokazano je da je zastupljenost ženskih poduzeća, koja su poslovala s gubitkom veoma niska. Udio poduzeća čiji su vlasnici žene iznosio je samo 18.8%, u usporedbi sa 81.2% poduzeća u vlasništvu muškaraca. Također, utvrđeno je da postoji značajna razlika u visini duga, pri čemu je utvrđeno da ženska poduzeća imaju značajno niže stope dugovanja za razliku od poduzeća u vlasništvu muškaraca. Rezultate ovog istraživanja mogu primjeniti kreatori politika kao strateški okvir u cilju poticanja ženskog poduzetništva.

Ključne reči: *mala i srednja preduzeća, vlasnička struktura, žene-poduzetnice, poduzeća koja posluju sa gubitkom, kapital*

JEL klasfikacija: *D24, J16, L26*

[1] *Izvanredni profesor, Univerzitet Privredna akademija u Novom Sadu, Fakultet za primenjeni menadžment, ekonomiju i finansije u Beogradu, Jevrejska 24, Beograd, Srbija. Znanstveni interes: liderstvo, upravljanje ljudskim resursima, poduzetništvo. Tel.: +381637235232. E-mail: tatjana.janovac@mef.edu.rs.*

[2] *Profesor strukovnih studija na Visokoj školi za ekonomiju i upravu, Imotska 1, Beograd, Srbija. Znanstveni interes: poduzetništvo, poslovno planiranje, razvoj tvrtke. Tel.: +381654443552. E-mail: ekomen.pancevo@gmail.com.*

[3] *Izvanredni profesor, Univerzitet Privredna akademija u Novom Sadu, Fakultet za primenjeni menadžment, ekonomiju i finansije u Beogradu, Jevrejska 24, Beograd, Srbija. Znanstveni interes: poduzetništvo, poslovno planiranje, razvoj tvrtke. Tel.: +381637235232. E-mail: pavle.radanov@mef.edu.rs.*

[4] *Redoviti profesor, Univerzitet Privredna akademija u Novom Sadu, Fakultet za primenjeni menadžment, ekonomiju i finansije u Beogradu, Jevrejska 24, Beograd, Srbija. Znanstveni interes: marketing, upravljanje robnom markom i digitalno brendiranje. Tel.: +38163259083. E-mail: sasa.virijevic@mef.edu.rs.*

Original scientific paper
UDC: 339.727.22:342.72/.73(4-69)
https://doi.org/10.18045/zbefri.2021.1.59

Governance and civil and political rights as FDI determinants in transition countries[*,1]

Jelena Zvezdanović Lobanova[2], *Mikhail Lobanov*[3], *Milan Zvezdanović*[4]

Abstract

This paper aimed to investigate the FDI determinants in 27 transition countries within the 2002 – 2018 period by employing system GMM analysis. One of the results of our research is that an uncertain political situation and civil liberties violations have a significant negative impact on foreign investors' confidence. Generally, the erosion of democratic institutions acts as a deterrent to FDI inflows. Transition countries which experienced prolonged periods of central planning also recorded lower levels of FDI inflows. The results show that creating conditions for stimulating foreign investors through the improvement of institutional quality embodied in the control of corruption and voice and accountability impacted positively on FDI inflows. The interplays between overall institutional quality, voice and accountability, regulatory quality, government effectiveness and GDP growth are positive and significant. Hence, macroeconomic development has an important impact on the marginal effect of institutional quality. Therefore, we

[*] Received: 10-01-2021; accepted: 22-06-2021

[1] The paper was written within the research programme of the Institute of Social Sciences for 2021 supported by Ministry of Education, Science and Technological Development of the Republic of Serbia.

[2] *Research Associate, Center for Economic Research, Institute of Social Sciences, Kraljice Natalije 45, 11000 Belgrade, Serbia. Scientific affiliation: international capital flows, cross-border mergers and acquisitions, and quality of institutional setting. Phone: +381113616002. E-mail: jzvezdanovic@idn.org.rs.*

[3] *Deputy Director for Research, Senior research fellow, Institute of Economics, Russian Academy of Sciences, Nakhimovskiy pr. 32, 117997 Moscow, Russian Federation. Scientific affiliation: problems of socio-economic and political development of Central-Eastern and South-Eastern Europe, the EU enlargement, functional and territorial organization of industry and agriculture and varieties of capitalist relations. Phone: +74997241541. E-mail: m.m.lobanov@yandex.ru.*

[4] *Docent, Academy for National Security, Kraljice Ane bb, 11000 Belgrade, Serbia. Scientific affiliation: mergers and acquisitions, corporative management, corruption and institutional development. Phone: +381648495255. E-mail: zvezdanovicmilan@gmail.com.*

concluded that the influence of governance on FDI inflows is conditional on the transition countries' macroeconomic performance. Our findings also reveal that of the governance dimensions, control of corruption and voice and accountability have a significant influence on the decision of multinationals to undertake investment.

***Key words**: foreign direct investment, institutions, civil society, democracy, transition countries*

***JEL classification**: D73, E22, F21, F23, O52*

1. Introduction

The issue of cross-border capital flows is one of the key areas in the study of foreign economic activity at the national and corporate levels. The territorial and sectoral structure transformation of cross-border investment flows, and their dynamics have enabled us to assess the international division of labour development in the modern globalizing world. Studies on international investment activity are highly controversial and leave open unanswered questions about the advantages and disadvantages of capital attraction, factors concerning the investment competitiveness of recipient countries, the effects of capital exports in home countries, and, finally, the essential reasons for the movement and accumulation of capital. The transition countries considered in this paper have only been actively involved in the global process of capital redistribution for a few decades, but their experience in participating in cross-border investment flows is very revealing and has been the subject of an extensive number of scientific studies. Of particular interest in this regard is the issue of institutional factors in attracting foreign direct investment (FDI), which are usually addressed less frequently than macroeconomic factors.

Analysis of cross-border capital movements shows that FDI inflows in transition countries are linked to progress in the implementation of economic reforms. It is believed that some transition countries have attracted fewer capital flows than expected due to factors like the quality of the institutional environment, macroeconomic instability, differences in technology, high adjustment costs, etc. (Lipschitz et al., 2001). Some studies have proved that the improvement of the institutional framework together with the abolition of capital restrictions and the enhancement of economic growth influence patterns of international capital flows. The characteristics of institutional development in the host transition countries determine the investment decisions of transnational companies (TNCs) as regards entry mode strategy (Dikova and Witteloostuijn, 2007).

Although, in general, openness to capital flows influenced economic modernization, in most industries the expected technology transfer did not happen. It was primarily because TNC subsidiaries only insignificantly integrated local firms into their

global and regional value chains. According to some studies, FDI does not generate positive intra-industry spillovers for domestic firms in transition countries (Damijan et al., 2003). Intersectoral and intrasectoral spillover effects affecting productivity and technology transfer have arisen in only a few transition countries, characterized by a developed institutional environment.

FDI inflows in these countries are often attracted by different types of incentives which play a role of compensation for an underdeveloped business environment and potential macroeconomic risks. These incentives are also often caused by mutual competition between countries of the region characterized by similar macroeconomic conditions. The incentives to foreign investors are usually various subsidies and tax breaks. In addition, the key drivers for *FDI* attraction in these countries *are natural resources*, the availability of cheap, *unskilled or semi-skilled labour, adequate technological capacity, and management skills of the host country (Dunning and Lundan, 2008).*

This paper aims to provide a broader perspective on FDI determinants in transition countries. We analyze the influence of governance and democratic society variables on FDI inflows in 27 transition countries from 2002 to 2018 by using dynamic panel data approach.[5] In addition, we examine the possibility of whether the marginal impact of various governance dimensions on FDI inflows is determined by the economic conditions in transition countries. We will not only assess the marginal effect of the overall Worldwide Governance Indicators (WGIs), but also examine the impact of six governance indicators on FDI inflows according to separate models. Based on the previous empirical findings, we build three hypotheses. The first hypothesis is as follows: respect for political rights and civil liberties bears testament to a movement towards democracy and could lead to an increase in FDI inflows into host transition countries. The second hypothesis is formulated as: an improvement in governance has positive and significant effect on FDI attraction in transition countries. Finally, we assume that the creation of conditions for stimulating foreign investors through the improvement of institutional quality combined with favourable macroeconomic development influence positively on FDI inflows. The results of this research will broaden our understanding of the interdependence of governance and democratic society institutions and macroeconomic development on FDI inflows in transition countries.

[5] Countries included in the sample: Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Kyrgyz Republic, Latvia, Lithuania, Moldova, Montenegro, North Macedonia, Poland, Romania, the Russian Federation, Serbia, Slovakia, Slovenia, Tajikistan, Ukraine and Uzbekistan. Taking into account the time period of the study (starting from 2002), we deliberately included in the sample those countries that became members of the European Union in 2004, 2007, and 2013, i.e. formally lost the status of countries with economies in transition.

This paper is structured as follows: first, we review the literature concerning the determinants of FDI inflows, the following sections present our methodology, model specification and data, and the final one discusses the results.

2. Literature review

The second half of the 20th century marked the FDI's steady growth in different political and socio-economic conditions. It increased research activities focused on the investment decisions of companies. However, the fact remains that, despite the vast number of theoretical and empirical studies on FDI, they have not yielded a consensus. Empirical studies on FDI determinants are substantial, but there is no consensus on the role of factors influencing investors' behaviour. Several recent studies have confirmed that low transaction and labour costs, the availability of natural resources, geographical position, market size, access to infrastructure, the degree of openness could influence decisions on the location of FDI (Demirhan and Masca, 2008; Chanegriha et al., 2017; Asongu et al., 2018). Most of them are within the well-known Dunning's eclectic paradigm methodological frames (Dunning, 2000). However, some authors pinpoint that for multinational companies, efficiency-seeking factors such as the level of the minimum wage, the unemployment rate, or corporate income taxation in host countries, are not relevant factors (see Wach and Wojciechowski, 2016). They believe that increasing the degree of investor protection and labour productivity could attract additional levels of FDI.Shukurov (2016) used a panel of CIS countries and found that foreign investors are more sensitive to various factors such as market size, abundance in natural resources, FDI stock, fiscal imbalance and inflation. He indicates that these determinants influence the pattern of FDI inflows in transition countries regardless of the presence of high investment risk. On the other hand, Ezeoha and Cattaneo (2012) note that urban infrastructure, property rights policy, trade openness and institutional quality (rule of law) can significantly affect FDI, especially in non-resource-rich countries, while Bobenič Hintošova et al. (2018) suggest the level of gross wages and the share of educated labour force have the greatest positive influence on foreign investor attraction. The latter paper also reveals that factors such as corporate income tax, trade openness and expenditure on research and development deter FDI inflows in Visegrad countries.

In recent years, a growing number of authors have emphasized the importance of institutional setting as a determinant of FDI inflows (Fabry and Zeghni, 2010; Kazemi and Azman-Saini, 2017; Azis, 2018; Mahmood et al., 2019). For example, Bevan et al. (2004) examined the relationship between various dimensions of a newly-created institutional framework in East European transition economies and FDI inflows. They found that the quality of formal institutions (especially the private ownership of business, banking sector reform, foreign exchange, trade

liberalization, and legal developments) had encouraged FDI inflows in transition economies. FDI sensitivity to the institutional environment was also shown in a paper by Fabry and Zeghni (2006). The authors argue that foreign investors are more willing to invest in new EU members than in post-socialist countries which have become or are on the way to becoming candidates for EU membership. The institutional arrangement in countries which have already fulfilled the acquis communautaire requirements is characterized by greater stability and reliability, positively impacting on the level of inward FDI. Moreover, expectations of accession to the EU lead to large-scale financial inflows, in particular FDI.

Researchers tend to differentiate between institutional factors for attracting FDI based on the level of socio-economic and political development of countries. For instance, Peres et al. (2018) provide evidence that the quality of institutions has a positive and significant impact on FDI in developed countries, while their influence in developing countries has not been identified. Similarly, Sabir et al. (2019) show that institutional setting has a more significant impact on FDI inflows in developed countries than in developing ones. The authors also reveal that factors such as GDP per capita, agriculture value-added and a high inflation rate tend to discourage foreign investors in developed countries. In the case of developing countries, the authors point out that GDP per capita, trade openness, agriculture value-added and infrastructure play an important role in attracting FDI inflows, while, by observing advanced economies, Dellis et al. (2017) also provide evidence that quality of economic structure and institutions are influential factors in this, too. They argue that foreign investors are not only interested in respect for basic rights (rule of law, property rights or regulatory efficiency), but also the well-functioning of labour markets and product markets in host countries. The results mentioned above are in contrast to the findings of Jadhav (2012), who investigated the role of economic, institutional and political determinants of FDI in BRICS countries. He demonstrates that economic factors such as market size measured according to real GDP, trade openness and natural resource availability are more important to foreign investors than institutional and political factors.

On the other hand, Lucke and Eicher (2016) point out that FDI is affected by improvements in institutional quality in developing and transitional economies more than in developed countries. They provide evidence that foreign investors are likely to invest in developed countries characterized by a higher level of corruption and a politically unstable system (compared to their home countries). Younsi and Bechtini (2019) found that political stability, government effectiveness and regulatory quality are the main drivers of FDI inflows in emerging host countries. Therefore, they stress the importance of sound economic policies and the implementation of regulations to improve the investment climate. Lacroix et al. (2018) demonstrate that low political risk and democratic institutions are important for attracting FDI in developing countries. The authors emphasise that consolidated

democratic transitions defined as those that do not go into reverse for at least five years bring in a higher amount of FDI.

These results contrary to the findings of Adam and Filippaios (2007). They demonstrate that multinational firms tend to invest in countries characterized by low civil liberties but high political rights. They stress that such a result can be explained by the various motives of foreign investors in different types of countries. A study by Asiedu and Lien (2011) reveals interesting results regarding the relationship between democracy and FDI inflows in a large number of developing countries. The authors demonstrate that democracy promotes FDI only if the share of mineral resources in total exports is lower than a certain critical value and they show that the expansion of democracy enhanced FDI in 90 countries while in the remaining countries it was a deterrent.

The recent empirical study by Economou (2019) shows that economic freedom components such as protection of property rights, monetary and financial freedom, government integrity bear positive impact on FDI inflows in four South European economies. Paul and Jadhav (2020) argue that institutional setting measured by effective rule of law, political stability, regulatory quality and control on corruption has significant impact on FDI in emerging markets, as well as infrastructure quality and trade cost measured by tariff and non-tariff barriers. By investigating the effects of traditional, institutional and agglomeration determinants on choice of investment location on a sample of six countries of the Western Balkans, Kurtovic et al. (2020) highlight that traditional (GDP per capita and GDP growth rate), agglomeration (urbanisation rate, foreign agglomerations in the service sector and the number of employees in the service sector) and institutional determinants (government spending) have a positive impact on the choice of FDI location.

3. Research methodology

To assess the FDI determinants, a number of researchers apply the dynamic panel data analysis, primarily because of providing an overview of the spatial and temporal dimensions for all units in the sample. System GMM estimator allows us to model the dynamic aspects of the FDI inflows and take into account the endogenous nature of explanatory variables included in our analysis. This estimator is suitable for panel data analysis characterized by small T and large N and for models with endogenous and predetermined explanatory variables. It checks for the presence of unobserved country-specific effects, as well as for a simultaneity bias caused by the potential endogeneity of the explanatory variables. Thanks to dynamic panel data analysis, we were able to investigate the dynamics of adjustment by including a lagged endogenous variable among the exogenous variables and to address the problems of potential endogeneity, autocorrelation and

heteroscedasticity in our models. Namely, the system GMM estimator enabled us to see the effects of lagged FDI on the current inflows.

System GMM involves combining moment conditions for the model in first differences with moment conditions for the model in levels (Bun and Windmeijer, 2010). This estimator has an advantage over Difference GMM in cases when random-walk variables (or those close to being random-walk variables) and time-invariant variables (such as the number of years under central planning in our case) are included in the analysis. In addition, as highlighted by Roodman (2009), this estimator can significantly improve efficiency and concurrently allows for more instruments.

It was used to overcome the shortcomings of its difference-based GMM counterparts, which occur in cases when the series are highly persistent (Blundell and Bond, 1998). This estimator is commonly used in studies that investigate the importance of institutional quality, whose variables are characterized by long-term persistence. In such circumstances, the system GMM estimator helps us to reduce biased parameter estimates and the imprecision associated with other methods (Blundell et al. 2000).

Following Kucera and Principi (2017) Lucke and Eichler (2016), Sabir et al. (2019), we used a dynamic system Generalized Method of Moment (GMM) estimator on a panel data set compiled from annual observations of 27 transition countries. This model examines the determinants of FDI inflows in chosen set of countries:

$$\begin{aligned} FDI_{it} &= \beta_0 + \beta_1 FDI_{it-1} + \beta_2 GDPG_{it} + \beta_3 OPEN_{it} + \beta_4 GFCF_{it} + \\ &\beta_5 INF_{it} + \beta_6 DEMOCRACY_{it} + \varepsilon_{it} \end{aligned} \quad (1)$$

where the subscript i denotes the i^{th} country (i = 1…27) and the subscript t denotes the t^{th} year (t = 1…17), while β_0 to β_6 are regression coefficients and ε_{it} are the error terms. FDI is FDI inflows as a percentage of GDP, FDI_{it-1} is the lagged dependent variable, GDPG is GDP growth as a measure of macroeconomic development, OPEN is Trade as a percentage of GDP as a measure of trade restriction, GFCF is gross fixed capital formation as a percentage of GDP as a measure of infrastructure development, INF is the average consumer price (percentage change) as a measure of macroeconomic stability, and DEMOCRACY is a vector of determinants like:

– political rights (POLRIGHTS);

– civil liberties (CIVLIBERTIES), and

– a dummy variable for STATUS.

The impact of governance indicators and their interplay with macroeconomic development was also investigated with the following panel model specifications:

$$FDI_{it} = \beta_0 + \beta_1 FDI_{it-1} + \beta_2 GDPG_{it} + \beta_3 OPEN_{it} + \beta_4 GFCF_{it} + \beta_5 INF_{it} + \beta_6 INS_{it} + \varepsilon_{it} \quad (2)$$

$$FDI_{it} = \beta_0 + \beta_1 FDI_{it-1} + \beta_2 GDPG_{it} + \beta_3 OPEN_{it} + \beta_4 GFCF_{it} + \beta_5 INF_{it} + \beta_6 INS_{it} * GDPG_{it} + \varepsilon_{it} \quad (3)$$

where INS_{it} stands for the overall institutional quality index (denoted as OWGI), obtained by the Principal Component Analysis Method – PCA, as well as governance indicators, which were included separately in order to avoid multicollinearity.

PCA is used for dimension reduction within a large dataset and saving computation. Its advantage is that it keeps as much variation as possible and retains most of the information while enabling it to avoid multicollinearity. This mathematical technique summarizes the six governance indicators (Voice and Accountability (VA), Political Stability and Absence of Violence (PSAV), Government Effectiveness (GE), Regulatory Quality (RQ), Rule of Law (RL), and Control of Corruption (CC)) into one factor (OWGI). The value of each indicator ranges from -2.5 to 2.5, with higher values indicating a better quality of the institutional setting.

The first principal component derived from these indicators can explain about 87% of the variations in the original six governance indicators. In addition, according to the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (0.90), the data is suitable for PCA. Therefore, we were able to use the first PCA component as an indicator for an assessment of the impact of institutional quality in transition countries and thus eliminate problems, which could occur due to omitted variable bias.

In model specification (2), we examined which aspects of institutional quality have contributed most to FDI inflows, while in specification (3) we assessed the combined effect on FDI inflows by employing the interaction terms between GDP growth and various governance dimensions. In our study, the lagged dependent variable, GDP growth and GFCF were treated as endogenous variables in each of our regressions. We also used lags 2 to 4 of endogenous variables in order to alleviate the instrument proliferation problem. The collapse option was also used to reduce the size of the instruments matrix. We performed the 'Windmeijer correction' (Windmeijer, 2005) using Stata's 'small' command (Roodman, 2009) to obtain corrected standard errors. We employed the Hansen test to analyse the appropriateness of the model specification and the validity of over-identifying restrictions. According to Roodman (2009), problems which occur due to instrument proliferations are overfitting of endogenous variables and failure to expunge their endogenous components. We are guided by the rule that the number

of instruments should not exceed the number of groups in order to maintain the validity of the Hansen over-identification test to reduce bias. Moreover, Roodman (2009) suggested that the Hansen p-value should have a higher value than the 0.1, at least 0.25 levels. In addition, we also tested for second-order serial correlations AR (2) of the differenced residuals. Having in mind that lagged values are used as instruments, unbiased estimation requires the absence of second-order serial correlation in the error term (Arellano and Bond, 1991). To test this requirement, we perform the Arellano-Bond AR (2) test. A p-value of greater than 0.05 implies the absence of second-order autocorrelation. All the estimations were performed using the xtabond2 program written by Roodman (2009).

4. Empirical data and analysis

The choice of the time period and the set of transition countries were dependent on data availability. In our research, we tried to include variables that prove to have significant influence on FDI inflows. Some of the macroeconomic variables used in other studies were found insignificant in our calculations. A list of all the variables included in our dynamic panel data analysis is presented in Appendix. Data for our dependent variable FDI inflows as a percentage of GDP were taken from the World Bank World Development Indicators online database. The same source was used for GDP growth, Trade openness and GFCF. Data on Worldwide governance indicators were obtained from the World Bank Worldwide Governance Indicators project database and data on inflation (average consumer prices, percentage change) – from the World Economic Outlook database developed by the International Monetary Fund.

As far as the concept of institutional quality is concerned, we adhere to the description proposed by the experts of the World Bank. According to them, institutional quality is positively associated with balances in the political system and civil rights, as well as with the commitment to policy measures of openness (Islam and Montenegro, 2002). We used civil and political rights indicators by the Freedom House Foundation (Freedom in the World database), which rates all countries according to the development of their democratic institutions. Each of these two indices is given a value between 1 and 7, with 1 representing the highest degree of freedom or democratic rights and liberties and 7 the lowest. According to Freedom House, the political rights rating is constructed based on the status of the electoral process, political pluralism and participation, and the functioning of government. The civil liberties rating assesses the presence or lack of freedom of expression, associational and organizational rights, rule of law, and personal autonomy and individual rights. Transition countries are likely to be less attractive to foreign investors if they exhibit a weakening of democratic norms. Therefore, the expected signs of coefficients are negative.

We also added a dummy variable to evaluate the impact of the state of democracy (free, partly free, or not free) on the decision of potential foreign investors. For instance, the dummy variable STATUS is given the value 1 when denoting countries that are classified as partly free or not free, and 0 otherwise (free countries). Additionally, institutional development encompasses variables such as years under central planning and the EU membership dummy variable. It can be assumed that the achievements in transition countries are determined to some extent by how deeply rooted the formal and informal institutions linked to central economic planning are and the nature of prior economic development (the 'path dependence' effect hypothesis).

The variable CENTRAL PLANNING represents the number of years under central planning and shows how long transition countries experienced direct state involvement in economic processes. We included the dummy variable NON-EU, which is given the value 1 if a country is not a member of the EU and 0 otherwise. For transition countries, the EU accession process represents one of the main systemic incentives for a fundamental transformation of the institutional setting. The EU played the role of external anchor, ensuring the implementation of market economy norms and the establishment of democratic institutions in these countries (Roland, 2004). It is widely believed that institutional transformation in European transition countries *was closely linked to the process of EU accession*. Since the level of institutional quality in the majority of transition countries is far below that advocated by the EU, we expected this coefficient to have a negative and significant impact on FDI inflows.

WGIs are developed by Kaufmann et al. (2010: 4), who defined governance as 'the traditions and institutions by which authority in a country is exercised'. These measurements are based on expert evaluations and surveys of households and businesses related to different areas of the institutional setup. They cover three significant aspects of institutional setting. Namely, one can identify the following groups of governance indicators:

– the first group of measures (VA and PSAV) assesses 'the process by which governments are selected, monitored and replaced';

– the second group of measures (GE and RL) captures 'the capacity of the government to effectively formulate and implement sound policies';

– the third group of measures (CC and RQ) shows 'the respect of citizens and the state for the institutions that govern economic and social interactions among them'.

It should be noted that VA and PSAV primarily measure the strength of political institutions in contrast to the other WGIs. We believe that these two indicators are related to those aspects of the institutional setting covered by the Freedom House data (Civil rights, Political rights).

According to the descriptive statistics in Table 1, the economic development indicators in the transition countries differ to a great extent. For example, the mean FDI as a percentage of GDP for the total sample is 5.76%, with a standard deviation of 7.49. We also found wide variations in openness to trade, gross fixed capital formation, the level of inflation and GDP growth. For instance, the trade openness variable was between 29.75 and 192.34% with an average of 102.92% and a standard deviation of 32.36. The mean values of the governance indicators ranged from -0.26 to 0.16, while their medians ranged from 0.66 (for CC) to 0.89 (for VA). The RQ variable had the highest mean value (0.16) among the governance factors.

Table 1: Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
FDI	459	5.760	7.490	-46.769	55.075
GDPG	459	4.200	4.654	-14.814	34.466
OPEN	457	102.919	32.366	29.748	192.345
GFCF	457	23.889	5.681	6.3	57.71
INF	459	5.665	6.546	-1.601	59.218
POLRIGHTS	451	3.292	2.096	1	7
CIVLIBERTIES	451	3.066	1.736	1	7
STATUS	451	0.536	0.4992	0	1
CENTRAL PLANNING	459	55.370	12.707	41	74
NON-EU	459	0.673	0.469	0	1
OWGI	455	3.08e-09	2.293	-4.883	4.233
CC	459	-0.260	0.663	-1.415	1.506
VA	459	-0.021	0.895	-2.124	1.213
PSAV	455	0.028	0.719	-2.020	1.302
RL	459	-0.136	0.737	-1.476	1.372
RQ	456	0.166	0.772	-1.710	1.698
GE	456	0.004	0.671	-1.230	1.192

Source: Authors' calculations

In Table 2, we have provided the correlation matrix for FDI and its determinants in order to assess whether there are significant associations between the analysed variables. When the correlation coefficient is greater than 0.6, the relationship between the variables is considered to be significant, which may call into question efficient and reliable parameter estimation and thus the validity of the model. The correlation coefficients between various governance dimensions, as well as indicators of democracy, have a value higher than 0.7, which might indicate the presence of multicollinearity. In order to avoid this problem, we decided to include them separately in our regressions.

Table 2: Correlation matrix

	FDI	GDPG	OPEN	GFCF	INF	PR	CL	CP	STATUS	NON-EU	OWGI	CC	VA	PSAV	RL	RQ	GE
FDI	1.00																
GDPG	0.19	1.00															
OPEN	0.06	-0.03	1.00														
GFCF	0.35	0.23	0.01	1.00													
INF	0.03	0.09	-0.07	0.12	1.00												
PR	0.02	0.23	-0.44	0.11	0.43	1.00											
CL	-0.01	0.24	-0.45	0.11	0.43	0.96	1.00										
CP	0.01	0.21	-0.33	0.06	0.46	0.83	0.80	1.00									
STATUS	0.01	0.22	-0.38	0.10	0.29	0.81	0.82	0.69	1.00								
NON-EU	0.10	0.18	-0.53	0.05	0.31	0.67	0.69	0.57	0.75	1.00							
OWGI	-0.03	-0.23	0.50	-0.03	-0.46	-0.89	-0.90	-0.74	-0.81	-0.75	1.00						
CC	-0.03	-0.21	0.51	-0.02	-0.38	-0.82	-0.82	-0.67	-0.75	-0.70	0.95	1.00					
VA	-0.01	-0.24	0.45	-0.08	-0.47	-0.97	-0.97	-0.81	-0.79	-0.67	0.92	0.86	1.00				
PSAV	-0.05	-0.15	0.47	0.09	-0.31	-0.69	-0.70	-0.65	-0.75	-0.64	0.83	0.75	0.70	1.00			
RL	-0.03	-0.24	0.50	-0.05	0.46	-0.86	-0.87	-0.72	-0.80	-0.77	0.98	0.94	0.90	0.79	1.00		
RQ	0.01	-0.22	0.43	-0.01	0.49	-0.85	-0.86	-0.68	-0.73	-0.70	0.86	0.86	0.90	0.71	0.93	1.00	
GE	-0.05	-0.24	0.46	-0.06	0.45	-0.80	-0.81	-0.62	-0.76	-0.72	0.91	0.91	0.84	0.77	0.94	0.91	1.00

Note: Abbreviations PR, CL and CP are used for POLRIGHTS (political rights), CIVLIBERTIES (civil liberties) and CENTRAL PLANNING.

Source: Authors' calculations

According to the p-values of the Hansen test statistics reported in Table 3, we can conclude that the instruments are uncorrelated with errors. Therefore, our results show that the instruments are valid at conventional levels of statistical significance. The test statistic for second-order serial correlation also suggests that there is no second-order serial correlation in the first differences in the residuals in all specifications. In column 1 of Table 3, we have presented the results of our baseline model, while in columns 2-6, we have assessed the influence of democracy variables on FDI attraction.

The coefficient of lagged FDI inflows is positive and significant at the 1% level in all the tables. Therefore, we found that the agglomeration effect has a positive influence on FDI inflows in transition countries. The value of this coefficient is below 1, which points to the existence of convergence. GDP growth has the sign we expected, but the coefficient is not significant in any of our regressions. It seems that this variable is not of decisive importance for FDI attraction in the selected countries.

We found that trade openness does not contribute positively to an increase in FDI inflows. These coefficients are negative and significant at the 5% level. Trade openness does not contribute positively to an increase in FDI inflows. In some circumstances, trade openness can lead to the excessive dependence of economic growth on external market factors and, therefore, may trigger macroeconomic imbalances. Moreover, trade openness provides indirect evidence of the absence of foreign trade barriers, so it reduces the interest of potential investors in FDI: companies can expand into new markets through cross-border commodity deliveries without investing in the creation of production sites. On the other hand, investments in the development of different kinds of infrastructure (industrial, transport, and social) are among the important incentives for TNCs to invest abroad.

The significant positive coefficients of GFCF show that investments in developing different kinds of infrastructure (industrial, transport, and social) are among the important incentives for TNCs to invest abroad, which is in line with the findings of Asiedu and Lien (2011). The coefficient of inflation in Table 3 exhibits a mixed pattern, but is not statistically significant in any of the models.

Table 3: System GMM estimation results for the democratic determinants of FDI

Variables	1	2	3	4	5	6
FDI(-1)	0.668*** (0.121)	0.710*** (0.099)	0.699*** (0.096)	0.619*** (0.125)	0.757*** (0.108)	0.709*** (0.098)
GDPG	0.131 (0.141)	0.078 (0.122)	0.090 (0.130)	0.156 (0.150)	0.044 (0.133)	0.096 (0.146)
OPEN	-0.078** (0.032)	-0.047** (0.019)	-0.044** (0.018)	-0.076** (0.034)	-0.017* (0.010)	-0.051** (0.022)
GFCF	0.444** (0.188)	0.355** (0.151)	0.359** 0.150	0.502** (0.232)	0.280* (0.153)	0.351** (0 .153)
INF	-0.075 (0.081)	0.044 (0.035)	0.046 (0.034)	-0.002 (0.046)	0.039 (0.038)	0.004 (0.045)
POLRIGHTS		-0.742** (0.308)				
CIVLIBERTIES			-0.927** 0.382			
STATUS				-4.067* (2.262)		
CENTRAL PLANNING					-0.071* (0.037)	
NON-EU						-2.431* (1.277)
No. of Observation	430	424	424	424	430	430
No. of groups	27	27	27	27	27	27
No. of instruments	14	15	15	15	15	15
Hansen test (*p* value)	0.677	0.445	0.442	0.587	0.615	0.659
AR(2) (*p* value)	0.799	0.441	0.456	0.731	0.325	0.455

Note: Standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10%, respectively.

Source: Authors' calculations

Our findings reveal a negative and significant coefficient of political rights on FDI, meaning that countries with increasing concerns over political rights discourage foreign investors. We also found that less protection of fundamental basic rights also reduces investment inflows, while an uncertain political situation and violations of civil liberties weigh heavily on foreign investors' confidence. The coefficient of central planning and the dummy variable Status are significant and have the expected signs. Countries classified as partly free or not free due to difficulties in establishing political rights and civil liberties are also less attractive to foreign investors. The coefficient of the Non-EU dummy variable is negative and significant, indicating that non-EU transition countries had fewer FDI inflows during the period under consideration.

Based on the GMM diagnostics in Table 4, we note that the p-value of the Hansen test statistic is relatively high, suggesting instrument validity. We did not find evidence for the presence of second-order serial correlation in the first-difference residuals. In all our regressions, the lagged dependent variable has the correct sign and significance, which provides evidence for the dynamic nature of FDI inflows in transition countries. The estimated coefficients for current GDP growth are positive but not statistically significant in all the columns. Trade openness carries a negative sign and it is statistically significant at the conventional level of 0.05.

The coefficients of control of corruption (CC) and voice and accountability (VA) are positive and statistically significant, while other governance indicators also turned out to be positive but insignificant. We can assume that these governance indicators are among the factors influencing the investment activities of multinationals in transition countries. Voice and accountability as a proxy for the level of pluralism in a country reveal the process of establishing, monitoring, and replacing government bodies. Therefore, we have provided evidence that an improvement in political and human rights ratings is important for foreign investors in transition countries.

Table 5 presents results using the interaction terms between GDP growth and the quality of the institutional setting measured by both the overall and separate governance indicators. The large p-values of the Hansen test statistics are taken as evidence of the validity of the instrument subsets. The coefficients of the current GDP growth rate range from 0.127 to 0.173 according to these particular regressions, but they are not statistically significant at conventional levels. The coefficients of trade openness are negative and statistically significant in all our regressions, which means that higher trade openness discourages FDI inflows in transition countries. Gross fixed capital formation is positively and significantly associated with FDI inflows in all columns in this table. Inflation has the expected sign, but it continues to be insignificant in all regressions.

Table 4: System GMM estimation results for the institutional determinants of FDI

Variables	OWGI	CC	VA	RQ	RL	PSAV	GE
FDI(-1)	0.694*** (0.109)	0.688*** (0.108)	0.682*** (0.108)	0.672*** (0.126)	0.688*** (0.114)	0.689*** (0.112)	0.673*** (0.126)
GDPG	0.116 (0.142)	0.112 (0.145)	0.113 (0.139)	0.165 (0.170)	0.127 (0.156)	0.113 (0.131)	0.147 (0.166)
OPEN	-0.078** (0.034)	-0.073** (0.031)	-0.075** (0.032)	-0.092** (0.042)	-0.077* (0.035)	-0.074** (0.032)	-0.096** (0.042)
GFCF	0.407** (0.182)	0.409** (0.183)	0.399** (0.174)	0.470** (0.214)	0.413** (0.189)	0.413*** (0.180)	0.471** (0.218)
INF	0.003 (0.049)	0.011 (0.044)	0.015 (0.045)	-0.021 (0.067)	0.001 (0.048)	-0.052 (0.061)	-0.009 (0.060)
INS	0.597 (0.377)	2.416* (1.246)	1.744* (0.931)	1.618 (1.190)	2.093 (1.334)	0.553 (0.703)	2.238 (1.460)
No. of Observation	427	430	430	428	430	427	428
No. of groups	27	27	27	27	27	27	27
No. of instruments	15	15	15	15	15	15	15
Hansen test (*p* value)	0.642	0.706	0.607	0.704	0.734	0.689	0.666
AR(2) (*p* value)	0.624	0.573	0.711	0.713	0.617	0.641	0.745

Note: Standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10%, respectively.

Source: Authors' calculations

Table 5: System GMM estimation results for the impact of the interplay between governance dimensions and macroeconomic development on FDI inflows

Variables	OWGI	CC	VA	RQ	RL	PSAV	GE
FDI(-1)	0.723*** (0.088)	0.730*** (0.083)	0.719*** (0.087)	0.707*** (0.105)	0.710*** (0.095)	0.687***(0.101)	0.709***(0.102)
GDPG	0.136 (0.144)	0.172 (0.197)	0.173 (0.161)	0.124 (0.150)	0.155 (0.172)	0.127 (0.126)	0.154 (0.162)
OPEN	-0.071** (0.028)	-0.069** (0.027)	-0.070** (0.028)	-0.082** (0.034)	-0.075** (0.030)	-0.075**(0.031)	-0.080** (0.033)
GFCF	0.387** (0.154)	0.379** (0.148)	0.377** (0.151)	0.444** (0.183)	0.413** (0.163)	0.421** (0.176)	0.435** (0.175)
INF	-0.039 (0.057)	-0.035 (0.051)	-0.025 (0.057)	-0.052 (0.068)	-0.041 (0.057)	-0.068 (0.075)	-0.049 (0.066)
INS*GDPG	0.055* (0.031)	0.226 (0.169)	0.178** (0.080)	0.175** (0.082)	0.191 (0.130)	0.028 (0.104)	0.201* (0.117)
No. of Observation	427	430	430	428	430	427	428
No. of groups	27	27	27	27	27	27	27
No. of instruments	15	15	15	15	15	15	15
Hansen test (p value)	0.660	0.761	0.429	0.732	0.524	0.638	0.707
AR(2) (p value)	0.480	0.393	0.750	0.547	0.774	0.713	0.561

Note: Standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10%, respectively.

Source: Authors' calculations

The synergetic effects captured by the interactive terms are all positive but the only significant coefficient is between GDP growth and VA, RQ, GE, and overall WGI. In other words, the creation of conditions for stimulating foreign investors via the improvement of institutional quality combined with favourable macroeconomic development has reflected positively on FDI inflows. Based on the magnitude of the coefficients mentioned above, the interaction term with VA has the strongest influence on FDI inflows followed by RQ. Therefore, it can be assumed that foreign investors are not attracted by the quality of institutional setting alone, but they also take into account the effectiveness of economic development.

5. Results and discussion

Using system GMM, we have found out that the agglomeration effect has a positive influence on FDI inflows in transition countries. This means that FDI recipients manage to create a virtuous circle of attracting investment, which then greatly encourages the attraction of more foreign investment into these countries. Therefore, the agglomeration effect leads to the further differentiation of transition countries in terms of the tempo of FDI accumulation. Our results also show that investments in developing different kinds of infrastructure are among the important incentives for TNCs to invest abroad, which is in line with the findings of Asiedu and Lien (2011).

Contrary to the earlier findings by Younsi and Bechtini (2019), Ezeoha and Cattaneo (2012) and Jadhav (2012), who demonstrated that trade openness attracts more FDI inflows, our findings show that trade openness discourages foreign investors. It is noteworthy that our conclusion is in line with the results of some other studies such as Brun and Gnangnon (2017), Walsh and Yu (2010), and Bobenič Hintošova et al. (2018). The obtained results could be explained in two ways. Firstly, higher trade openness in some countries could prove a disincentive for foreign investors. Namely, in some circumstances trade openness can lead to the excessive dependence of economic growth on external market factors, and therefore, they may trigger macroeconomic imbalances. Secondly, trade openness is indirect evidence of the absence of foreign trade barriers, so it reduces the interest of potential investors in FDI: companies can expand into new markets through cross-border commodity deliveries without investing in the creation of production sites.

The following example can illustrate this assumption.The transition of the Visegrad group states to the EU common external tariffs applicable to third countries contributed to a decrease in the weighted average rate of import duty, but for some types of industrial products (including household electrical appliances and electronics) it increased. As a result, in the mid-2000s, Asian companies began to actively create production sites in the Visegrad group countries in order to

avoid paying customs duties (so-called 'anti-dumping tariff jumping') (see, for example, Ando and Kimura (2013)). In addition, it has been estimated that while the improvement of the terms of foreign trade (for example, by signing free trade agreements) has a positive effect on the volume of commodity flows, it often has a negative effect on capital inflows.

Our empirical findings indicate that insufficient attention to respect for political rights and civil liberties has a negative and significant effect on FDI inflows in transition countries. Multinational companies may be reluctant to invest in transition countries that have experienced a substantial deterioration in political rights. A democratic deficit and unfavourable environment for the promotion and respect of civil society values have harmed the willingness of foreign investors to take a risk in some of these countries. In conditions where the gap between the political elites and society is widening, which has culminated in the erosion of civil liberties in some transition countries, there is a justifiable fear that foreign investors' rights, including those concerning intellectual property, will not be adequately protected. Our findings are consistent with the results of Adam and Filippaios (2007), Harms and Ursprung (2002), and Kucera and Principi (2017), who also shows that the development of democratic society institutions results in additional FDI inflows.

Moreover, we have found out that those transition countries that experienced longer periods of central planning also recorded a lower level of FDI inflows. It can be assumed that it is difficult for these countries to overcome the structural imbalances of the economy, rooted during the development of the planned economy, and thereby to improve the investment climate (a negative 'lock-in' effect). Countries classified as partly free or not free due to difficulties in securing political rights and civil liberties were also less attractive to foreign investors. Our findings provide evidence that those transition countries which did not become EU members received fewer FDI inflows than the others included in our analysis. Most probably these countries were less attractive to foreign investors since they did not have the stable institutional framework necessary for the functioning of a market economy. The implementation of economic reforms slowed down or was even suspended as a result of adverse economic, political and social developments in these countries. The existing institutional arrangements were serious impediments to the economic development of the post-socialist countries since they were not able to adapt successfully to the changing conditions.

We found that control of corruption and voice and accountability were the main drivers of FDI inflows in transition countries (among the governance indicators). We have shown that FDI inflows are positively and significantly affected by improvements in these areas of institutional quality. In those countries where public power is commonly used for private gains (the 'state capture' phenomenon), higher amounts of FDI are less probable. A similar result was obtained by Sabir et al. (2019), who also points out that FDI inflows in developing countries are positively

and significantly affected by control of corruption, government effectiveness and political stability. The concentration of power by a limited circle of representatives of the political elite in some countries is usually accompanied by corruption that limits business opportunities. In conditions of legal uncertainty, foreign investors are put at a disadvantage since local companies could be more familiar with non-transparent business procedures, weak judicial systems, complicated legal and regulatory frameworks, etc. Therefore, investors feel safe if their rights are protected and the operational rules are developed and enforced by independent institutions.

Our conclusion that a higher level of democracy improves competitiveness for FDI attraction confirms the findings by Lucke and Eicher (2016), and Harms and Ursprung (2002). However, it contradicts the results of Mengistu and Adkihary (2012), who failed to provide evidence that voice and accountability and regulatory quality have a significant impact on FDI inflows in Asian economies. It is also inconsistent with the findings of Younsi and Bechtini (2019), which indicate that voice and accountability, rule of law and control of corruption are negatively and significantly linked to FDI inflows in emerging markets.

Our results indicate that the impact of the quality of institutions on FDI inflows is conditional on the macroeconomic performance of transition countries. We argue that GDP growth has a positive impact on the marginal effects of overall institutional quality as well as on voice and accountability, regulatory quality and government efficiency. The coefficient of the interaction term between the overall WGI and GDP growth is positive and significant. It means that macroeconomic development has a positive impact on the marginal effect of institutional quality. Therefore, the efforts made in areas such as the quality of public services, the transparency of economic regulation, and the promotion of the private sector play an important role in FDI attraction in transition countries. Foreign investors expect improvements in the legal framework, a rise in institutional capacity, and a reduction in administrative barriers.

6. Conclusion

The primary aim of this study was to investigate the FDI determinants in 27 transition countries within the 2002-2018 period by employing the system GMM analysis.The results confirmed the main hypothesis that respect for political rights and civil liberties could lead to an increase in FDI inflows into host transition countries. Among the governance indicators, corruption and voice and accountability were found to be the key drivers for FDI attraction. Our findings indicated that benefiting from an improved institutional environment requires favourable macroeconomic conditions. Specifically, we found that GDP growth affects FDI inflows positively and significantly in condition of improved

institutional quality, especially voice and accountability, regulatory quality and government efficiency.

This paper contributes to the literature on determinants of FDI attraction in transition countries. In particular, we studied the joint impact of institutional quality and macroeconomic development. Our emphasis was on the institutional factors which may be crucial for all types of FDI. The decision made on independent variables was based on the previous research, and on existing theoretical knowledge on possible determinants of FDI inflows. We relied on the open data sources on the quality of the institutional setting that has been widely used in scholarly research. However, many of these indices are very subjective in many cases, because they reflect expert opinion on a few different areas of institutional quality. In addition, we acknowledge that we could not address the majority of factors that influence the foreign investment decisions. Therefore, we suppose that our empirical research could be extended and enriched by including factors related to different types of FDI. The attractive factors are, to a great extent, dependent on the motivation of the investor, i.e. different factors influence resource-seeking, efficiency-seeking, market-seeking and strategic asset-seeking FDI.

Our findings have important implications for policymakers from countries in transition. Their major problem is not only providing a constitutional and legal framework for democracy and civil liberties but also securing the newly established economic and political freedoms that support competition. Fundamental rights are largely enshrined in the legislation of these countries, but it is necessary to ensure that they are fully implemented in practice. Democracy should not only be accepted formally, but there also has to be the protection of human rights and the creation of conditions for the development of political culture and a high degree of political participation. In order to increase the FDI attractiveness, institutional strengthening of transition countries is of key importance, which implies the introduction of democratic, legal, and economic institutions and improving administration and the judiciary so these institutions can function unhindered. In addition, policymakers are expected to make more effort to stimulate sustainable socio-economic development to produce a positive and significant marginal effect of institutional quality on FDI inflows. Transition countries may ensure higher FDI inflows and faster economic development by increasing the quality of institutional arrangements to catch up with developed countries.

References

Adam, A., Filippaios, F. (2007) "Foreign Direct Investment and Civil Liberties: A New Perspective", *European Journal of Political Economy*, Vol. 23, No. 4, pp. 1038–1052, https://doi.org/10.1016/j.ejpoleco.2006.08.006.

Ando M., Kimura F. (2013) "Production linkage of Asia and Europe via Central and Eastern Europe", *Journal of Economic Integration*, Vol. 28, No. 2, pp. 204–240, https://doi.org/10.11130/jei.2013.28.

Arellano, M., Bond, S. (1991) "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations", *Review of Economic Studies*, Vol. 58, No. 2, pp. 277–297, https://doi.org/10.2307/2297968.

Asiedu, E., Lien, D. (2011) "Democracy, foreign direct investment and natural resources", *Journal of International Economics*, Vol. 84, No. 1, pp. 99–111, https://doi.org/10.1016/j.jinteco.2010.12.001.

Asongu, S. A., Akpan, U. S., Isihak, S. R. (2018) "Determinants of Foreign Direct Investment in Fast-Growing Economies: Evidence from the BRICS and MINT Countries", Financial Innovation, Vol. 4, No. 26, pp. 1–17, https://doi.org/10.1186/s40854-018-0114-0.

Azis, O. G. (2018) "Institutional quality and FDI inflows in Arab economies", *Finance Research Letters*, Vol. 25, pp. 111–123, https://doi.org/10.1016/j.frl.2017.10.026.

Bevan, A., Estrin, S., Meyer, K. (2004) "Foreign Investment Location and Institutional Development in Transition Economies", *International Business Review*, Vol. 13, No. 1, pp. 43–64, https://doi.org/10.1016/j.ibusrev.2003.05.005.

Blundell, R., Bond, S. (1998) "Initial Conditions and Moment Restrictions in Dynamic Panel Data Models", *Journal of Econometrics*, Vol. 87, No. 1, pp. 115–143, https://doi.org/10.1016/S0304-4076(98)00009-8.

Blundell, R., Bond, S., Windmeijer, F. (2000) "Estimation in Dynamic Panel Data Models: Improving on the Performance of the Standard GMM Estimator", IFS Working Paper (W00/12), The Institute for Fiscal Studies, http://dx.doi.org/10.1920/wp.ifs.2000.0012.

Bobenič Hintošova, A. et al. (2018) "Determinants of foreign direct investment flows: A case of the Višegrad countries", *Journal of International Studies*, Vol. 11, No. 2, pp. 222–235, https://doi.org/10.14254/2071-8330.2018/11-2/15.

Brun, J-F., Gnangnon, S. K. (2017) "Does Trade Openness contribute to driving Financing Flows for Development?" WTO Working Paper ERSD-2017-0, https://www.wto.org/english/res_e/reser_e/ersd201706_e.pdf.

Bun, M. J. G, Windmeijer, F. (2010) "The weak instrument problem of the system GMM estimator in dynamic panel data models", *Econometrics Journal*, Vol. 13, No. 1, pp. 95–126, https://doi.org/10.1111/j.1368-423X.2009.00299.x.

Chanegriha, M., Stewart,, C., Tsoukis, C. (2017) "Identifying the robust economic, geographical and political determinantts of FDI: an Extreme Bounds Analysis", *Empirical Economics*, Vol. 52, No. 2, pp. 759–776, https://doi.org/10.1007/s00181-016-1097-1.

Damijan, J. P. et al. (2003) "The role of FDI, R&D accumulation and trade in transferring technology to transition countries: evidence from firm panel data

for eight transition countries", *Economic systems*, Vol. 27, No. 2, pp. 189–204, https://doi.org/10.1016/S0939-3625(03)00039-6.

Dellis, K., Sondermann, D., Vansteenkiste, I. (2017) "Determinants of FDI Inflows in Advanced Economies: Does the Quality of Economic Structure Matter?" Working Paper Series. No. 2066, https://www.ecb.europa.eu/pub/pdf/scpwps/ecb.wp2066.en.pdf.

Demirhan, E., Masca, M. (2008) "Determinants of Foreign Direct Investment Flows to Developing Countries: A Cross Sectional Analysis", *Prague Economic Papers*, Vol. 17, No. 4, pp. 356–369, https://doi.org/10.18267/j.pep.337.

Dikova, D., Witteloostuijn, A. (2007) "Foreign Direct Investment Mode Choice: Entry and Establishment Modes in Transition Economies", *Journal of International Business Studies*, Vol. 38, pp. 1013–1033, https://doi.org/10.1057/palgrave.jibs.8400297.

Dunning, J. (2000) "The Eclectic Paradigm as an Envelope for Economic and Business Theories of MNE Activity", *International Business Review*, Vol. 9, No. 2, pp. 163–190, https://doi.org/10.1016/S0969-5931(99)00035-9.

Dunning, J., Lundan, S. (2008) *Multinational Enterprises and the Global Economy* (second edition). Cheltenham, UK: Edward Elgar.

Economou, F. (2019) "Economic freedom and asymmetric crisis effects on FDI inflows: The case of four South European economies", *Research in International Business and Finance*, Vol. 49, pp. 114–126, https://doi.org/10.1016/j.ribaf.2019.02.011.

Ezeoha, A. E., Cattaneo, N. (2012) "FDI Flows to Sub-Saharan Africa: The Impact of Finance, Institutions and Natural Resource Endowment", *Comparative Economic Studies*, Vol. 54, pp. 597–632, https://doi.org/10.1057/ces.2012.18.

Fabry, N., Zeghni, S. (2006) "How Former Communist Countries of Europe May Attract Inward Foreign Direct Investment? A Matter of Institutions", *Communist and Post-Communist Studies*, Vol. 39, No. 2, pp. 201–219, https://doi.org/10.1016/j.postcomstud.2006.03.006.

Fabry, N., Zeghni, S. (2010) "Inward FDI in Seven Transitional Countries of South-Eastern Europe: A Quest of Institution-based Attractiveness", *Eastern Journal of European Studies*, Vol. 1, No. 2, pp. 77–90, https://hal.archives-ouvertes.fr/hal-01100288.

Harms, P., Ursprung, H. W. (2002) "Do civil and political repression really boost foreign direct investments? ", *Economic Inquiry*, Vol. 40, No. 4, pp. 651-663, https://doi.org/10.1093/ei/40.4.651.

Islam, R., Montenegro, C. E. (2002) "What determines the quality of institutions?" Policy, Research working paper series No. WPS 2764 Washington, D.C.: World Bank Group, https://openknowledge.worldbank.org/handle/10986/15725.

Jadhav, P. (2012) "Determinants of foreign direct investment in BRICS economies: Analysis of economic, institutuional and political factor", *Procedia – Social and Behavioral Sciences*, Vol. 37, pp. 5–14, https://doi.org/10.1016/j.sbspro.2012.03.270.

Kaufmann, D., Kraay, A., Mastruzzi, M. (2010) "The Worldwide Governance Indicators: Methodology and Analytical Issues", World Bank Policy Research Working Paper No. 5430, https://ssrn.com/abstract=1682130.Kazemi, M., Azman-Saini, W. N. W. (2017) "Foreign Direct Investment, Economic Freedom and Democracy", *International Journal of Economics and Management*, Vol. 11, No. 1, pp. 1–15, http://www.ijem.upm.edu.my/vol11no1/(1)-Paper%2001%20Final-IJEM%2011(1),2017_FDI%20Demo.pdf.

Kucera, D. C., Principi, M. (2017) "Rights, governance and foreign direct investment: an industry-level assessment", *International Review of Applied Economics*, Vol. 31, No. 4, pp. 468–494, https://doi.org/10.1080/02692171.2016.1263606.

Kurtovic, S., Maxhuni, N., Halili, B., Talović, S. (2020) "The determinants of FDI location choice in the Western Balkan countries", *Post-Communist Economies*, Vol. 32, No. 8, pp. 1089–1110, https://doi.org/10.1080/14631377.2020.172258.

Lacroix, J., Meon, P. G., Sekkat, K. (2018) "Do democratic Transitions Attract Foreign Investors? If So, How Fast?" CEB Working Paper 17/006, https://dipot.ulb.ac.be/dspace/bitstream/2013/246943/3/wp17006.pdf.

Lipschitz, L., Lane, T., Mourmouras, A. (2001) "Capital Flows to Transition Economies: Master of Servant?" IMF Working Paper, https://doi.org/10.5089/9781451842791.001.

Lucke, N., Eichler, S. (2016) "Foreign direct investment: the role of institutional and cultural determinants", *Applied Economics*, Vol. 48, No. 11, pp. 935–956, https://doi.org/10.1080/00036846.2015.1090551.

Mahmood, N. et al. (2019) "Foreign direct investment and institutional stability: who drives whom?", *Journal of Economics, Finance and Administrative Scince*, Vol. 24, No. 47, pp. 145–156, https://doi.org/10.1108/JEFAS-05-2018-0048.

Mengistu, A. A., Adhikary, B. K. (2011) "Does good governance matter for FDI inflows? Evidence from Asian economies", *Asia Pacific Business Review*, Vol. 17, No. 3, pp. 281–299, https://doi.org/10.1080/13602381003755765.

Paul, J., Jadhav, P. (2020) "Institutional determinants of foreign direct investment inflows: evidence from emerging markets", *International Journal of Emerging Markets*, Vol. 15, No. 2, pp. 245–261, https://doi.org/10.1108/IJOEM-11-2018-0590.

Peres, M., Ameer, W., Xu, H. (2018) "The impact of institutional quality on foreign direct investment inflows: evidence for developed and developing countries", *Economic research – Ekonomska istraživanja*, Vol. 31, No. 1, pp. 626–644, https://doi.org/10.1080/1331677X.2018.1438906.

Roland, G. (2004) "After Enlargement: Institutional Achievements and Prospects in the New Member States". In Detken, C., Gaspar, V., Noblet, G. eds., *The New EU Member States – Convergence and Stability,* European Central Bank, pp. 35–58, https://www.ecb.europa.eu/pub/pdf/other/neweumemberstatesen2005en.pdf.

Roodman, D. (2009) "How to Do xtabond2: An Introduction to "Difference" and "System" GMM in Stata", *Stata Journal*, Vol. 9, No. 1, pp. 86–136, https://doi.org/10.1177/1536867X0900900106.

Sabir, S., Rafique, A., Abbas, K. (2019) "Institutions and FDI: Evidence from developed and developing countries", *Financial Innovation*, Vol. 5, No. 8, pp. 1–20, https://doi.org/10.1186/s40854-019-0123-7.

Shukurov, S. (2016) "Determinants of FDI in transition Economies: The Case of CIS Countries", *Journal of International and Global Economic Studies*, Vol. 9, No. 1, pp. 75–94, https://www2.southeastern.edu/orgs/econjournal/index_files/JIGES%20JUNE%202016%208-15-2016%20Shukurov%20Sobir_Uzbekistan.pdf.

Wach, K., Wojciechowski, L. (2016) "Determinants of inward FDI into Visegrad countries: empirical evidence based on panel data for the years 2000-2012", *Economic and Business Review*, Vol. 2, No. 16, pp. 34–52, https://doi.org/10.18559/ebr.2016.1.3.

Walsh, J. P., Yu, J. (2010) "Determinants of FDI: A Sectoral and Institutional Approach", IMF Working Paper, No. 10/187, https://www.imf.org/en/Publications/WP/Issues/2016/12/31/Determinants-of-Foreign-Direct-Investment-A-Sectoral-and-Institutional-Approach-24135.

Windmeijer, F. (2005) "A Finite Sample Correction for the Variance of Linear Efficient Two-step GMM Estimators", *Journal of Econometrics*, Vol. 126, No. 1, pp. 25–51, https://doi.org/10.1016/j.jeconom.2004.02.005.

Younsi, M., Bechtini, M. (2019) "Does governance matter for FDI? New evidence from emerging countries using a static and dynamic panel gravity model approach", *Economics of Transition and Institutional Change*, Vol. 27, No. 3, pp. 841–860, https://doi.org/10.1111/ecot.12224.

Upravljanje i građanska i politička prava kao odrednice inozemnih izravnih ulaganja u tranzicijskim zemljama[1]

Jelena Zvezdanović Lobanova[2], Mikhail Lobanov[3], Milan Zvezdanović[4]

Sažetak

Cilj ovog rada bio je istraživanje odrednica izravnih stranih ulaganja u 27 tranzicijskih zemalja u razdoblju od 2002. do 2018. godine, uz pomoć sistemskog GMM procjenitelja. Otkrili smo da neizvjesna politička situacija i kršenje građanskih sloboda imaju značajan negativan utjecaj na povjerenje stranih ulagača. Općenito, erozija demokratskih institucija odvraća priljev izravnih stranih ulaganja. Zemlje u tranziciji koje su imale duža razdoblja centralnog planiranja također su zabilježile niže nivoe priljeva SDI. Rezultati pokazuju da je stvaranje uvjeta za privlačenje stranih ulagača, uz pomoć poboljšanja institucionalne kvalitete u vidu kontrole korupcije i glasa i odgovornosti, pozitivno utjecalo na priljev SDI. Međudjelovanje ukupne institucionalne kvalitete, glasa i odgovornosti, regulatorne kvalitete, učinkovitosti Vlade i rasta BDP-a su pozitivna i značajna; prema tome, makroekonomski razvoj ima značajan utjecaj na granični učinak institucionalne kvalitete. Stoga smo zaključili da utjecaj upravljanja na priljev SDI ovisi o makroekonomskim performansama tranzicijskih zemalja. Naši rezultati također otkrivaju da, među upravljačkim dimenzijama, kontrola korupcije i glas i odgovornost imaju značajan utjecaj na odluke multinacionalnih kompanija o poduzimanju investicija.

***Ključne riječi**: izravna strana ulaganja, institucije, građansko društvo, demokracija, tranzicijske zemlje*

***JEL klasifikacija**: D73, E22, F21, F23, O52*

[1] Rad je napisan u sklopu istraživačkog programa Instituta društvenih znanosti za 2021. godinu koji podržava Ministarstvo prosvjete, znanosti i tehnološkog razvoja Republike Srbije.

[2] *Znanstveni suradnik, Centar za ekonomska istraživanja, Institut društvenih znanosti, Kraljice Natalije 45, 11000 Beograd, Srbija. Znanstveni interes: međunarodni tokovi kapitala, prekogranična spajanja i preuzimanja, kvalitet institucionalnog okruženja. Tel.: +381113616002. E-mail: jzvezdanovic@idn.org.rs.*

[3] *Zamjenik ravnatelja za istraživanje, Viši znanstveni suradnik, Ekonomski institut, Ruska akademija znanosti, Nakhimovskiy pr. 32, 117997 Moskva, Ruska Federacija. Znanstveni interes: problem socijalno-ekonomskog i političkog razvoja srednje, istočne i jugoistočne Europe, proširenje Europske unije, funkcionalna i teritorijalna organizacija industrije i poljoprivrede i varijeteti kapitalističnih odnosa. Tel.: +74997241541. E-mail: m.m.lobanov@yandex.ru.*

[4] *Docent, Akademija za nacionalnu sigurnost, Kraljice Ane bb, 11000 Beograd, Srbija. Znanstveni interes: spajanja i preuzimanja, korporativni menadžment, korupcija i institucionalni razvoj. Tel.: +381648495255. E-mail: zvezdanovicmilan@gmail.com.*

Appendix: A list of the variables included in the analysis

Variables	Definition	Source
Foreign Direct Investment (FDI)	FDI inflows as a percentage of GDP	World Bank World Development Indicators
GDP growth (GDPG)	Annual percentage growth rate of GDP	World Bank World Development Indicators
Trade Openness (OPEN)	Trade as percentage of GDP	World Bank World Development Indicators
Gross fixed capital formation (GFCF)	Gross fixed capital formation as percentage of GDP	World Bank World Development Indicators
Inflation (INF)	Average consumer prices, percentage change	World Economic Outlook database developed by the International Monetary Fund
Civil Rights (CIVLIBERTIES)	The civil liberties' rating includes four subcategories: Freedom of Expression and Belief, Associational and Organizational Rights, Rule of Law, and Personal Autonomy and Individual Rights. It ranges from 1 to 7, with 1 representing the highest degree of freedom or democratic rights and liberties and 7 the lowest.	Freedom in the World database
Political Rights (POLRIGHTS)	The political rights' rating includes three subcategories: Electoral Process, Political Pluralism and Participation, and Functioning of Government. It ranges from 1 to 7, with 1 representing the highest degree of freedom or democratic rights and liberties and 7 the lowest.	Freedom in the World database
STATUS	The dummy variable STATUS is given the value 1 when denoting countries which are classified as partly free or not free, and 0 otherwise (free countries).	Author's calculations based on the data of Freedom in the World database
CENTRAL PLANNING	The number of years under central planning	
NON-EU	The dummy variable NON-EU is given the value 1 if a country is not a member of the EU and 0 otherwise.	
INS	The variable INS is defined differently in each model. It relates to overall institutional quality index and separate governance indicators. All estimates of these indicators range from -2.5 to 2.5 (the higher the number, the higher the quality of institutions).	Author's calculations based on the data of World Bank Worldwide Governance Indicators project database
Overall institutional quality index (OWGI)	A composite governance indicator which is constructed by the PCA of the governance indicators.	Author's calculations based on the data of World Bank Worldwide Governance Indicators project database

Variables	Definition	Source
Control of Corruption (CC)	This variable captures the perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.	World Bank Worldwide Governance Indicators project database
Rule of Law (RL)	This variable captures the perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.	World Bank Worldwide Governance Indicators project database
Regulatory Quality (RQ)	This variable captures the perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.	World Bank Worldwide Governance Indicators project database
Political Stability and Absence of Violence (PSAV)	This variable captures the perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism.	World Bank Worldwide Governance Indicators project database
Voice and Accountability (VA)	This variable captures the perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.	World Bank Worldwide Governance Indicators project database
Government Effectiveness (GE)	This variable captures the perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.	World Bank Worldwide Governance Indicators project database

Original scientific paper
UDC: 339.138:338.486.22](497.11)
https://doi.org/10.18045/zbefri.2021.1.87

Application of logistics model in analysing relationship marketing in travel agencies*

Katarina Borisavljević[1], *Gordana Radosavljević*[2]

Abstract

A concept of relationship marketing in tourism implies creating quality relations among all participants in the tourist supply chain. Analyzing the assumptions of the development of relations and their impact on the overall performance of companies in tourism is especially important. In this regard, the subject matter of this research is the application of relationship marketing in travel agencies in Serbia and the identification of key factors of loyalty of users of tourist services. This paper aims to investigate the influence of relationship marketing assumptions (such as trust, customer complaint management, investment in internal marketing, implementation of information technology in agencies, business image and tradition of agencies, as well as socio-demographic characteristics of clients) on the choice of travel agency through which clients will travel. The contribution of the paper is in the application of the logistics model in the research of relationship marketing in agencies. The results of this research have confirmed that investing in relational determinants in tourism leads both to the development of a long-term relationship with customers and to business performance improvement. Also, the results showed that customer profiles are important in the implementation of relationship marketing to increase the number of loyal customers in tourism. The importance of the paper is in proposing an efficient model for the application of relationship marketing in order to increase the level of customer loyalty in travel agencies operating on the Serbian market.

Key words: *relationship marketing, travel agencies, logistics model, customer loyalty*

JEL classification: *Z33, M31*

* Received: 26-08-2020; accepted: 24-05-2021

[1] *Assistant professor at University of Kragujevac, Faculty of Economics, Liceja Knezevine Srbije 3, 34000 Kragujevac, Serbia. Department of Management and Business Economics. Scientific affiliation: marketing and management in tourism and retaling. Phone: +38134303552. E-mail: katarinab@kg.ac.rs. http://www.ekfak.kg.ac.rs/sr/nastavnici/nastavnici-pregled?id=156&idd=375.*

[2] *Full professor at University of Kragujevac, Faculty of Economics, Liceja Knezevine Srbije 3, 34000 Kragujevac, Serbia. Department of Management and Business Economics. Scientific affiliation: marketing and management in tourism and retaling. Phone: +38134303568. E-mail: gocar@kg.ac.rs. http://www.ekfak.kg.ac.rs/sr/nastavnici/nastavnici-pregled?id=156&idd=158.*

1. Introduction

Applying the concept of relationship marketing is one of the key marketing paradigms leading to the shift from a transactional to a relational marketing approach, especially in the sector of providing services (Jones et al., 2018). Relationship marketing involves creating, maintaining, and improving relationships with customers and other stakeholders to achieve a mutual interest (Handriana, 2016). Unlike the traditional approach based on the application of marketing mix and mass marketing strategies aiming at attracting as many customers as possible in the first place, the relational approach is based on retaining existing customers and developing long-term and profitable relationships with them. Bearing in mind that the application of relationship marketing is significant in small and medium-sized businesses, it is crucial to analyze ways of applying these assumptions of relationship marketing in a sector of tourism.

The paper examines certain assumptions of the implementation of relationship marketing in travel agencies and how they affect customer loyalty. The study fills the existing research gap by applying a specific model for identifying the key determinants of relationship marketing in agencies. The significance of the model lies in the fact that it consists not only of well-known predictors of relationship marketing, like customer trust, internal marketing, management compliance, and quality of the website, but it also includes factors like business image and tradition, frequency of using services and socio-demographic characteristics examined in a limited number of studies. The main objective of this research is to investigate the influence of relationship marketing assumptions on the client's choice of a travel agency and the level of customer loyalty. The paper primarily contributes by introducing the application of the logistics model in the research of relationship marketing in tourism, which has not been applied in this field so far. In contrast to the classical linear regression model, the binary and ordinal logistics models examined customer attitudes such as whether they are loyal to a particular travel agency and identified relational assumptions that affect the increase in their degree of loyalty.

According to the subject and aim of the research, the paper is structured as follows. Besides Introduction and Concluding remarks, there are four sections. Section two gives an overview of existing literature about the assumptions and effects of relationship marketing in tourism. Section three represents the methodology used to estimate the impact of relationship marketing on customer loyalty in tourism. Sections four and five deal with empirical results and discussion of applying the ordinary and binary logistics models in travel agencies.

2. Theoretical background

Based on the literature review, there is no universal and generally accepted definition of relationship marketing (Jones et al., 2018; Hunt et al., 2006; Gronroos, 1996; Gordon, 2008; Shammount, 2013; Gronroos, 1997; Gummesson, 1997; Berry, 1995; Hunt and Morgan, 1994). According to Gronroos (1996, p. 19), relationship marketing is the process of building, maintaining and improving relationships with customers and other stakeholders to realize common interests, and exchange products, services, values and ideas. Many authors (Ladhari, 2009; Palmatier et al., 2006; Doaei et al., 2011) have investigated the impact of improving the quality of tourism services on increasing customer satisfaction and loyalty, on positive WOM, on reducing employees turnover and minimizing costs, increasing market share and profitability of companies in the field of tourism.

According to these, many studies have pointed out key determinants of application of relationship marketing (such as trust, commitment, conflict management, communication, competence, empathy, customer attitudes, frequency of interaction, etc.) which all create a complex model of relationship marketing application (Chakiso, 2015; Handriana, 2016). Previous studies (e.g. Hea et al., 2018; Ndubisi and Nataraajan, 2018) have shown that the quality of relationships consists of a great number of dimensions and plays an important role in the customer decision-making process before, during, and after purchase. Many studies analyzed the trust and commitment (e.g. Hunt and Morgan, 1994; Brown et al., 2020; Payne and Flow, 2013; Young, 2006; Jones et al., 2010; Garbarino and Johnson, 1999; Aborumman et al., 2011) and customer compliance (e.g. Tronvoll, 2012; Kasabov and Warlow, 2010; Alvarez et al., 2011; Hua et al., 2019; Namkung et al., 2011). Previous research about customer complaint management process in tourism agencies showed that socio-demographic characteristics significantly influence their intention to complain to the agency (Borisavljevic and Radosavljevic, 2019). Also, results showed that customers would not complain if they had built trust and when the agency had built an image on the Serbian market.

Some of the dimensions of the relationship quality in tourism are tourists' satisfaction (Crotts et al., 2009; Song et al., 2011; Hasegawa, 2010; Dominici and Guzzo, 2010; Hu et al., 2019) and their sense of devotion to a particular destination image (Jalilvand et al., 2012; Akgüna et al., 2020; Almeida-Santana and Moreno-Gilbl. 2017; Pesonena et al., 2019) or company in tourism. The development of certain dimensions of the quality of relationships, such as internal relationships and the development of employees' knowledge in tourism companies, can significantly affect the level of customer satisfaction and loyalty (Lombard and Steyn, 2008; Tortosa-Edo et al., 2010; Dogrua et al., 2019; Cătălin et al., 2014; Hill and Tombs, 2011; Herington et al., 2006; Cheng and Cho, 2011). For example, in the hotel business, the importance of the very moment when a guest meets the staff at the hotel reception is especially emphasized when evaluating the overall quality of the offer (Lenka et al., 2009). Also,

customer trust is the basis for the development of quality relationships that affect their loyalty and purchase intentions (Handriana, 2016).

Based on literature of marketing tourism, there are many studies about customer satisfaction and loyalty in tourism (Zhang et al., 2014; Bo, 2018; Clemes et al., 2011; Akamavi et al., 2015; Pesonena et al., 2019; Rudež, 2010). In the aviation business, , in addition to the high level of quality of air transport services (flights are always on time or the concept right on time applied), building passengers' confidence regarding flight safety plays a significant role (Saha and Theingi, 2009). However, most of the research refers to the application of relationship marketing on the level of the tourist destination (Almeida-Santanaa and Moreno-Gilbl., 2017; Pesonena et al., 2019; Dominici and Guzzo 2010; Shirazi and Som, 2013; Kim and Brown, 2012). The authors (Huang and Chiu, 2006) emphasized the special influence of the dimensions of relationship quality (trust, devotion, and tourist satisfaction) on the level of tourism destination loyalty. Also, Kim and Brown (2012) examined the role of perceived quality of the offer as visitor's experience, level of tourist expectations, and their socio-demographic and other characteristics on the degree of destination loyalty. The authors confirmed that their experience during the previous visit and the length of their stay had a decisive influence on tourists' decision to re-visit the same destination and to recommend it to others (Gremler et al., 2011; Murphy et al., 2007).

In addition to informing and attracting new tourists, Web marketing activities and their implementation on the destination level significantly affect creating long-term relationships with tourists (Cobos et al., 2009; Buhalis and Law, 2008; Siegel, 2004; Álvarez et al., 2007). Also, destination image can significantly influence tourists' intention to choose a particular destination (Jalilvand et al., 2012), and hence, it influences the implementation of relationship marketing both on the level of tourist destinations and tourist companies.

The importance of the concept of online marketing has been emphasized in tourism lately (Ho and Lee, 2007; Chen and Kao, 2010; Kim et al., 2009; Nusair et al., 2011). Companies are increasingly focusing on creating and maintaining online relationships with their customers, so certain research has shown that 85% of customers maintain relationships with companies without direct contact (Steinhoff et al., 2019). However, there is little empirical evidence of the application of relationship marketing in tourism companies (such as hotels, agencies, airlines, etc.) that operate in the traditional way and by introducing online business. All this was an incentive for conducting some research regarding the application of relationship marketing in travel agencies in Serbia and for the identification of key factors of customer loyalty in the field of tourist services.

The development of e-business in the tourism sector has reduced or even eliminated the role of travel agencies as mediators. In order to survive and to increase market competitiveness, traditional agencies tend to improve the quality of their services and

relationships with other participants in the tourism supply chain. The number of online agencies (such as Expedia, Travelocity, etc.) is increasing, as well as the number of providers offering online services, so that traditional agencies are increasingly shifting to a multi-channel approach of sales and to developing long-term relationships with their clients (Rajaobelina, 2018). Many authors (e.g. Hui and Wan, 2005; Rajaobelina, 2018; Lombard and Steyn, 2008; Ku and Fan, 2009; Moliner et al., 2007) believe that one of the key factors for the success of business agencies, apart from improving elements of marketing (quality of tourist offer, booking efficiency, promotion, business image, etc.) is developing quality relationships with service users.

Travel agencies have direct communication through personal contact in their branch offices or indirectly (via phone, email, website, social platforms, mobile applications and other forms of online communication). For these reasons, there is a development of the so-called hybrid relationships between agencies and users based on the application of a multi-channel approach to selling arrangements (Steinhoff et al., 2019). According to some authors (Sharma et al., 2020), the key dimensions of the quality of the agency's relationship with customers include satisfaction with their offer, trust and customer loyalty. Tourist satisfaction may be a consequence of the perceived value of the package arrangement, the previous experience of tourists and the level of their trust in the agency. The influence of the first impression that customers have while contacting the agency is particularly emphasized as their feelings and way of thinking have a strong impact on improving the quality of the relationship with the respective agency. Tourists' trust in the agency is based on honesty, good intentions, and being up to users' expectations. If the agency does not fulfill the given promises, tourists end all the contacts with the agency and do not return to the same agency (Moliner et al., 2007).

Travel agencies are increasingly facing different types of competition in the tourism market (Oppermann, 1999). Namely, tour operators tend to sell their arrangements directly to end-users. Avoiding the mediators, they reduce the profit margins of agencies. Also, airlines are reducing sales through agencies in order to increase profits and reduce additional commission costs. With the development of IT, hotels are also selling their accommodation packages via certain online booking platforms and are less and less using the services of mediators. Because of all this, agencies are increasingly shifting to implementing various relationship marketing strategies in order to increase the number of loyal customers. Developing and maintaining long-term relationships with clients implies implementing various concepts, such as creating databases and loyalty programs, CRM, online business, creating a well-known business image, efficient investment in internal marketing, customer complaints process, and similar. In this paper, we investigated the level of applied relationship marketing in agencies in Serbia that operate traditionally and those that operate via the Internet. We particularly emphasize the importance of relational factors and demographic characteristics of users regarding the choice of the travel

agency and building customer loyalty towards the agency. According the aim and subject of the paper, the next one hypothesis and two sub hypotheses were tested:

H_1: The implementation of relationship marketing activities (customer trust, internal marketing, complaint management and web quality) in travel agencies influence the increase in the degree of loyalty of users of tourist services.

H_1a: The influence of relationship marketing activities on the degree of customer loyalty in agencies depends on their socio-demographic and behavioral characteristics.

H_{1b}: The influence of relationship marketing on the degree of customer loyalty in agencies depends on the image of agencies and duration of that agency's business activities.

3. Research methodology

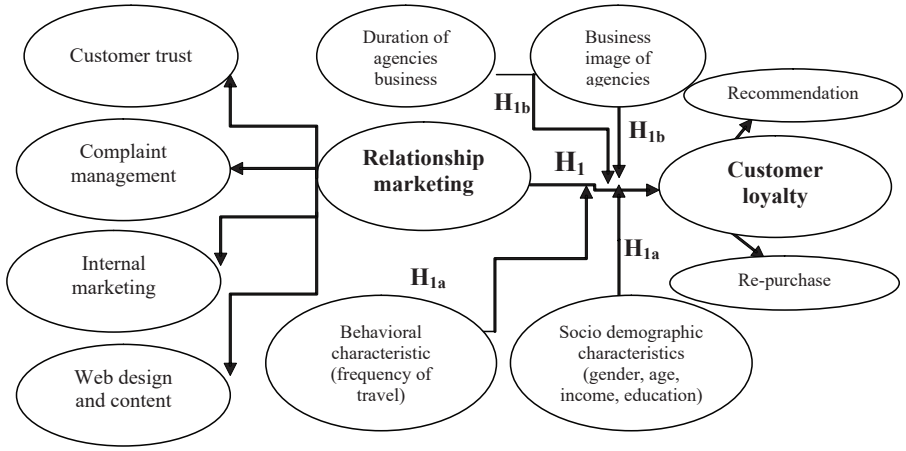
To achieve the goals of this research, we collected data on the attitudes of clients who use the services of travel agencies regarding the assessment of relationship marketing assumptions which have the greatest impact on increasing their loyalty i.e. on their tendency to return to the same agency or to recommend it to other potential users. Based on the previous research on the application of relationship marketing in the service sector, the questionnaire structure was adjusted (Kim et al., 2001; Ndubisi and Chan, 2005). The research was based on a sample of users of travel agencies' services from major cities in the Republic of Serbia. The sample can be considered a convenience sample which is common practice in marketing research (Soldić-Aleksić and Krasavac, 2009, p. 10). Field research was conducted in the period from October 2018 to January 2019. A total number of 469 respondents were interviewed and based on the total number of valid answers further processing and data analysis were performed.

Based on key assumptions of relationship marketing (such as the level of customer trust, the level of communication, and competence of employees, the process of managing customer complaints and the application of information technology in travel agencies) the research model included several main independent variables and one dependent variable. Each independent variable was measured by specific statements/questions. Respondents expressed their opinions on a five-point Likert scale (1 – strongly disagree, 5 – strongly agree). The statements were formulated based on the relevant literature review. Customer trust was measured through four statements, which were formulated based on the studies conducted by Ndbusi et al. (2007), Medina – Munos and Garcia – Falcon (2000) and Negi and Ketema (2010). Internal marketing was measured by using four statements taken from Ndbusi et al. (2007), Kim et al. (2001), Sin et al. (2002) and modified to meet the requirements of

our research. Ndubisi (2007) and Ndbusi and Wah (2005) were used as the basis for formulating three statements by which Complaint management was measured. For measuring Quality of web site two statements were taken from Chen and Kao, (2010) and Kim et al. (2009), and adapted to meet the needs of our research. Finally, to measure dependent variable Customer loyalty, we took two statements from Ndbusi et al. (2007) and Kim et al. (2001) and adapted them in line with the objectives of our research. The variable Loyalty in the binary logistics model was measured by the willingness of customers to recommend the agency to others or to return to the same agency. Also, the level of customer loyalty (low, moderate and high level of loyalty) was based on question relating to how many times they use the services of one agency and this variable represented a dependent variable in the ordinary logistics model.

The structure of the research sample was given in Annex 1. The analysis of socio-demographic and behavioral characteristics of the respondents (gender, age, education, monthly income, frequency of travel during the year) was given through descriptive statistics. The results of descriptive statistics showed that women participate with 60% in the sample and that the largest percentage of respondents is with high school degree of education (44.9%) but also there is large percentage of highly educated users (37.2%). It is interesting that the largest percentage of respondents generally travel once a year (53.1%) and most respondents are between 18 and 40 years old. In terms of the monthly household income, the highest percentage of respondents has income between 100 and 500 euro's (37%) but also many of them has income more than 1000 euro's (33.2%). In the paper, we proposed a conceptual model of application of relationship marketing in travel agencies (Figure 1), based on the analysis of the attitudes of service users on the business of travel agencies in Serbia which perform their activities in the traditional way and via the Internet.

Figure 1**:** Conceptual model of relationship marketing in travel agencies



Source: Authors calculation

4. Empirical data and analysis

The methodology of researching users' attitudes towards the assumptions of the application of relationship marketing in travel agencies in Serbia is based on the application of the logistics models which were done in the Statistical Package for Social Sciences (SPSS 22.0) and AMOS 24.0 software. In the binary logistics model, the dependent variable has values of 0 or 1, and within the logistics model of ordered logistic regression, the dependent variable has more than two modalities (Nojković, 2007). The aim of the analysis is to determine the level of customer loyalty, as well as to identify the factors which have influence on the increase of their loyalty. The research was conducted based on the binary and ordinal logistic regression, since customer loyalty can have two modalities (loyal and disloyal customer) or more modalities (high, moderate and low customer loyalty). With factor analysis, a large number of variables (questions) were connected and grouped within the key factors of relationship marketing. The Principal Component Analysis (PCA) method was used to simplify the data and reduce the number of variables. As the rotation method, it was used the Varimax raw rotation (Table 1).

Table 1: The matrix of factor loadings

Items	Trust	Internal marketing	Complaint management	Web design & content
Consistency of your travel agency when it comes to providing quality service	0.882			
The level of trust in your travel agency	0.805			
The employees of your travel agency respect their clients	0.796	0.310		
Your travel agency keep its promises when providing its services	0.662		0.432	
The satisfaction in communication with the employees of your travel agency		0.840		
The level of knowledge of the employees in your travel agency about the tourist offer		0.821		
The employees of your travel agency provide you with advisory services		0.632	0.408	
The employees of your travel agency provide you with reliable information		0.469	0.403	0.345
The willingness of your travel agency to listen to your problems and find the best solution for you			0.842	
The efficiency of the employees in your travel agency when it comes to solving customers' complaints			0.802	
Your travel agency try to avoid potential problems	0.410	0.308	0.592	
The receiving the necessary information through your agency's website				0.830
The satisfaction with the appearance and design of your travel agency's website		0.309		0.825

Source: Authors calculation

In order to check whether the set of data is suitable for factor analysis and to analize the correlation between variables, we carried out the so-called KMO (Kaiser-Mayer-Olkin) and Bartlett's Test . If the value of KMO is between 0.5 and 1, and the the Bartlett test value is statistically significant, it would confirm the justification of the factor analysis, and that these items are essential for the study (Soldic-Aleksic and Krasavac, 2009, p. 206). In this case, the value of KMO was 0.799 and the Bartlett test value was significant in the factor analysis (p=0.00).

Based on the factor analysis (Table 1) one can conclude that the following factors were used in further research: customer trust, design and content of the agencies' websites, the process of managing customers' complaints, and the level of applying internal marketing in travel agencies. The reliability of the survey questionnaire was checked. The most common measurement system is through the reliability of the internal consistency, i.e. the calculation of the Cronbach's alpha coefficient that is 0.87 for whole scale with acceptable values of the coefficient above 0.7 (customer trust = 0.82; customer compliance = 0.73; internal marketing =0.73; web content and design =0.67).

Convergent validity and discriminant validity were also tested. The model is characterized by convergent validity since the average variance extracted (AVE) of each construct was higher than 0.5 Composite reliability (CR) values of each variable were higher than AVE values, which further confirmed convergent validity. According to the Fornell-Larcker criterion (Fornell and Larcker, 1981) and due to the fact the square root of each construct's AVE is higher than the latent variables correlation, the discriminant validity has been achieved (Annex 2). Also, the HTMT criteria, which are based on a comparison of the heterotrait-heteromethod correlations and the monotrait-heteromethod correlations, identify a lack of discriminant validity (Henseler et al., 2015). If the value of the HTMT is higher than predefined threshold, it can be concluded that there is a lack of discriminant validity. We computed the HTMT criteria for each pair of constructs on the basis of the item correlations (Annex 2). Comparing these results with the threshold values as defined in $HTMT_{0.85}$ we concluded that all of them were lower than 0.85 and that discriminant validity has been achieved.

4.1. The application of the ordinal logistics model

The application of the ordinal logistics model was used in order to examine the impact of relational assumptions (such as: customer trust, design and content of the agencies' websites, the process of managing customers' complaints and the level of applying internal marketing in travel agencies) as well as socio demographic and other characteristics of the clients, on the degree of their loyalty towards the travel agency. By using the ordinal logistic regression, we examined the impact of assumptions regarding relationship marketing, image, and the duration of the agency's business activities on the degree of their customer loyalty, that is, the variable which takes more than two values. The degree of customer loyalty was analyzed based on a

question that reads "How many times customers used the services of the same travel agency?" which is measured by an ordinary scale. The dependent variable in this ordinal model has multiple modalities (high, moderate, and low customer loyalty). Most of customers used the service from the same agency once (38.2%) or two and three times (34.6%) (table 2). One modality of the dependent variable ('once') was taken as the reference category in the model. The independent variables were transformed into categorical variables (e.g. two categories of customer trust are: low (1) and high level of trust (2)). Respondents with a lower level of trust belonged to the group of those who expressed the lowest degrees of agreement on the Likert scale (e.g. they chose completely (1) disagree and disagree (2)) regarding the level of trust in the agency, and vice versa. As is always the case with categorical predictors in models with intercepts, the number of coefficients displayed is one less than the number of categories of the variable. Based on that, a comprehensive model of applying relationship marketing in tourism was proposed. After several iterations, the final model was presented (Table 2) with statistically significant variables whose significance of the test is less than the limit value of 10% ($p < 0.10$).

Based on the results of the parallel test or by doing the Brant test, it can be concluded that the assumption about the parallelism was not met and that there are differences in the relationships between the independent variables and the dependent variable (the outcome) in all three possible outcomes (the degree of customer loyalty). The null hypothesis is rejected. It indicates that the impact of the variables on the thresholds (possible outcomes) is different or that there are differences in the significance of the variables for the possible outcomes in the logistics model. However, by using the so-called *Gologit2* (General Ordinar Logit) or *Partial General Ordinar Logit,* additional analysis can be performed in order to overcome the given limitation of the logistics model and to accept the null hypothesis (when the statistical significance of the X^2 test is higher than the limit value p=0.05), which indicates that there are no differences in the significance of the observed variables between the outcomes 0 and 1, and there are no differences between the outcomes 1 and 2 in the model either. In the final model, the thresholds are statistically significant, which indicates that the assumption that there is a clear difference among the three loyalty categories, that is, between two possible outcomes, (0 and 1 or 1 and 2) is met (as shown in Table 2).

Table 2**:** The impact of applying relationship marketing, socio demographic characteristics of the clients, agency's image and the duration of its business activities on the degree of the customer loyalty

Model Fitting Information			
Model	-2 Log Likelihood	Chi-Square	Sig.
Intercept Only	231.578		
Final	167.019	64.559	0.000

Goodness-of-Fit		
	Chi-Square	Sig.
Pearson	133.735	0.000
Deviance	118.608	0.000

Pseudo R-Square	
Cox and Snell	0.155
Nagelkerke	0.175
McFadden	0.078

Case Processing Summary			
		N	Marginal Percentage
How many times you used the services of the same travel agency?	once	146	38.2%
	two or three times	132	34.6%
	four times and more	104	27.2%
Trust	1.00	55	14.4%
	2.00	327	85.6%
Complaint management	1.00	67	17.5%
	2.00	315	82.5%
Internal marketing	1.00	58	15.2%
	2.00	324	84.8%
Web design	1.00	101	26.4%
	2.00	281	73.6%
Education	1.00	173	45.3%
	2.00	209	54.7%
Valid		382	100.0%
Missing		87	
Total		469	

Parameter Estimates							
		Estimate	Stand. Error	Wald	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Threshold	[ordinal = 1.00]	-1.244	0.169	54.408	0.000	-1.575	-0.914
	[ordinal = 2.00]	0.418	0.156	7.170	0.007	0.112	0.725
Location	[trust =1.00]	-1.111	0.328	11.465	0.001	-1.754	-0.468
	[trust =2.00]	0	.	.	.	.	.
	[complaint management =1.00]	0.268	0.440	0.370	0.543	-0.595	1.130
	[complaint management =2.00]	0	.	.	.	.	.
	[internal marketing =1.00]	-0.797	0.341	5.476	0.019	-1.465	-0.130
	[internal marketing =2.00]	0	.	.	.	.	.
	[web design =1.00]	-1.276	0.400	10.183	0.001	-2.059	-0.492
	[web design =2.00]	0	.	.	.	.	.
	[education =1.00]	-0.334	0.198	2.837	0.092	-0.722	0.055
	[education =2.00]	0	.	.	.	.	.

Source: Authors calculation

According to the results of the ordinal logistic regression, it can be concluded that statistically significant relational assumptions are those that are related to *the level of investment in internal marketing, design and content of the agencies' websites and the level of customer trust*. In addition, besides the significant assumptions regarding the application of relationship marketing, the level of the customers' *education* also significantly affects the degree of their loyalty to a certain travel agency. Based on the final model, which only includes statistically significant variables, certain conclusions can be drawn. It is less likely that the clients who have a lower level of trust in a certain agency (which they used the last time) will use the same agency more often than those clients who have a higher level of trust in the agency. Then, it is less likely that the clients who are not satisfied with the employees' knowledge and the way they treated them will return to the same agency, compared to those clients who are satisfied with the communication and the cooperation with the agency's employees. In addition, it is less likely that the clients who are not satisfied with the internet offer of the agency will use the services of the same agency more than once, compared to those clients who are satisfied with the content and design of the website of the agency they used the last time. Finally, it is less likely that clients with a lower level of education will travel using the same agency three or more times, compared to clients with a higher level of education.

4.2. The application of the binary logistics model

Customer loyalty, which represents a dependent variable in the model, can have values 0 or 1, when analyzing clients' decisions that they will use the services of the agency again regardless of the higher price of the offer compared to the competition or their decisions about whether they will recommend the services to other potential clients. Most of them (about 72%) would like to go back and use the services of the agency again and recommend the agency to others. The customer loyalty can have two modalities (loyal and disloyal customer). By applying the binary logistic regression, the impact of individual assumptions on customer loyalty can be examined. By using the following model, the impact of assumptions regarding the application of relationship marketing and the clients' socio-demographic characteristics on the level of their loyalty to the agency can be examined (Table 3). Starting from the initial model, the paper analyzes the impact of all assumptions of relationship marketing, business image and tradition of agencies, as well as the impact of certain sociodemographic and behavioral characteristics of users. By conducting regression analyses, final models were obtained that include only statistically significant variables.

Table 3**:** The impact of applying relationship marketing and the clients' socio-demographic characteristics on the possibility of giving recommendations to other clients

Model Summary			
Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	111.093	0.251	0.486

Classification Table					
	Observed		Predicted		
			Would you gladly recommend your travel agency to others?		Percentage Correct
			no	yes	
Step 1	Would you gladly recommend your travel agency to others?	no	15	15	50.0
		yes	4	220	98.2
	Overall Percentage				92.5

Variables in the Equation					
	B	S.E.	Wald	Sig.	Exp(B)
Web design	0.928	0.302	9.415	0.002	2.530
Web content	0.465	0.247	3.546	0.060	1.592
Travel frequency	1.883	0.603	9.738	0.002	6.572
Income	0.000	0.000	11.090	0.001	1.000
Trust	2.658	0.633	17.623	0.000	14.263
Complaint management	1.858	0.571	10.578	0.001	6.412
Age of respondents	0.035	0.020	3.025	0.082	1.036
Constant	-13.401	2.623	26.100	0.000	0.000

Source: Authors calculation

Based on the final binary model (shown in Table 3), the results have proved the significance of the following factors – complaint management in the agency, content and design of the agency's website, income per household member, travel frequency, clients' age, as well as the level of trust in the agency – for the increase in the number of recommendations and the communication of the client's positive experience with other potential clients. Namely, the results have shown that travel frequency affects customer loyalty. By determining the quotient of the relationship between the likelihood of two outcomes, certain conclusions can be drawn. The likelihood that the clients will recommend the agency's services to others increases by 557.2% (OR=6.572; p= 0.005) when the clients' travel frequency increases in a single unit, that is for those who travel two or more times in a year, compared to people who use the agency's services once a year. It is also interesting that the

likelihood that the clients will recommend the agency's services to others increases only by 3.6% with the increase in the clients' age, under the condition that the other factors are the same in the model (OR=1.036, 9, p= 0.010). The following model (in Table 4) examines the impact of relational factors and the clients' characteristics on the degree of their loyalty to the agency (which refers to their decision to use the services of the same agency again). The results of the binary logistic regression have shown that statistically significant variables (complaint management, the duration of the agency's business activities, clients' age, investment in internal marketing, income per household member, website design, the level of customer trust and the household's average spending on travel) affect the clients' decision to go back and use the services of the same agency again. The final model presents significant variables (Table 4).

Table 4**:** The impact of assumptions related to the application of relationship marketing in an agency on the clients' decision to use the services of the same agency again

Model Summary			
Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	170.854	0.197	0.373

Classification Table				
Observed		Predicted		
		Would you use the services of your travel agency again?		Percentage Correct
		no	yes	
Would you go back and use the services of your travel agency again?	no	14	26	35.0
	yes	5	276	98.2
Overall Percentage				90.3

Variables in the Equation

	B	S.E.	Wald	Sig.	Exp(B)
Complaint management	2.288	0.447	26.213	0.000	9.855
Age of respondents	-0.008	0.015	0.287	0.592	0.992
Education	-0.700	0.421	2.761	0.097	0.496
Web design	1.281	0.217	34.768	0.000	3.601
Constant	-4.922	1.402	12.323	0.000	0.007

Source: Authors calculation

Based on this final model, it can be concluded that the process of managing the clients' complaints, website design, as well as the clients' level of education and age are statistically significant variables when it comes to the increase in the degree of customer loyalty and their decision to return to the same agency.

By determining the quotient of the relationship between the likelihood of two outcomes, certain conclusions can be drawn. The likelihood that clients will return to the same agency is higher by 885% (OR=9.885; p=0.0005) if the efficiency of the complaint management process increases in a single unit. With an increase in the clients' satisfaction level, the chance that they will visit the agency's website again and use its services increases by 260% (OR=3.601, p=0.0005).

5. Results and discussion

Based on the calculated indicators about the validity of the examined models, the most important factors that affect customer loyalty to the travel agency services in Serbia have been identified. The significance of the research is in analyzing the impact of relationship marketing assumptions on varying degrees of customer loyalty in tourism sector. The previous studies (Chakiso, 2015; Ndubisi, 2007; Negi and Ketema, 2010; Sin et al., 2002) were based on influencing the main relationship marketing activities (customer trust, internal marketing, management compliance and web quality) on customer loyalty in the service sector, but they did not explore the application of this concept in tourism. In addition, the paper examined the importance of additional relational variables, as well as the business image and length of business of tourist agencies to the degree of customer loyalty which was different from other relationship marketing research.

In relation to previous analyses (Jones et al., 2018; Álvarez et al., 2007), the proposed model in the paper explains the process of carrying out relationship marketing and points out the connection among relational assumptions, customers' socio-demographic and behavioral characteristics and the specificity of travel agencies' business activities, whose purpose is to increase the degree of loyalty in end customers. The model starts from meeting certain prerequisites related to the application of relationship marketing, which refers to building trust in customers, efficiently managing their complaints in agencies, the level of investment in internal marketing and the creation of the agencies' website suitable design and content. In addition, the impact of website design and content on the loyalty of customers who buy services in a traditional way or using the internet is also significant. Besides the efficient complaint management process, the way the agency's employees treat clients, together with the duration of the agency's business activities, considerably affects clients when it comes to deciding to use the services of the same agency again. Depending on the clients' age and the amount of their monthly income, they

will recommend the agency's services to others, whereas their level of education will significantly affect their decision to travel using the same agency's services again.

Based on these, it can be concluded that the main hypothesis and first sub-hypothesis were partially confirmed, because some relational factors were statistically significant in increasing customer loyalty which was measured by their willingness to recommend or return to the same agency. The relational variables (such as: trust, internal marketing, web design and level of customer education) were significant in measuring the level of loyalty. Also, the results showed that the business image and duration of agency's business were not significant factors in the application of relationship marketing in order to increase the degree of customer loyalty, so the second sub-hypothesis was rejected.

The scientific contribution of the paper is reflected in expanding the knowledge on relational models and on assumptions regarding the application of relationship marketing in tourism, which have not been the subject of previous research conducted in this field. Namely, there are not papers that focused only on the implementation of the relational concept in various tourism activities, but papers were more based on the assumptions of the application of the CRM concept, of direct or digital or viral marketing. This indicates the necessity of studying the concept of relationship marketing in modern marketing theory as well as its connection to other concepts that can also be applied in the field of tourism. The practical contribution of the research refers to proposing the application of a comprehensive relational model in tourist companies operating on the Serbian market. The results of our research confirmed that continuous investment in key relational determinants in business leads to the development and maintenance of long-term relationships with customers, thus increasing the level of their loyalty. In particular, customer profiles (in terms of their socio-demographic and behavioral characteristics) are taken into account when performing relationship marketing activities in order to identify target groups of customers who contribute to improving the business performance of companies in the field of tourism.

6. Conclusions

The research results strongly pinpoint the travel agencies' need to address those determinants that have proven to be statistically significant for the increase in the degree of customer loyalty in the research. A special focus should be on factors contributing to increasing customer loyalty the most and other factors such as business image and duration of business activities. All of them contribute to a stronger impact of the main assumptions regarding the application of relationship marketing on customer loyalty because there are differences in the clients'

opinions regarding which assumptions need to be met. One of the paper's limitations refers to the analysis of travel agencies that do business in a traditional way as well as using the Internet, but not of agencies that offer only online tourist services.

Considering the increasing application of strategies related to online relationship marketing, online travel agencies can be the subject of special analysis. Also, the limitation of the paper refers to the application of relationship marketing only in travel agencies. The subject of additional analysis may be the application of marketing relations at the level of tourist destinations or in other areas of tourism (hospitality, restaurant business, air transport, etc.). Future research can also look at the impact of special exogenous factors on the act of conducting relationship marketing activities in agencies (for example, the impact of the pandemic on the agencies' business activities). It is important to examine the impact of relationship marketing on the overall business performance of companies in tourism, primarily on financial performance and the application of social responsibility in tourism. In addition to determining the degree of customer loyalty, the rate of their retention or departure from the company can be determined, as well as the reasons that influenced their decision to leave the company.

Since the highest source of income in tourism is achieved precisely by developing quality relationships, the significance of this paper lies in giving recommendations for a more efficient application of the relationship marketing concept and an increase in the level of customer loyalty in travel agencies. The practical goal is to consider the current level of relationship marketing in travel agencies in Serbia, developing awareness of the need for broader application of this concept and giving recommendations to managers and employees in improving the marketing performance of tourism companies.

References

Aborumman, A., Alhawary, F., Irtaimeh, H. (2011) "Enhancing holiday travelers loyalty toward traveling agents through the relationship quality: an empirical study on the Jordanian travelers", *International Journal of Academic Research*, Vol. 3, No. 4, pp. 461–467.

Akamavi, R. et al. (2015) "Key determinants of passenger loyalty in the low-cost airline business", *Tourism Management*, Vol. 46, No. C, pp. 528–545, doi: 10.1016/j.tourman.2014.07.010.

Akgüna, A. et al. (2020) "The relationships among nostalgic emotion, destination images and tourist behaviors: An empirical study of Istanbul", *Journal of Destination Marketing & Management*, Vol. 16, pp. 1–13, doi: 10.1016/j.jdmm.2019.03.009.

Almeida-Santanaa, A., Moreno-Gilbl, S. (2017) "New trends in information search and their influence on destination loyalty: Digital destinations and relationship marketing", *Journal of Destination Marketing & Management*, Vol. 6, No. 2, pp. 150–161, doi: 10.1016/j.jdmm.2017.02.003.

Alvarez, L., Casielles, R., Mart, A. (2011) "Analysis of the role of complaint management in the context of relationship marketing", *Journal of Marketing Management*, Vol. 27, No. 1–2, pp. 143–164, https://doi.org/10.1080/02672571003719088.

Álvarez, L., Martín, A., Casielles, R. (2007) "Relationship marketing and information and communication technologies: analysis of retail travel agencies", *Journal of Travel Research,* Vol. 45, No. 4, pp. 453–463, https://doi.org/10.1177/0047287507299593.

Berry, L. (1995) "Relationship marketing of services, growing interest, emerging perspectives", *Journal of the Academy of Marketing Science*, Vol. 23, No. 4, pp. 236-245, https://doi.org/10.1177/009207039502300402.

Bo, G. (2018) "Proposal and validation of a Theoretical Model of Costumer retention determinants in Service Environment", *RAUSP Management Journal*, Vol. 53, No. 2, pp. 202–213, https://doi.org/10.1016/j.rauspm.2017.06.004.

Borisavljević, K. Radosavljević, G. (2019) "Upravljanje žalbama kupaca u turističkim agencijama", *Teme*, Vol. 43, No. 2, pp. 543–555, https://doi.org/10.22190/TEME180512033B.

Brown, J., Crosno, J., Tong, P. (2020) "Is the theory of trust and commitment in marketing relationships incomplete?", *Industrial Marketing Management,* doi: 10.1016/j.indmarman.2018.10.005.

Buhalis, D., Law, R. (2008) "Progress in information technology and tourism management: 20 years on and 10 years after Internet-The state of e-Tourism research", *Tourism Management,* Vol. 29, No. 4, pp. 609–623, doi: 10.1016/j.tourman.2008.01.005.

Cătălin, M., Andreea P., Adina, C. (2014) "A holistic approach on internal marketing implementation", *Business Management Dynamics*, Vol. 3, No. 11, pp. 09–17, doi: 10.13140/2.1.1790.0163.

Chakiso, C. (2015) "The effect of relationship marketing on customers' loyalty (Evidence from Zemen Bank)", *Emerging Markets Journal,* Vol. 5, No. 2, pp. 58–70, doi: 10.5195/emaj.2015.84.

Chen, C., Kao, Y. (2010) "Relationships between process quality, outcome quality, satisfaction, and behavioral intentions for *online* travel agencies – evidence from Taiwan", *The Service Industries Journal*, Vol. 30, No. 12, pp. 2081–2092, doi: 10.1080/02642060903191108.

Cheng, S., Cho, V. (2011) "An integrated model of employees' behavioral intention toward innovative information and communication technologies in travel

agencies", *Journal of Hospitality & Tourism Research*, Vol. 35, No. 4, pp. 488–510, https://doi.org/10.1177/1096348010384598.

Clemes, M., Gan, C., Ren, M. (2011) "Synthesizing the effects of service quality, value, and customer satisfaction on behavioral intentions in the motel industry: an empirical analysis", *Journal of Hospitality & Tourism Research*, Vol. 35, No. 4, pp. 530–568, https://doi.org/10.1177/1096348010382239.

Cobos, L., Wang, Y., Okumus, F. (2009) "Assessing the Web-Based Destination Marketing Activities: A Relationship Marketing Perspective", *Journal of Hospitality Marketing & Management,* Vol. 18, No. 4, pp. 421–444, doi: 10.1080/19368620902799643.

Crotts, J., Mason, P., Davis, B. (2009) "Measuring guest satisfaction and competitive position in the hospitality and tourism industry", *Journal of Travel Research*, Vol. 48, No. 2, pp. 139–151, https://doi.org/10.1177/0047287508328795.

Doaei, H., Rezaei, A., Khajei, R. (2011) "The impact of relationship marketing tactics on customer loyalty: the mediation role of relationship quality", *International Journal of Business Administration,* Vol. 2, No. 3, pp. 83–93, https://doi.org/10.5430/ijba.v2n3p83.

Dogrua, T. et al. (2019) "Employee earnings growth in the leisure and hospitality industry", *Tourism Management*, Vol. 74, pp. 1–11, https://doi.org/10.1016/j.tourman.2019.02.008.

Dominici, G., Guzzo, R. (2010) "Customer satisfaction in the hotel industry: a case study from Sicily", *International Journal of Marketing Studies*, Vol. 2, No. 2, pp. 3–12, doi: 10.5539/ijms.v2n2p3.

Fornell, C., Larcker, D. (1981) "Evaluating Structural Equation Models with Unobservable Variables and Measurement Error", *Journal of Marketing Research*, Vol. 18, pp. 39–50, doi: 10.2307/3151312.

Garbarino, E., Johnson, M. (1999) "The different roles of satisfaction, trust, and commitment in customer relationships", *Journal of Marketing*, Vol. 63, No. 2, pp. 70–87, doi: 10.2307/1251946.

Gordon, T. (2008) "The relationship marketing orientation of Hong Kong financial services industry managers and its links to business performance", *Journal of Financial Services Marketing,* Vol. 13, No.3, pp. 193–203, doi: 10.1057/fsm.2008.22.

Gremler, D., Gwinner, K., Brown, S. (2001) "Generating positive word-of-mouth communication through customer-employee relationships", *International Journal of Service Industry Management,* Vol. 12, No. 19, pp. 44–59, doi: 10.1108/09564230110382763.

Gronroos, C. (1996) "Relationship marketing: strategic and tactical implications", *Management Decision*, Vol. 34, No. 3, pp. 5–14, doi: 10.1108/00251749610113613.

Gronroos, C. (1997) "Keynote paper, From marketing mix to relationship marketing –towards a paradigm shift in marketing", *Management Decision*, Vol. 35, No. 4, pp. 322–339, doi: http://dx.doi.org/10.1108/00251749410054774.

Gummesson, E. (1997) "Relationship marketing as a paradigm shift: some conclusions from the 30R approach", *Management Decision*, Vol. 35, No. 4, pp. 267–272, doi: https://doi.org/10.1108/00251749710169648.

Handriana, T. (2016) "The Role of Relationship Marketing in Small and Medium Enterprises (SMEs)", *Journal Pengurusan*, Vol. 48, pp. 1–18, http://dx.doi.org/10.17576.

Hasegawa, H. (2010) "Analyzing tourists' satisfaction: A multivariate ordered probit approach", *Tourism Management*, Vol. 31, No. 1, pp. 86–97, doi: 10.1016/j.tourman.2009.01.008.

Hea, X. et al. (2018) "Destination perceptions, relationship quality, and tourist environmentally responsible behavior", *Tourism Management Perspectives*, Vol. 28, pp. 93–104, doi: 10.1016/j.tmp.2018.08.001.

Henseler, J., Ringle, C., Sarstendt, M. (2015) "A new criterion for assessing discriminant validity in variance-based structural equation modeling", *Journal of the Academy Marketing Science,* Vol. 43, pp. 115–135, doi: 10.1007/s11747-014-0403-8.

Herington, C., Johnson, L., Scott, D. (2006) "Internal relationships linking practitioner literature and relationship marketing theory", *European Business Review*, Vol. 18, No. 5, pp. 364–381, doi: 10.1108/09555340610686958.

Hill, S., Tombs, A. (2011) "The effect of accent of service employee on customer service evaluation", *Managing Service Quality*, Vol. 21, No. 6, pp. 649–666, https://doi.org/10.1108/09604521111185637.

Ho, C., Lee, Y. (2007) "The development of an e-travel service quality scale", *Tourism Management*, Vol. 28, No. 6, pp. 1434–1449, doi: 10.1016/j.tourman.2006.12.002.

Hua, N. et al. (2019) "What do hotel customers complain about? Text analysis using structural topic model", *Tourism Management*, Vol. 72, pp. 417–426, doi: 10.1016/j.tourman.2019.01.002.

Huang, H., Chiu, C. (2006) "Exploring customer satisfaction, trust and destination loyalty in tourism", *The Journal of American Academy of Business, Cambridge*, Vol. 10, No. 1, pp. 156–159, doi: 10.1007/978-3-030-16981-7_5.

Hui, T., Wan, D. (2005) "Factors Affecting Consumers' Choice of a Travel Agency", *Journal of Travel & Tourism Marketing*, Vol. 19, No. 4, pp. 1–12, https://doi.org/10.1300/J073v19n04_01.

Hunt, S., Arnett, D., Madhavaram, S. (2006) "The explanatory foundations of relationship marketing theory", *Journal of Business & Industrial Marketing*, Vol. 21, No. 2, pp. 72–87, doi: 10.1108/10610420610651296.

Hunt, S., Morgan, R.M. (1994) "Relationship Marketing in the Era of Network Competition", *Marketing Management*, Vol. 3, No. 1, pp. 18–28.

Jalilvand, M. et al. (2012) "Examining the structural relationships of electronic word of mouth, destination image, tourist attitude toward destination and travel intention: An integrated approach", *Journal of Destination Marketing & Management,* Vol. 1, No. ½, pp. 134–143, doi: http://dx.doi.org/10.1016/j.jdmm.2012.10.001.

Jones, T. et al. (2010) "Service customer commitment and responce", *Journal of Services Marketing*, Vol. 24, No. 1, pp. 16–28, doi: https://doi.org/10.1108/08876041011017862.

Jones, T. et al. (2018) "Prototyping analysis of relationship marketing constructs: what constructs to use when", *Journal of Marketing Management,* Vol. 34, No. 9–10, pp. 865–901, doi: 10.1080/0267257X.2018.1520281.

Kasabov, E., Warlow, A. (2010) "Towards a new model of "customer compliance" service provision", *European Journal of Marketing,* Vol. 44, No. 6, pp. 700–729, doi: 10.1108/03090561011032685.

Kim, A., Brown, G. (2012) "Understanding the relationships between perceived travel experiences, overall satisfaction, and destination loyalty", *Anatolia – An International Journal of Tourism and Hospitality Research,* Vol. 23, No. 3, pp. 328–347, doi: 10.1080/13032917.2012.696272.

Kim, J., Jin, B., Swinney, J. (2009) "The role of retail quality, e-satisfaction and e-trust in *online* loyalty development process", *Journal of Retailing and Consumer Services,* Vol. 16, No. 4, pp. 239–247, doi: 10.1016/j.jretconser.2008.11.019.

Kim, W., Han., J., Lee, E. (2001) "Effects of relationship marketing on repeat purchase and word of mouth", *Journal of Hospitality and Tourism Research,* Vol. 25, No. 3, pp. 272–288, doi: 10.1177/109634800102500303.

Ku, E., Fan, Y. (2009) "Knowledge sharing and customer relationship management in the travel service alliances", *Total Quality Management*, Vol. 20, No. 12, pp. 1407–1421, doi: 10.1080/14783360903248880.

Ladhari, R. (2009) "Service quality, emotional satisfaction, and behavioral intentions A study in the hotel industry", *Managing Service Quality*, Vol. 19, No. 3, pp. 308–331, doi: 10.1108/09604520910955320.

Lenka, U., Suar, D., Mohapatra, P. (2009) "Service quality, customer satisfaction, and customer loyalty in Indian commercial banks", *The Journal of Entrepreneurship*, Vol. 18, No. 1, pp. 47–64, doi: https://doi.org/10.1177/097135570801800103.

Lombard, R., Steyn, T. (2008) "Relationship marketing practices of travel agencies in the Western Cape Province", *South African Journal of Business Management,* Vol. 39, No. 4, pp. 15–26, https://doi.org/10.4102/sajbm.v39i4.568.

Medina-Munos, D., Garcia-Falcon, J. (2000) "Successful relationships between hotels and agencies", *Annals of Tourism Research,* Vol. 27, No. 3, pp. 737–762, doi: 10.1016/S0160-7383(99)00104-8.

Moliner, M. et al. (2007) "Relationship quality with a travel agency: The influence of the postpurchase perceived value of a tourism package", *Tourism and Hospitality Research,* Vol. 7, No. 3/4, pp. 194–211, doi: 10.1057/palgrave.thr.6050052.

Murphy, L., Mascardo, G. Benckendorff, P. (2007) "Exploring word-of-mouth influences on travel decisions: friends and relatives vs. other travelers", *International Journal of Consumer Studies,* Vol. 31, No. 5, pp. 517–527, *doi:* https://doi.org/10.1057/palgrave.thr.6050052.

Namkung Y., Jang S., Choi, S. (2011) "Customer complaints in restaurants: Do they differ by service stages and loyalty levels*?", International Journal of Hospitality Management*, Vol. 30, No. 3, pp. 495–502, doi: 10.1016/j.ijhm.2010.07.005.

Ndubisi, N. (2007) "Relationship marketing and customer loyalty", *Marketing Intelligence and Planning*, Vol. 25, No. 1, pp. 98–106, doi: 10.1108/02634500710722425.

Ndubisi, N., Chan, W. (2005) "Factorial and discriminant analyses of the underpinnings of relationship marketing and customer satisfaction", *International Journal of Bank Marketing*, Vol. 23, No. 7, pp. 542–557, doi: 10.1108/02652320510629908.

Ndubisi, N., Nataraajan, R. (2018) "Customer satisfaction, Confucian dynamism, and long-term oriented marketing relationship: A threefold empirical analysis", *Psychol Mark*, Vol. 35, No. 6, pp. 477–487, doi: https://doi.org/10.1002/mar.21100.

Negi, R., Ketema, E. (2010) "Relationship marketing and customer loyalty: the Ethiopian mobile communications perspective", *International Journal of Mobile Marketing*, Vol. 5, No. 1, pp. 113–124.

Nojković, A. (2007) "Modeli diskretne zavisne promenljive: pregled metodologije i primenjenih istraživanja", *Ekonomski Anali*, Ekonomski fakultet, Beograd, No. 172, pp. 55–92, doi: 10.2298/EKA0772055N.

Nusair, K., Parsa, H., Cobanoglu, C. (2011) "Building a model of commitment for Generation Y: An empirical study on e-travel retailers", *Tourism Management*, Vol. 32, No. 4, pp. 833–843, doi: 10.1016/j.tourman.2010.07.008.

Oppermann, M. (1999) "Databased Marketing by Travel Agencies", *Journal of Travel Research*, Vol. 37, pp. 231–237, doi: https://doi.org/10.1177/004728759903700303.

Palmatier, R. et al. (2006) "Factors influencing the effectiveness of relationship marketing: a meta-analysis", *Journal of Marketing*, Vol. 70, pp. 136–153, doi: 10.1509/jmkg.70.4.136.

Payne, A., Flow, P. (2013) *Strategic customer management: integrating relationship marketing and CRM*, Cambridge University Press.

Pesonena, J., Komppulaa, R., Murphy, J. (2019) "Plastic loyalty – Investigating loyalty card programs for a Finnish hotel chain", *Tourism Management*, Vol. 73, pp. 115–122, doi: 10.1016/j.tourman.2019.01.023.

Rajaobelina L. (2018) "The Impact of Customer Experience on Relationship Quality with Travel Agencies in a Multichannel Environment", *Journal of Travel Research*, Vol. 57, No. 2, pp. 206–217, doi: https://doi.org/10.1177/0047287516688565.

Rudež, H. (2010) "Integration of corporate social responsibility into loyalty programs in the tourism industry", *Tourism and Hospitality Management,* Vol. 16, No. 1, pp. 101–108.

Saha, G., Theingi, C. (2009) "Service quality, satisfaction, and behavioral intentions-a study of low-cost airline carriers in Thailand", *Managing Service Quality,* Vol. 19, No. 3, pp. 350–372, doi: 10.1108/09604520910955348.

Shammount, A. (2013) *Relationship marketing in hospitality, theory and practice,* Lambert Academy Publishing, Germany.

Sharma A., Sharma, S., Chaudhary, M. (2020) "Are small travel agencies ready for digital marketing? Views of travel agency managers", *Tourism Management*, Vol. 79, doi: 10.1016/j.tourman.2020.104078.

Shirazi, F., Som, A. (2013) "Relationship marketing and destination loyalty: evidence from Penang, Malaysia", *International Journal of Management and Marketing Research,* Vol. 6, No. 1, pp. 95–106.

Siegel, C. (2004) *Internet matketing: foundations and applications,* Houghton Miffin Company, Boston, USA.

Sin, L., et al. (2002) "The effect of relationship marketing on business performance in a service – oriented economy", *Journal of Service Marketing*, Vol. 16, No. 7, pp. 656–676, https://doi.org/10.1177/1096348006287863.

Soldić-Aleksić, J., Krasavac, B. (2009) Kvantitativne tehnike u istraživanju tržišta – Primena SPSS računarskog paketa, CID, Beograd.

Song, H., et al. (2011) "Assessing Mainland Chinese tourists satisfaction with Hong Kong using tourist satisfaction indeks", *International Journal of Tourism Research*, Vol. 13, No.1, pp. 82–96, doi: 10.1002/jtr.801.

Steinhoff, L., et al. (2019) "Online relationship marketing", *Journal of the Academy of Marketing Science,* Vol. 47, No. 1, pp. 369–393, doi: 10.1007/s11747-018-0621-6.

Tortosa-Edo, V., Sanchez-Garcı´a, J., Moliner-Tena, M. (2010) "Internal market orientation and its influence on the satisfaction of contact personnel", *The Service Industries Journal,* Vol. 30, No. 8, pp. 1279–1297, https://doi.org/10.1080/02642060802348312.

Tronvoll, B. (2012) "A dynamic model of customer complaining behavior from the perspective of service-dominant logic", *European Journal of Marketing,* Vol. 46, No. 1/2, pp. 284–305, doi: 10.1108/03090561211189338.

Young, L. (2006) "Trust: looking forward and back"*, Journal of Business & Industrial Marketing,* Vol. 21, No. 7, pp. 439–445, doi: 10.1108/08858620610708920.

Zhang H. et al. (2014) "Destination image and tourist loyalty: A meta-analysis", *Tourism Management,* Vol. 40, No. (C), pp. 213–223, doi: 10.1016/j.tourman.2013.06.006.

Primjena logističkog modela u analizi marketinških odnosa u turističkim agencijama

Katarina Borisavljević[1]*, Gordana Radosavljević*[2]

Sažetak

Primjena koncepta relacijskog marketinga u turizmu podrazumijeva izgradnju kvalitetnih odnosa između svih sudionika u turističkom lancu ponude. Osobito je važna analiza pretpostavki za razvoj odnosa i njihov utjecaj na ukupnu uspješnost tvrtki u turizmu. S tim u vezi, predmet rada je istraživanje primjene marketinških odnosa u turističkim agencijama u Srbiji koji posluju na tradicionalan način i putem interneta, te identifikacija ključnih čimbenika lojalnosti korisnika turističkih usluga. Cilj ovog rada je istražiti utjecaj pretpostavki relacijskog marketinga (poput povjerenja, upravljanja pritužbama kupaca, ulaganja u interni marketing, primjene informacijske tehnologije u agencijama, poslovnog imidža i tradicije, kao i socio-demografskih karakteristika klijenata) na izbor putničke agencije preko koje će klijenti putovati. Doprinos rada je u primjeni logističkog modela u istraživanju relacijskog marketinga u agencijama. Važnost rada ogleda se u predlaganju učinkovitog modela primjene koncepta marketinških odnosa u cilju povećanja lojalnosti kupaca u turističkim agencijama.

Ključne riječi: *relacijski marketing, turističke agencije, logistički model, lojalnost kupaca*

JEL klasifikacija: *Z33, M31*

[1] *Docent na Univerzitetu u Kragujevcu, Ekonomski fakultet, Liceja Kneževine Srbije 3, 34000 Kragujevac, Srbija. Katedra za Menadžment i poslovnu ekonomiju. Znanstveni interes: marketing i menadžment u turizmu i trgovini. Tel.: +38134303552. E-mail: katarinab@kg.ac.rs. http://www.ekfak.kg.ac.rs/sr/nastavnici/nastavnici-pregled?id=156&idd=375.*

[2] *Redovni profesor na Univerzitetu u Kragujevcu, Ekonomski fakultet, Liceja Kneževine Srbije 3, 34000 Kragujevac, Srbija. Katedra za Menadžment i poslovnu ekonomiju. Znanstveni interes: marketing i menadžment u turizmu i trgovini. Tel.: +38134303568. E-mail: gocar@kg.ac.rs, http://www.ekfak.kg.ac.rs/sr/nastavnici/nastavnici-pregled?id=156&idd=158.*

Appendices

Annex 1: Analysis of descriptive statistics

	Frequency	Percentages	Valid percentages
Gender of respondents			
men	159	33.9	39.9
women	239	51.0	60.1
Education of respondents			
high school degree	175	37.3	44.9
college (two- year post-secondary educations) degree	70	14.9	17.9
university degree	145	30.9	37.2
Travel frequency of respondents			
once per year	207	44.1	53.1
2-3 times per year	160	34.1	41.0
4 and more times per year	23	4.9	5.9
Age of respondents			
18 – 30	137	29.2	35.1
31- 40	113	24.1	29.0
41 – 50	66	14.1	16.9
51 – 60	63	13.4	16.2
61 – 72	11	2.3	2.8
Monthly household income of respondents			
100 – 500 euros	119	25.4	37.0
500 – 1000 euros	96	20.5	29.8
more than 1000 euros	107	22.8	33.2

Source: Authors calculation

Annex 2: Testing of convergent and discriminant validity

Intercorrelation matrix, average variance extracted (AVE), composite reliabilities (CR) and HTMT results

Indicator variables	<---	Latent variables	Standardised loadings	Square of standardised loadings	Sum of square of standardised loadings	Number of indicators	AVE	Square root of AVE
CT1	<---	CT	0.75	0.56				
CT2	<---	CT	0.64	0.41				
CT3	<---	CT	0.74	0.54				
CT4	<---	CT	0.75	0.56	2.08	4	0.52	0.83
IM1	<---	IM	0.80	0.63				
IM2	<---	IM	0.65	0.42				
IM3	<---	IM	0.75	0.57				
IM4	<---	IM	0.79	0.62	2.24	4	0.56	0.75
CM1	<---	CM	0.61	0.38				
CM2	<---	CM	0.85	0.72				
CM3	<---	CM	0.65	0.42	1.51	3	0.51	0.71
WQ1	<---	WQ	0.69	0.48				
WQ2	<---	WQ	0.74	0.56	1.03	2	0.51	0.72

Customer trust (CT); internal marketing (IM); compliant management (CM); web quality/web design and content (WQ).

	Customer trust	Internal marketing	Compliant management	Web design and content
Customer trust	1			
Internal marketing	0.66	1		
Compliant management	0.63	0.59	1	
Web design and content	0.38	0.62	0.29	1
AVE	0.52	0.56	0.51	0.51
CR	0.81	0.84	0.75	0.68

HTMT	Customer trust	Internal marketing	Compliant management	Web design and content
Customer trust				
Internal marketing	0.587			
Compliant management	0.638	0.580		
Web design and content	0.280	0.629	0.275	

Source: Authors calculation

Original scientific paper
UDC: 336.74-021.131(1-69 Islam)
https://doi.org/10.18045/zbefri.2021.1.113

A qualitative approach to evaluate the reconciliation of GOLDX and OneGram in Islamic Finance*

Marwan Mohamed Abdeldayem[1], *Saeed Hameed Al Dulaimi*[2], *Fuaad Hameed Al Dulaimi*[3]

Abstract

The purpose of this study is two-folded. The first purpose is to examine the perception of Islamic finance experts and Shariah scholars on the Islamic cryptocurrency (i.e., GOLDX and OneGram). The question is whether it has a role in reconciling cryptocurrency in Islamic finance. The second is to introduce the new Islamic cryptocurrency to serve these rich Islamic populaces. The study used a qualitative research approach by conducting interviews to explore the Islamic scholars' views on the framework of the new Islamic cryptocurrency. The scholars have been deemed to meet particular requirements of having comprehensive knowledge and have extensive experience in both the Islamic Shariah and cryptocurrency. Accordingly, the number of such scholars was limited, and eventually, with the access offered only to five scholars from different Islamic countries. We thoroughly analyzed the collected data from the interviews. The findings reveal that Islamic law is absent on the essential models for the conventional cryptocurrency utilization(such as bitcoin) as either a legitimate or illicit apparatus exchange device. Consequently, introducing new Islamic cryptocurrencies is to reconcile cryptocurrencies such as GOLDX and OneGram.

* Received: 09-12-2020; accepted: 18-06-2021

[1] *Associate Professor of Business and Finance, Cairo University, Egypt and College of Administrative Sciences, Applied Science University (ASU), P.O Box 5055 Manama, Kingdom of Bahrain. Scientific affiliation: corporate finance, behavioral finance and cryptocurrency applied research. Phone: +973 35121048. E-mail: Marwan.abdeldayem@asu.edu.bh.*

[2] *Associate Professor of Business & HR Management College of Administrative Sciences, Applied Science University (ASU), P.O Box 5055 Manama Kingdom of Bahrain. Scientific affiliation: human resources management and change management. Phone: +973 39998703.E-mail: Saeed.aldulaimi@asu.edu.bh.*

[3] *Assistant Professor of Islamic Finance Bait al-Mashura Finance Consultations, Gulf Cooperation Countries. E mail: f.dulaimi@b-mashura.com.*

They will play a vital role in attracting more than 1.5 billion Muslims around the globe to enter the world of cryptocurrency.

***Key words**: cryptocurrency, GOLDX, OneGram, Fintech, Islamic finance*

***JEL Classification:** G15, G32*

1. Introduction

In societies where Islam prevails, the principles of work, commerce, and daily dealings follow Islamic rules. In Islamic law, it is accepted that monetary movement ought to be founded on genuine, actual resources, not speculation hypothesis; Islamic law also prohibits the payment and collection of interest, also commonly called "Riba" (usury). In this manner, numerous individuals in the Middle East and Gulf Cooperation Council (GCC) do not consider bitcoin, Ethereum, and different cryptocurrencies to be compliant with Shariah law (Abdeldayem and Aldulaimi, 2020a&c). As a rule, any currency goes about as a mechanism of trade, store of significant worth, and unit of record (see figure 1 below). Two of the principal addresses a public asks before it acknowledges a currency as legal money seem to be "who is issuing this currency" and "is the currency issuer reliable and trusted"?

Digital forms of money have not been formally restricted in Muslim Countries such as Saudi Arabia and the United Arab Emirates yet; however, these legislatures have given admonitions about their residents buying bitcoin (Kusuma, 2020). Along these lines, Muslim business sectors have been slower to exchange advanced monetary standards and get involved in the cryptocurrency markets. Furthermore, there is a great deal of money to be made in Islamic countries: Muslim nations contribute about 9% of worldwide GDP. As indicated by Price Water House (PWH) coopers (2020), total Islamic finance assets are over $2.8 trillion and record for just 1.2 % of all-out worldwide financial resources. To serve these rich Islamic populaces, another kind of Shariah-endorsed crypto is springing up as GOLDX and OneGram.

In societies where Islam prevails, the principles of work, commerce, and daily dealings follow Islamic rules (Ahmed, 2009 and 2011; Velayutham, 2014; Beekun, 1997). Since Muslims are guided by their shariah and fatwa, this study will make a valuable and valuable contribution to the literature at both the theoretical and practical levels. At the theory level, this study-to the best of our knowledge- is the first of its kind to evaluate the new Islamic cryptocurrency, and hence it adds to the international body of literature in this field. The results of this research will provide empirically based information on the perception of Islamic finance experts and Shariah scholars on whether Islamic cryptocurrency (i.e., GOLDX and OneGram) would play a role in reconciling (accommodating and conforming) cryptocurrency in Islamic finance. This study also contributes to the larger area of Islamic finance theories by highlighting the effect of Islamic cryptocurrency on reconciling cryptocurrency in Islamic finance. At a practical level, this research will also contribute to policymakers' evaluation of the

new Islamic cryptocurrency to serve these rich Islamic populaces, as this would attract more than 1.5 billion Muslims around the globe to enter the world of cryptocurrency, as well as contributing to the improvement of cryptocurrencies management and corporate governance practices. After all, the results revealed from this study will have implications for improvements in practices of Islamic finance and could serve as a guide towards advancing the management and performance of cryptocurrency in the Islamic world. Distinct from most past studies, this study will investigate whether new Islamic cryptocurrencies (for example, GOLDX and OneGram) can accommodate cryptographic money in Islamic accounts. "In this study, the general hypothesis can be stated in the null form as follows: "Islamic Cryptocurrencies (GOLDX and OneGram) have no significant impact on the reconciliation of cryptocurrency with Islamic finance".

The historical development of money began when the Islamic government dominated. It commenced when Prophet Muhammad PBUH governed in the city of Medina in 625 AD. The first money was the dinar minted 4.25 g gold of 22-carat, and dirham made of 3-grams of silver. At that period, the restriction of the prevailing money on the skin of a camel was partly because of the camel populace decrease (Haneef and Barakat, 2002). The dinar replicated from the golden money of the Byzantine Empire, while the silver duplicated from the Persian Empire. These two kinds of money had a steady proportion of 1:10 then varied to 1:15 in the extensive stretch (Rashid et al., 2002). Such a vacillation happened due to the storing by certain individuals. Therefore, if an Islamic cryptocurrency (such as GOLDX and/or OneGram) successfully develops and is used for all Muslim societies, it may serve as alternative currencies against US Dollar as a World reserve currency.

The remaining of this paper is structured as follows: Literature review is in section 2. Section 3 introduces the methodology. Discussion and statistical analysis results are explained in section 4, while conclusions and avenues for future research are in section 5.

2. Theoretical Background and Literature Review

There is a big debate in the literature on the lawfulness of cryptocurrency in Islam (see Siswantoro et al., 2020). Some researchers believe that cryptocurrency is unlawful in Islam. For example, Bakar et al. (2017) discovered three conditions barring cryptocurrency from the class of money. It is characterized by (1) no natural worth, (2) has an unknown holder, and (3) it is flimsy. A comparative study conducted by Meera (2018), who recommended that "Islamic" money ought to be upheld by a resource. Hence, cryptocurrency does not satisfy that necessity. He proposed that to meet the Islamic standards, cryptocurrency ought to be upheld by a genuine resource. Hassan et al. (2020), Nurhisam (2017), and Abdeldayem and Aldulaimi (2020 b) expressed that Bitcoin is not reasonable as money since it is not

under government guidelines and the dangers and shortcomings are more prominent than the advantages.

On the other hand, as argued by Siswantoro et al. (2020) some scholars argue that cryptocurrency is compliant with Shariah law. Oziev and Yandiev (2018) have perceived the congruity of Bitcoin to Islamic instructing and found that it has no maker, money related to control, or straightforwardness. Some Islamic specialists moreover have different evaluations on this issue. In 2018, the Sharyah Review Bereau in Bahrain (www.shariyah.com) perceives that cryptocurrency and tokens are admissible as money as they meet inclinations for exchange trades other than various essentials, for instance, maal (property), manfa'ah (usufruct), haqq (right), and dayn (commitment). Besides, there are a couple of differentiations among coins and tokens. Tokens are moreover varied be that as it may, the limit as a method of exchange is relative. Amalin (2018) felt that computerized currency fulfilled for money exchange it is a direct and clear rule for trading. It doesn't contain usury (riba), which is confined in Islamic educating. Near reasons proposed by Zain (2018), who argued that Bitcoin can be used for unlawful trades in light of unregulated by national banks.

Finally, compatibility is perhaps the main measurements while examining cryptocurrency speculation conduct among Muslim financial backers (Ayedh et al., 2020). It is important that compatibility in the current study alludes to the compatibility of cryptocurrency venture with the social and cultural estimations of the investors, their strict convictions, their risk profile and inclination and the similarity with their past speculation experience. The basic pertinence is the compatibility of cryptocurrency venture with the Islamic standards of business, which has been vigorously addressed by academicians, specialists and Islamic researchers the same. The issue of high gharar related with cryptocurrency speculation has been the essential worry as cryptocurrency has no actual structure and exists just in an online network, it has no characteristic worth and cannot be recovered against genuine monetary forms. Besides, the cryptocurrency holders and administrators are mysterious, its worth is flimsy on account of high instability, and it does not qualify as a decent store of significant worth (Abu Bakar et al., 2017). These perspectives were upheld by Meera (2018), who likewise noticed that money without natural worth has a component of unfairness, and henceforth, it is not viable with the target of Islamic guidelines (maqasid al-shariah). Essentially, Hayes (2017) set up that cryptocurrency misses the mark regarding satisfying the standards of the safeguarding of abundance in Sharīah, and neglects to have the currency ascribes (Thamaniyyah), which is a characterizing trait of money. Additionally, Nurhisam (2017) broke down cryptocurrency from the Islamic viewpoint and found that it causes a few damages (Madharrat) including the chance of falsifying, loss of certainty and excessive inflation. Likewise, they reasoned that money ought to be given and overseen by state specialists (Ulil Amri). These issues are relied upon to altogether affect the use and reception of Islamic cryptocurrency by Muslims.

However, the authors of this research effort believe that cryptocurrency needs further investigation to examine the appropriateness of Islamic teaching. This supposition was as that of Asif (2018), who expressed that the framework of cryptocurrency is neither against Islamic teaching nor the derivatives. Furthermore, Bangash (2017) raised comparative issues. He expressed that serval Islamic scholars, (for example, Imam Ibn Taymiyyah, Imam Abu Hanifa, and Imam Abu Yusuf) did not explicitly expand on the necessity of money. They allowed regarding money as an item with certain limitations.

2.1. Component of Cryptocurrency

A cryptocurrency is a "virtual coin" and does not exist physically. The main evidence of responsibility is a recorded exchange on the blockchain. The blockchain is an openly available report (or electronic record) as illustrated below in figures 1 and 2. Individuals who own cryptographic money, for instance, need to purchase merchandise from vendors ready to acknowledge cryptocurrency as installments. Instead of having a bank encourage the exchange of the money, that move happens through the public record framework (Abdeldayem et al., 2020; Abu Bakar et al., 2017; Bakar and Rosbi, 2017)

Figure 1: Cryptocurrency Transaction Procedure

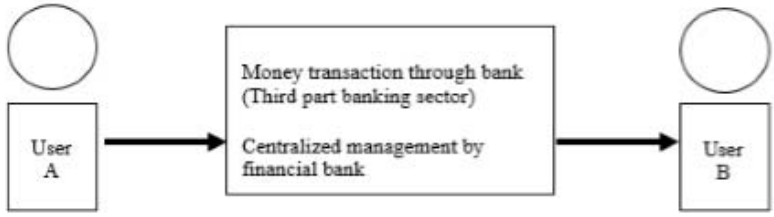
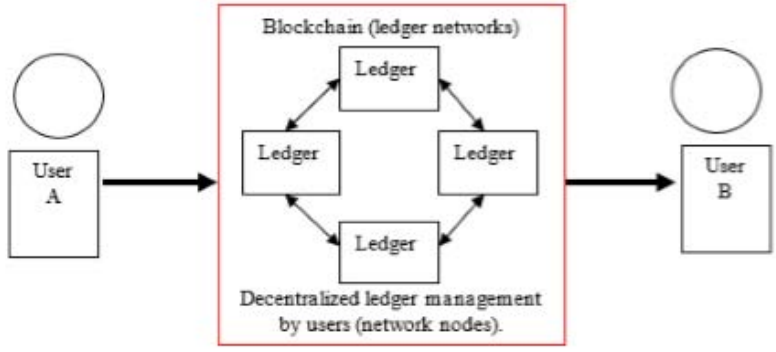


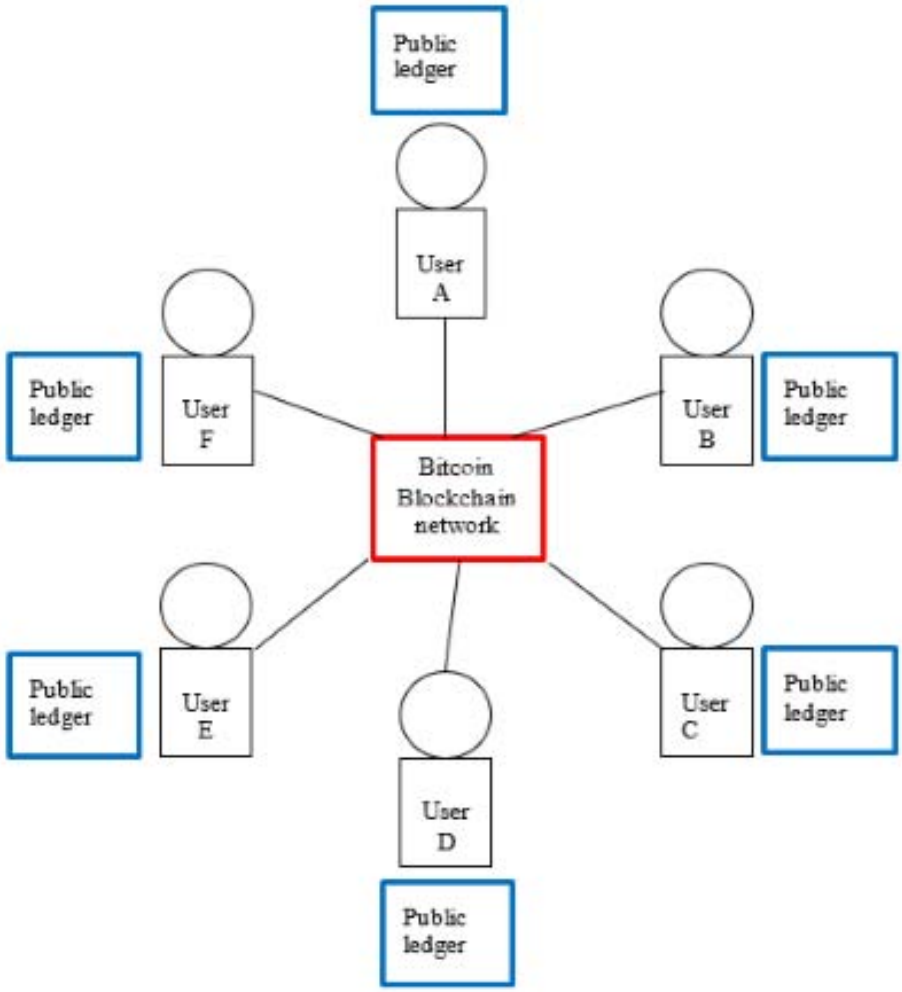
Figure 1: Money transaction procedure



Source: Abu Bakar et al. (2017)

The inception of another cryptocurrency ordinarily emerges when an organization intends to dispatch new items and discover assets to create them. Cryptographic forms of money work as a mode of trade, a unit of record, and additionally a store of significant worth however do not have lawful delicate status in any ward. It is not given or ensured by any administration and capacities simply by arrangement inside the restricted network of clients. Cryptographic forms of money are unique concerning fiat currency or "genuine money", which is the actual money that makes up any nations legitimate delicate, and they are likewise not quite the same as e-money, which is a computerized portrayal of fiat currency (Han et al., 2018; Rahim et al., 2019).

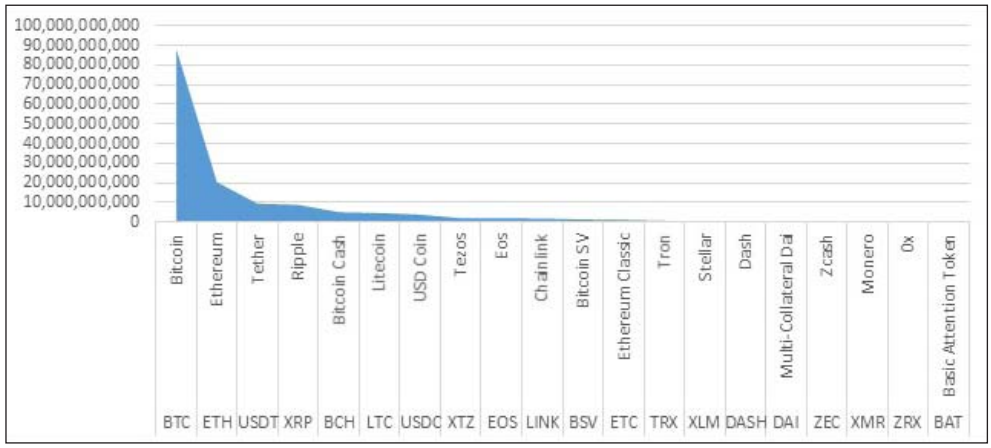
Figure 2: Blockchain Network (open ledger network)



Source: Abu Bakar et al. (2017)

Throughout the most recent couple of years, the market capitalization of digital forms of money, prominently known as cryptocurrencies, has arrived at a close $400 billion with more than 1500 monetary standards been made. Among them, bitcoin has been the most famous and favored one with a current market capitalization of over $150 billion. Figure 3 shows the most common cryptocurrencies along with their market capitalization. It can be seen from figure 3 that Bitcoin has the highest market capitalization, while XMR and ZRX were having the lowest market capitalization in 2020. In the light of such developing fame, it merits investigating whether cryptocurrencies, for example, bitcoin or a comparative framework can make an elective mechanism of trade in Islamic money when contrasted with customary Riba-upheld national bank fiat money (see Ayedh et al., 2020; Bakar and Rosbi, 2018).

Figure 3: Market Capitalization of Most common Cryptocurrencies in 2020



Source: Prepared by authors based on data from Coin Market Cap (2020)

2.2. GOLDX

In 2017, a Singapore-based financial technology (fintech) organization called "HelloGold" (HGF) has presented an altcoin named GOLDX that may revolutionize the entire cryptocurrency market. It may very well be the steadiest yet. In reality, when cryptographic money plunges to 30% of its incentive in seven days, this is particularly significant. GOLDX is a token based on Smart Contract technology built on the Ethereum ERC20 Blockchain. Each GOLDX token is represented by one (1) gram of investment-grade physical allocated gold securely vaulted with and insured by a bullion custodian in Singapore i.e. Bullion Star International.

Hence, users and financial specialists can buy GOLDX with Bitcoin or Ethereum, two of the greatest digital forms of money out there. Nonetheless, where it varies is in its sponsorship by actual gold. One GOLDX is consistently attached to 1g of gold,

making it an "anchor of strength" to cryptocurrency speculators. This gold is put away in a protected vault in Singapore, cared for by overseer "BullionStar" Singapore. Furthermore, table 1 below summarizes the main features of GOLDX such as the acquisition of gold; Technology; management fees, and how to acquire GOLDX.

Table 1: GOLDX Summary and Mechanism

Items	Description
Key Features	- GOLDX is issued on the block chain as and when gold is deposited into HGF's gold account and upon approval by 3 authorized signatories including from 1 Director of HGF. The issuance process will be done on the same day; - GOLDX issued belongs to HGF and can be traced at the HGF public address. The information can be verified using the Ethereum block search; - GOLDX is backed by real physical allocated gold, where 1GOLDX = 1g of gold; - No limit of issuance; - Each GOLDX is divisible up to 18 decimal points; - Any transfer of GOLDX between the parties (crypto wallets) will require a small amount of transaction fee in Ether since it is built on the Ethereum blockchain.
Acquisition of gold	- HGF will purchase the gold from its supplier Bullion Star International; - Pursuant to the purchase, HGF will receive the allocated gold into its account on the same day (T0); - HGF will earn management fee from its Customers in the form of gold; - HGF has committed to allocate a fixed amount of grant endowment to HGF on a monthly basis amounting to 10% of its revenue earned from the management fee; and - HGF shall receive the amount of allocated gold into its account as endowment, which is confirmed by way of Customer's gold holding position in the HGF's website (updated on daily basis).
Technology	Ethereum ERC20 – Blockchain based technology
Management Fee	- GOLDX is backed by real allocated physical gold stored in the HGF's gold vault. Therefore, it is subject to management fee charged by HGF which is 2% p.a. - The management fee formula is embedded into the GOLDX Smart Contract and is calculated daily. - Hence, the amount of GOLDX will decrease on a daily basis at the rate of 2% p.a., and therefore, the amount of GOLDX will also be less than the HGF's gold amount (because the information on the management fee in the website will be updated at month end).
How to Acquire GOLDX	Currently, there are two (2) ways of acquiring GOLDX which are as follows: **i. "Hibah", or gift** HGF may distribute GOLDX to the HGT holder on a discretionary basis. **ii. "Over the counter Purchase"** GOLDX can be purchased via over the counter (OTC) process from HGF using Ether or Bitcoin. Minimum purchase is 1 GOLDX.
Tradability	- GOLDX are currently tradable based on peer-to-peer transaction between parties on the Ethereum blockchain, therefore, Ethereum wallet is required; - Holder of GOLDX can choose to sell the token in open market or opt to sell back to the HGF at a fixed percentage below the market price of gold. Minimum selling back to HGF is set at 1 GOLDX.

Source: Prepared by authors

It is believed that GOLDX's meets the adhering conditions that fulfill Shariah law limitations:

– The cycle of purchasing and selling is adequately straightforward

– It is sponsored by actual gold that is completely apportioned

– The cycle of purchasing and selling actual gold is finished in the time permitted by the norm.

The Shariah Compliance measure was directed by a Malaysian firm called Amanie Advisors, a group of Islamic scholars who keep up and guarantee the respectability of the cycle. In contrast to other virtual monetary standards, GOLDX includes the issuance of a token sponsored by actual gold put away in a vault in Singapore, and exchanges must be finished inside a characterized time. The recorded terms supposedly ensure straightforwardness, conviction and instantaneousness of exchanges, which are the essential standards for Islamic financial agreements. The progression may help the number of fintech partnerships ready to venture into Islamic account markets, opening up such areas as the Middle East and Southeast Asia.

Furthermore, in 2017 HelloGold dispatched a blockchain-based versatile application in Malaysia. The application, which furnishes clients with an occasion to purchase and sell physical, speculation grade gold, was likewise confirmed by Amanie Advisors. The organization intends to expand its online gold stage in Thailand and different nations. HelloGold is investigating other vague resources for its blockchain innovation. It includes a common electronic record that permits gatherings to follow exchange data through a protected organization.

2.3. OneGram

Gold was one of the underlying types of money to be utilized in Islamic countries, which settles a decent decision for a UAE gold-based digital money (i.e., OneGram) expecting to agree with Sharia law. Since that point, millions of dollars of OneGram coins have effectively been given. It represents about 60% of the complete proposed to be shared out. In 2018 the UAE introduced a new cryptocurrency called OneGram, sponsored by one of the global most-steady resources: gold. OneGram's pitch means that every unit of significant worth is sponsored by an actual gram of gold kept in a safe. Accordingly, it restricts volatility and speculation and has been esteemed satisfactory under Islamic standards by Dubai-based al-Maali consulting. Gold remains generally steady, floating somewhere within the range of $1,200 and $1,350 for as far back as a year, while Bitcoin cost changes broadly every day. While in the wake of moving to an unequaled height of almost $20,000 in 2017, the cost dropped in 2020, sitting at the season of composing at $7,000.

The tokens presently matched for exchanging against Bitcoin, the organization intends to add pairings to a few hard monetary standards. The coins are recorded on the company's trade, known as "Hulk", and future postings would focus on provincial trade in Asia and the Middle East. OneGram has sold around $400 million worth of its gold-sponsored tokens over the previous year, part of a developing number of Fintech firms entering the field of Islamic finance. In customary business sectors, the cost of gold is regularly utilized as the estimating bar for the status of the worldwide economy. It is because it is a shield against financial turmoil or the expansion of fiat money; if the securities exchange crashes, speculators would have still got the resources in a safe. The idea of gold being a sure thing, as opposed to a bet, consequently, additionally adjusts itself more intimately with Shariah's anti-risk rules.

3. Methodology

In general, there are four types of personal interviews: structured, semi-structured, unstructured, and group interviews (see May 1993). The structured interview has the same disadvantages as the face-to-face questionnaire since they both include predetermined questions. Thus, the interviewer has no freedom to probe or get additional information. The unstructured interview is also unsuitable for this analysis since it is time-consuming and impractical from the interviewee's point of view. The group interview method is not desirable either, as the main purpose is to reach some form of triangulation. Given the purpose as well as time and resource constraints, we have adopted the semi-structured interview. This type of interview allows the researcher to have control over time, content, and the sequence of interviews, allowing the interviewer to probe and the interviewee being more or less free in responding to the questions.

Guided by the unique purpose of the study, the intention was to undertake a series of semi-structured interviews with several Islamic finance experts and Shariah scholars from different Islamic counties. The aim was to analyze the overall impact of the Islamic cryptocurrency (i.e., GOLDX and OneGram) on accommodating cryptocurrency in Islamic finance. It was deemed necessary that scholars should meet certain requirements of having comprehensive knowledge and have exhaustive experience in both the Islamic Shariah and cryptocurrency. In short, the criteria utilized for selecting the interviewees are as follows:

1. They should have comprehensive knowledge and experience in both Islamic Shariah and cryptocurrency i.e. they should have at least 5 years of working experience in the field of Islamic finance and/or cryptocurrency.

2. They are either from top academic institutions or distinguished Fatwa bodies.

Accordingly, the number of such scholars was limited. Thus, the number of interviewees selected in this study and who met the above criteria is 10 Islamic finance experts and Shariah scholars from 8 different Islamic countries. However, due to the problem of inaccessibility and the time scale. The results showed that eventually, only five scholars had access. The small number of interviewees selected is not considered to be a major constraint or limitation since it is felt to be representative. It is an opportunity to gather invaluable information from high-ranking scholars and experts with many years of work experience and were also involved in both the Islamic Shariah and cryptocurrency (Sutton and Austin, 2015; Al-hussaini et al., 2019).

The data collection procedures incorporate defining the limits for the study, gathering information through semi-structured interviews, archives, and visual materials, just as setting up the convention for recording data. In this research effort, purposive sampling has been selected. The explanation behind picking this sampling strategy is to select participants that will best assist the researchers of this study to comprehend the issue and the interview questions. The research instrument for this study used open-ended questions. These questions have been approved and validated by Islamic finance and Shariah specialists before conducting the interviews. Consequently, after approval and ensuing redresses of the instrument, we developed the following interview questions:

1. What is your opinion on using cryptocurrency by Muslims?
2. Do you think cryptocurrency is (Halal) lawful or (Haram) prohibited in Islam?
3. Regarding GOLDX and OneGram as the first Islamic crypto, how do you evaluate their role to reconcile cryptocurrency in Islamic finance?
4. What are your recommendations to ensure the spread of cryptocurrencies among users in the Islamic world?

The interviews were performed from 10th September 2020 to 19th November 2020. The interview has been conducted with five participants; this small number of interviews is defended by Creswell and Clark (2017) and Al-hussaini et al. (2019) to be fitting for qualitative studies. This is one way to deal with the sample size issue, which harps on the possibility of immersion for building up a grounded hypothesis. As indicated by Gentles et al. (2015) data collection should stop even with two interviewees when the themes are explored. Consequently, the participants for this examination are sufficient to create a solidly grounded hypothesis, the profile of the interview participants, dependent on the proficient ground are introduced in Table 2:

Table 2: Profile of Interviews' Participants

Participant ID	Professional Background
P1	Managing Director and CEO of Bait al-Mashura Finance Consultations – GCC
P2	Professor of Economy and Islamic Banking-Zarqa University – Yemen
P3	Associate Prof. of Islamic Law International Islamic University – Malaysia
P4	*Shariah Consultant*- Amanie Advisors – Malaysia
P5	Associate Professor of Islamic law and Economy – King Khaled University – Kingdom of Saudi Arabia

Source: Prepared by authors

4. Empirical data and analysis

As mentioned earlier, guided by the unique purpose of the study, the intention was made to undertake a series of semi-structured interviews with several Islamic finance experts and Shariah scholars from different Islamic counties to further ascertain the overall impact of the Islamic cryptocurrency (i.e. GOLDX and OneGram) on accommodating cryptocurrency in Islamic finance. The interview that has been conducted with five participants has been analyzed in four themes as shown below.

4.1. The Use of Cryptocurrency by Muslims

The use of cryptocurrency by Muslims has been revealed by P1, as "Cryptocurrency for Muslims is the same as other innovative products. He/she can use it as long as it is in line with the Shari'ah principles". In line with this P3 adds, "It is a good innovation that has the potential to benefit the Ummah". P4 also agrees with this point of view and indicates, "There are many types of cryptocurrency and from fiqh perspective; we consider whether something is (Maal) – which meaning is anything tradable or is something storable and usable as utility and it is lawful. Therefore, any asset is Maal and utility then it is (Hala) lawful. Hence, this is the first thing we have to check whether it is a currency or intangible asset. Based on this, a cryptocurrency certainly has some of the utility because it is the usable and stable value used by several sectors and used as approval of ownership and so forth". However, P2 and P5 have a different opinion. P2 indicates, "I think cryptocurrency is still confined to some Arab and Muslim investors to get quick profits, especially in previous years". P5 also reveals, "The use of cryptocurrencies among Muslims is essentially dependent on the issuance of legal fatwas permitting dealing with them by respected Shariah bodies, in addition to the difference in the fatwa on such contemporary issues that will make dealing with them among Muslims limited as they will be the subject of dispute among scholars". These different points of views

mean that cryptocurrency has not been thoroughly investigated by the research community from an Islamic perspective and cryptocurrency may have a better position in the future, but now the fear of dealing with it has become a source of anxiety, and it is plagued by adventure and lack of discipline for most Muslims around the globe. This result is in line with previous studies such as that of Asif (2018), Billah (2019 a and b), Siswantoro et al. (2020), and Bangash (2017).

4.2. The Lawfulness of Cryptocurrency in Islam

"My view is it is halal provided that it fulfills the Shariah conditions". This view is supported by previous researchers such as Metawa et al. (2019), Oziev and Yandiev (2018), Zain (2018), Amalin (2018), and the Shariah Review Bureau as discussed by Dikko and Bakar (2018) who confirmed that cryptocurrency and tokens are allowable as money as they meet propensities for trade exchanges.

On the other hand, P4, indicates "I think that cryptocurrency in its current situation does not assist in establishing its legitimacy because the ignorance in it is clear and does not meet the conditions of the commodity or the financial and the difficulty of tracking it ... etc.". P5 adds, "The fatwa regarding the ruling of cryptocurrencies is still pausing in its ruling, as it is still shrouded in mystery, which makes the perception of it among Shariah scholars incomplete, so it is difficult to issue a Shariah ruling on it." Therefore, the limited dealing with cryptocurrency by Muslims without the approval of the sovereign authorities makes the fatwa bodies unable to issue a ruling regarding it. However, if the guardian approves it, then the scope of issuing a fatwa will be inevitable for the fatwa bodies.

4.3. GOLDX and OneGram to reconcile/accommodate cryptocurrency in Islamic finance

During the interview, participants were asked about GOLDX and OneGram as Islamic crypto and their ability to reconcile cryptocurrency in Islamic finance. P1, indicates, "Asset-backed cryptocurrencies are in general shariah compliant. However, when it is metal or gold-backed, one should be mindful of shariah rules. For instance, in this regard, AAOIFIs gold standard issued could be helpful to understand how much we can stretch this rule in application". P2 reveals, "Some academic experts across Britain, India, Turkey and Middle East have argued that traditional cryptocurrencies (e.g. Bitcoin, Ethereum) cannot be permissible, and in 2019, the Grand Mufti in Egypt declared that cryptocurrencies shouldn't be traded. The argument around traditional cryptocurrencies is complicated for several reasons, including the fact that there are thousands of digital coins present in the world today, all with their own unique features related to mining, distribution, and trading. This is why some groups-including me – believe that introducing of Islamic cryptocurrencies such as GOLDX and OneGram would open a new avenue

for the reconciliation of cryptocurrency with Islamic shariah". P3 also confirms, "As it is covered with gold, it is more stable than traditional cryptocurrencies, and can achieve the standards of money considered Shariah. Hence, I strongly believe that Islamic Cryptocurrencies such as GOLDX and OneGram will certainly have significant impact on the reconciliation of cryptocurrency with Islamic finance". While some participants could not provide conclusive answers on the role of GOLDX and OneGram to reconcile cryptocurrency in Islamic fiancé. For example, P4 indicates "I don't know its details". P5 comments "I have not done a Shariah review of this cryptocurrency (GOLDX or OneGram) to determine whether they are Shariah-compliant or not. However, introducing of such Islamic cryptocurrencies would play a vital role in the reconciliation of cryptocurrency with Islamic finance". So this study is seeking to find out if they are fitful the shariah principles investing in gold and whether they ensure that ownership is past and a token is surely asset-backed and know the way are traded and what platform used. Those things must be reviewed to determine whether COLDX and OneGram are Shariah-compliant or not". It can be concluded that GOLDX has been approved as Shariah's compliant gold-backed token. The process of acquiring GOLDX as per the below mechanisms observes the Shariah requirements and principles:

(i) "Hibah", or gift (HGF may distribute GOLDX to the HGT holder on a discretionary basis) or

(ii) "Over the counter Purchase" (GOLDX can be purchased via over the counter (OTC) process from HGF using Ether or Bitcoin. Minimum purchase is 1 GOLDX).

Therefore, despite some researchers believe that cryptocurrency is unlawful in Islam such as Bakar et al. (2017), Sarea and Hanefah (2013), Alam et al. (2019), Nurhisam (2017), and Kusuma (2020) who argued that cryptocurrency is not reasonable as money since it is not under government guideline and the dangers and shortcomings are more prominent than the advantages. However, the aforementioned sentiments of Islamic scholars strongly support that both COLDX and OneGram can be the remedy to reconcile cryptocurrency in Islamic finance and play a vital role in attracting more than 1.5 billion Muslims around the globe to enter the world of cryptocurrency particularly if governments in Islamic countries start to approve and deal with these Islamic cryptocurrencies.

4.4. The spread of cryptocurrencies among users in the Islamic world

Participants also were asked for their recommendations to ensure the spread of cryptocurrencies among users in the Islamic world. P1 reveals, "We need to educate Muslims to take part in the use of this type of assets and benefit from it without violating the principles of Shariah". P3, adds "Definitely it is unstoppable. As such, we need to find ways to ensure that they are shariah compliant. Therefore,

instead of avoiding it, innovation needs to be used to ensure this". These sentiments indicate that what important is the need for more education on cryptocurrency to increase clarity because the greatest factor would be if a Shariah standard exists like IOF. We confidently need a standard on cryptocurrency. That would be an optimal method by which we will get clarity on this matter and more information will be available for users in the Islamic world. Only then, a great number of Muslims will move towards cryptocurrency trading.

Moreover, P4 expressed his point of view by highlighting that "the spread of cryptocurrencies among users in the Islamic world is a function of adherence to the significant Shariah money standards and controls; and to move away from the known functions of money and not become a place of trade and a commodity". In this regard, as pointed out by Dikko and Bakar (2018) and Nienhaus (2020) Shariah advisory council of the security exchange in Malaysia has already issued a resolution in favor of cryptocurrency to provide guidelines. We need the same thing from IOF and the Shariah standard setting across the world to give more clarity and more knowledge on cryptocurrency about how can be used and Shariah compliance screening criteria for such assets. Finally, in order to ensure the spread of cryptocurrencies, two main entities must approve to deal with them. The first of which is the legal approval by the guardian and the second is the legal approval by the prestigious fatwa bodies in the Islamic world such as Al-Azhar in Egypt; the Permanent Committee for Scholarly Research and Ifta in Saudi Arabia; and the National Fatwa Council in Malaysia.

5. Results and discussion

After data collection and analysis of interview data, the researchers reject the null hypothesis and accept the alternative hypothesis that "Islamic Cryptocurrencies (GOLDX and OneGram) have a significant impact on the reconciliation of cryptocurrency with Islamic finance". The collected data from the interviews were thoroughly analyzed. The findings reveal that Islamic law is absent on the essential models for the utilization of the conventional cryptocurrency (such as bitcoin) as either a legitimate or illicit apparatus exchange device. Consequently, the Islamic cryptocurrency model is vital for applying Islamic law to the utilization of cryptocurrency.

Up until now, no single Muslim nation licenses cryptocurrency for lawful exchanges. While it is very hard to recognize the motivation behind utilizing explicit money, because of cryptocurrency, for example, Bitcoin, most users have a theoretical intention to picking up benefits rather than for trade similarly as with money. This is fascinating, as the trait of cryptographic money may not be fluid and stable for change. In the case of supply, not all digital forms of money have

adequate flexibility to cover all exchanges. Moreover, accessible online dealers, particularly for electronic exchanges, must uphold this. The last issue is steadiness. Cryptocurrency is more unpredictable and volatile than the Standard and Poor itself. This outcome is additionally steady with heartiness tests. Users must know about these attributes. Accordingly, the cryptocurrency might be delegated a mechanism of trade of computerized currency as opposed to money for this classification. Money has adaptable attributes from cryptographic money and its steadiness can be interceded by the government.

Hence, the introduction of new Islamic cryptocurrencies such as GOLDX and OneGram may perhaps be the remedy to reconcile cryptocurrency in Islamic finance and play a vital role in attracting more than 1.5 billion Muslims around the globe to enter the world of cryptocurrency particularly if governments in Islamic countries start to approve and deal with this Islamic cryptocurrency. Ultimately, the Islamic (Ummah) society should have the option to confide in Islamic cryptocurrency as a substantial method for trade unafraid of the superfluous risk of misfortune.

This study will make a valuable and significant contribution to the literature at both the theoretical and practical levels. At the theory level, this study-to the best of authors' knowledge – is the first of its kind to evaluate the new Islamic cryptocurrency, and hence it adds to the international body of literature in this field. The results of this research will provide empirically-based information on the perception of Islamic finance experts and Shariah scholars on whether Islamic cryptocurrency (i.e., GOLDX and OneGram) would play a role in reconciling cryptocurrency in Islamic finance. This study also contributes to the larger area of Islamic finance theories by highlighting the effect of Islamic cryptocurrency on reconciling cryptocurrency in Islamic finance. At a practical level, this research will also contribute to policymakers' evaluation of the new Islamic cryptocurrency to serve these rich Islamic populaces, as this would attract more than 1.5 billion Muslims around the globe to enter the world of cryptocurrency, as well as contributing to the improvement of cryptocurrencies management and corporate governance practices. After all, the results revealed from this study will have implications for improvements in practices of Islamic finance and should be used as a guide towards advancing the management and performance of cryptocurrency in the Islamic world. Distinct from the majority of past studies, this study will investigate whether new Islamic Cryptocurrencies, (for example, GOLDX and OneGram) can accommodate cryptographic money in Islamic accounts.

6. Conclusions

The purpose of this study is two folds. First, to examine the perception of Islamic finance experts and Shariah scholars on whether Islamic cryptocurrency (i.e.

GOLDX and OneGram) would play a role in reconciling cryptocurrency in Islamic finance. Second, to introduce the new Islamic cryptocurrency to serve these rich Islamic populaces, as this may attract more than 1.5 billion Muslims around the globe to enter the world of cryptocurrency. In addition, if an Islamic cryptocurrency (such as GOLDX and/or OneGram) is successfully developed and used for all Muslim societies, it may serve as alternative currencies against US Dollar as a World reserve currency. The study used a qualitative research approach by conducting interviews to explore the Islamic scholars' views on the framework of the new Islamic cryptocurrency. The collected data from the interviews were thoroughly analyzed. The findings reveal that Islamic law is absent on the essential models for the utilization of the conventional cryptocurrency (such as bitcoin) as either a legitimate or illicit apparatus exchange device. Consequently, the Islamic cryptocurrency model is vital for applying Islamic law to the utilization of cryptocurrency.

This study has some limitations. It relied to some extent on official information collected from governmental organizations in Singapore, Malaysia, and UAE. Thus, a caveat should be given regarding the accuracy of this information as it may perhaps include a government bias. A further limitation is that the study considered the views of only five finance experts and Shariah scholars in the interview. The original intention was to interview 10 Islamic scholars from 10 different Islamic countries. However, due to severe access problems as well as the time scale to which the researchers were working, this proved not to be possible especially during the exceptional time of COVID 19. It was only due to the intervention and effort by other colleagues of the five scholars that eventual access was realized.

Despite the above limitations, this study has demonstrated that some future research could be attempted. Prior to distinguishing headings for future studies as shown by this research effort, it is pivotal to deliver the pressing need to set up an advanced international database for the conventional and Islamic cryptocurrencies, which would be useful for both researchers and policymakers. Such data should be maintained via databases to enable researchers to more adequately assess the performance of different cryptocurrencies. Hence, the availability of data would encourage future research and this would also allow governments in Islamic countries to see how things went and facilitate the tasks of decision-makers.

A useful starting point for future research would be to incorporate the perceptions and experiences of other Islamic finance experts and Shariah scholars on whether Islamic cryptocurrency (i.e., GOLDX and OneGram) would play a role in reconciling cryptocurrency in Islamic finance. By conducting the interview utilized in this study to a much larger sample of Islamic scholars and experts will lead to a better understanding based on the experiences of all cryptocurrencies. It should lead to a broader understanding of Islamic cryptocurrency. A study of this nature should perhaps be undertaken in collaboration with some prestigious fatwa bodies in the

Islamic world such as Al-Azhar in Egypt; the Permanent Committee for Scholarly Research and Ifta in Saudi Arabia; or the National Fatwa Council in Malaysia, as this would have the benefit of making the study official as well as making access to Islamic scholars and experts much easier.

Finally, comparative studies that cover the effect of Islamic cryptocurrency on accommodating cryptographic money in Islamic finance in various Islamic nations are required. Specifically, in the Middle East area and North Africa, as this piece of the world is by all accounts a lot of ignored as far as exploration. These nations have additionally been left out and about cryptocurrency exchanges, and a research study that looks at this would be valuable and would reveal significant insight into the Islamic cryptographic money as this may draw in more than 1.5 billion Muslims around the world to enter the universe of cryptocurrency.

References

Abdeldayem Marwan, M., Aldulaimi S. H. (2020a) "Cryptocurrency in the GCC Economy", *International Journal of Scientific and Technology Research*, Vol. 9, No. 2, pp. 1739–1755, http://www.ijstr.org/final-print/feb2020/Cryptocurrency-In-The-Gcc-Economy.pdf.

Abdeldayem Marwan, M., Aldulaimi S. H. (2020b) "Investors' herd behavior related to the pandemic-risk reflected on the GCC stock markets | Psihologija stada investitora i pandemijski rizik na tržištu dionica zemalja arapskog zaljeva", *Zbornik Radova Ekonomskog Fakulteta U Rijeci: Casopis Za Ekonomsku Teoriju i Praksu*, Vol. 38, No. 2, pp. 563–584, https://doi.org/10.18045/zbefri.2020.2.563.

Abdeldayem Marwan, M., Aldulaimi S. H., Nekhili R. (2020) "Cryptocurrency as a Fin Tech Instrument and Islamic Finance: The GCC Perspective", *Journal of Xi'an University of Architecture and Technology*, Vol. 12, No. 2, pp. 2736–2747, https://www.xajzkjdx.cn/gallery/226-feb2020.pdf.

Abdeldayem Marwan M., Aldulaimi S. H. (2020c) "Cryptocurrency in the Time of Coronavirus", *Strad Research*, Vol. 7, No. 8, pp. 729–744, https://doi.org/10.37896/sr7.8/073.

Bakar, N. A., Rosbi, S., & Uzaki, K. (2017) "Cryptocurrency framework diagnostics from Islamic finance perspective: a new insight of Bitcoin system transaction", *International Journal of Management Science and Business Administration*, Vol. 4, No. 1, pp. 19–28, https://doi.org/10.18775/ijmsba.1849-5664-5419.2014.41.1003.

Ahmed, H. (2009) "Financial crisis, risks and lessons for Islamic finance", *ISRA International Journal of Islamic Finance*, Vol. 1, No. 1, pp. 7–32, https://www.semanticscholar.org/paper/Financial-crisis%3A-risks-and-lessons-For-islamic-Ahmed/551fbf214e92e71a23eea8beb666be03e4fe3656.

Ahmed, H. (2011) "Maqasid al-Shari'ah and Islamic financial products: a framework for assessment", *ISRA International journal of Islamic finance*, Vol. 3, No. 1, pp. 149–160, https://dro.dur.ac.uk/9775/.

Alam, N., Gupta, L., Zameni, A. (2019) "Cryptocurrency and Islamic Finance", In *Fintech and Islamic Finance,* pp. 99–118, Palgrave Macmillan, Cham https://doi.org/10.1007/978-3-030-24666-2_6.

Al-hussaini, A. I. S., Ibrahim, A. A., Fauzan, M. (2019) "Users Perception of Cryptocurrency System Application from the Islamic Views", *International Journal on Islamic Applications in Computer Science And Technology*, Vol. 7, No. 1, pp. 13–25, https://www.academia.edu/40871824/Users_Perception_of_Cryptocurrency_System_Application_from_the_Islamic_Views.

Amalin, G. (2018) "The Legality of Cryptocurrency Trade in Accordance with the Principles of Islamic Banking Law", https://dspace.uii.ac.id/bitstream/handle/123456789/11715/GAZI%20AMALIN%2014410068.pdf?sequence=1&isAllowed=y.

Asif, S. (2018) "The halal and haram aspect of cryptocurrencies in Islam", *Journal of Islamic Banking and Finance*, Vol. 35, No. 2, pp. 91–101, https://www.academia.edu/37137631/The_Halal_and_Haram_Aspects_of_Cryptocurrencies_in_Islam.

Ayedh, A. et al. (2020) "Malaysian Muslim investors' behaviour towards the blockchain-based Bitcoin cryptocurrency market", *Journal of Islamic Marketing*, Vol. 12, No. 4, pp. 690–704, https://doi.org/10.1108/JIMA-04-2019-0081.

Bakar, N. A., Rosbi, S. (2017) "Autoregressive integrated moving average (ARIMA) model for forecasting cryptocurrency exchange rate in high volatility environment: A new insight of bitcoin transaction", *International Journal of Advanced Engineering Research and Science*, Vol. 4, No. 11, https://doi.org/10.22161/ijaers.4.11.20.

Bakar, N. A., Rosbi, S. (2018) "Robust outliers detection method for ethereum exchange rate: a statistical approach using high frequency data", *The International Journal of Engineering and Science*, Vol. 7, No. 4, pp. 1–8, http://www.theijes.com/Vol7-Issue4.html.

Bakar, N. A., Rosbi, S., Uzaki, K. (2017) "Cryptocurrency framework diagnostics from Islamic finance perspective: a new insight of Bitcoin system transaction", *International Journal of Management Science and Business Administration*, Vol. 4, No. 1, pp. 19–28, https://doi.org/10.18775/ijmsba.1849-5664-5419.2014.41.1003.

Bangash, A. K. (2017) "An Overview of the Religious Perspective of Honour Killing In Federally Administered Tribal Areas (Fata) of Pakistan", *Al-Idah*, Vol. 34, No. 1, pp. 104–118, http://al-idah.szic.pk/index.php/al-idah/article/view/85.

Beekun, R. I. (1997) *Islamic business ethics*, International Institute of Islamic Thought (IIIT), https://doi.org/10.2307/j.ctvk8w1zv.

Billah, M. M. S. (2019a) Investment in Halal Cryptocurrency, In *Modern Islamic Investment Management*, pp. 207–223, Palgrave Macmillan, Cham, https://doi.org/10.1007/978-3-030-17628-0_15.

Billah, M. M. S. (2019b) Islamic Cryptocurrency, In *Islamic Financial Products,* pp. 413-434, Palgrave Macmillan, Cham, https://doi.org/10.1007/978-3-030-17624-2_30.

Creswell, J. W., Clark, V. L. P. (2017) *Designing and conducting mixed methods research*, Sage publications.

Dikko, M., Bakar, M. A. (2018) "A COMPARATIVE REVIEW OF TAKAFUL FRAMEWORKS IN NIGERIA, MALAYSIA AND PAKISTAN", *International Journal*, Vol. 3, No. 1, pp. 56–69, http://ijib.uum.edu.my/julai2018/Vol.%203%20Issue%201%2056-69.pdf .

Gentles, S. J., et al. (2015) "Sampling in qualitative research: Insights from an overview of the methods literature", *The qualitative report*, Vol. 20, No. 11, pp. 1772–1789, https://doi.org/10.46743/2160-3715/2015.2373.

Han, M., et al. (2018) "A novel blockchain-based education records verification solution", In *Proceedings of the 19th Annual SIG Conference on Information Technology Education*, pp. 178–183, https://doi.org/10.1145/3241815.3241870.

Haneef, M. A., Barakat, E. R. (2002) "A Preliminary Survey of Fiqhi Opinions and Their Implications", Dlm. In *Proceedings 2002 International Conference on Stable and Just Global Monetary System–Viability of The Islamic Dinar, International Islamic University Malaysia, Kuala Lumpur: t. pt*.

Hassan, M. K., Karimb, M. S., Muneeza A. (2020) "A Conventional and Sharīʿah Analysis of Bitcoin", *Arab Law Quarterly,* Vol. 35, No. 1-2, pp. 1–35, https://doi.org/10.1163/15730255-BJA10067.

Hayes, A. S. (2017) "Cryptocurrency value formation: An empirical study leading to a cost of production model for valuing bitcoin", *Telematics and Informatics*, Vol. 34, No. 7, pp. 1308–1321, https://doi.org/10.1016/j.tele.2016.05.005.

Kusuma, T. (2020) "Cryptocurrency for Commodity Futures Trade in Indonesia: Perspective of Islamic Law", *In The Name of Allah, The most Beneficent, The most Merciful*, http://islamicbanking.asia/wp-content/uploads/2020/04/Amended-Jan-March-2020-3.pdf#page=70.

Leung, L. (2015) "Validity, reliability, and generalizability in qualitative research", *Journal of family medicine and primary care*, Vol. 4, No. 3, pp. 324–355, https://doi.org/10.4103/2249-4863.161306.

May, T. (1993) *"Social Research, Issues, Methods and Process",* Buckingham: Open University Press.

Meera, A. K. M. (2018) "Cryptocurrencies from Islamic perspectives: The case of bitcoin", *Buletin Ekonomi Moneter Dan Perbankan*, Vol. 20, No. 4, pp. 475–492, https://doi.org/10.21098/bemp.v20i4.902.

Metawa, N., et al. (2019) "Impact of behavioral factors on investors' financial decisions: case of the Egyptian stock market", *International Journal of Islamic and Middle Eastern Finance and Management. Management*, Vol. 12, No. 1, pp. 30–55, https://doi.org/10.1108/IMEFM-12-2017-0333.

Nienhaus, V. (2020) "The Future of Islamic Finance after the Corona Crisis", *Bait Al-Mashura Journal*, Vol. 13, Special Issue, pp. 173–201. https://doi.org/10.33001/M010820201373.

Nurhisam, L. (2017) "Bitcoin: Islamic law perspective", *QIJIS Qudus International Journal of Islamic Studies*, Vol. 5, No. 2, https://doi.org/10.21043/qijis.v5i2.2413.

Oziev, G., Yandiev, M. (2018) "Cryptocurrency from Shari'ah perspective", *Al Sharajah*, Vol. 23, No. 2, pp. 315–337, https://boiv.org.au/wp-content/uploads/2020/08/SSRN-id3101981.pdf.

Rahim, N. F., Bakri, M. H., Yahaya, S. N. (2019) "Fintech and Shariah Principles in Smart Contracts", In *FinTech as a Disruptive Technology for Financial Institutions,* pp. 207–220, IGI Global, https://doi.org/10.4018/978-1-5225-7805-5.ch009.

Rashid, A. M., et al. (2002) "Getting to know you: learning new user preferences in recommender systems", In Proceedings of the 7th international conference on Intelligent user interfaces, pp. 127–134, https://doi.org/10.1145/502716.502737.

Sarea, A. M., Hanefah, M. M. (2013) "The need of accounting standards for Islamic financial institutions: evidence from AAOIFI", *Journal of Islamic Accounting and Business Research*, https://doi.org/10.12816/0031381.

Seale, C. (1999) *"The Quality of Qualitative Research"* London: SAGE. https://doi.org/10.4135/9780857020093.

Siswantoro, D., Handika, R., Mita, A. F. (2020) "The requirements of cryptocurrency for money, an Islamic view", *Heliyon*, Vol. 6, No. 1, https://doi.org/10.1016/j.heliyon.2020.e03235.

Sutton, J., Austin, Z. (2015) "Qualitative research: Data collection, analysis, and management", *The Canadian journal of hospital pharmacy*, Vol. 68, No. 3, pp. 226–271. https://doi.org/10.4212/cjhp.v68i3.1456.

Velayutham, S. (2014) "Conventional" accounting vs "Islamic" accounting: the debate revisited", *Journal of Islamic Accounting and Business Research*, Vol. 5, No. 2, pp. 126–141, https://doi.org/10.1108/JIABR-05-2012-0026.

Zain, M. F. (2018) "Mining-trading cryptocurrency dalam hukum Islam" *Al-Manahij: Journal Kajian Hukum Islam*, Vol. 12, No. 1, pp. 119–132. https://doi.org/10.24090/mnh.v12i1.1303.

Kvalitativni pristup procjeni pomirenja GOLDX-a i OneGrama u islamskim financijama

Marwan Mohamed ABDELDAYEM[1], *Saeed Hameed AL DULAIMI*[2], *Fuaad Hameed AL DULAIMI*[3]

Sažetak

Svrha ove studije je dvostruka. Prva svrha je ispitati percepciju islamskih stručnjaka za financije i šerijatskih znanstvenika o islamskoj kriptovaluti (tj. GOLDX i OneGram). Pitanje je ima li ona ulogu u prihvaćanju kriptovaluta u islamskim financijama. Drugo je predstavljanje nove islamske kriptovalute koja će služiti tim bogatim islamskim populacijama. U radu se primjenjuje kvalitativni pristup istraživanja provodeći intervjue za istraživanje stavova islamskih znanstvenika o okviru nove islamske kriptovalute. Smatralo se potrebnim da znanstvenici posjeduju sveobuhvatno znanje i imaju veliko iskustvo u islamskom šerijatu i kriptovaluti. U skladu s tim, broj znanstvenika bio je ograničen i na kraju, samo je pet znanstvenika iz različitih islamskih zemalja ispunjavalo te posebne uvjete. Temeljito smo analizirali prikupljene podatke iz intervjua. Rezultati istraživanja ukazuju na činjenicu da u islamskom zakonu ne postoji model za utvrđivanje legitimnog i nedozvoljenog korištenja i razmjene konvencionalne kriptovalute (kao što je Bitcoin). Slijedom toga, uvođenje novih islamskih kriptovaluta je prihvaćanje kriptovaluta kao što su GOLDX i OneGram, koji mogu imati vitalnu ulogu u privlačenju više od 1,5 milijardi muslimana širom svijeta da uđu u svijet kriptovaluta.

Ključne riječi: *kriptovaluta, GOLDX, OneGram, Fintech, islamske financije*

JEL klasifikacija: *G15, G32*

[1] *Docent, Cairo University, Egypt and College of Administrative Sciences, Applied Science University (ASU), P.O Box 5055 Manama, Kraljevina Bahrein. Znanstveni interes: korporativne financije, financije ponašanja i primijenjena istraživanja, kriptovaluta,. Tel.:+973 35121048, E-mail: Marwan.abdeldayem@asu.edu.bh. (Osoba za kontakt).*

[2] *Docent, College of Administrative Sciences, Applied Science University (ASU), P.O Box 5055 Manama, Kraljevina Bahrain. Znanstveni interes: upravljanje ljudskim potencijalima i upravljanje promjenama. Tel.:+973 39998703. E-mail: Saeed.aldulaimi@asu.edu.bh.*

[3] *Docent, College of Administrative Sciences, Applied Science University (ASU), P.O Box Docent, Bait al-Mashura Financijske konzultacije, Zemlje zaljevske suradnje. Znanstveni interes: islamske financije. E-mail: f.dulaimi@b-mashura.com.*

Original scientific paper
UDC: 330.142.212(497.5)
https://doi.org/10.18045/zbefri.2021.1.135

Target adjustment model and new working capital management performance measure: Evidence from Croatia*

Dina Korent[1]

Abstract

The paper develops a dynamic panel model of target adjustment in order to investigate the determinants of the cash conversion cycle of companies in manufacturing, trade, and information and communication industries in the Republic of Croatia for the period 2008-2015. The emphasis is on examining the significances and the speeds of the adjustment processes of the cash conversion cycles of companies subsamples by industry and size. Due to the adjustment costs, the results show that the observed companies gradually adjust their current cash conversion cycles to the target ones. In addition, these adjustments were slow, which can be explained by the predominance of the adjustment costs over the costs of being in disequilibrium. Moreover, the results of this study indicate that the rate of adjustment varies among companies from different industries and size categories. The differences in market power allow companies to change more easily the components of the cash conversion cycle. As a result, they enable faster convergence to their target levels. Besides the lagged cash conversion cycle, tested potential determinants that significantly affect the cash conversion cycles of Croatian companies in selected industries, although with different robustness, are company size, company growth, return on assets, fixed asset investments, financial leverage and the growth of the real gross domestic product. Finally, the paper presents a new measure for working capital management performance.

Key words: *working capital management, target adjustment model, determinants, performance measure, Croatia*

JEL classification: *G3*

* Received: 25-03-2021; accepted: 28-06-2021

[1] *PhD, Senior Teaching Assistant/Postdoctoral Researcher, Faculty of Organization and Informatics, Pavlinska 2, 42000 Varaždin, University of Zagreb – Croatia. Scientific affiliation: corporate finance, working capital management, capital budgeting, capital structure, business planning. Phone:+385 98 160 2295. E-mail: dina.korent@foi.unizg.hr. https://www.foi.unizg.hr/hr/djelatnici/dina.korent.*

1. Introduction

Working capital management in this paper is equated with the management of net operating working capital. More precisely, in the narrow sense,the overall management of net operating working capital is defined as the integrative management of inventories, trade receivables and trade payables. In general, this should strive to achieve balanced, optimal levels of working capital components (Ganesan, 2007), or optimal size, structure and circulation of working capital, which largely contribute to attaining the fundamental goal of the company, i.e. maximizing its present value (Deloof, 2003; Raheman & Nasr, 2007). Striving to achieve the set goal, companies define and implement a working capital management strategy by observing the importance of working capital management and considering the interdependence of risk and profitability under risk preferences.

The effectiveness and efficiency, i.e., the optimality of working capital management strategies, can be described and evaluated by identifying and quantifying the costs of working capital management and the contribution to the achieved profitability and value of the company. In this context, depending on the relationship between rising costs and declining costs with the level of investment in net operating working capital in the narrower sense, the optimal working capital management strategy in a particular situation may be relatively more aggressive or conservative.

With the intention of evaluating and ex-post determining the optimality of working capital management strategy, in the last twenty years, and potentiated by the economic crisis, there is a noticeable increase in research on the impact of working capital management on profitability and performance, and as a result, research on working capital determinants. The results of both groups of studies demonstrate the existence of gaps and inconsistencies, which suggest that the understanding of how to manage working capital is not explicit and can lead to insolvency and bankruptcy of companies (Palombini & Nakamura, 2012). Consequently, the fact that one cannot talk about one strategy that is necessarily optimal for all companies, independently of their specifics, and in all time periods, the renewed research interest in the field of working capital management determines the permanent need to examine the impact of working capital management on profitability and performance, and the need to identify key determinants of working capital management. This paper is focused on the development and testing of target adjustment models of working capital management of companies in manufacturing, trade as well as on the information and communication industries registered in the Republic of Croatia for the period 2008-2015. It includes the identification of working capital management determinants with an emphasis on examining the significances and the speeds of the adjustment processes of the working capital management indicators of the observed companies. Additionally, the paper develops a new working capital management performance measure, which, to various

stakeholders, both internal and external, can enable or improve the evaluation and comparison of companies' working capital management performance.

Based on the defined research problem and the resulting research goals, as well as on the literature review, the set hypotheses are as follows:

H1: *Croatian companies in selected industries have target levels of cash conversion cycles and follow the processes of continuous partial adjustment to the achieve them.*

H2: *Speeds of adjustment to the target cash conversion cycles differ among companies from different industries and size categories.*

H3: *The determinants that significantly affect the cash conversion cycle of Croatian companies in selected industries are the following internal determinants: lagged cash conversion cycle, company size, company growth, return on assets, fixed asset investments and financial leverage, and growth of real gross domestic product as an external determinant.*

The remainder of paper is organized as follows. Chapter 2 provides a theoretical framework, the literature review, and sets out the hypotheses. Chapter 3 presents the analysis methods, followed by Chapter 4, presenting the used empirical data and analysis results. Chapter 5 discusses the results of the empirical analysis. Chapter 6 synthesizes the conclusions of the work and limitations and recommendations for future research.

2. Theoretical framework, literature review and hypotheses

Based on the pecking order theory, agency theory and asymmetric information theory, and taking into account the costs and benefits of working capital holding, it is assumed that companies have target levels of working capital management indicators (Lee & Wu, 1988; Peles & Schneller, 1989; Baños-Caballero et al., 2009). Furthermore the company's working capital management decisions are assumed to aim at achieving the target levels of working capital management indicators and that these levels are function of determinants of working capital management (Baños-Caballero et al., 2009; Baños-Caballero et al., 2010), of which, unlike on those external, company can influence on those internal.

However, despite the well-founded assumption of the existence of target levels and the rational presumption of the intention of the company to achieve them, the current levels of the relevant indicators are not always equal to the desired levels (Baños-Caballero, et al., 2009). There are several reasons for this. According to Nadiri (1969), companies cannot always accurately and reliably estimate sales and purchases, and that they cannot accurately anticipate changes in monetary policy,

changes in default rates or bad debts on their trade credits, and the detection and collection of delinquent accounts take time and cause certain costs that can be distributed over time. Peles & Schneller (1989), also suggest that companies could deviate from the target due to accidental or other temporary shocks, changes in the cost of production factors, or due to improvements in technology.

Further, in situations of disequilibrium between the current and desired, i.e. target levels of working capital management indicators, companies follow the adjustment process in order to reach the latter (Baños-Caballero et al., 2009; Baños-Caballero et al., 2010; Abbadi & Abbadi, 2013; Kwenda & Holden, 2014), so this process can also be characterized as a dynamic partial adjustment process. The duration of the disequilibrium between the current and target levels, i.e. the speed of adjustment to the target levels of working capital management indicators depends on the trade-off between adjustment costs and costs of being in disequilibrium, that is it is inversely related to the former and directly to the latter (Baños-Caballero et al., 2009; Baños-Caballero et al., 2010; Abbadi & Abbadi, 2013; Kwenda & Holden, 2014). If the costs of being in disequilibrium are higher than the adjustment costs, the company quickly adjusts its working capital management to the target, and vice versa (Kwenda & Holden, 2014). Peles & Schneller (1989) thus believe that items of current assets and short-term liabilities are largely under the control of the company, so they are easier to manipulate and can be easily changed, even in the short term. In contrast, Baños-Caballero et al. (2013) do not expect that adjustments to target working capital requirements are immediate, precisely because of the existence of adjustment costs. Companies will adjust their working capital requirements only if the benefits outweigh the costs of reducing deviations from their target levels (Baños-Caballero et al., 2013). Besides, since the target levels, as well as the current ones, are subject to change, the adjustment process usually takes place continuously.

Based on the above, and in accordance with the results of studies conducted by Baños-Caballero et al. (2009), Baños-Caballero et al. (2010), Abbadi & Abbadi (2013), Russo (2013) and Kwenda & Holden (2014), on the samples of Spanish companies listed on the Spain Stock Exchange for the period 1997-2004, Spanish non-financial corporations for the period 2001-2005, of all industrial companies listed on the Palestine Securities Exchange (PSE) for the period 2004-2011, on 2,000 Spanish companies with less than 250 employees, turnover less or equal to 50 € million and total assets less than 43 € million for the period 2009 -2011, and on a sample of 92 companies from selected sectors listed on the JSE for the period 2001-2010, respectively, the first hypothesis of this paper was set. The first hypothesis assumes the existence of target levels of the cash conversion cycle and the significance of the dynamic nature of working capital management, i.e.,, specifically, of the processes of continuous partial adjustment to the target levels for companies in manufacturing, trade and information and communication industries in Croatia.

Considering that changes in the levels of working capital, both target and current, are influenced by numerous determinants of working capital, the speed of adjustment, i.e., changes in working capital, is also determined by same. Consequently, taking into account the internal determinants of working capital, it is expected that the adjustment rate is not the same for all companies. Moreover, widening the horizon to industrial and wider macroeconomic determinants of working capital one can provoke the existence of differences in the adjustment rates of companies from different industries and geographical areas. In the context of the internal determinants of working capital, Baños-Caballero et al. (2013), for example, find that the adjustment rate of companies listed on the Spanish stock exchange for the period 1997–2004 depends on external financial constraints, i.e. access to capital markets, and on their bargaining, i.e., market power. In line with the authors' expectations, the estimated speed of adjustment turned out to be higher for companies with better access to external financing and for companies with greater bargaining power. Namely, companies that have better access to capital markets can more easily modify their investments in trade receivables and inventories, as well as the trade credits received. Similarly, companies with greater market power can more easily modify their working capital needs for two reasons (Hill et al., 2010). First, they can extend the terms of credit received from their suppliers and hold less inventories with less consequences on their relationships with suppliers. Second, companies with greater market power can reduce the terms of trade credit given to their customers without incurring major consequences in terms of declining sales. Following the presented study, the second research hypothesis tests the assumption that the rates, i.e., speeds of adjustment to the target cash conversion cycles differ among companies from different industries and size categories.

Building on the previous, the target levels of working capital, and respecting the dynamic adjustment model, and the current ones, are influenced by numerous internal and external factors, as well as by industry in which the company operates. Existing studies test or identify the following internal determinants of working capital: company size (Moss & Stine, 1993; Chiou et al., 2006; Kieschnick et al., 2006; Baños-Caballero et al., 2009; Hill et al., 2010; Zariyawati et al., 2010; Gill, 2011; Mongrut et al., 2014; Afrifa & Padachi, 2016; Haron & Nomran, 2016; among others), that is, access to the capital market, company growth (Chiou et al., 2006; Kieschnick et al., 2006; Baños-Caballero et al., 2009; Nazir & Afza, 2009; Baños-Caballero et al., 2010; Hill et al., 2010; Zariyawati et al., 2010; Gill, 2011; Russo, 2013; Wasiuzzaman & Arumugam, 2013; Haron & Nomran, 2016; among others), return on assets and contribution margin as indicators of company profitability and performance (Chiou et al., 2006; Nazir & Afza, 2009; Baños-Caballero et al., 2010; Gill, 2011; Russo, 2013; Wasiuzzaman & Arumugam, 2013; Haron & Nomran, 2016; among others), investments in fixed (tangible) assets (Fazzari & Petersen, 1993; Kieschnick et al., 2006; Baños-Caballero et al., 2009; Russo, 2013; Wasiuzzaman & Arumugam, 2013; Kwenda & Holden, 2014;

Afrifa & Padachi, 2016; among others), financial leverage (Chiou et al., 2006; Baños-Caballero et al., 2009; Nazir & Afza, 2009; Baños-Caballero et al., 2010; Zariyawati et al., 2010; Gill, 2011; Russo, 2013; Wasiuzzaman & Arumugam, 2013; Kwenda & Holden, 2014; Afrifa & Padachi, 2016; among others), operating cash flow or capacity to generate internal funds (Fazzari & Petersen, 1993; Chiou et al., 2006; Baños-Caballero et al., 2009; Nazir & Afza, 2009; Baños-Caballero et al., 2010; Hill et al., 2010; Gill, 2011; Wasiuzzaman & Arumugam, 2013; Kwenda & Holden, 2014; Haron & Nomran, 2016; among others), and other less represented internal determinants. External factors that have been identified or tested in previous studies include economic conditions, business cycles, ie the growth rate of gross domestic product (Lamberson, 1995; Chiou et al., 2006; Nazir & Afza, 2009; Baños-Caballero et al., 2010; AL Taleb et al., 2010; Zariyawati et al., 2010; Akinlo, 2012; Manoori & Muhammad, 2012; Abbadi & Abbadi, 2013; Russo, 2013; Wasiuzzaman & Arumugam, 2013; Kwenda & Holden, 2014; Azeem & Marsap, 2015; Onaolapo & Kayjola, 2015), time indicator variables (Baños-Caballero et al., 2009; Rimo & Panbunyuen, 2010; Russo, 2013; Kwenda & Holden, 2014), interest rates (Baños-Caballero et al., 2010; Abbadi & Abbadi, 2013), inflation rate (Zariyawati et al., 2010), etc. There are numerous studies that examine the significance of differences in the working capital management of companies from different industries (Hawawini et al., 1986; Weinraub & Visscher, 1998; Filbeck & Krueger, 2005; Chiou et al., 2006; García-Teruel & Martínez-Solano, 2007; Afza & Nazir, 2008; Lončar & Ćurak, 2008; Zariyawati et al., 2009; Hill et al., 2010; Gill, 2011; Baños-Caballero et al., 2012a; Aljinović Barać et al., 2013; Koralun-Bereźnicka, 2014; Mongrut et al., 2014; Yazdanfar & Öhman, 2014; Aktas et al., 2015; Afrifa & Padachi, 2016; Korent, 2018; among others). Previous studies on working capital determinants have analysed and identified a limited number of significant determinants, the direction and intensity of which, due to the contradiction of their results, and especially the fact that they often differ spatially and temporally, are still being reconsider. If the subject studies are taken as a starting point, the third hypothesis presumes that, in addition to the cash conversion cycle in the previous period, the determinants that significantly affect the cash conversion cycle of companies in selected industries in the Republic of Croatia are the following internal determinants: company size, company growth, return on assets, fixed asset investments and financial leverage, and growth of real gross domestic product as an external determinant.

3. Method of analysis

To test the hypotheses, a panel regression model of working capital management determinants was formed. The selection of panel regression analysis is determined by the character of the hypotheses and the nature of the data used, i.e., the variables

for testing it. The model uses variables used in other similar studies, and their selection is determined by the theoretical basis, their significance in previous studies and the preliminary empirical study, as well as by the availability of data for their calculation. The names, labels, and measurement methods of all variables used to test the hypotheses are set in *Table 1*. The cash conversion cycle is used as a dependent variable. The variables used as independent variables are the following: cash conversion cycle in the previous period, company size, company growth, net return on assets, fixed asset investments, financial leverage and annual growth of real gross domestic product as an indicator of macroeconomic impact. Variables related to companies are defined for each company-year. The annual growth rate of real gross domestic product varies over time, but is constant for all companies in each period or year.

Table 1: Variables names, labels and methods of measurement

Variable name and label	Method of measurement of variable
Cash conversion cycle (CCC)	Cash conversion cycle = (average inventories / operating costs + average trade receivables / sales revenue – average trade paybles / operating costs) * 365
Company size	Company size (LN_SS) = ln (sales revenue of company) Company size categories: small companies (S), medium-sized companies (M) and large companies (L)
Company growth (GRS)	Company growth = (sales revenue$_t$ – sales revenue$_{t-1}$) / sales revenue$_{t-1}$)
Net return on assets (NROA)	Net return on assets = net profit / total assets
Fixed asset investments (FATA)	Fixed assest investments = fixed assets / total assets
Financial leverage (LEV)	Financial leverage = total debt / total assets
Annual growth rate of real gross domestic product (GDPGR)	The source of data on annual growth rates of real gross domestic product are the databases of the Croatian Bureau of Statistics.

Source: Author's work

Theoretical knowledge from the subject area and the results of previous studies indicate the existence of the endogeneity problem. This problem may be due to the existence of reverse causality, bias caused by omitted variables, measurement error, sample selectivity, self-selection, or other reasons (Baltagi, 2005; Wooldridge, 2006). In terms of the former, it is not only the sales, growth, and profitability of a company that can affect the working capital management but also working capital management(Hill et al., 2010). Besides, the presence of unobserved individual effects correlated with independent variables in the model is evident. Both cases were detected in this study and resulted in the correlation of certain independent variables with the model error. Regardless of how it is determined, a dynamic specification of the panel regression model can be used to control the problem of

endogeneity. The latter is, if the dynamic character of working capital management is taken into account, the most relevant for examining the direction and significance of working capital management determinants. This is in line with the results of the studies conducted by Baños-Caballero et al. (2009), Baños-Caballero et al. (2010), Abbadi & Abbadi (2013), Russo (2013) and Kwenda & Holden (2014). Among other things, dynamic panel regression analysis supports the development of a partial target adjustment model that allows the current levels of working capital variables to be explained based on their levels in the previous period and their target levels (Baños-Caballero et al., 2009; Baños-Caballero et al., 2010).

Following the above, the model of working capital management determinants, ie the cash conversion cycle, is tested as a linear dynamic panel model with individual fixed effects according to Expression 1.

$$CCC_{it}^{*} = \beta_0 + \beta_1 * LN\_SS_{it} + \beta_2 * GRS_{it} + \beta_3 * NROA_{it} + \beta_4 * FATA_{it} + \beta_5 * LEV_{it} + \beta_6 * GDPGR_t + \varepsilon_{it} \quad (1)$$

Expression 1

where the symbol *i* denotes the company, and the symbol *t* the year. The cash conversion cycle and the independent variables, i.e., potential determinants, are defined in the previously stated manner, where the CCC_{it}* represents the target value of the cash conversion cycle for the company *i* at time *t*. β_0 represents a constant, and ε_{it} symbolizes a random error.

Furthermore, as pointed out earlier, it is assumed that companies seek to adjust their working capital management, i.e., cash conversion cycle, to achieve the target levels of the same. However, since it is assumed that this adjustment is not instantenous because companies face adjustment costs, they adjust their current to target levele according to Expression 2.

$$CCC_{it} - CCC_{i,t-1} = \gamma * (CCC_{it}^{*} - CCC_{i,t-1}), \ 0 < \gamma < 1 \quad (2)$$

Expression 2

where the CCC_{it} is the value of the cash conversion cycle for the company *i* at time *t*, and the CCC_{it}* is the mentioned target value of the same. The expression CCC_{it}*- $CCC_{i,t-1}$ represents the adjustment required to to achieve the company's target level of the cash conversion cycle, and the coefficient γ measures the speed of adjustment, which is inversely related to the adjustment costs and takes values between 0 and 1. If γ = 1 then the CCC_{it} = CCC_{it}* so the company immediately adjusts its cash conversion cycle to their target level. However, if γ = 0, then CCC_{it} = $CCC_{i,t-1}$, which indicates that the adjustment costs are so high that the company does not adjust its cash conversion cycle at all and consequently it remains at the same level as in the previous period.

If the second equation, ie Expression 2, is substituted into the first equation, ie Expression 1, the unobserved heterogeneity, ie time-invariant individual effects specific to each company η_i, is included, and the following expressions are introduced: $\alpha = \gamma\beta_0$; $\rho = (1-\gamma)$; $\delta_k = \gamma\beta_k$ and $\upsilon_{it} = \gamma\varepsilon_{it}$, the current value of the cash conversion cycle, ie the regression equation to be tested can be expressed as Expression 3.

$$CCC_{it} = \alpha + \rho * CCC_{i,t-1} + \delta_1 * LN\_SS_{it} + \delta_2 * GRS_{it} + \delta_3 * NROA_{it} + \delta_4 * FATA_{it} + \delta_5 * LEV_{it} + \delta_6 * GDPGR_t + \eta_i + \upsilon_{it} \quad (3)$$

Expression 3

The defined model is estimated for 9 subsamples of the companies depending on their industry (manufacturing, trade, information and communication) and size (small, medium-sized and large). For the tested model, the statistical significance of the estimate of the parameter ρ is determined for each subsample of the companies. Based on his knowledge and knowledge of the value of the cash conversion cycle for each individual company *i* in each individual period *t* and *t-1*, according to Expression 2, the target value of the cash conversion cycle for each individual company *i* in each individual period *t* can be determined. Knowing the target value of the cash conversion cycle for each individual company in each individual year allows to determine the deviations of the current value of the company's cash conversion cycle from the same. The absolute value of the relative deviations of the current from the target value enables the evaluation of the working capital management performance of individual companies, as well as their ranking in relation to other companies in the industry.

Finally, the defined model for all subsamples is estimated using a two-step robust Arellano – Bover/Blundell – Bond estimator of linear dynamic panel models. The reason for choosing the Arellano – Bover/Blundell – Bond estimator lies in its suitability, especially since this estimator is designed for panel cases with several time periods and a large number of individual entities (small T, large N), with a linear functional relationship, with one dynamic dependent variable that depends on its past realizations and with independent variables that are not strictly exogenous, ie correlated with past and possibly current realizations of random error, then for situations with fixed individual effects implying the existence of unobserved individual heterogeneity, and finally for those with *within*, but not *between* heteroskedasticity and autocorrelation (Baum, 2013). Next , the subject estimator is an extension of the Arellano-Bond estimator that corresponds to large autoregressive parameters and a large ratio of panel effect variance, ie unobserved individual effects and idiosyncratic error variance (StataCorp., 2015). In application of this estimator, growth of real gross domestic product is defined as an exogenous variable, cash conversion cycle in the previous period as predetermined, and all remaining variables as endogenous variables. Comparatively, the Arellano – Bover/

Blundell – Bond estimator has been used in related studies, for example, by Baños-Caballero et al. (2009) and Baños-Caballero et al. (2010), while Russo (2013) and Kwenda & Holden (2014) used an Arellano – Bond estimator.

4. Empirical data and analysis

4.1. Data sample

The data sample consists of company-year observations, i.e., data on companies registered in the Republic of Croatia in one of the selected industries, i.e., activity sections according to the National Classification of Activities 2007: C (Manufacturing), G (Wholesale and retail trade; repair of motor vehicles and motorcycles) and J (information and communication), which persist in the market, have employees, positive sales revenues, operating expenses, assets, capital and reserves, and sum of long-term and short-term liabilities for the period 2008-2015, and are recorded in the Financial Agency database. The data used to conduct the research within this paper are secondary data on companies from the sample and macroeconomic data on the growth of the real gross domestic product. The data needed to calculate the variables at the company level were obtained from the database of the Financial Agency (FINA, 2017), while the macroeconomic data were taken from the databases of the Central Bureau of Statistics (DZS, 2017).

The initially received data sample on all companies from manufacturing, trade and information and communication industries in the Republic of Croatia for the period from 2008 to 2015 consisted of 73,724 companies and 372,871 company-year observations. Taking into account the criterion of the company persistence in the observed period, in the first step of the final sample creation, the intial sample was balanced using the software package MS Excel and DigDB add-in. After balancing, the sample consisted of 25,076 companies, or 200,608 company-year observations. In the second step, using the software package Stata 14, the company-year observations without employees (based on working hours), without positive values, ie with non-positive values of sales revenues, operating expenses, assets, capital and reserves or the sum of short-term and long-term liabilities were eliminated from the specified set. After this step, in the sample remained 20,472 companies, ie 132,165 company-year observations. In order to reduce the impact of outliers and allow the adjustment of distribution to normal, in line with some previous studies (Deloof, 2003; García-Teruel & Martínez-Solano, 2007; Baños-Caballero et al., 2012b; Baños-Caballero et al., 2012a; Baños-Caballero et al., 2014; Pais & Gama, 2015; Lyngstadaas & Berg, 2016), in the final step of final sample creation for all variables, except for the annual growth of real gross domestic product, 1% of the minimum and maximum values for each observed variable by subsamples of companies according to their industry and size were eliminated.

The final unbalanced sample consists of 19,608 companies, or 118,623 company-year observations. Table 2 shows the structure of the final sample by companies' industry and size, indicating the number of companies and the number of company-year observations.

Table 2: Sample structure by companies' industry and size (number of companies and company-year observations)

Industry \ Size	Small companies	Medium-sized companies	Large companies	Total
C (Manufacturing)	5,730 32,849	493 2,363	137 722	6,142 35,934
G (Wholesale and retail trade; repair of motor vehicles and motorcycles)	11,965 69,753	443 1,964	113 540	12,333 72,257
J (Information and communication)	1,808 10,142	44 192	19 98	1,855 10,432
Total	18,805 123,480	959 4,519	268 1,360	19,608 118,623

Source: Author's work

4.2. Results of empirical analysis

4.2.1. Target adjustment model tests results

The results of the conducted panel regression analysis are given in Table 3. At the significance level of 1% the cash conversion cycle in the previous period significantly positively affects the cash conversion cycle in the current period in all model estimates, i.e., for all subsamples of companies simultaneously determined by industry and size. The speed of adjustment, ie convergence to the target cash conversion cycle is determined by the coefficient of the speed of adjustment (γ), which is equal to the difference between the number 1 and the regression coefficient of the lagged variable of the cash conversion cycle. Specifically, in the manufacturing and information and communications industries, medium-sized companies achieve the highest adjustment coefficients (γCM: 0.182; γJM: 0.444), followed by large companies (γCL: 0.101; γJL: 0.127), and finally small companies (γCS). ΓJS: 0.120). In the trade section, large companies adjust their cash conversion cycle the fastest (γGL: 0.067), medium-sized companies slightly slower (γGM: 0.060) and small companies the slowest (γGS: 0.017). As evident, the differences in adjustment rates are more pronounced between small companies on the one hand and medium-sized and large companies on the other, than between the latter among themselves. Furthermore, in all three categories of company size, the companies in the information and communication industry are in the lead in

Table 3: Panel regression resuls

	CS	CM	CL	GS	GM	GL	JS	JM	JL
L.CCC	0.924***	0.818***	0.899***	0.983***	0.940***	0.933***	0.880***	0.556***	0.873***
	(38.00)	(13.03)	(19.98)	(65.91)	(20.32)	(25.22)	(23.60)	(3.47)	(7.60)
ln_ss	-9.874***	-12.34	-2.846	-5.816***	-0.903	-5.115**	-6.110	-31.48	-11.48
	(-2.78)	(-1.49)	(-0.61)	(-2.75)	(-0.16)	(-2.03)	(-1.57)	(-1.62)	(-0.59)
GRS	-106.0***	-77.00***	-75.61***	-94.95***	-54.63***	-17.72*	-73.33***	-40.03*	-120.6**
	(-11.04)	(-4.23)	(-5.47)	(-11.63)	(-5.32)	(-1.73)	(-8.68)	(-1.73)	(-2.36)
NROA	53.33*	42.66	81.63***	58.00***	28.79	56.82	54.44***	14.22	85.65
	(1.85)	(1.07)	(2.69)	(2.94)	(0.57)	(1.52)	(3.28)	(0.42)	(0.46)
FATA	-88.68***	-81.16***	-26.71	-76.22***	-60.05***	6.416	-30.91**	-20.44	-101.7
	(-8.50)	(-3.00)	(-1.21)	(-8.55)	(-3.51)	(1.06)	(-2.37)	(-0.97)	(-0.66)
LEV	35.66***	23.54	23.70	20.62***	37.81***	6.973	12.01	8.873	-6.410
	(3.73)	(1.62)	(1.59)	(3.44)	(2.79)	(0.67)	(1.15)	(0.45)	(-0.09)
GDPGR	-15.96	-63.73	-60.99	-27.34*	-30.55	-81.62***	-41.62*	-393.1*	-107.4
	(-0.77)	(-1.12)	(-1.61)	(-1.91)	(-1.03)	(-2.70)	(-1.65)	(-1.67)	(-0.63)
Constant	170.4***	269.3*	64.13	99.04***	18.78	96.91*	97.11*	602.6*	290.7
	(3.41)	(1.67)	(0.61)	(3.32)	(0.17)	(1.91)	(1.81)	(1.67)	(0.83)
Observations	26600	1909	586	56034	1490	435	8094	145	76
F									
r2									

t statistics in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Source*:* Author's calculation

the speed of adjustment of the cash conversion cycle (γJS: 0.120; γJM: 0.444; γJL: 0.127), followed by companies in manufacturing (γCS: 0.076; γCM: 0.182; γCL: 0.101), and, finally, companies in trade (γGS: 0.017; γGM: 0.060; γGL: 0.067).

If the test results of all potential determinants, not only the lagged cash conversion cycle, are observed, it can be seen that significant estimates of the parameters of the tested cash conversion cycle potential determinants are more present for subsamples of companies in trade than in subsamples of manufacturing and information and communication industries. In the context of subsamples by size, they are more present in subsamples of small companies than is the case for subsamples of medium-sized and large companies from the analyzed industries.

If the subsamples of small companies are compared, in the subsample of small companies in the trade all 7 potential determinants were identified as significant, whereas, in the subsamples of small companies in manufacturing and information and communication industries 6 out of 7 and 5 out of 7 tested potential determinants, respectively, were significant. In the categories of medium-sized and large companies, by the number of significant tested determinants, also, trade is in the lead (7 and 4 significant determinants, respectively), followed by manufacturing (3 significant determinants in each) and information and communication industry (3 and 2 significant determinants, respectively).

In particular, for the subsamples of small companies from each of the observed three industries, most tested determinants are unequivocally significant. Exception for manufacturing companies is only the growth of the real gross domestic product, while for small companies in the information and communication industry the company size and financial leverage proved to be insignificant. Compared to subsamples of small companies from a particular industry, subsamples of medium-sized and large companies from the same are characterized by a smaller number of significant estimates of the parameters of the tested determinants of the cash conversion cycle. Significant predictors of the cash conversion cycles of medium-sized and large companies from all three industries were the exclusively lagged cash conversion cycle and company growth. In addition to the above, fixed asset investments and net return on assets have a statistically significant impact on the cash conversion cycles of the medium-sized and large manufacturing companies, respectively, while fixed-asset investments and financial leverage, and company size and growth of the real gross domestic product on the cash conversion cycles of the medium-sized and large companies in trade, respectively. The latter, along with the lagged cash conversion cycle and company growth, is a significant determinant of the cash conversion cycle of medium-sized companies in information and communication industry.

Additionally, in the context of the frequency of significant occurrence in the observed model estimates and subsamples, which is more determined by the

size category than the predominant industry of the company, completely robust determinants of the cash conversion cycle are the cash conversion cycle in the previous period and company growth. The last ones precede fixed asset investments, the net return on assets, and the growth of the real gross domestic product. The least frequently identified as significant determinants are the company size and financial leverage.

Moreover, in the subsamples in which they proved to be significant, the tested determinants show the same impact on the cash conversion cycles of companies. Besides the lagged cash conversion cycle, the net return on assets and financial leverage has a significant positive effect on the cash conversion cycle and thus,encourage conservative working capital management. On the contrary, company size, company growth, fixed-asset investments, and the growth of the real gross domestic product were detected as significantly negative predictors of the cash conversion cycle.. The latter, accordingly, stimulate more aggressive working capital management.

4.2.2. Evaluation of working capital management by the new working capital management performance measure

Given that companies are more or less successful in achieving their target values of the cash conversion cycle in a particular time period, specifically year, their knowledge for each company in each year allows to determine the deviation of current values of the cash conversion cycle from their target values and can serve to evaluate and compare the performance of working capital management strategies of the observed companies. A summary demonstration of the latter for five small companies in manufacturing (class 15.20 Manufacture of footwear), for five small companies in trade (class 47.73 Dispensing chemist in specialized stores) and for five small companies in the information and communication industry (class 62.01 Computer programming activities) for 2015 is shown in Table 4.

Table 4 for each analyzed company shows the values of the cash conversion cycle in 2014 and 2015, as well as the target value of cash conversion cycle for 2015 calculated according to Expression 2 using coefficient of the speed of adjustment for model estimate of small companies from the observed industry (γCS: 0.076, γGS : 0.017, γJS: 0.120). Also, the table shows the absolute values of the relative deviations of the current from the target values of the cash conversion cycle and the ranking of companies in accordance with them.

Table 4: Summary of the results of evaluation and comparison of the working capital management performance by five selected small companies from the observed industries for 2015

4	Company registration number	CCC_{2014}	CCC_{2015}	γ	CCC_{2015}^{*}	The absolute value of the relative deviation of CCC_{2015} from CCC_{2015}^{*}	Company rank according to working capital management performance
C 15.20	363014	39.033	37.771	0.076	22.424	40.632%	2.
	180823	-24.812	-30.546		-100.261	228.226%	5.
	448834	155.123	150.664		96.450	35.984%	1.
	926329	82.766	101.382		327.714	223.248%	4.
	1602896	323.471	303.239		57.259	81.117%	3.
G 47.73	845124	137.239	130.467	0.017	-261.111	300.135%	4.
	80009565	83.951	81.728		-46.792	157.253%	2.
	1078186	-8.243	-6.788		77.363	1239.751%	5.
	1100106	-45.437	-46.851		-128.619	174.529%	3.
	1783904	70.463	69.408		8.439	87.841%	1.
J 62.01	125318	27.214	27.936	0.120	33.228	18.945%	4.
	179582	70.759	65.656		28.233	56.999%	5.
	342017	158.683	154.921		127.328	17.811%	2.
	823384	89.914	89.974		90.413	0.487%	1.
	792187	106.910	104.231		84.585	18.849%	3.

Source: Author's calculation and work

5. Results and discussion

The identified significant positive impact of the cash conversion cycle in the current period is consistent with the results of studies conducted by Baños-Caballero et al. (2009), Baños-Caballero et al. (2010), Baños-Caballero et al. (2013), Abbadi & Abbadi (2013) and Kwenda & Holden (2014), and contrary to the results of the study conducted by Russo (2013), which demonstrates a significantly negative impact of working capital management in the previous period on the same in the current period. Significant estimates of the parameters of lagged cash conversion cycles, and congruent with all previous studies, indicate that the cash conversion cycles of the respective companies depend on their levels in the previous period and on their target levels. In other words, significant estimates of the parameters of lagged cash conversion cycles confirm the dynamic nature of working capital management which implies that companies have target levels of cash conversion cycles and follow their own partial adjustment processes to achieve them. This makes it impossible to reject the first hypothesis.

Estimated coefficients of adjustment rates, regardless of the industry and size of the company, suggest that the speed of adjustment of the cash conversion cycle of the observed companies, except for medium-sized companies from the information and communication industry, is slow, i.e., for this companies the costs of adjusting the cash conversion cycles to their target levels significantly outweigh the costs of being in disequilibrium. Stated is in line with the results of studies conducted by Kwenda & Holden (2014), but contrary to those of the rapid adjustment found in studies conducted by Baños-Caballero et al. (2009), Baños-Caballero et al. (2010), Abbadi & Abbadi (2013) and Baños-Caballero et al. (2013). At the same time, congruent with market power, in all three observed industries, medium-sized and large companies achieve higher coefficients of the speed of adjustment (γ), i.e. they are characterized by a faster adjustment processes compared to small companies. The order of industries by adjustment rates can also be argued by market power, i.e. by the degree of concentration of industry, which is the highest for information and communication industry (2008-2015 averages: C4: 46.79; C8: 52.95; C50: 73.91; HHI: 821.31), followed by manufacturing (2008-2015 averages: C4: 20.79; C8: 25.94; C50: 48.03; HHI: 268.50) and trade (2008-2015 averages: C4: 11.96; C8: 16.88; C50: 38.26; HHI: 72.45). The presented results indicate that the rate of adjustment to the target cash conversion cycle differ among companies from different industries and size categories, which is why the second hypothesis cannot be rejected.

Further, regardless of the frequency of the significant occurrence of other individual tested determinants in the companies' subsamples, the third hypothesis also cannot be rejected. Accordingly, it can be concluded that in addition to the cash conversion

cycle in the previous period, the determinants that significantly affect the cash conversion cycle of companies in selected industries in the Republic of Croatia are the following internal determinants: company size, company growth, return on assets, fixed asset investments and financial leverage, and growth of real gross domestic product as an external determinant.

Significantly negative impact of company size, in line with studies conducted by Kieschnick et al. (2006), Baños-Caballero et al. (2010) and Wasiuzzaman & Arumugam (2013) generally implies that larger companies in the identified subsamples use their size to build better relationships and gain bargaining power in relationships with their suppliers and customers, but also capital market stakeholders, which allows them reduction of working capital investments.

Statistically significant negative predictability of sales growth of companies suggests that higher growth rates of the observed companies, which, due to the fact that the valuation of companies with more growth opportunities depends on these future growth prospects, is characterized by greater information asymmetry and more severe conflicts of interest between creditors and owners (Baños-Caballero et al., 2009), in order to increase the internal resources of the company, result in a reduction of investments in net working capital in a narrower sense. This result is consistent with the results of studies conducted by Baños-Caballero et al. (2009), AL Taleb et al. (2010), Baños-Caballero et al. (2010), Hill et al. (2010), Zariyawati et al. (2010), Gill (2011), Palombini & Nakamura (2012), Naser et al. (2013), Russo (2013) and Haron & Nomran (2016).

With exceptions, the diagnosed significantly positive impact of net return on assets on the cash conversion cycle of the analysed companies implies that higher profitability rates result in more conservative working capital management and it is symmetrical to the results of most previous studies (Chiou et al., 2006; Nazir & Afza, 2009; AL Taleb et al., 2010; Gill, 2011; Manoori & Muhammad, 2012; Saarani & Shahadan, 2012a; Abbadi & Abbadi, 2013; Wasiuzzaman & Arumugam, 2013; Onaolapo & Kayjola, 2015). The implication that higher profitability rates result in more conservative working capital management can be explained by the fact that highly profitable companies have sufficient investment funds and are therefore not burdened with efficient working capital management, resulting in higher working capital investments (Chiou et al., 2006; Nazir & Afza, 2009). The positive relationship also potentially arises from the fact that the monetary value of products in terms of trade receivables is generally higher than the same in terms of trade payables, so each unit of product sold contributes to an increase in working capital needs (Hill et al., 2010).

Further, consistent with the results of previous empirical studies (Fazzari & Petersen, 1993; Appuhami, 2008; Baños-Caballero et al., 2009; Baños-Caballero et al., 2010; Manoori & Muhammad, 2012; Saarani & Shahadan, 2012b; Wasiuzzaman

& Arumugam, 2013; Kwenda & Holden, 2014; Mongrut et al., 2014; Afrifa & Padachi, 2016), a significant lengthening of the cash conversion cycle is also achieved by a decrease in the company's fixed asset investments. This suggests that fixed assets and working capital compete for the same investment funds (Kwenda & Holden, 2014), ie that due to financial constraints, fixed asset investments compete with working capital investments for limited available financing (Fazzari & Petersen, 1993).

Significantly positive predictability of financial leverage, contrary to the pecking order theory, suggests that more indebted companies in the identified subsamples tend to invest more of their capital in the working capital cycle, and that the latter use debts to finance their working capital investments. Stated is in line with the results of studies conducted by Appuhami (2008), Valipour et al. (2012), Naser et al. (2013) and Afrifa & Padachi (2016), and contradictory to the results of the vast majority of previous empirical studies indicating that the leverage effect is consistently (Chiou et al., 2006; Nazir & Afza, 2009; Baños-Caballero et al., 2010; AL Taleb et al., 2010; Saarani & Shahadan, 2012b; Abbadi & Abbadi, 2013; Wasiuzzaman & Arumugam, 2013; Kwenda & Holden, 2014; Azeem & Marsap, 2015; Onaolapo & Kayjola, 2015) or dominantly (Akinlo, 2012; Palombini & Nakamura, 2012; Russo, 2013) significantly negative.

Finally, the detected significantly negative predictability of growth of real gross domestic product is compliant with the results of studies conducted by Chiou et al. (2006) and Manoori & Muhammad (2012), and contrary to studies conducted by Zariyawati et al. (2010). The results of the former, according to the results of this study, imply that an increase in growth and a decrease in the decline in real gross domestic product result in a shortening of the cash conversion cycle. Conversely, the slowdown in growth and the increase in the decline in real gross domestic product, may casuse certain problems in the sale of inventories and collection of receivables, and as the money supply is small, companies do not get it easily (Chiou et al., 2006). The latter is manifested in higher needs for net operating working capital and an extension of the cash conversion cycle.

Respecting the importance of working capital management, managers must understand the key influencing factors of their companies' working capital investment. The test results of the working capital management impact on the profitability of companies in selected industries in the Republic of Croatia generally pinpoint an aggressive working capital management strategy as profit-maximizing. Generally speaking, financial managers focus on increasing the company size and growth and concurrently reducing financial leverage to manage net operating working capital more aggressively to achieve the target values of cash conversion cycles. These impacts further strengthen the positive direct impacts on the company profitability identified in the previous study. Contrary, although reductions in the companies' size and growth and increases in

financial leverage result in more conservative working capital management, the possibility of the opposite is provoked. In this case, it is recommended to manage the mentioned determinants in order to avoid their undesirable movements. Forward, due to the decrease in net return on assest and the increase in fixed asset investements and the annual growth rate of real gross domestic product, the proposal is to amortize the negative direct effects of the latter movements by aggressive management. Inverse, given that increasing net return on assets, as well as reducing fixed asset investment and the annual growth rate of real gross domestic product, leads to more conservative working capital management, it is suggested to avoid such practices.

If we refer to the evaluation of working capital management presented in this paper, it is possible to compare the remaining companies analogously by applying the new working capital management performance measure. The accuracy of the evaluation and comparison of working capital management performance can increase by determining the speed of adjustment coefficients for more related or more homogeneous subsamples of companies.

The scientific contribution of the paper is multidimensional. First, unlike most previous empirical studies, this paper adopts a dynamic framework that assumes that companies have optimal or target levels of working capital investment and gradually adjust their current levels of working capital investment over time due to adjustment costs. Through the prism of the above, the paper examines potential determinants of the current levels of cash conversion cycles, identified based on existing literature, in the presence of adjustment costs using dynamic panel data and Arellano – Bover/Blundell – Bond estimator, which allows control for unobserved heterogeneity and endogeneity problems. Studies of this type are generally rare, and has not been conducted in the Republic of Croatia so far. Moreover, the study is of respectable spatial and temporal coverage and expands the range from listed, usually larger companies to, in studies, mainly due to unavailability of data, noticeably less represented, private, and small and medium-sized companies. Given that the paper provides empirical results for a sample of the Croatian companies characterized by a continental governance model, less developed capital market, low level of investor protection and high concentration of ownership, it allows comparison with the results of other studies conducted on samples of companies with different financial systems. Finally, the applicative contribution of the paper is reflected in the provision of guidelines for company managers on how to manage working capital efficiently and in the development of a new measure of working capital management performance that, to various stakeholders, both internal and external, can enable or improve the evaluation and comparison of working capital management performance. The importance of the stated is further emphasized by the current economic situation marked by liquidity tensions of many companies.

6. Conclusions

This paper develops a target adjustment model to investigate determinants that could explain the length of the cash conversion cycle of companies in manufacturing, trade and information and communication industries in the Republic of Croatia for the period 2008-2015. Examining the significance and the speed of the subsamples of the selected companies' adjustment processes of the cash conversion cycles is the focus of interest in this research. Additionally, the paper develops a new measure for evaluating working capital management performance. Consistent with the first hypothesis, the results show that the analyzed companies, due to the presence of adjustment costs, gradually adjust their current cash conversion cycles to the target ones. Besides, this adjustment was slow, which could be explained by the fact that the costs of adjusting to the companies' target cash conversion cycles is higher than the costs of being in disequilibrium. Moreover, the results of this study indicate that the rate of adjustment varies among companies from different industries and size categories, which gives support to the second hypothesis. This can be explained by differences in market power. Apart from lagged cash conversion cycle, whose significantly positive predictability suggests the dynamic nature of working capital management, all other tested potential determinants, although with different robustness, are also statistically significant. Hereof, the third hypothesis cannot be rejected. Managers should, as implied, manage these determinants in order for companies to achieve the target levels of the cash conversion cycles that maximize their profitability and value. Finally, it is suggested that internal and external stakeholders use the developed new measure to improve the evaluation and comparison of the companies' working capital management performance.

Without disputing the scientific contribution of this paper, certain limitations do exist. These include the impossibility of spatial and temporal generalization of identified results, findings and implications, limited possibilities of explaining the identified directions and the significance of the impacts of the observed potential determinants, and detection of reasons for (in)compliance with previous studies results. Furthermore, the unavailability of data and a purely quantitative paradigm results in the restriction that is the omission of potentially significant working capital management factors. Therefore, future research should focus on depreciation and cancellation of established restrictions, especially when conducting comparative research on samples of companies from different countries and conducting qualitative research or combined quantitative-qualitative research.

References

Abbadi, S. M., Abbadi, R. T. (2013) "The Determinants of Working Capital Requirements in Palestinian Industrial Corporations", *International Journal of Economics and Finance*, Vol. 5, No. 1, pp. 65–75, https://www.researchgate.net/publication/258048685_The_Determinants_of_Working_Capital_Requirements_in_Palestinian_Industrial_Corporations.

Afrifa, G. A., Padachi, K. (2016) "Working capital level influence on SME profitability", *Journal of Small Business and Enterprise Development*, Vol. 23, No. 1, pp. 44–63, https://www.emerald.com/insight/content/doi/10.1108/JSBED-01-2014-0014/full/pdf?title=working-capital-level-influence-on-sme-profitability.

Afza, T., Nazir, M. S. (2008) "Working Capital Approaches and Firm's Returns in Pakistan", *Social Sciences*, Vol. 1, pp. 25–36, https://www.econstor.eu/bitstream/10419/187978/1/pjcss006.pdf.

Akinlo, O. O. (2012) "Determinants of Working Capital Requirements in Selected Quoted Companies in Nigeria", *Journal of African Business*, Vol. 13, No. 1, pp. 40–50, https://www.tandfonline.com/doi/pdf/10.1080/15228916.2012.657951?casa_token=cYammUAOUwgAAAAA:pjxstGnIPsdlaKv7wRfqWubYA1NrprC7Qa8jjrwDwyWX0NMx_O9M6Pur_-rcg_dT0U6spwO8gggmOg.

Aktas, N., Croci, E., Petmezas, D. (2015) "Is working capital management value-enhancing? Evidence from firm performance and investments", *Journal of Corporate Finance*, Vol. 30, February 2015, pp. 98–113, https://dro.dur.ac.uk/31420/1/31420.pdf.

Aljinović Barać, Ž., Vuko, T., Vučak, T. (2013) "Effects of working capital management on profitability: evidence from Croatia", in Kandžija, V. and Kumar, A. (eds) *9th International conference Economic integrations, competition and cooperation: accession of the Western Balkan countries to the European Union*. Opatija: University of Rijeka, Faculty of Economics, pp. 578–589, https://www.researchgate.net/profile/Vera-Boronenko/publication/321683068_Why_Supporting_Instruments_of_the_Small_Busines_Act_are_not_Widely_Used_by_the_European_SMEs_The_Case_of_Latvia/links/5a2ab9fba6fdccfbbf850ead/Why-Supporting-Instruments-of-the-Small-Busines-Act-are-not-Widely-Used-by-the-European-SMEs-The-Case-of-Latvia.pdf#page=592.

AL Taleb, G. et al. (2010) "The Determinants of Effective Working Capital Management Policy: A Case Study on Jordan", *Interdisciplinary Journal of Contemporary Research in Business*, Vol. 2, No. 4, pp. 248–264.

Appuhami, B. A. R. (2008) "The Impact of Firms' Capital Expenditure On Working Capital Management: An Empirical Study Across Industries in Thailand", *International Management Review*, Vol. 4, No. 1, pp. 1–10, https://www.proquest.com/docview/195578526/fulltextPDF/81C9218BAF944EC5PQ/1?accountid=202211.

Azeem, M. M., Marsap, A. (2015) "Determinant Factors and Working Capital Requirement", *International Journal of Economics and Finance*, Vol. 7, No. 2, pp. 280–292, https://pdfs.semanticscholar.org/4e9a/baea1b0963ebdb367e4d02f36392a67e4b75.pdf.

Baltagi, B. H. (2005) *Econometric Analysis of Panel Data*. 3rd edn. Chichester, West Sussex: John Wiley & Sons, Ltd.

Baños-Caballero, S., García-Teruel, P. J., Martínez-Solano, P. (2009) "How do market imperfections affect working capital management?", *Working papers= Documentos de trabajo: Serie EC (Instituto Valenciano de Investigaciones Económicas)*, Vol. 14, No. 1, pp. 3–25, http://www.ivie.es/downloads/docs/wpasec/wpasec-2009-14.pdf.

Baños-Caballero, S., García-Teruel, P. J., Martínez-Solano, P. (2012a) "How does working capital management affect the profitability of Spanish SMEs?", *Small Business Economics*, Vol. 39, No. 2, pp. 517–529, https://link.springer.com/content/pdf/10.1007/s11187-011-9317-8.pdf.

Baños-Caballero, S., García-Teruel, P. J., Martínez-Solano, P. (2012b) "Working capital requirement financing and Spanish SMEs performance", *Fundación de Estudios Financieros*, pp. 5–23, https://www.ieaf.es/images/premios-de-investigacion/premios-2012/WORKING.pdf.

Baños-Caballero, S., García-Teruel, P. J., Martínez-Solano, P. (2013) "The speed of adjustment in working capital requirement", *The European Journal of Finance*, Vol. 19, No. 10, pp. 978–992, https://www.tandfonline.com/doi/pdf/10.1080/1351847X.2012.691889?casa_token=U9xKhetExrwAAAAA:a94QjCbudMYIpXoS7e0d88WccdXQiQ3k9UA0TWNUAUpeeerj-9NppsLL853nHBEJFjqbeJu37iKqjw.

Baños-Caballero, S., García-Teruel, P. J., Martínez-Solano, P. (2014) "Working capital management, corporate performance, and financial constraints", *Journal of Business Research*, Vol. 67, No. 3, pp. 332–338, http://www.aeca1.org/pub/on_line/comunicaciones_xvicongresoaeca/cd/106b.pdf.

Baños-Caballero, S., Martínez-Solano, P., García-Teruel, P. J. (2010) "Working capital management in SMEs", *Accounting and Finance*, Vol. 50, No. 457, pp. 511–527, https://onlinelibrary.wiley.com/doi/pdf/10.1111/j.1467-629X.2009.00331.x?casa_token=QXNAq9--SwkAAAAA%3AZl0TJsFf7QWrAq1jpjsMXvAu1lkx8UZY2XSa-_bLkj4-iMiznRc1nmPqrdqXhUx53ueRENadaLTx7vwr.

Baum, C. F. (2013) Dynamic Panel Data estimators; EC 823: Applied Econometrics. *Course material*. Boston College, http://fmwww.bc.edu/EC-C/S2013/823/EC823.S2013.nn05.slides.pdf.

Chiou, J.-R., Cheng, L., Wu, H.-W. (2006) "The Determinants of Working Capital Management", *The Journal of American Academy of Business*, Vol. 10, No. 1, pp. 149–156.

Deloof, M. (2003) "Does working capital management affect profitability of Belgian firms?", *Journal of Business Finance and Accounting*, Vol. 30, No. 3–4, pp. 573–587, https://onlinelibrary.wiley.com/doi/pdf/10.1111/1468-5957.00008?casa_token=yRMAw77FtlgAAAAA:pgj6pNpYnim2AGVd0NBp0F-xEjwOT0JGj2QPb1o8ZLHMo9tQ4NcoDG7DVwL9u0mYfgHWVUaiVSO4EN7N.

DZS (2017) *Strukturne-poslovne statistike poduzeća*, Priopćenje. Zagreb. Available at https://www.dzs.hr/Hrv_Eng/publication/2017/15-01-01_01_2017.htm, Accessed 8 June 2017.

Fazzari, S. M., Petersen, B. C. (1993) "Working Capital and Fixed Investment: New Evidence on Financing Constraints", *The RAND Journal of Economics*, Vol. 24, No. 3, pp. 328–342, https://www.researchgate.net/profile/Steven-Fazzari-2/publication/24048817_Working_Capital_and_Fixed_Investment_New_Evidence_on_Financing_Constraints/links/00b4953c82135943f0000000/Working-Capital-and-Fixed-Investment-New-Evidence-on-Financing-Constraints.pdf.

Filbeck, G., Krueger, T. M. (2005) "An Analysis of Working Capital Management Results Across Industries", *American Journal of Business*, Vol. 20, No. 2, pp. 11–20, https://www.emerald.com/insight/content/doi/10.1108/19355181200500007/full/pdf?casa_token=uRgymRR0Gd8AAAAA:LulOvIC-JL1zZrqlnE8CyTl-9wuYwRyiLB-SVrs-5r3KxS-8KfAPHCu44MYnhuHAK1c0C0lhRQgp_5ZEskF2yNDiE9JiA0o8L-HnOizaxEHOp6dTR6gAm.

FINA (2017) Baza podataka FINA-e. *Kupljeni podaci o poduzećima iz odabranih djelatnosti*. Zagreb.

Ganesan, V. (2007) "An analysis of working capital management efficiency in telecommunication equipment industry", *Rivier academic journal*, Vol. 3, No. 2, pp. 1–10, http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.566.1800&rep=rep1&type=pdf.

García-Teruel, P. J., Martínez-Solano, P. (2007) "Effects of working capital management on SME profitability", *International Journal of Managerial Finance*, Vol. 3, No. 2, pp. 164–177, https://www.emerald.com/insight/content/doi/10.1108/17439130710738718/full/pdf?title=effects-of-working-capital-management-on-sme-profitability.

Gill, A. (2011) "Factors that influence working capital requirements in Canada", *Economics and Finance Review*, Vol. 1, No. 3, pp. 30–40, https://www.researchgate.net/profile/Amarjit-Gill/publication/268350639_Factors_that_influence_working_capital_requirements_in_Canada/links/55ca327808aeb975674a4668/Factors-that-influence-working-capital-requirements-in-Canada.pdf.

Haron, R., Nomran, N. M. (2016) "Determinants of Working Capital Management Before, During and After The Global Financial Crisis of 2008: Evidence From

Malaysia", *The Journal of Developing Areas*, Vol. 50, No. 5, pp. 461–468, http://irep.iium.edu.my/50858/1/BNote17RazaliHaronEACOMPLETED.pdf.

Hawawini, G., Viallet, C., Vora, A. (1986) "Industry influence on corporate working capital decisions", *Sloan Management Review*, Vol. 27, No. 4, pp. 15–24, https://mpra.ub.uni-muenchen.de/44894/1/MPRA_paper_44894.pdf.

Hill, M. D., Kelly, G. W., Highfield, M. J. (2010) "Net Operating Working Capital Behavior: A First Look", *Financial Management*, Vol. 39, No. 2, pp. 783–805, https://onlinelibrary.wiley.com/doi/pdf/10.1111/j.1755-053X.2010.01092.x?casa_token=BGR6ALP253MAAAAA:Mqe9TeSSHphicKXROcf-XppwPjiilKiDZ7ps-dkwWs2nrsWZmmmCD-QTxylQPJ5im_dYBCTrVZavnI7e.

Kieschnick, R., LaPlante, M., Moussawi, R. (2006) "Corporate working capital management: determinants and consequences", *International Journal of Managerial Finance*, Vol. 3, No. 2, pp. 164-177, https://www.researchgate.net/profile/Robert-Kieschnick/publication/242506805_Corporate_working_capital_management_Determinants_and_Consequences/links/54c8f3c30cf238bb7d0ea5c5/Corporate-working-capital-management-Determinants-and-Consequences.pdf

Koralun-Bereźnicka, J. (2014) "On the Relative Importance of Corporate Working Capital Determinants: Findings from the EU Countries", *Contemporary Economics*, Vol. 8, No. 4, pp. 415–434, https://www.econstor.eu/bitstream/10419/141892/1/825958865.pdf.

Korent, D. (2018) *Identifikacija odrednica upravljanja obrtnim kapitalom u funkciji povećanja profitabilnosti poduzeća u odabranim djelatnostima u Republici Hrvatskoj*. Doktorski rad. Zagreb: Ekonomski fakultet Zagreb.

Kwenda, F., Holden, M. (2014) "Determinants of Working Capital Investment in South Africa: Evidence from Selected JSE-Listed Firms", *Journal of Economics and Behavioral Studies*, Vol. 6, No. 7, pp. 569–580, https://ojs.amhinternational.com/index.php/jebs/article/view/518/518.

Lamberson, M. (1995) "Changes in Working Capital of Small Firms in Relation to Changes in Economic Activity", *American Journal of Business*, Vol. 10, No. 2, pp. 45–50, https://www.emerald.com/insight/content/doi/10.1108/19355181199500015/full/pdf?title=changes-in-working-capital-of-small-firms-in-relation-to-changes-in-economic-activity.

Lee, C. F., Wu, C. (1988) "Expectation formation and financial ratio adjustment processes", *The Accounting Review*, Vol. 63, No. 2, pp. 292–306, https://www.ideals.illinois.edu/bitstream/handle/2142/28908/expectationforma1395leec.pdf?sequence=1&isAllowed=y.

Lončar, S., Ćurak, M. (2008) "Efficiency of working capital management and its influence on the profitablity - the case of Croatian companies", *Journal of International Research Publications: Economy & Business*, Vol. 2, pp. 246–265.

Lyngstadaas, H., Berg, T. (2016) "Working capital management: evidence from Norway", *International Journal of Managerial Finance*, Vol. 12, No. 3, pp. 295–313, https://www.emerald.com/insight/content/doi/10.1108/IJMF-01-2016-0012/full/pdf?title=working-capital-management-evidence-from-norway.

Manoori, E., Muhammad, D. (2012) "Determinants of working capital management: Case of Singapore firms", *Research Journal of Finance and Accounting*, Vol. 3, No. 11, pp. 15–24, http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.856.4142&rep=rep1&type=pdf.

Mongrut, S. et al. (2014) "Determinants of Working Capital Management in Latin American Companies", *Innovar*, Vol. 24, No. 51, pp. 5–18, http://www.ub.edu/iafi/Recerca/Seminaris/Papersamuel.pdf.

Moss, J. D., Stine, B. (1993) "Cash conversion cycle and firm size: A study of retail firms", *Managerial Finance*, Vol. 19, No. 8, pp. 25–34, https://www.academia.edu/23645809/CASH_CONVERSION_CYCLE_AND_FIRM_SIZE_A_STUDY_OF_RETAIL_FIRMS.

Nadiri, M. I. (1969) "The Determinants of Trade Credit in the U.S. Total Manufacturing Sector", *Econometrica*, Vol. 37, No. 3, pp. 408–432, https://www.researchgate.net/profile/M-Nadiri/publication/4894382_The_Determinants_of_Trade_Credit_in_the_US_Total_Manufacturing_Sector/links/57d85ae508ae6399a3992594/The-Determinants-of-Trade-Credit-in-the-US-Total-Manufacturing-Sector.pdf.

Naser, K., Nuseibeh, R., Al-Hadeya, A. (2013) "Factors Influencing Corporate Working Capital Management: Evidence from an Emerging Economy", *Journal of Contemporary Issues in Business Research*, Vol. 2, No. 1, pp. 11–30, https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.278.4754&rep=rep1&type=pdf.

Nazir, M. S., Afza, T. (2009) "Working Capital Requirements and the Determining Factors in Pakistan", *IUP Journal of Applied Finance*, Vol. 15, No. 4, pp. 28–38, https://www.researchgate.net/profile/Talat-Afza-2/publication/228618942_Working_Capital_Requirements_and_the_Determining_Factors_in_Pakistan/links/09e4150c06b3e1db5e000000/Working-Capital-Requirements-and-the-Determining-Factors-in-Pakistan.pdf.

Onaolapo, A. A., Kayjola, S. O. (2015) "What are the Determinants of Working Capital Requirements of Nigerian Firms?", *Research Journal of Finance and Accounting*, Vol. 6, No. 6, pp. 118–128., https://core.ac.uk/reader/234630590.

Pais, M. A., Gama, P. M. (2015) "Working capital management and SMEs profitability: Portuguese evidence", *International Journal of Managerial Finance*, Vol. 11, No. 3, pp. 341–358, https://www.emerald.com/insight/content/doi/10.1108/IJMF-11-2014-0170/full/pdf?title=working-capital-management-and-smes-profitability-portuguese-evidence.

Palombini, N. V. N., Nakamura, W. T. (2012) "Key factors in working capital management in the Brazilian market", *Revista de Administração de Empresas*, Vol. 52, No. 1, pp. 55–70, https://www.scielo.br/j/rae/a/YT7WszFRfLK4S8cnWSF85rQ/?lang=en.

Peles, Y. C., Schneller, M. I. (1989) "The duration of the adjustment process of financial ratios", *The Review of Economics and Statistics*, Vol. 71, No. 3, pp. 527–532, https://www.jstor.org/stable/1926912, https://www.jstor.org/stable/1926912.

Raheman, A., Nasr, M. (2007) "Working Capital Management And Profitability – Case Of Pakistani Firms", *International Review of Business Research Papers*, Vol. 3, No. 1, pp. 279–300, https://www.researchgate.net/profile/Mohamed-Nasr-22/publication/228727444_Working_capital_management_and_profitability-case_of_Pakistani_Firms/links/0c960523758d23d0e1000000/Working-capital-management-and-profitability-case-of-Pakistani-Firms.pdf.

Rimo, A., Panbunyuen, P. (2010) *The effect of company characteristics on working capital management A quantitative study of Swedish listed companies*. Master thesis. Umeå University, Umeå School of Business, Economics and Statistics, https://docplayer.net/6719852-The-effect-of-company-characteristics-on-working-capital-management.html.

Russo, J. F. T. B. (2013) *The working capital management: the determinants and the effect on profitability: Evidence from Portuguese SMEs*. Master Thesis. ISCTE – Instituto Universitário de Lisboa., https://repositorio.iscte-iul.pt/bitstream/10071/8554/1/Thesis_Russo_J_Final.pdf.

Saarani, A. N., Shahadan, F. (2012a) "Analyzing the Validity of Working Capital Determinant Factors of Enterprise 50 (E50) Firms in Malaysia using Partial Least Square-Structural Equation Modeling", in *Proceeding Perkem VII*. Ipoh, Perak: Transformasi Ekonomi dan Sosial Ke Arah Negara Maju, pp. 466–472, https://www.ukm.my/fep/perkem/pdf/perkemVII/PKEM2012_2C2.pdf.

Saarani, A. N., Shahadan, F. (2012b) "The Determinant Factors of Working Capital Requirements for Enterprise 50 (E50) Firms in Malaysia: Analysis Using Structural Equation Modelling", *Social Sciences and Scientific Studies*, Vol. 5, No. 2, pp. 52–66, https://www.academia.edu/2038148/The_Determinant_Factors_of_Working_Capital_Requirements_for_Enterprise_50_E50_Firms_in_Malaysia_Analysis_Using_Structural_Equation_Modelling.

StataCorp. (2015) STATA Longitudinal-Data/Panel-Data Reference Manual, Release 14. *Stata Press*. Texas: Stata Press.

Valipour, H., Moradi, J., Farsi, F. D. (2012) "The Impact of Company Characteristics on Working Capital Management", *Journal of Applied Finance & Banking*, Vol. 2, No. 1, pp. 105–125, http://www.scienpress.com/Upload/JAFB/Vol%202_1_5.pdf.

Wasiuzzaman, S., Arumugam, V. C. (2013) "Determinants of Working Capital Investment: A Study of Malaysian Public Listed Firms", *Australasian Accounting*

Business & Finance Journal, Vol. 7, No. 2, pp. 49–69, https://ro.uow.edu.au/cgi/viewcontent.cgi?referer=https://scholar.google.hr/&httpsredir=1&article=1436&context=aabfj.

Weinraub, J. H., Visscher, S. (1998) "Industry practice relating to aggressive conservative working capital policies", *Journal of Financial and Strategic Decisions*, Vol. 11, No. 2, pp. 11–18, https://www.researchgate.net/publication/237607242_Industry_practice_relating_to_aggressive_conservative_working_capital_policies.

Wooldridge, J. M. (2006) *Introductory Econometrics: A Modern Approach*. 2rd ed. Thomson South-Western.

Yazdanfar, D., Öhman, P. (2014) "The impact of cash conversion cycle on firm profitability: An empirical study based on Swedish data", *International Journal of Managerial Finance*, Vol. 10, No. 4, pp. 442–452, https://www.emerald.com/insight/content/doi/10.1108/IJMF-12-2013-0137/full/pdf?title=the-impact-of-cash-conversion-cycle-on-firm-profitability-an-empirical-study-based-on-swedish-data.

Zariyawati, M. A. et al. (2009) "Working capital management and corporate performance: Case of Malaysia", *Journal of Modern Accounting and Auditing*, Vol. 5, No. 11, pp. 47–54, https://www.researchgate.net/publication/259704839_Working_Capital_Management_and_Corporate_Performance_Case_of_Malaysia.

Zariyawati, M. A. et al. (2010) "Determinants of Working Capital Management: Evidence from Malaysia", in *Financial Theory and Engineering (ICFTE), 2010 International Conference on Financial Theory and Engineering*. Dubai: IEEE, pp. 190–194, https://www.researchgate.net/publication/241169568_Determinants_of_working_capital_management_Evidence_from_Malaysia.

Model ciljne prilagodbe i nova mjera uspješnosti upravljanja obrtnim kapitalom: Slučaj Hrvatske

Dina Korent[1]

Sažetak

U radu je razvijen dinamički panel model ciljne prilagodbe kako bi se istražile odrednice ciklusa konverzije novca prerađivačkih, trgovinskih i poduzeća u djelatnosti Informacije i komunikacije u Republici Hrvatskoj za razdoblje 2008.-2015. Pritom je naglasak na ispitivanju signifikantnosti te brzina procesa prilagodbi ciklusa konverzije novca poduzoraka promatranih poduzeća po djelatnosti i veličini. Rezultati pokazuju da promatrana poduzeća, zbog troškova prilagodbe, postupno prilagođavaju svoje trenutne cikluse konverzije novca ciljnima. Uz to, utvrđeno je da je ta prilagodba spora, što se može objasniti pretežnošću troškova prilagodbe nad troškovima ostanka u neravnoteži. Dodatno, rezultati ovog istraživanja ukazuju da se brzina prilagodbe razlikuje među poduzećima iz različitih djelatnosti i kategorija veličine. Navedeno se može objasniti razlikama u tržišnoj moći među istima, koja poduzećima omogućava lakše promjene komponenata ciklusa konverzije novca, te, shodno tome, bržu konvergenciju njihovim ciljnim razinama. Uz zakašnjeli ciklus konverzije novca, testirane potencijalne odrednice koje signifikantno utječu na cikluse konverzije novca hrvatskih poduzeća u odabranim industrijama, premda s različitom robusnošću, su i veličina poduzeća, rast poduzeća, neto prinos na imovinu, ulaganja u fiksnu imovinu, financijska poluga i rast realnog bruto domaćeg proizvoda. Konačno, rad prezentira novu mjeru za vrednovanje uspješnosti upravljanja obrtnim kapitalom.

Ključne riječi: *upravljanje obrtnim kapitalom, model ciljne prilagodbe, odrednice, mjera uspješnosti, Hrvatska*

JEL klasifikacija: *G3*

[1] *Dr. sc., Viša asistentica/poslijedoktorandica, Fakultet organizacije i informatike, Pavlinska 2, 42000 Varaždin, Sveučilište u Zagrebu – Hrvatska. Znanstveni interes: poslovne financije, upravljanje obrtnim kapitalom, budžetiranje kapitala, struktura kapitala, poslovno planiranje. Tel.:+385 98 160 2295. E-mail: dina.korent@foi.unizg.hr. https://www.foi.unizg.hr/hr/djelatnici/dina.korent.*

Preliminary communication
UDC: 336.77:519.8
https://doi.org/10.18045/zbefri.2021.1.163

An implementation of ensemble methods, logistic regression, and neural network for default prediction in Peer-to-Peer lending*

Aneta Dzik-Walczak[1], *Mateusz Heba*[2]

Abstract

Credit scoring has become an important issue because competition among financial institutions is intense and even a small improvement in predictive accuracy can result in significant savings. Financial institutions are looking for optimal strategies using credit scoring models. Therefore, credit scoring tools are extensively studied. As a result, various parametric statistical methods, non-parametric statistical tools and soft computing approaches have been developed to improve the accuracy of credit scoring models. In this paper, different approaches are used to classify customers into those who repay the loan and those who default on a loan. The purpose of this study is to investigate the performance of two credit scoring techniques, the logistic regression model estimated on categorized variables modified with the use of WOE (Weight of Evidence) transformation, and neural networks. We also combine multiple classifiers and test whether ensemble learning has better performance. To evaluate the feasibility and effectiveness of these methods, the analysis is performed on Lending Club data. In addition, we investigate Peer-to-peer lending, also called social lending. From the results, it can be concluded that the logistic regression model can provide better performance than neural networks. The proposed ensemble model (a combination of logistic regression and neural network by averaging the probabilities obtained from both models) has higher AUC, Gini coefficient and Kolmogorov-Smirnov statistics compared to other models. Therefore, we can conclude that the ensemble model

* Received: 08-04-2020; accepted: 15-03-2021

[1] *Assistant Professor, University of Warsaw – Faculty of Economic Sciences, Długa 44/50, 00-241 Warsaw, Poland. Scientific affiliation: econometric methods and models, corporate finance. Phone: +48 22 55 49 111. Fax: 22 831 28 46. E-mail: adzik@wne.uw.edu.pl. Personal website: http://www.wne.uw.edu.pl/index.php/pl/profile/view/155/.*

[2] *PhD Student, University of Warsaw – Faculty of Economic Sciences, Długa 44/50, 00-241 Warsaw, Poland. Scientific affiliation: econometric methods and models, financial risk, credit risk, corporate finance. Phone: +48 22 55 49 111. Fax: 22 831 28 46. E-mail: mheba@wne.uw.edu.pl. Personal website: https://www.wne.uw.edu.pl/index.php/en/profile/ view/336/.*

allows to successfully reduce the potential risks of losses due to misclassification costs.

Key words: *credit scoring, ensemble methods, logistic regression, neural nets, peer-to-peer lending*

JEL classification: *G21, G32*

1. Introduction

Credit risk is an inseparable aspect of lending. An important issue for the financial institution is to achieve the lowest possible percentage of non-performing loans by minimizing the information asymmetry between the lender and the borrower. Credit risk decisions are a critical factor in the success of financial institutions due to the very high cost of bad decisions (Lahsasna et al., 2010). Credit risk assessment is an essential element of credit risk management and forms the basis for credit decisions (Wu et al., 2010). Due to the importance of credit risk, several tools have been proposed to improve risk scoring and increase predictive accuracy. Credit scoring aims to classify customers as good customers, i.e., customers who repay the loan, and bad customers, i.e., customers who default on a loan. Various parametric statistical methods, non-parametric statistical tools and soft computing approaches have been developed. Artificial neural networks, genetic algorithms, genetic programming, support vector machines and some hybrid models have been used to assess credit risk.

Peer-to-peer (P2P) lending has developed in recent years. In P2P lending, also called social lending, individuals lend money to other individuals. There is no financial institution involved in this process. In P2P lending, individual investors bear the credit risk, not financial institutions. An electronic platform mediates between borrowers and lenders and charges a fee for the service. Companies broker loans between individuals.

The research question of this paper aims to compare the following credit score classification methods: logistic regression model and neural networks, and a combination of these models using ensemble methods. In recent years, neural networks are perceived as one of the best statistical techniques for building scoring models. Moreover, the use of ensemble methods very often improves the performance of the classifier compared to single methods. We test the hypothesis that the neural network model is a better classifier compared to logistic regression, but using ensemble methods to combine these two single classifiers allows us to increase the final predictive power of the model. We use data from Lending Club, the largest US P2P lending company. The analyzed sample contains 119,160 loans within the period 2011 – 2013.

The rest of the paper is organized as follows. In Section 2, we present the literature review. In Section 3, we describe the details of the methodology. In

Section 4, we present data and analysis. Section 5 presents the empirical results and discussion, while in Section 6, we present the conclusions based on the results of our research.

2. Literature review

Credit scoring is a financial tool used in the process of risk assessment, namely to manage and diversify risk in investment portfolios. One of the main objectives of this tool is to assess the risk of loans. Credit scoring models allow the classification of loan customers into a good or bad category in terms of their characteristics and are widely used by financial institutions. They are used to score new consumer loans as well as to analyze existing loans. Credit scoring models make it possible to reduce the cost of credit analysis, enable faster credit decisions, and reduce potential risks (Lee et al., 2002; West, 2000). Scoring tasks are then associated with classification analysis. Since improving such classification can lead to significant savings, the accuracy of different techniques should be analyzed and compared.

In order to increase the accuracy of the credit scoring model, numerous methods have been developed. Both parametric statistical techniques (e.g. discriminant analysis, logistic regression) and non-parametric statistical techniques (e.g. decision trees) are used. In recent years, many novel approaches such as artificial neural networks, rough sets or decision trees have been proposed to improve credit scoring models.

Based on the literature review, it can be concluded that there is no general best method used in building credit scoring models. Authors state that many factors such as data structure, explanatory variables, comparison criterion are relevant in selecting the best technique of classification (e.g. Hand and Henley, 1997).

Abdou et al. (2008) find that the criterion of lowest misclassification cost leads network search to select a multilayer feed-forward network with five nodes. However, probabilistic neural networks provide the highest average correct classification rate. Tsai et al. (2009) show that DEA -DA (Data Envelopment Analysis-Discriminant Analysis) and neural networks have better predictive ability than probit analysis and logistic regression. Neural networks were also selected as the optimal predictive model by Yeh and Lien (2009). Kočenda and Vojtek (2011) found that both credit risk models based on logistic regression and regression trees are comparably efficient. Wang et al. (2011) studied logistic regression analysis, decision tree, artificial neural network and support vector machine. The bagging decision tree achieved the best performance in terms of accuracy, type I error and type II error. Akkoç (2012) proposes a three-stage hybrid adaptive neuro-fuzzy inference system credit scoring model that performs better than linear discriminant analysis, logistic regression and artificial neural network in terms of average correct

classification rate and estimated misclassification cost. Bekhet and Eletter (2014) state that logistic regression performs better than the radial basis function model in terms of overall accuracy rate. However, the radial basis function is superior in identifying customers who may drop out. Tsai et al. (2014) attempted to reduce the risk of loan defaults and outperform the return of Lending Club at the same level of risk. They used four algorithms: Naive Bayes, Random Forest, Support Vector Machines, and modified logistic regression (penalty if the classifier misclassifies a defaulted loan as a good loan). The highest precision was obtained for modified logistic regression on two-dimensional principal component analysis data. Chang et al (2015) compared the performance of logistic regression, Naive Bayes, Support Vector Machine (with different commonly used kernels: linear, polynomial, Gaussian radial basis function and sigmoid). To indicate the performance of the model, they used sensitivity, specificity, G-mean, completion of performance metrics, accuracy and precision. They found that Naive Bayes with Gaussian performs the best in standard prediction (80.1% sensitivity). Malekipirbazari and Aksakalli (2015) declared a Random Forests-based classification method as the best classifier compared to FICO (a publicly traded company that produces scoring models most commonly used and distributed by TransUnion, Equifax, and Experian), logistic regression, and support vector machines. Random Forests had the highest accuracy rate, the highest AUC, and the lowest RMSE. Fritzpatrick and Mues (2016) evaluate the performance of Boosted regression trees, Random Forests, penalized linear and semi-parametric logistic regression models and find that Boosted regression trees outperform logistic regression. Imtiaz and Brimicombe (2017) conclude that an artificial neural network is a better alternative than a decision tree and logistic regression when data availability in a dataset is high.

The summary of the methods compared in empirical articles is shown in Table 1. Logistic regression, neural networks, decision trees, discriminant analysis, and support vector machines are the most commonly compared techniques. Neural networks outperform the other methods most often.

Table 1: Credit scoring techniques used in various studies

Article/Technique	Logistic regression	Neural networks	Decision trees	Discriminant analysis	Support vector machines	Random forests	Naive Bayes	K-nearest neighbors	Survival time analysis	Proportional hazards model	Probit model	Generalized additive model	Graphic analysis with discriminant analysis	ANFIS system
Abdou et al. (2008)	•	• I		•							•			
Ince, Aktan (2009)	•	• I	•	•										
Tsai et al.(2009)	•	• I											• I	
Yeh, Lien (2009)	•	• I	•	•			•	•						
Kočenda, Vojtek (2011)	• I		•											
Wang et al. (2011)	•	•	• I		•									
Akkoç (2012)	•	•		•										• I
Bekhet, Eletter (2014)	• I	•												
Abdou et al.(2016)	•	• I	•											
Fritzpatrick, Mues (2016)	•		• I			•						•		
Imtiaz, Brimicombe (2017)	•	• I^{i}	• I^{bi}											
Serrano-Cinca et al.(2015)	•								•					
Emekter et al. (2015)	•									•				
Tsai et al. (2014)	• I				•	•	•							
Chang et al. (2015)	•				•		• I							
Malekipirbazari, Aksakalli (2015)	•				•	• I		•						

Note: • – the technique used in a study, I – the technique stated as the best in a study (I^{i} – with data imputation, I^{bi} – without data imputation)

Source: Authors' elaboration.

A more advanced classification technique in the literature is ensemble methods. Ensemble learning is a machine learning paradigm in which multiple learners are trained to solve the same problem (Polikar, 2006). Ensemble learners are usually referred to as base learners. Hansen and Salamon (1990) proved that the generalization performance of a neural network can be improved by using an ensemble of similarly configured neural networks. Schapire (1990) showed that a good classification model can be generated by combining weak classifiers through boosting. The generalization ability of an ensemble is usually much stronger than that of a single learner, which makes ensemble methods very attractive (Dietterich, 1997). According to Windeatt and Ardeshir (2004), two necessary conditions should be met for a good ensemble: Accuracy and Diversity. Some researchers claim that models built using ensemble methods have better predictive power than single classifiers (Lessmann et al., 2015). He et al. (2018) created an original ensemble model based on two types of decision trees, a Random Forest and the XGBoost (Extreme Gradient Boosting) model. It was the most effective classification method compared to single classifiers. In addition, the effectiveness of each model was tested on several datasets. The ensemble model was the best in terms of robustness in the context of changes in data structure. Abellán and Castellano (2017) proved that adding a simple classifier to other more complex ones in an ensemble scheme improves the predictive power.

3. Methodology

This section describes three statistical methods used in credit scoring. The first method is the logistic regression model. The second method is neural networks. And the last one is ensemble method, and then, we present the tools to evaluate the quality of classification models .

3.1. Logistic regression

Logistic regression is a modeling technique that relates the probability of a binary outcome to a set of predictor variables. Logistic regression is the most commonly used technique in the field of credit scoring – particularly in the classification of customers. Among other things, this model can be used to analyze the probability of timely repayment of a loan and to determine whether the customer belongs to one of two groups – reliable or unreliable borrowers (Matuszyk, 2018). Thus, the goal of a logistic regression model in credit scoring is to determine the conditional probability that a given observation belongs to one of two groups (good and bad customers) given the values of the independent variables of that observation. Bad customers refer to those customers who have defaulted on a loan, and good customers refer to those customers who have repaid a loan.

The dependent variable in the logistic regression model is the binary variable, and the method of estimation is maximum likelihood. The scoring model in our study was estimated on categorized variables modified by using WOE (Weight of Evidence) transformation. WOE allows the transformation of a continuous independent variable into a set of bins based on the similarity of the distribution of the dependent variable, i.e. the number of events. Such an approach solves the problems related to outliers, allows modeling nonlinear relationships using linear models, and gives the opportunity to better interpret the relationships found in the data (Siddiqi, 2006). WOE allows measuring the difference between the analyzed groups (e.g. borrowers who pay their debts on time and borrowers who do not pay their payments) within a given category of the selected variables and is calculated as follows:

$$WOE_i = ln\left(\frac{good_i}{bad_i}\right) \tag{1}$$

where: i – category of a variable, $good_i$ – the percentage of clients who repay loans on time for category i, bad_i – the percentage of clients who do not pay their liabilities on time for category i.

WOE is used to calculate IV (Information Value) to select important variables in a predictive model:

$$IV = \sum_{i=1}^{n} (good_i - bad_i) \cdot WOE_i \tag{2}$$

If the IV statistic is less than 0.02, then the predictor is not useful for modeling (separating the Good from the Bad). Values between 0.02 and 0.1, indicate a weak predictor. IV from 0.1 to 0.3 means a medium predictor. If IV ranges from 0.3 to 0.5, then the predictor has a strong relationship to the Goods/Bad odds ratio.

An alternative measure of the predictive power of variables is the Gini coefficient:

$$Gini = 1 - \sum_{i=1}^{n} ((cbad_i - cbad_{i-1}) \cdot (cgood_i - cgood_{i-1})) \tag{3}$$

where: n – numer of categories, $cgood_i$ – the cumulative percentage of clients who repay loans on time for category i, $cbad_i$ – cumulative percentage of clients who do not pay their liabilities on time for category i.

3.2. Neural networks

The idea of neural networks comes from the structure of the human brain. In the human brain, a neuron can send (receive) a signal to (from) other neuron(s).

Similarly, neural networks consist of elements, each of which receives many inputs and produces a single output. Neural networks consist of a large number of simple nodes or neuron elements connected from either a single layer or multiple layers.

An important element of each neuron's activity is the function responsible for the value of the output signal, called the activation function. It can take one of three forms: Binary step, linear, and non-linear (e.g., sigmoid). As a result, an output value (node value) Y is given:

$$Y = g\left(\sum_{i=0}^{n-1} w_i y_i - \varphi_h\right) \tag{4}$$

where: Y – output signal value (node value), i – selected input signal, y_i – value of the selected input signal, w_i – weight of the selected input signal, $g(*)$ – activation function, φ_h – threshold activation level.

Neural networks have many advantages. One of the most important: no assumptions about the statistical distribution of variables and error terms need to be satisfied (Matuszczyk, 2018). However, neural networks also have some disadvantages, including the possibility of a very long learning process, the possibility of instability of behavior in the learning process, the possibility of terminating the action of finding the local minimum (without finding the optimum), poor network transparency – difficulties in interpretation, and the difficulty of finding the cause of the errors that occur.

In our analysis we use a popular type of neural network – the multilayer perceptron (MLP). The MLP network is a unidirectional network that usually has the following structure: an input layer, one (or two) hidden layers consisting of sigmoidal neurons, and an output layer consisting of sigmoidal or linear neurons. The backpropagation algorithm is used for the learning process.

3.3. Ensemble methods

In recent years, ensemble methods have become increasingly popular in the context of data modeling. The main goal of using these methods is to increase the performance of classification by combining different classifiers (Abellán and Castellano, 2017). It is possible to combine few models in different ways. One approach aggregates predictions from individual models by using different aggregation functions, such as averaging or voting. Another approach often uses model combination methods such as bagging, boosting, or stacking. The bagging method allows the construction of an ensemble model, where the individual classifiers are based on different subsets generated by sampling with replacement (bootstrap). In the final step, the outputs of the models are aggregated using

a particular aggregation function, e.g., majority voting. Boosting is based on a sequence of different classifiers built on a dataset with equal weights for each observation. Predictions are computed and the process starts again, but contains observations with different weights inversely proportional to the accuracy of the predictions. *Stacking* is a multi-layer combination of models. The first layer consists of a few individual classifiers. The predictions obtained from the classifiers in the previous layer are input to the next model (in a subsequent layer). Such a model combination may include a few layers (Raschka and Mirjalili, 2017).

3.4. Assessing the quality of classification models

Knowledge of the real state of the repayment process can be compared to the prediction generated by a given model. By testing the model against actual observations, it is possible to evaluate the effectiveness of the model and hence its usefulness for new cases (loans). In the following, we briefly describe how the quality and correctness of classification models can be assessed.

3.5. Confusion matrix

In most cases it is not enough to know how often the model being evaluated is wrong. It may be more important to know how often it fails to correctly predict a particular outcome. The confusion matrix provides useful insight into the model's ability to predict a particular group. The matrix contains four possible cases (assuming there are only two categories – positive and negative): *True Positives* (TP) – the number of positive cases correctly classified into the positive class, *False Negatives* (FN) – the number of positive cases incorrectly classified as negative, *False Positives* (FP) – the number of negative cases incorrectly classified as positive, *True Negatives* (TN) – the number of negative cases correctly classified into a negative class.

A variety of performance measures can be derived from the confusion matrix, such as*accuracy* (the ratio of correctly classified cases to all cases), *error rate* (the ratio of misclassified cases to all cases), *positive predictive value* (true-positive rate – the ratio of cases correctly classified as positive to all positive cases), *negative predictive value* (false-positive rate – the ratio of cases classified incorrectly as positive to all negative cases), *sensitivity* (precision – the ratio of cases classified correctly as positive to all cases classified positively), *specificity* (the ratio of cases classified correctly as negative to all negative cases).

Type I error rate is the rate of bad customers categorized as good. A high Type I error rate means that the institution is exposed to credit risk. The Type II error rate (also called β) is the rate of good customers who are categorized as bad. A high Type II error rate means that the institution is exposed to high business risk over a

long period of time, which means that the institution has a restrictive lending policy over a long period of time and may lose its market share.

The given confusion matrix is calculated for the given cut-off point, which is a certain threshold used to determine whether an observation belongs to a certain class.

3.6. ROC Curve

A practical tool that facilitates the performance of a classification model at all classification thresholds is the ROC (Receiver Operating Characteristic) analysis. The ROC curve plots the rate of true positives versus false positives at various classification thresholds. On the ROC curve, the x-axis is labeled with the unit minus specificity measure, while the y-axis represents the sensitivity. To plot a ROC curve for a scoring classifier, confusion matrices are calculated for different cut-off points. A reasonable scoring classifier should have its ROC curve completely above the diagonal (the random model line, y=x line passing through (0,0) and (1,1)), which means that the true-positive rate should always be above the false-positive rate.

3.7. AUC

To facilitate comparison of classification models, the area under the entire ROC curve can be calculated – AUC (*Area Under ROC Curve*). AUC provides an aggregate measure of performance across all possible classification thresholds. The AUC value ranges from 0 to 1. The ideal classifier has an AUC measure of 1 (predictions are 100% correct), while this indicator for the random classifier is 0.5. The larger the AUC measure, the better the classification model. AUC measures the quality of the model's predictions, regardless of which classification threshold is chosen.

3.8. Gini coefficient

Another measure of goodness of a binary classifier is Gini coefficient. Its calculation is based on mentioned above the area underneath the entire ROC curve (AUC). The Gini coefficient is a ratio between (1) the area between the ROC curve and the random model line and (2) the top left triangle above the random model line.

$$Gini = \frac{AUC - 0.5}{0.5} = \frac{AUC}{0.5} - 1 = 2 \cdot AUC - 1 \tag{5}$$

where: AUC – the area underneath the entire ROC curve.

The higher the Gini coefficient, the better the model.

3.9. Kolmogorov-Smirnov statistic

Kolmogorov-Smirnov statistic is defined as the maximum difference between true positive rate (the probability that the model detects an actual positive as positive) and false positive rate (the probability that the model detects an actual negative as positive) obtained for different cut-off points. A higher Kolmogorov-Smirnov statistic value is indicative of a better model. It is defined as:

$$KS = \max_{a \in [L,H]} [abs(F_{m,bad}(a) - F_{n,good}(a))] \tag{6}$$

where: a – score that ranges from L to H, L – the minimum value of a given score, H – the maximum value of a given score, $F_{m,bad}(a)$ – the empirical cumulative distribution function of the scores of bad clients, $F_{n,good}(a)$ – the empirical cumulative distribution function of the scores of good clients.

4. Empirical data and analysis

In this section data and results of empirical research are presented.

4.1. Data – source and preparation for modelling

The use of data provided by financial institutions is restricted due to different legal regulations and limitations. Therefore, we used social lending data provided by one of the largest peer-to-peer lending companies in the US. The dataset was downloaded from the website Lending Club [3] for the period between June 2007 and June 2018. We examined 1911592 loans, representing a total loan amount of approximately $ 28.5 billion. We eliminated loans that had not yet been issued or reached maturity to include cases with “paid in full” or “defaulted” status. The final sample includes 119,160 observations from 2011 to 2013. Loans funded through 2013 are analyzed because the status of later loans (defaulted or non-defaulted) is still unknown because the maturity of these loans is 36 or 60 months. For example, the status of a 36-month loan funded in September 2014 may not be known until September 2019. In this article, the 2-year time frame is chosen (July 1, 2011 – July 30, 2013). In credit scoring, the 12-month time frame is commonly used in model development, but the time window can be extended to 24 months (Matuszyk, 2018). The data examined included credit records with all credit information commonly used to assign a score, so financial and other borrower-specific characteristics were available.

The objective of credit scoring is to determine the conditional probability of default of a given observation given the values of the independent variables. An important step in developing the predictive model is then to define the response variable that

divides all observations into two separate groups: good and bad customers. In this research, we aim to analyze customers who repay the loan and those who default on a loan. We based the definition of good and bad customers on a variable that describes the loan status. Thus, fully repaid loans are interpreted as good customers (marked as 0) and loans that have been written off are considered bad customers (marked as 1).

The next step was to select characteristics with good predictive power for the response variable. After the analysis, the details of which are described below, we selected 17 of these features to be used in the predictive modeling.

Originally, the dataset we used contained more than 100 variables. Variables with many missing values were then eliminated (at least 90% of missing values). We then removed technical variables (e.g., links to websites, observation IDs), features that are difficult to use in the modeling process (e.g., unstructured job description provided by the borrower), and variables that are not known at the time of the loan application – there is no such information in the document submitted by the borrower (e.g., rate amount, credit risk class, interest rate, last payment amount).

Some of the remaining variables were difficult to use in the modeling in their original form, e.g. comment about the loan delivered by the borrower or date of opening of the first loan product by the borrower. Due to this fact, new variables were created (based on the original variables): number of letters in the credit comment (there is a suspicion that individuals who add a very long comment as a motivation for needing credit are more risky because they want to get the credit at any cost), number of years from credit release (assuming that the date of credit release is almost identical to the date of submission of the credit application by a borrower).

In the next step of model building, the dataset was constrained to include only the most predictive variables. To select the variables, the fine classification procedure was used. This is a binning procedure. In this process, the independent variable is divided into quantile groups. And then for each group, there are several good customers and several bad customers. Based on this, the following measures are calculated: the bad rate (shows the proportion of observations that have a value of 1 for the target variable compared to all records in the given group) and the WOE (Weight of Evidence). It is useful to calculate the measures of predictive power of the variable, such as the Gini coefficient and IV (Information Value). These indicators are very helpful in variable selection. However, before the final variable selection, the correlation analysis was performed. Kendall's tau correlation coefficient was used as a measure of the relationship between ordinal variables (obtained with WOE transformation). After correlation analysis, the final variable selection was based on the Gini coefficient. Variables with Gini coefficient higher than 5% were considered as the most predictive variables. According to this rule, the final set of variables includes 16 explanatory variables. The characteristics used in our predictive models are described in Table 2.

Table 2: List of final features used in the estimation process

Variable's name	Variable's description	Gini coefficient
Term	The number of payments (in months): 36 months (78%), 60 months (22%).	0.17113
Acc_open_past_24mths	The number of trades opened in past 24 months	0.11715
Dti	A ratio calculated using the borrower's total monthly debt payments on the total debt obligations, excluding mortgage and the requested loan, divided by the borrower's self-reported monthly income	0.11669
Revol_util	Revolving line utilization rate	0.10943
Annual_inc	The self-reported annual income provided by the borrower during registration	0.10906
Percent_bc_gt_75	Percentage of all bankcard accounts greater than 75% of limit	0.10460
Verification_status	Indicates if income was verified: verified (45.5%), not verified (34.4%), source verified (20.1%)	0.10199
Inq_last_6mths	The number of inquiries in past 6 months: 0 (50%), 1 (28.3%), 2 (13.7%), 3+ (8%)	0.10078
Loan_amnt	The amount of the loan	0.09831
Num_tl_op_past_12m	The number of accounts opened in past 12 months	0.09365
Purpose	A category provided by the borrower for the loan request: debt consolidation (57.9%), credit card (21%), home improvement (5.8%), other (5.2%), major purchase (2.4%), small business (2.1%), car (1.5%), wedding (1.1%), medical (1%), house (0.7%), moving (0.7%), vacation (0.5%), renewable energy (0.1%)	0.09249
Mo_sin_rcnt_tl	Months since most recent account opened	0.08401
Mths_since_recent_bc	Months since most recent bankcard account opened	0.07545
Num_rev_tl_bal_gt_0	The number of revolving trades with balance greater than 0	0.07218
Mort_acc	The number of mortgage accounts	0.05926
Earliest_cr_line_n	The number of months from the date that the borrower's earliest reported credit line was opened (modified original variable)	0.05216

Source: Authors' calculations.

Descriptive statistics of continuous variables are shown in Table 3.

Table 3: Descriptive statistics of continuous variables

Variable/statistic	Average	Standard deviation	Minimum	Median	Maximum	Kurtosis	Missing percentage
Acc_open_past_24mths	3.91	2.68	0.00	3.00	40.00	3.19	16.80
Dti	16.67	7.59	0.00	16.44	34.99	0.63	0.00
Revol_util	58.08	24.00	0.00	60.90	122.50	-0.57	0.10
Annual_inc	71,546	55,790	4,800	61,000	71,41,778	3,875	0.00
Percent_bc_gt_75	34.64	27.53	0.00	33.00	94.00	-1.32	17.50
Loan_amnt	14,046	8,168	1,000	12,000	35,000	-0.10	0.00
Num_tl_op_past_12m	1.82	1.57	0.00	2.00	25.00	4.77	33.80
Mo_sin_rcnt_tl	8.95	9.67	0.00	6.00	99.00	13.80	33.80
Mths_since_recent_bc	22.14	21.69	0.00	14.00	99.00	1.17	17.40
Num_rev_tl_bal_gt_0	5.75	2.96	0.00	5.00	37.00	2.36	33.80
Mort_acc	1.74	2.19	0.00	1.00	29.00	3.41	16.80
Earliest_cr_line_n	14.59	6.93	3.00	13.00	62.00	1.78	0.00

Source: Authors' calculations.

Additionally, Table 4 presents the results of independence Chi^2 test between the target variable and the categorical explanatory variables.

Table 4: Results of Chi2 test (target variable vs. categorical explanatory variables)

Variable	Chi^2 statistics	p-value
Term	2719.3	0.0000
Verification status	597.12	0.0000
Inq_last_6mths	585.46	0.0000
Purpose	598.11	0.0000

Source: Authors' calculations.

According to the results from Table 4, the null hypothesis about the independence of variables is rejected for all variables (p-value is smaller than the assumed 5% significance level in each case), so there are statistically significant dependencies between the target variable and certain explanatory variables.

The sample analyzed consists of 119,160 credit records. Of these, 70% were randomly selected as a training sample to estimate parameters of the credit scoring

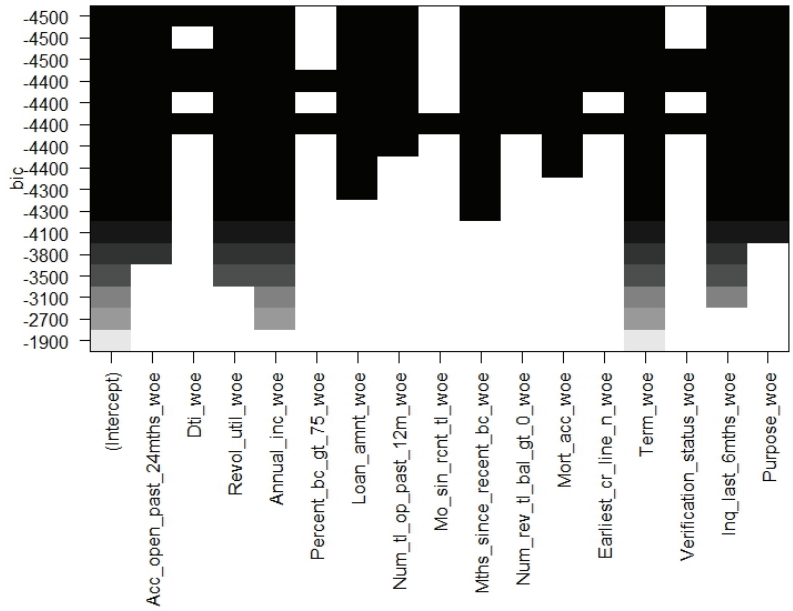
model. The remaining 30% were retained for validation. Both subsets contain a similar proportion of delinquencies, about 16%.

4.2. Logistic regression model

The weight-of-evidence method (WOE) with a coarse classification procedure was applied to transformation variables. Coarse classification was used to create fewer categories by merging similar adjacent groups. The graphical results of the coarse classification procedure are presented in the appendix of this paper.

The selection of independent variables in a logistic regression model posed a challenging problem. This task was approached using techniques such as the backward stepwise regression method and the forward stepwise regression method. In addition, graphical visualization was used to display the Bayesian Information Criterion (BIC) values for models with different sets of explanatory variables (Figure 1).

Figure 1: Values of BIC statistics for models with different sets of explanatory variables



Note: The BIC value on the graph means the approximate difference of this indicator between the BIC of the given model and the BIC of the model that includes only a constant. The bigger the difference, the better the model.

Source: Authors' calculations.

Results of 6 best models are presented in Table 5.

Table 5: Results of logistic models

Variable/model	model 1	model 2	model 3	model 4	model 5	model 6
Intercept	-1.6664*** (0.01)	-1.6664*** (0.01)	-1.6662*** (0.01)	-1.6664*** (0.01)	-1.6664*** (0.01)	-1.6639*** (0.0095)
Acc_open_past_24mths_woe	-0.6797*** (0.0673)	-0.6652*** (0.0654)	-0.6621*** (0.0654)	-0.6627*** (0.0654)	-0.7045*** (0.0643)	
Dti_woe	-0.1631** (0.0528)	-0.1628** (0.0528)	-0.1662** (0.0528)	-0.1845*** (0.0524)		
Revol_util_woe	-1.0875*** (0.0574)	-1.0863*** (0.0574)	-1.1303*** (0.0524)	-1.1336*** (0.0524)	-1.1728*** (0.0512)	
Annual_inc_woe	-1.5293*** (0.0586)	-1.5292*** (0.0586)	-1.5309*** (0.0586)	-1.5304*** (0.0586)	-1.585*** (0.0565)	
Percent_bc_gt_75_woe	-0.1495 (0.0801)	-0.149 (0.0801)				
Loan_amnt_woe	-0.6281*** (0.0705)	-0.6264*** (0.0705)	-0.6274*** (0.0704)	-0.6699*** (0.0687)	-0.6979*** (0.0683)	
Num_tl_op_past_12m_woe	-0.3802*** (0.0881)	-0.4324*** (0.0666)	-0.432*** (0.0666)	-0.4307*** (0.0666)	-0.4327*** (0.0666)	
Mo_sin_rcnt_tl_woe	-0.094 (0.1038)					
Mths_since_recent_bc_woe	-0.5631*** (0.0731)	-0.5737*** (0.0721)	-0.5785*** (0.0721)	-0.5767*** (0.0721)	-0.5581*** (0.0719)	
Num_rev_tl_bal_gt_0_woe	-0.4094*** (0.0734)	-0.4155*** (0.073)	-0.4354*** (0.0722)	-0.4348*** (0.0722)	-0.4673*** (0.0717)	
Mort_acc_woe	-0.7002*** (0.1102)	-0.7023*** (0.1101)	-0.7067*** (0.1101)	-0.6915*** (0.11)	-0.6804*** (0.1099)	
Earliest_cr_line_n_woe	-0.6441*** (0.1089)	-0.6466*** (0.1088)	-0.644*** (0.1088)	-0.6345*** (0.1088)	-0.6069*** (0.1085)	
Term_woe	-0.8989*** (0.0293)	-0.8996*** (0.0293)	-0.9003*** (0.0293)	-0.9196*** (0.0284)	-0.9212*** (0.0284)	
Verification_status_woe	-0.1554** (0.0584)	-0.1546** (0.0584)	-0.1541** (0.0584)			
Inq_last_6mths_woe	-0.8608*** (0.0538)	-0.8655*** (0.0535)	-0.8644*** (0.0535)	-0.8673*** (0.0535)	-0.871*** (0.0535)	
Purpose_woe	-0.861*** (0.0502)	-0.862*** (0.0502)	-0.862*** (0.0502)	-0.8693*** (0.0501)	-0.8681*** (0.0501)	
AIC	68626.8	68625.62	68627.11	68632.09	68642.52	73137.14
BIC	68785.44	68774.93	68767.08	68762.73	68763.83	73146.47

Note: ***,**, * donate the significance level of 1%, 5%, 10% respectively. Standard errors are reported in the parenthesis.

Source: Authors' calculation.

The final model was selected based on the Akaike information criteria (AIC) and the Schwartz information criteria (BIC). The information criteria consider the goodness of fit of the model and the simplicity of the model. The model with the lowest information criteria is preferred. The AIC indicates that the best model is the model number 2, while the BIC states that the best model is the model number 4. However, the literature shows that the AIC criterion tends to consider a model with too many parameters as the best. This is consistent with the analyzed case – model 2 contains more parameters compared to model 4. Therefore, model 4 was finally considered as the best logistic regression model.

The diagnostic tests for logistic regression model 4 were then conducted. The goodness of fit of the model to the data is tested using the Hosmer-Lemeshow test. The null hypothesis in this test is a statement of goodness of fit of the model to the data. In all the versions of this test performed (Hosmer-Lemeshow (5 bins), chi2 = 3.0610, *p-value* = 0.3823; Hosmer-Lemeshow (10 bins), chi2 = 10.8666, *p-value* = 0.2094; Hosmer-Lemeshow (15 bins), chi2 = 20.10210, *p-valu*e = 0.0927), there is no reason to reject the null hypothesis at the 5% significance level, therefore the model is well fitted to the data. However, this test has many drawbacks, including high sensitivity to the number of bins. For this reason, there are some critical opinions about this test (Allison, 2013). For this reason, another test is performed – the Osius-Rojek test, which also checks the goodness of fit of the model. According to the test (*p-valu*e = 0.7426), there is no reason to reject the null hypothesis about goodness of fit of the model to the data at 5% level of significance. Thus, the model specification can be considered as the correct one. In addition, the likelihood ratio test (LR) is performed to test the joint significance of all variables in the model. According to the results of this test (*p-value* = 0.0000), the null hypothesis about the lack of significance of all variables at the 5% significance level is rejected, therefore, it is assumed that the variables in the selected model are significant.

The results of the tests described above were as expected, therefore model 4 is considered as the best choice. The next step was to perform the prediction. For all observations in the training set as well as in the validation set, the failure probability estimated by the model was assigned. The evaluation of the model prediction is shown in Table 6.

Table 6: The evaluation of model prediction – logistic regression

Measure	Training data	Validation data
AUC	0.6772	0.6708
Gini	0.3545	0.3416
KS	0.2580	0.2447

Source: Authors' calculations.

4.3. Neural networks model

The scale and distribution of variables may differ. Differences in the scales of the input variables can increase the difficulty of the problem being modeled. For example, large input values (e.g., measured in thousands of units) can lead to a model that learns large weight values (Szeliga, 2017). In turn, a model with large weight values is often unstable. Also, a target variable with a large spread of values makes the learning process unstable, as it leads to weight values changing dramatically. In practice, it is almost always beneficial to apply preprocessing transformations to variables before training a neural network model. Scaling data is useful to improve neural network stability and modeling performance. In this process, the values of variables are rescaled so that the minimum value is 0 and the maximum value is 1. By transforming the inputs in this way, training can be faster and the probability of getting stuck in local optima can be reduced. We used the original values of a variable (not after the WOE transformation) transformed by subtracting the minimum and dividing by the range (the difference between the largest and smallest values).

We use a multilayer perceptron neural network. An important point in constructing this type of neural network is to determine the number of layers and the number of neurons in each layer. In this paper, a neural network with only one hidden layer is used. It is claimed that a multilayer perceptron neural network with two hidden layers can model almost any problem, which does not mean that a neural network with more layers would not solve this problem more easily or conveniently – the more complex neural network (in terms of its structure) can give better results. In practice, it is sufficient to use only one hidden layer for the majority of considered problems. In special cases, there is a need to include two hidden layers. The use of three hidden layers is extremely rare and is rarely used in practice (Hastie et al., 2008).

The next issue that arises is the selection of the number of neurons in the hidden layer. The selection of the number of neurons in the hidden layer is a very important part of the overall neural network architecture. Although hidden layers do not directly interact with the external environment, they affect the final output. There are different approaches to find out a large number of hidden nodes in the hidden layer. The rule of thumb is that the number of hidden neurons should be in the range between the size of the input layer and the size of the output layer (Panchal and Panchal, 2014). The try-and-error method assumes repeated trials. In the forward approach, a small number of hidden neurons, usually two, are started, then trained and tested. In the next step, the number of hidden neurons is gradually increased. The process is repeated until the test results do not improve.

In our research, we combined these two approaches. We started with two hidden neurons in the hidden layer. The neural network was trained and evaluated using

the AUC measure. Based on the rule of thumb mentioned above, we repeated the process until the variant with 34 hidden neurons in the hidden layer. The AUC measure was then used as a criterion for selecting the best network structure. Table 7 shows the AUC values for network structures with different numbers of neurons in the hidden layer.

Table 7: AUC values depending on a certain number of neural neurons in the hidden layer

Number of neurons	AUC	Number of neurons	AUC	Number of neurons	AUC
2	0.66533	13	0.67141	24	0.67137
3	0.66632	14	0.67092	25	0.67159
4	0.66621	15	0.67193	26	0.67201
5	0.66891	16	0.67289	27	0.67132
6	0.66856	17	0.6732	28	0.67297
7	0.66905	18	0.66898	29	0.67315
8	0.67048	19	0.67261	30	0.67254
9	0.67051	20	0.67251	31	0.67335
10	0.66943	21	0.67239	32	0.67364
11	0.67136	22	0.67259	33	0.67330
12	0.67061	23	0.67219	34	0.67361

Source: Authors' calculations.

Results presented in Table 7 show that the best neural network (in terms of AUC measure calculated on the training set) has 32 neurons in the hidden layer. Then a prediction was done and measures of model classification were calculated both for the training and validation set (Table 8).

Table 8: Evaluation of model prediction – neural network

Measure	Training set	Validation set
AUC	0.6736	0.6601
Gini	0.3473	0.3202
KS	0.2557	0.2359

Source: Authors' calculations.

4.4. Models built by using ensemble methods

Based on the assumption that combining different techniques in one predictive model could provide better predictive results, two other models were built using ensemble methods. They combined in different ways the two best models from the previous sections.

The first ensemble model combined logistic regression and neural networks in a parallel way by averaging the probabilities obtained from the individual models. The evaluation of the model prediction is shown in Table 9.

Table 9: Evaluation of model prediction – the first ensemble model

Measure	Training set	Validation set
AUC	0.6823	0.6732
Gini	0.3646	0.3464
KS	0.2629	0.2573

Source: Authors' calculations.

The second ensemble model combined the individual models in the other way – instead of using an average function, logistic regression was used to produce the final output. Probabilities returned from the logistic regression and the neural network were inputs to the logistic regression, which produced the final probability values. The evaluation of the model prediction is shown in Table 10.

Table 10: Evaluation of model prediction – the second ensemble model

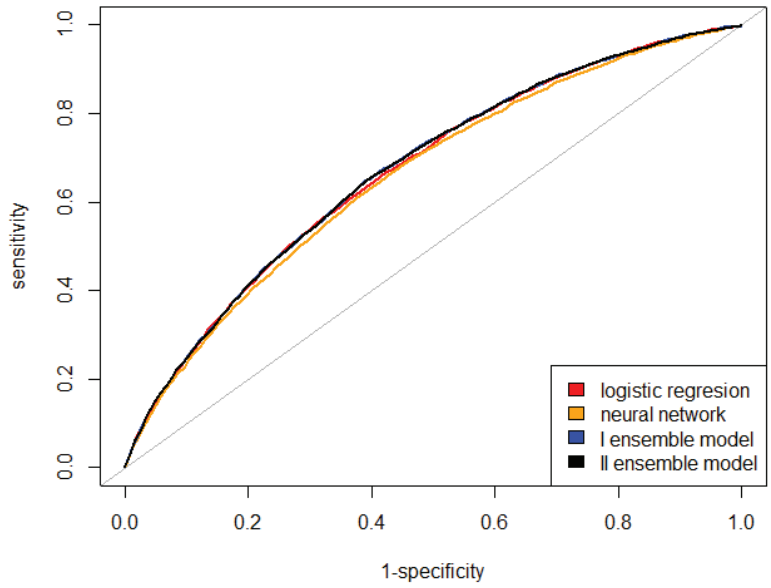
Measure	Training set	Validation set
AUC	0.6821	0.6727
Gini	0.3642	0.3453
KS	0.2632	0.2570

Source: Authors' calculations.

5. Results and discussion

The next step of the analysis was to compare the performance of all models. It was checked which model was better in terms of prediction. We started by graphically comparing the classification abilities of the models based on the ROC curves for the validation set (Figure 2).

Figure 2: ROC curves for final models (validation set)



Source: Authors' calculations.

Based on the ROC curves graph, it is very hard to decide which model is the best one. It can be noticed that probably neural network model in the worst way classifies borrowers into two groups, good customers and bad customers, as the neural network's ROC curve line is the least shifted towards the point (1.1) in comparison to the other models' ROC curves.

To evaluate the overall credit scoring capability of the proposed credit scoring models, performance across all possible classification thresholds (AUC), Gini coefficient, and the maximum difference between true positive rate and false positive rate obtained for different cut-off points (Kolmogorov-Smirnov statistic) are used. Moreover, accuracy, error ratio, positive predictive value (PPV), and negative predictive value (NPV) are computed. The following Table 11 shows the evaluation measures of the two credit scoring models calculated on a validation set.

Table 11: Evaluation of models' classification (a validation set; in %)

Measure/ model	Logistic regression		Neural network		I ensemble model		II ensemble model	
	*Z**=25	*Z**=50	*Z**=25	*Z**=50	*Z**=25	*Z**=50	*Z**=25	*Z**=50
AUC	67.08		66.01		67.32		67.27	
Gini	34.16		32.02		34.64		34.53	
KS	24.47		23.59		25.73		25.70	
Accuracy	78.71	84.07	76.14	84.11	77.87	84.07	78.55	83.9
Error ratio	21.29	15.93	23.86	15.89	22.13	15.93	21.45	16.1
PPV	31.07	48.91	28.62	53.05	30.35	47.06	31.09	44.05
NPV	86.58	84.16	86.97	84.25	86.78	84.14	86.67	84.51

Notes: Some measures depending on cut-off points (marked as Z*).

Source: Authors' calculations.

As the results in Table 11 show, the I ensemble model (a combination of logistic regression and neural network by averaging the probabilities obtained from both models) has higher AUC, higher Gini coefficient, and higher Kolmogorov-Smirnov statistic compared to other models. Therefore, we can conclude that the I ensemble model allows to successfully reduce the potential risks of losses due to misclassification costs.

Since the I-ensemble model and the II -ensemble model have similar discriminatory power, the formal test (on the validation set) is performed to check whether the ROC -curves for the compared models are equally good (the null hypothesis assumes that the ROC -curves are equally good). Based on the obtained test results, the null hypothesis is rejected at 5% significance level (*p-value* = 0.000). Thus, there are statistically significant differences in the classification effectiveness of the analyzed models.

Analyzing the readings from Table 11, we can see that the choice of a cut-off point (which defines a boundary between bad and good cases) is extremely important. When the cut-off point is increased, the accuracy and precision of the positive prediction also increase and consequently the classification error and precision of the negative prediction decrease. This is a key element in a business environment, especially in financial institutions, as it relates to the control of the sales process (loans granted) as well as to the quality of the loan portfolio (a certain percentage of customers who do not pay their liabilities according to the contract). For this reason, an econometric model that has a very good predictive power is a very important and practical business tool.

To summarize. When comparing logistic regression and neural networks, we found that logistic regression performs better than neural network in classifying

customers as good or bad (similar conclusions were found by Bekhet and Eletter, 2014). The reason for our result may be the use of transformation WOE in constructing a logistic regression model, which certainly improved its results and has not always been used by other researchers in the context of comparing classifiers. In addition, the poor efficiency of neural networks could result from the implementation of a rather simple network structure which, although widely used, could prove less effective than more complex network structures, including more hidden layers.

The proposed ensemble model (a combination of logistic regression and neural network by averaging the probabilities obtained from both models) showed higher AUC, Gini coefficient and Kolmogorov-Smirnov statistics compared to other models. Therefore, we can conclude that the ensemble model allows to successfully reduce the potential risks of losses due to misclassification costs. Further potential research in this area could address the application of more advanced features in ensemble methods.

6. Conclusions

Financial institutions engaged in the activity of money lending play an important role in everyone's life because they improve the quality of life. Moreover, the state of financial institutions affects the functioning of the finances of the whole country. Recently, an alternative way of raising money – social loans – is gaining quite significant importance. An important element of all financial institutions engaged in lending activity is strict control of credit risk (its minimization), which affects the financial condition of the institution.

In the era of growing importance of data and advanced data analysis, a number of methods are available to the companies to optimize the management of various processes. Different types of econometric models are used to measure and manage credit risk properly. Many studies compare the effectiveness of different techniques to properly classify good customers (on-time loan repayments) and bad customers (not on-time loan repayments). The choice of the best classifier plays a key role in controlling the proportion of non-performing loans in the portfolio of a given financial institution, which affects its functioning.

Our paper reviews the literature related to a comparison of classifier results. The two most commonly compared techniques are the logistic regression model and the neural network model. In our study, we analyze these two techniques on real social credit data. The aim of the study was to test the hypothesis whether the neural network model is a better classifier compared to logistic regression and whether ensemble methods have better performance than base learners (regression analysis and neural network).

Our results show that logistic regression performs better than neural networks. When comparing logistic regression and neural networks, we found that logistic regression performs better than neural networks in classifying customers as good or bad. Combining logistic regression and neural network by averaging the probabilities obtained from both models suggests that the ensemble model successfully reduces the potential risks of losses due to misclassification costs. Further potential research in this area could be devoted to the application of more advanced features in ensemble methods.

References

Abdou, H.A., Pointon, J., El-Masry, A. (2008) "Neural nets versus conventional techniques in credit scoring in Egyptian banking", *Expert Systems with Applications*, Vol. 35, No.3, pp. 1275–1292, doi: 10.1016/j.eswa.2007.08.030.

Abdou, H.A. et al. (2016) "Predicting creditworthiness in retail banking with limited scoring data", *Knowledge-Based Systems*, Vol. 103, pp. 89–103, doi: 10.1016/j.knosys.2016. 03.023.

Abellán, J., Castellano, J.G. (2017) "A comparative study on base classifiers in ensemble methods for credit scoring", *Expert Systems with Applications*, Vol. 73, pp. 1–10, doi: 10.1016/j.eswa.2016.12.020.

Akkoç, S. (2012) "An empirical comparison of conventional techniques, neural networks and the three stage hybrid Adaptive Neuro Fuzzy Inference System (ANFIS) model for credit scoring analysis: The case of Turkish credit card data", *European Journal of Operational Research*, Vol. 222, No. 1, pp. 168–178, doi: 10.1016/j.ejor.2012.04.009.

Allison, P. (2013) "Why I Don't Trust the Hosmer-Lemeshow Test for Logistic Regression", *Statistical Horizons*, https://statisticalhorizons.com/hosmer-lemeshow, [Accessed: February 26, 2021].

Bekhet, H., Eletter, S. (2014) "Credit risk assessment model for Jordanian commercial banks: Neural scoring approach", *Review of Development Finance*, Vol. 4, No. 1, pp. 20–28, doi: 10.1016/j.rdf.2014.03.002.

Chang, S., Kim, S.D., Kondo, G. (2015) „Predicting Default Risk of Lending Club Loans", *Machine Learning*, CS229, pp. 1–5.

Dietterich, T.G. (1997) "Machine-learning research", *AI magazine*, Vol. 18, No. 4, pp. 97–136, doi: 10.1609/aimag.v18i4.1324.

Emekter, R. et al. (2015) "Evaluating credit risk and loan performance in online Peer-to-Peer (P2P) lending", *Applied Economics*, Vol. 47, No. 1, pp. 54–70, doi: 10.1080/00036846. 2014.962222.

Fritzpatrick, T., Mues, C. (2016) "An empirical comparison of classification algorithms for mortgage default prediction: evidence from a distressed

mortgage market", *European Journal of Operational Research*, Vol. 249, No. 2, pp. 427–439, doi: 10.1016/j.ejor. 2015.09.014.

Hand, D.J., Henley, W.E. (1997) "Statistical classification methods in consumer credit scoring: a review", *Journal of the Royal Statistical Society: Series A (Statistics in Society)*, Vol. 160, No. 3, pp. 523–541, doi: 10.1111/j.1467-985X.1997.00078.x.

Hansen, L.K., Salamon, P. (1990) "Neural network ensembles", *IEEE transactions on pattern analysis and machine intelligence*, Vol. 12, No. 10, pp. 993–1001, doi: 10.1109/34.58871.

Hastie, T., Tibshirani, R., Friedman, J. (2008) "The Elements of Statistical Learning – Data Mining, Inference, and Prediction", Springer, second edition.

He, H., Zhang, W., Zhang, S. (2018) "A novel ensemble method for credit scoring: Adaption of different imbalance ratios", *Expert Systems With Applications*, Vol. 98, pp. 105–117, doi: 10.1016/j.eswa.2018.01.012.

Imtiaz, S., Brimicombe, A. (2017) "A Better Comparison Summary of Credit Scoring Classification", *International Journal of Advanced Computer Science and Applications*, Vol. 8, No. 7, pp. 1–4, doi: 10.14569/IJACSA.2017.080701.

Ince, H., Aktan, B. (2009) "A comparison of data mining techniques for credit scoring in banking: A managerial perspective", *Journal of Business Economics and Management*, Vol. 10, No. 3, pp. 233–240, doi: 10.3846/1611-1699.2009.10.233-240.

Kočenda, E., Vojtek, M. (2011) "Default Predictors in Retail Credit Scoring: Evidence from Czech Banking Data" *Emerging Markets Finance and Trade*, Vol. 47, No. 6, pp. 80–98, doi: 10.2753/REE1540-496X470605.

Lahsasna, A., Ainon, R.N., Teh, Y.W. (2010) "Credit Scoring Models Using Soft Computing Methods: A Survey", *Int. Arab J. Inf. Technol.*, Vol. 7, No. 2, pp. 115–123.

Lee, T.S. et al. (2002) "Credit scoring using the hybrid neural discriminant technique", *Expert Systems with applications*, Vol. 23, No. 3, pp. 245–254, doi: 10.1016/S0957-4174(02)00044-1.

Lessmann, S. et al. (2015) "Benchmarking state-of-the-art classification algorithms for credit scoring: An update of research", *European Journal of Operational Research*, Vol. 16, No. 1, pp. 124–136, doi: 10.1016/j.ejor.2015.05.030.

Malekipirbazari, M., Aksakalli, V. (2015) "Risk assessment in social lending via random forests", *Expert Systems with Applications*, Vol. 42, No. 10, pp. 4621–4631, doi: 10.1016/j.eswa.2015.02.001.

Matuszyk, A. (2018) "Credit Scoring", CeDeWu, second edition.

Panchal, F., Panchal, M. (2014) "Review on Methods of Selecting Number of Hidden Nodes in Artificial Neural Network", *International Journal of Computer Science and Mobile Computing*, Vol. 3, No. 11, pp. 455–464.

Polikar, R. (2006) "Ensemble based systems in decision making", *IEEE Circuits and systems magazine*, Vol. 6, No. 3, pp. 21–45, doi: 10.1109/MCAS.2006.1688199.

Raschka, S., Mirjalili,V. (2017) "Python Machine Learning", Packt Publishing Ltd.

Schapire, R.E. (1990) "The strength of weak learnability", *Machine learning*, Vol. 5, No. 2, pp. 197–227, doi: 10.1007/BF00116037.

Serrano-Cinca, C., Gutiérrez-Nieto, B., López-Palacios, L. (2015) "Determinants of Default in P2P Lending", *PLoS ONE*, Vol. 10, No. 10, pp. 1–22, doi: 10.1371/journal.pone.0139427.

Siddiqi, N. (2006) "Credit risk scorecards: developing and implementing intelligent credit scoring", Vol. 3, John Wiley & Sons.

Szeliga, M. (2017) „Data science i uczenie maszynowe", PWN, first edition.

Tsai, K., Ramiah, S., Singh, S. (2014) "Peer Lending Risk Predictor", CS229, pp. 1–5.

Tsai, M.C. et al. (2009) "The consumer loan default predicting model – An application of DEA-DA and neural network", *Expert Systems with Applications*, Vol. 36, No. 9, pp. 11682–11690, doi: 10.1016/j.eswa.2009.03.009.

Wang, G. et al. (2011) „A comparative assessment of ensemble learning for credit scoring", *Expert Systems with Applications*, Vol. 38, No. 1, pp. 223–230, doi: 10.1016/j.eswa. 2010.06.048.

West, D. (2000) "Neural network credit scoring models", *Computers & Operations Research*, Vol. 27, No. 11-12, pp. 1131–1152, doi: 10.1016/S0305-0548(99)00149-5.

Windeatt, T., Ardeshir, G. (2004) "Decision tree simplification for classifier ensembles", *International Journal of Pattern Recognition and Artificial Intelligence*, Vol. 18, No. 5, pp. 749–776, doi: 10.1142/S021800140400340X.

Wu, D., Olson, D.L. (2010) "Enterprise risk management: coping with model risk in a large bank", *Journal of the Operational Research Society*, Vol. 61, No. 2, pp. 179–190, doi: 10.1057/jors.2008.144.

Yeh, I.C., Lien. C. (2009) "The comparisons of data mining techniques for the predictive accuracy of probability of default of credit card clients", *Expert Systems with Applications*, Vol. 36, No. 2, pp. 2473–2480, doi: 10.1016/j.eswa.2007.12.020.

Primjena ansambl metoda, logističke regresije i neuronske mreže na mogućnost predviđanja Peer-to-Peer pozajmljivanja

Aneta Dzik-Walczak[1], *Mateusz Heba*[2]

Sažetak

Procjena kreditne sposobnosti postaje izuzetno važna s obzirom na sve intenzivniju konkurenciju među financijskim institucijama tako da čak i neznatno unapređivanje točnosti predviđanja može rezultirati značajnom uštedom. Financijske institucije traže optimalne strategije pomoću modela procjene kreditne sposobnosti. Stoga je proučavanje alata za procjenu kreditne sposobnosti široko rasprostranjeno. Kao rezultat toga, razvijene su različite parametarske statističke metode, ne-parametarski statistički alati i pristupi programskom računanju kako bi se povećala točnost modela procjene kreditne sposobnosti. U ovom radu primjenjuju se različiti pristupi za klasifikaciju kupaca, kao onih koji vraćaju zajam i onih koji ne mogu podmirivati svoje obveze. Svrha ove studije je istražiti uspješnost dviju tehnika vrednovanja kreditne sposobnosti, modela logističke regresije, procijenjene na temelju kategorizirane varijable modificirane pomoću WOE (Weight of Evidence) transformacije, i neuronskih mreža. Nadalje, istražuje se da li kombiniranje više klasifikatora i testiranje prikupljenih informacija ansambl metodom doprinosi boljim rezultatima. Da bi se procijenila izvedivost i učinkovitost ovih metoda, provodi se analiza podataka Lending Cluba. Istražuje se P2P pozajmljivanje, odnosno uzajamno pozajmljivanje bez posredovanja financijskih institucija, koje se još naziva i socijalno pozajmljivanje. Na temelju provedenog istraživanja, može se zaključiti da model logističke regresije daje bolje rezultate od neuronskih mreža. Izgleda da je predloženi ansambl model (kombinirajući logističku regresiju i neuronsku mrežu s prosjekom vjerojatnosti dobivenih iz oba modela) imao veću AUC krivulju, Gini koeficijent i Kolmogorov-Smirnov test veću statističku vrijednost u usporedbi s drugim modelima. Stoga možemo zaključiti da ansambl model omogućuje uspješno reduciranje mogućih rizika od gubitaka koji nastaju uslijed pogrešne klasifikacije troškova.

Ključne riječi: *procjena kreditne sposobnosti, ansambl metode, logistička regresija, neuronske mreže, P2P pozajmljivanje/ uzajamno pozajmljivanje*

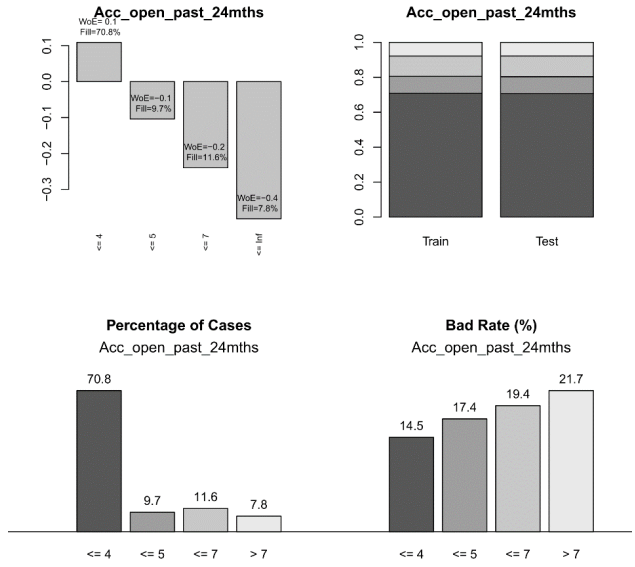
JEL klasifikacija: *G21, G32*

[1] *Docentica, University of Warsaw – Faculty of Economic Sciences, Długa 44/50, 00-241 Varšava, Poljska. Znanstveni interes: ekonometrijske metode i modeli, korporativne financije. Tel.: +48 22 55 49 111. Fax: 22 831 28 46. E-mail: adzik@wne.uw.edu.pl. Osobna web stranica: http://www.wne.uw.edu.pl/index.php/pl/profile/view/155/.*

[2] *Doktorand, University of Warsaw – Faculty of Economic Sciences, Długa 44/50, 00-241 Varšava, Poljska. Znanstveni interes: ekonometrijske metode i modeli, financijski rizik, kreditni rizik, korporativne financije. Tel.: +48 22 55 49 111. Fax: 22 831 28 46. E-mail: mheba@wne.uw.edu.pl. Osobna web stranica: https://www.wne.uw.edu.pl/index.php/pl/profile/ view/336/.*

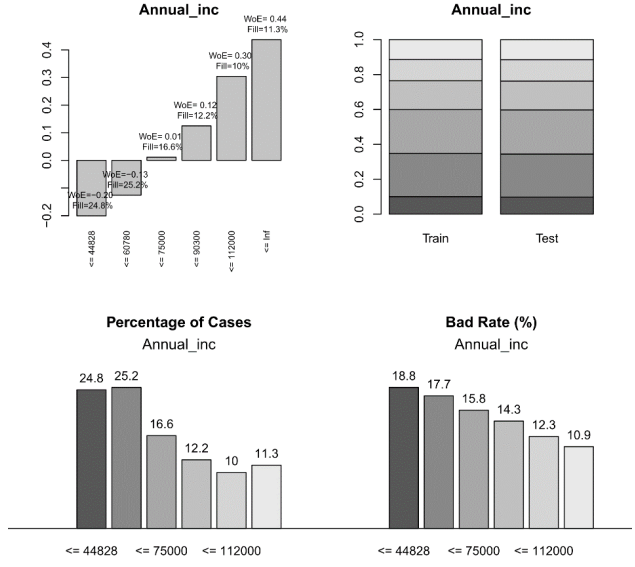
Appendix – *Coarse classing* procedure results for particular variables

Figure 3: Variable *Acc_open_past_24mths – coarse classing*



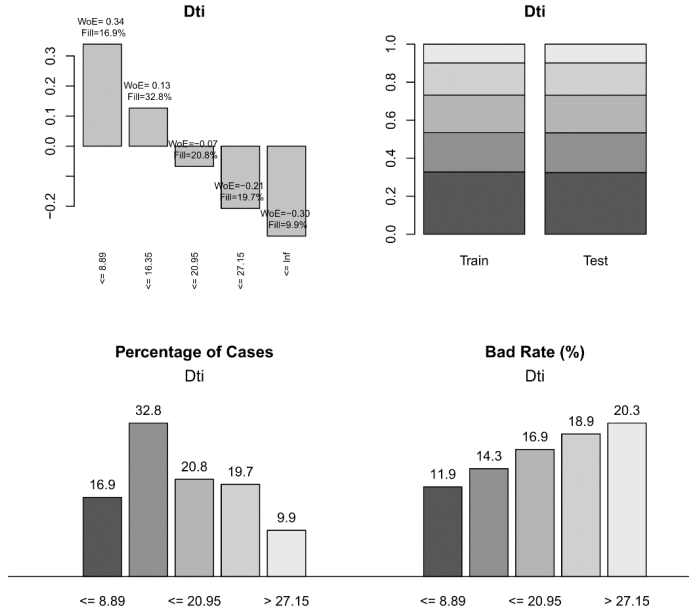
Source: Authors' calculations.

Figure 4: Variable *Annual_inc – coarse classing*



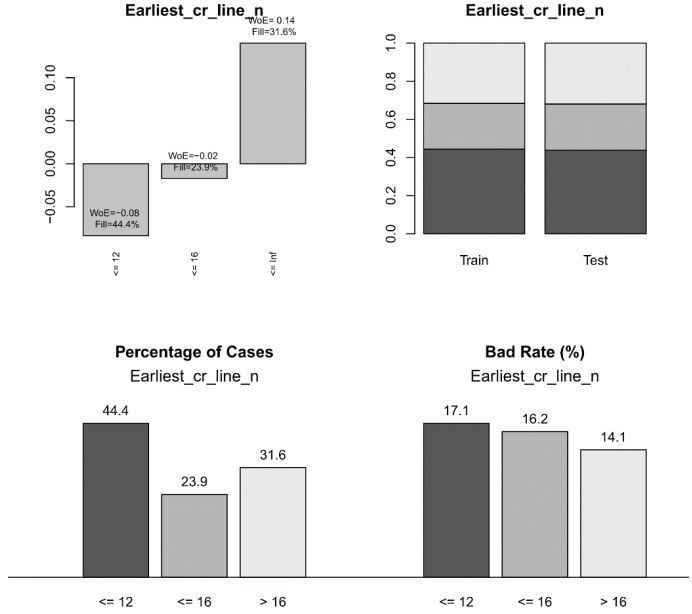
Source: Authors' calculations.

Figure 5: Variable *Dti – coarse classing*



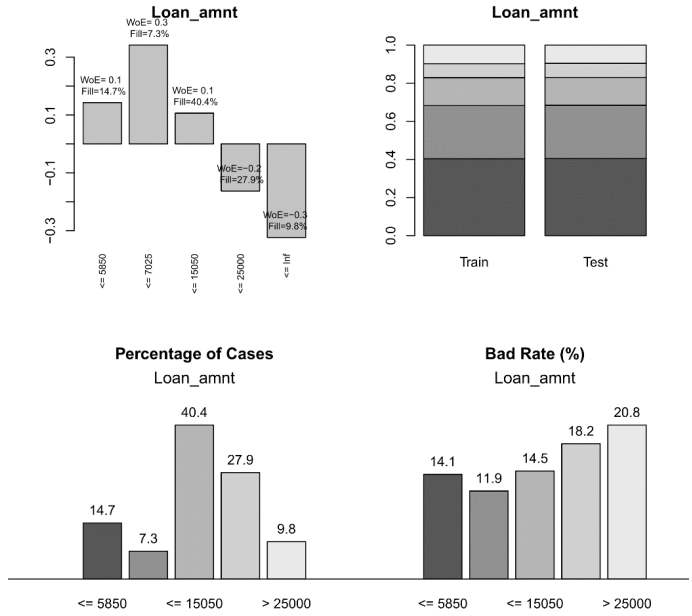
Source: Authors' calculations.

Figure 6: Variable *Earliest_cr_line_n – coarse classing*



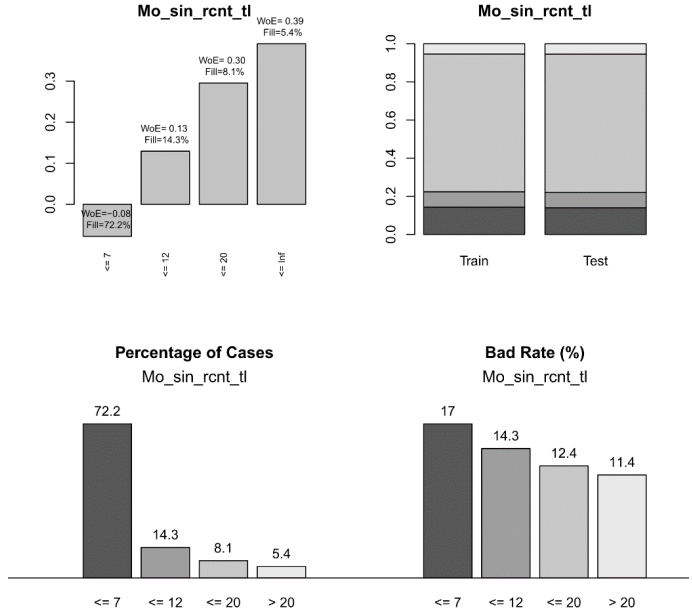
Source: Authors' calculations.

Figure 7: Variable *Loan_amnt – coarse classing*



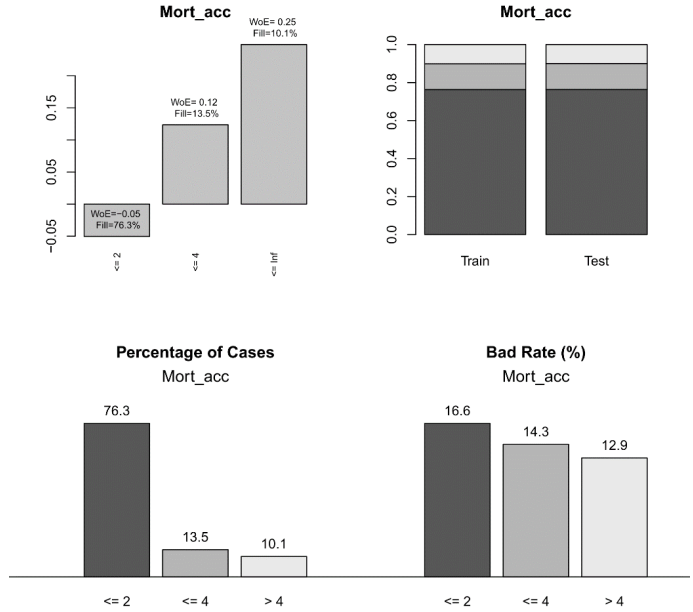
Source: Authors' calculations.

Figure 8: Variable *Mo_sin_rcnt_tl – coarse classing*



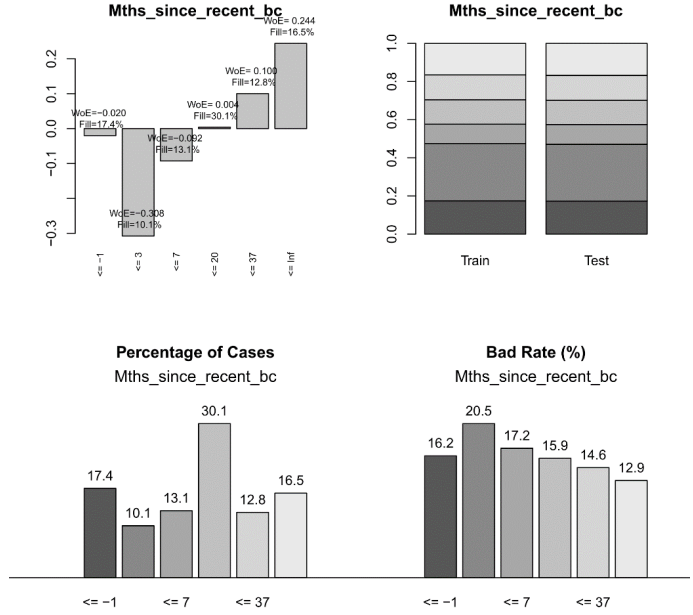
Source: Authors' calculations.

Figure 9: Variable *Mort_acc – coarse classing*



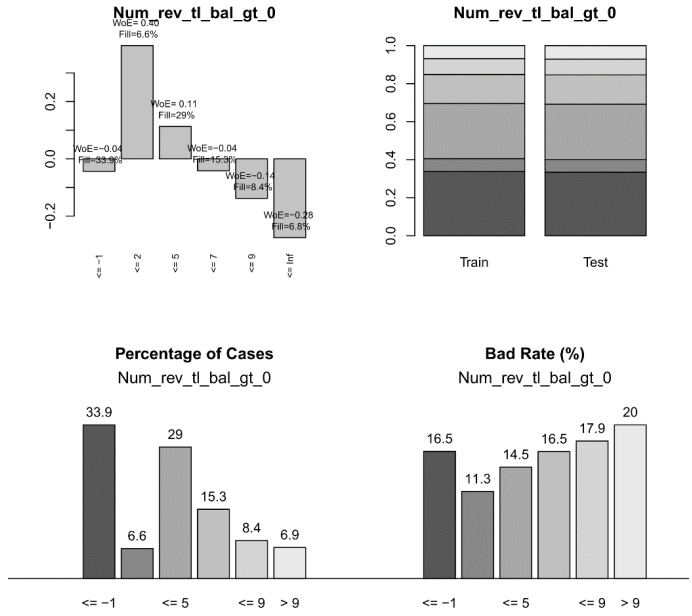
Source: Authors' calculations.

Figure 10: Variable *Mths_since_recent_bc – coarse classing*



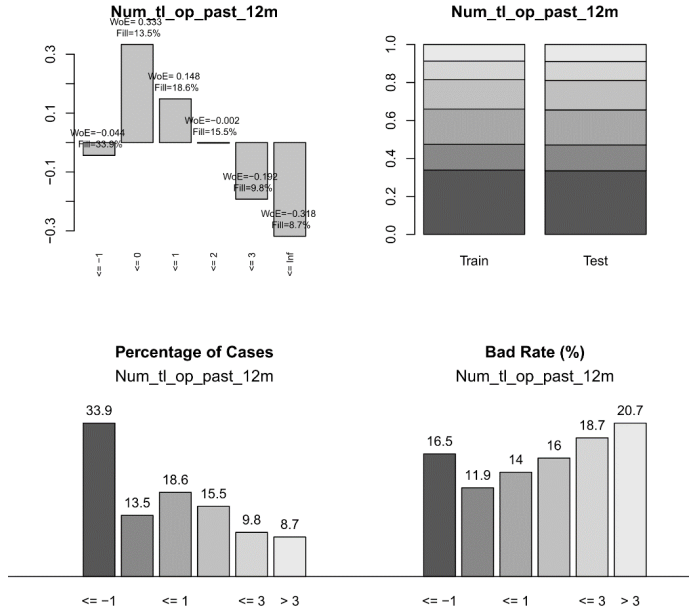
Source: Authors' calculations.

Figure 11: Variable *Num_rev_tl_bal_gt_0 – coarse classing*



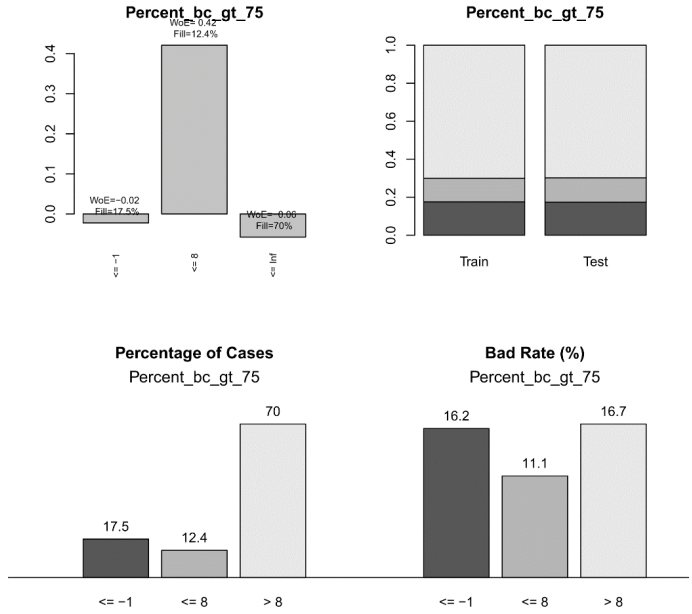
Source: Authors' calculations.

Figure 12: Variable *Num_tl_op_past_12m – coarse classing*



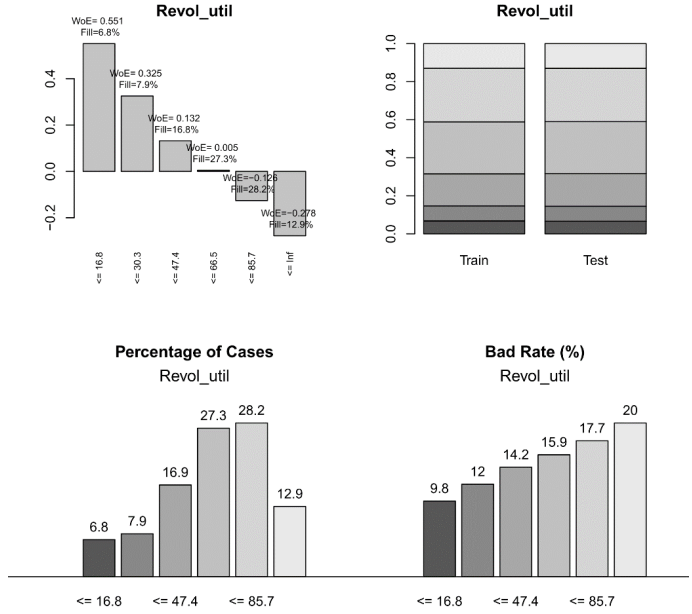
Source: Authors' calculations.

Figure 13: Variable *Percent_bc_gt_75 – coarse classing*



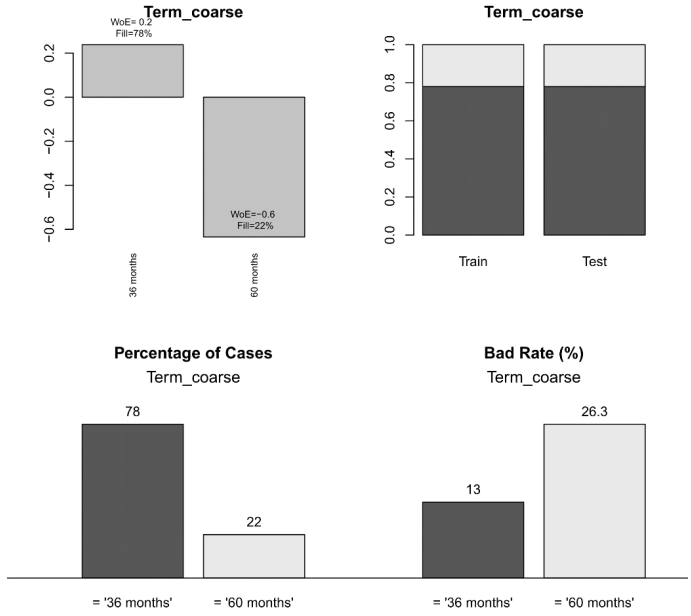
Source: Authors' calculations.

Figure 14: Variable *Revol_util – coarse classing*



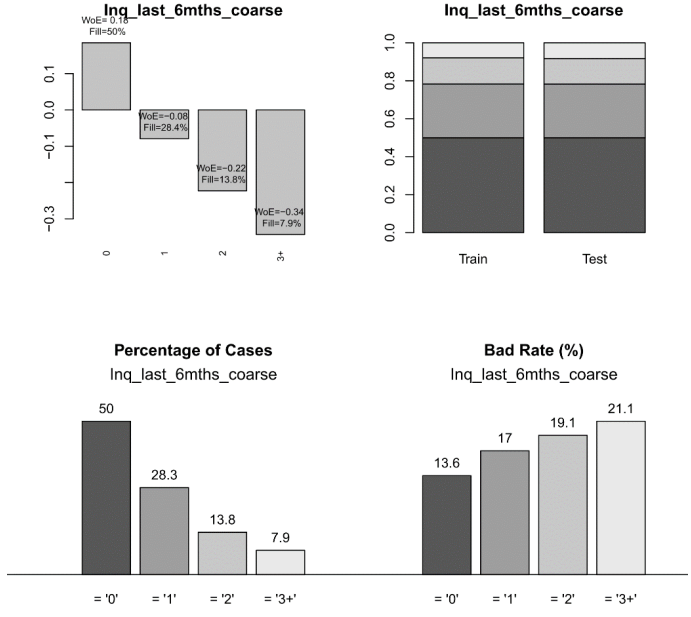
Source: Authors' calculations.

Figure 15: Variable *Term – coarse classing*



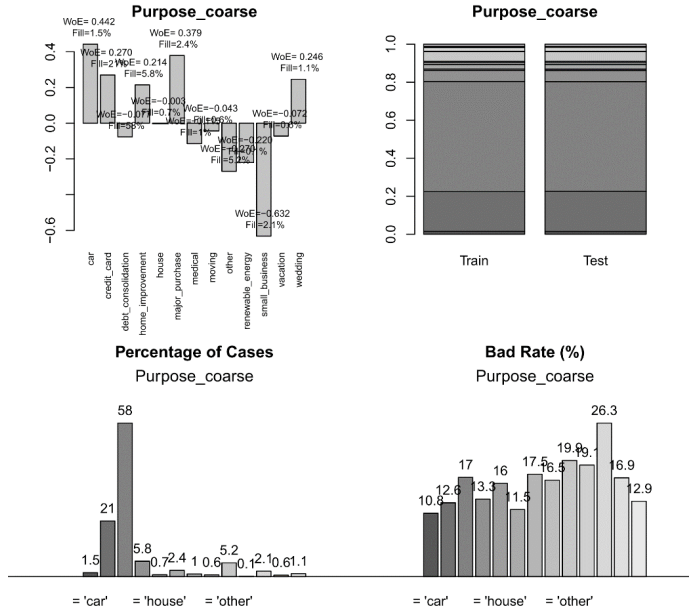
Source: Authors' calculations.

Figure 16: Variable *Inq_last_6mths – coarse classing*



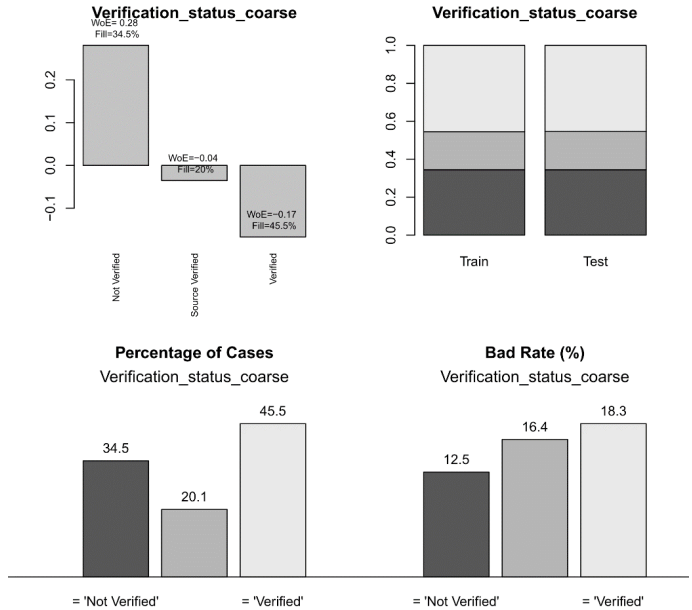
Source: Authors' calculations.

Figure 17: Variable *Purpose – coarse classing*



Source: Authors' calculations.

Figure 18: Variable *Verification_status – coarse classing*



Source: Authors' calculations.

Preliminary communication
UDC: 657.47:330.43(55)
https://doi.org/10.18045/zbefri.2021.1.199

The relationship between corporate governance characteristics and agency costs*

Mahdi Salehi[1], *Mohammad Sadegh Adibian*[2], *Zakiyeh Sadatifar*[3], *Ehsan Khansalar*[4]

Abstract

The present study aims to evaluate the contributing factors to agency costs in Iran. In this regard, 112 companies were studied over 2010 - 2016. Since the model is dynamic and the dependent variable suffers from a lag, the generalized method of moments is employed to free the independent variables and the disruptive component. The findings indicate a significant lag in the dependent variable of all three models. An audit committee's presence significantly affects the decline of agency costs in all three models. Moreover, results suggest that family companies and the state shareholders of all three models have no significant impact on the agency costs. The existence of financial leverage matching with all three models causes the decline of agency costs. In terms of assets, Larger companies based on the three models have more agency costs as well.

Key words: *agency costs, dynamic panel, generalized method of moments, factor analysis, and audit committee*

JEL classification: *M41, C18*

* Received: 20-03-2020; accepted: 27-06-2021

[1] *Associate Professor of Accounting, Ferdowsi University of Mashhad, Postal code 9177948974, Mashhad, Iran. Scientific affiliation: auditing and financial reporting. Phone:+989121425323. E-mail: mehdi.salehi@um.ac.ir. (Corresponding author)*

[2] *PhD student, Ferdowsi University of Mashhad, Mashhad, Postal code 9177948974, Iran. Scientific affiliation: econometric methods and models, corporate finance. Phone: 989157001093. E-mail: Adib.mohammad@gmail.com.*

[3] *M.A. in Accounting Imamreza International University of Mashhad, Postal code 916789412, Mashhad, Iran. Scientific affiliation: auditing and accounting. E-mail: saadate94@gmail.com.*

[4] *Associate Professor of Accounting, Kingston University London, London, the UK. Scientific affiliation: financial reporting and accounting. Phone: +44 752 8593389. E-mail: e.khansalar@kingston.ac.uk.*

1. Introduction

Any firm's goal is to try to have the desired performance to increase the value of the firm's shares, achieve greater profits, and ultimately increase shareholders' interests and satisfaction. Therefore, to achieve these goals, each firm must identify the factors that moderate the above goals' achievement. Agency costs are one of the factors whose increase has a negative impact on the shareholders' interests. Because increasing agency costs reduce the firm shareholders' value, ask the managers to manage the firm to increase the firm value (Dawar, 2014). The people of society seek to increase their interests, and managers are no exception to the case and want to, along with maximizing their interests, social welfare, and stabilizing their job position, provide a sound image of the financial status of the business firm to shareholders. The problem here is that, in some cases, the increase of the managers' wealth, as a result of decreasing shareholder benefits (Kim et al., 2012). This reflects a lack of conformity among managers' interests and other beneficiary groups within a business firm (Salehi et al., 2020).

To assume that both the manager and the owner think about maximizing their own interests emphasizes that an agent does not always work to the client's benefit. In other words, one of the agency problems is the presence of a conflict of interests between owner and manager. Numerous studies on the conflict of interests between managers and owners, especially after recent financial scandals in large global companies (Kilic, 2015), declared that the potential conflict of interests between managers and scattered shareholders provokes when managers have no ownership rights. Therefore, the firm's control is likely to be to managers' service rather than to implement shareholders' interests by the management's higher expertise.

One of the other agency problems is the incapability of the shareholder to monitor the manager's operations. A shareholder cannot pursue the managers' daily actions to be ensured whether or not the decisions are made following the interests of the shareholders (Salehi et al., 2020). Thus, the shareholder is deprived of the required information, which is called information asymmetry. In the agency theory, such additional information of the manager is called private information. The presence of private information gives rise to information asymmetry between the shareholder and manager. Therefore, the shareholders incur the agency costs for downsizing the crippling effects of the conflict of interests (Manos et al., 2012).

The agency costs are made of both parties' conflicts of interests by the agency relation's emergence. Broadly, we could say that the agency costs are those expenses derived from the conflict of interests between shareholders, bondholders, and business managers. Such a conflict of interest is often due to two main reasons, first, the difference in objectives and beliefs of shareholders, and second, the difference and the information asymmetry of participants about the firm and its performance (Buchwald, 2016). Hence, by bearing some costs, called the agency

costs, shareholders would be able to curtail the damaging effect of separation of ownership and management.

Since managers eventually incur the monitoring costs, they are willing to trust owners not to do action hurting their profit. The manager's consumed resources to earn the trust of owners are called the commitment costs. For instance, the owners' costs for disclosing additional information may lower the supervision and benefit the managers. Commonly, managers are willing to bear such costs until the final costs of commitment are equal to the decline of the monitoring costs.

In most agency relations, owners and managers carry the costs of monitoring and commitment. However, likely, the CEO's decisions do not conform to the maximizing decisions of owners' profit; in Rial currency, such a downturn in owners' welfare due to such conformity is called the residual loss (Jensen, 1986). Hence, when both parties to the agency relationship are expected to behave logically to maximize their interests, such a relation could be problematic because it is impossible to do so.

To lessen the agency costs, shareholders require a mechanism for controlling and decreasing the costs, one of which is the corporate governance mechanism. Improving firm performance due to favorable corporate governance would increase the firm's stock value and provide an opportunity for capital attraction (Yeo, 2012). Therefore, by upgrading the governance, the desired capital will be attracted by the investors from the local markets, but the foreign investors will be assured of investing in such companies (Salehi and Salimi, 2017). Good corporate governance by enhancing the firm performance and information transparency reduces the conflict of interests between shareholders and owners, decreases the information asymmetry between the shareholder and manager, satisfies the shareholders, and lowers agency costs (Hong et al., 2015). Thus, the corporate governance system's mechanisms have various aspects that reduce the agency conflict and may differ between alternative and complementary sides. Therefore, the present study examines whether corporate governance characteristics, including the audit committee, CEO tenure, family ownership, and state ownership, affect agency costs? And if so, how does each affect agency cost, positive or negative?

Therefore, the following hypotheses are postulated in the study:

H_1: There is a significant relationship between the audit committee and the agency costs.

H_2: There is a significant relationship between CEO tenure and agency costs.

H_3: There is a significant relationship between family ownership and agency costs.

H_4: There is a significant relationship between state ownership and agency costs.

The research›s brief structure is as follows: The second part of the research is related to reviewing the literature related to financial leverage, company size, audit committee, CEO tenure, Family ownership, and State ownership. The third part is related to research methodology, including introducing the statistical population, research models, variables, and how to measure them. The fourth part is related to estimating models and analyzing the obtained information. Finally, the last part is related to the discussion and the results of the research.

2. Literature review

2.1. Audit committee

In general, Jensen defined agency costs as follows: *Monitoring costs of a manager by the owner:*

These costs comprise the owners' efforts for evaluating, observing, and controlling the agent's behavior. Such an attempt may include the independent auditor's payment, compensation plans, and/or limitations on budget, etc. The owners incur these costs, but Fama and Jensen (1983) argue that they could finally modify a manager's rewards and benefits. Another alternative to monitoring managers is the audit committee. The audit committee's supervision is one strategy to enhance information flow between shareholders and managers (Rouf, 2011). The audit committee is a component of internal control, improving rate governance, and fewer leniency costs (Klein, 2002; Ilaboya and Obaretin, 2015). An internal control system is a management tool helping the profitability and enhancement of the firm performance and hindering the waste of firm resources (Hunzikera, 2014). When the agency costs soar, it demands high-quality audit increases, as well. This occurs either voluntarily as a medium mechanism or externally as a control mechanism by shareholders and creditors. Auditors gain more data collection and more accurate judgment with auditors' specialization and professional advancement. Therefore, we could state that the demand for specialized auditors is grown. To have more careful information flow supervision, the audit committee should grasp managerial and financial accounting's required expertise. The specializations needed for monitoring would reduce internal control, lowering agency costs (Yang and Krishnan, 2005). Dey (2005) concluded that in companies with the highest agency costs, the audit committee's effectiveness has a positive and significant relationship with the quality of benefit.

Beshkooh et al. (2015) showed a negative and significant relationship between agency costs and audit quality.

Therefore, the audit committee as an internal control can affect the agency costs by improving the transparency of financial statement information, so the audit committee›s effectiveness on agency costs is likely negative and significant.

2.2. CEO tenure

To increase the firm value and enhance profitability, most shareholders tend to use highly qualified managers. Hence, the increase of knowledge and experience could cause lower CEO tenure on the board. However, a longer tenure may establish a friendship between the board members and the CEO, downplaying the management's supervision role. Short-time CEO tenure causes the investments to be of higher priority than quicker returns, and investments that create long-term values would be avoided (Antia et al., 2010). Some scholars believe that as the CEO tenure increases, the sense of responsibility for controlling the decisions taken grows, plans will be more purposeful, and the firm characteristics and the opportunities and threats become clearer. These factors would develop more sensitivity concerning the decisions taken and the control of plans.

Consequently, longer management tenure is a long-term commitment to improving firm performance and decreasing agency costs (Arosa et al., 2013). Anita et al. (2010) indicate that the CEO's short-term decision-making horizon causes the investments to be the top priority with the fastest returns possible. Those that create long-term values will be ignored. Zhang (2010) concluded that compensation based on the percentage of equity increases the firm performance at the beginning of their tenure for the managers. For the internal managers, this variable decreases at the end of their tenure.

2.3. Family ownership

The ownership structure is different for various companies. It is a type of ownership in which real shareholders are the members of a family or are relatives and, by holding a high percentage of stocks or affiliation in the board, greatly influence the firm (Anderson et al., 2003).

According to the agency theory, the conflict of interests could obsess the owners (shareholders) to the point that they evaluate the managers to be ensured that optimal resources are allocated to the managers. We realized that some managerial decisions could waste the firm resources and destruct owners' wealth. On the other hand, managers have always sought to maximize their interests and ensure that their decisions benefit them. Based on an approach, due to the creation of good fame, in the long run, family ownership is encouraged, and activities like earnings management, which have short-term effects, should be avoided (Wang, 2006). Several studies put forward to test the management problems and different types of control derived from such an organizational structure (Gonzales et al., 2010).

The most important issue in the studies on family ownership is how to define such firms. Generally, family ownership refers to those firms, the shares of which are at the possession of a family, and the family members are the board members at

the same time or are working on different managerial and operational positions. Due to lower agency costs, those firms operate by family foundations and should be more efficient than the state institutions. The available evidence in the agency costs literature suggests that any increase in family shareholders' ownership and management causes fewer agency conflicts (Alton et al., 2007). Anderson et al. (2003) noticed that family ownership incurs fewer financial supply costs.

This is in line with the idea that family ownership has some goals to reduce agency costs between owners and firm creditors. Chrisman et al. (2004) showed that the agency problem in family ownership is less than that of the non-family firms. Fleming et al. (2005) showed an increase in family ownership could lower agency costs. Chrisman et al. (2007) show that family managers are under the supervision of and support family owners using a driver named compensation. Given the family managers' higher performance, we could guess such firms' agency behavior and confirm firm performance enhancement theory by establishing agency costs control mechanisms.

2.4. State ownership

The ownership structure has a pivotal and specified position in the corporate governance system. Determining the type of ownership structure and the shareholders' composition is a control and governance tool in firms. After leadership, the issue also contributes to different determining factors of ownership type, including ownership distribution, ownership concentration, the presence of minority shareholders in ownership composition, and ownership percentage. Moreover, firms' stock composition follows a different pattern like institutional ownership, managerial ownership, and private and state shareholders (Li et al., 2007).

In some studies, the state is considered a major investor, and in some others, state ownership is more than just a shareholder. The state-owned companies are those establishments; more than 5% of their shares belong to the state, state, or state firms, including insurance, financial institutions, banks, state companies, and other state sectors (Firth et al., 2008).

Several studies demonstrate that state ownership imposes some costs on the state and, consequently, brings about less profitability and lower firms' stock value. On the other hand, some scholars showed that state-owned companies, due to their access to financial resources, enjoy higher profitability. Their stock value will grow in the capital market.

Salehi et al. (2020) indicate that the greater number of board directors' meetings improves agency costs. They also highlighted that the higher educational level of board members decreases the agency cost. Further, they illustrated that women's presence in the board of directors, the ownership of firms' board of directors,

board members' bonuses, and independence decrease agency costs. Further, they documented that CEO duality plays a significant role in worsening agency costs in the statistical population.

Firth et al. (2008) found that institutional ownership and state ownership have no significant effect on agency costs.

2.5. Financial leverage

Financial leverage is a factor that captured other stakeholders' attention, like creditors, and consequently directs them to stricter supervision. This variable indicates the extent to which the firm could rely on long-term debts and borrowings to supply its required financial supply. Counting on debt as a governance characteristic is based on the view that creditors analyze the management performance. Some believe that the increase in debt inflates bankruptcy risk (Oberdavich and Gill 2013). Li and Gui (2003) argued that debts lower agency costs. Byrd (2010) declared a conflict of interest between managers and shareholders on spending free cash flows. The results of this study indicate that there is an inverse relationship between financial leverage and agency costs. Moussa and Chichti (2011) showed that the debt policy is a major mechanism for controlling the agency problems of free cash flows. Nazir and Satia (2013) found a negative relationship between these two variables. Brewer and Featherstone (2017) noticed a significant relationship between financial leverage and agency costs. Russell et al. (2017) found a negative and significant relationship between these two variables.

2.6. Firm size

Due to less complication, decision-making and control seem easier in small firms, and monitoring in such firms, compared with large companies, will be decreased (Arosa et al., 2013). Due to various operations, large companies are less on the brink of bankruptcy, enjoy a more comprehensive organizational structure, and incur more agency costs (Garanina and Kaikova, 2016). The firm size indicates its competitive advantage, and since a higher share of the market asks for more production and sales, having ample and larger financial resources help the firm produce more and spend freely on production and marketing to generate competitive advantages. Firm size also reflects the managerial ability and the quality of accounting plans. The development of firm size signals powerful management that tries to increase the economic resources using the accounting plans. Current studies demonstrate that there is a positive relationship between firm size and agency costs. Zhang and Li (2008) assessed the relationship between agency costs and the financial leverage of companies and found a positive and significant relationship between these two variables.

3. Methodology

The information software of Tadbir Pardaz and Rah Avar-e Novin was used to gather information from the audited financial statements of listed companies on the Stock Exchange.

The statistical population comprises all companies listed on the Tehran Stock Exchange. In this study, the screening method was used for selecting the samples, such that first all companies were selected during 2010-2016, then companies with the following qualifications were included:

– Being accepted to the Securities and Exchange before 2010;
– The financial yearend should be on March 20;
– Should not change their fiscal year;
– Should not be affiliated with non-financial companies, like banks, investment, and holding companies, because the nature of such companies is different; and
– Their financial information should be available.

Given the above-said limitations, finally, a total of 112 listed companies on the Tehran Stock Exchange were selected. Excel's spreadsheet software was used to summarize the information, and the hypotheses were tested using the Eviews10 Software.

3.1. Research models and variables

Since the dependent variable of the research has been measured in 3 different ways, so the present study has 3 models as follow:

Model 1)

$$ACOST1_{it} = \beta_0 + \beta_1 ACOST1(-1)_{it} + \beta_2 DEBT_{it} + \beta_3 ACS_{it} + \beta_4 STATE_{it} + \beta_5 TENUE_{it} + \beta_6 (FAMILY - FIRM_{it}) + \beta_7 (FIRM - AGE_{it}) + \beta_8 SIZE_{it} + e_{it}$$

Model 2)

$$ACOST2_{it} = \beta_0 + \beta_1 ACOST2(-1)_{it} + \beta_2 DEBT_{it} + \beta_3 ACS_{it} + \beta_4 STATE_{it} + \beta_5 TENUE_{it} + \beta_6 (FAMILY - FIRM_{it}) + \beta_7 (FIRM - AGE_{it}) + \beta_8 SIZE_{it} + e_{it}$$

Model 3)

$$ACOST3_{it} = \beta_0 + \beta_1 ACOST3(-1)_{it} + \beta_2 DEBT_{it} + \beta_3 ACS_{it} + \beta_4 STATE_{it} + \beta_5 TENUE_{it} + \beta_6 (FAMILY - FIRM_{it}) + \beta_7 (FIRM - AGE_{it}) + \beta_8 SIZE_{it} + e_{it}$$

3.1.1. Dependent variable:

3.1.1.1. ACOST1: The inverse asset turnover ratio is achieved from the inverse annual sales division on total assets and indicates the agency costs. The asset turnover ratio in the studies of Ang et al. (2000) and Sing and Davidson (2003) is also used as a variable with an inverse relationship with the agency costs. Here, we use the inverse value, which is directly associated with agency costs.

3.1.1.2. ACOST2: Are operation costs to sales ratio. An operational cost encompasses the marketing costs, sales advertisements, and rent costs and somehow reflects the managerial authorities in consuming the firm resources. This index is used as the direct criterion for agency costs. The higher the index, the higher the agency costs would be. So, an operational cost to sales ratio is indicative of the managerial authorities for consuming the firm resources (Florakis, 2008).

The accurate measurement of agency costs is one of the most complicated issues. Two variables of inverse asset turnover ratio and operational costs to sales ratio demonstrate the relative amount of the agency costs and assign a ratio to the agency costs from different aspects. In this paper, factor analysis is used to include these two variables. The SPSS25 Software, KMO test statistic, and Bartlett test were used to measure the factor analysis's appropriateness. The value of the KMO test statistic is 0.54. So, we can cautiously say that data are suitable for the factor analysis. Further, we test the null hypothesis, based on the Bartlett test, to determine whether or not the correlation matrix among the variables is related to a population with uncorrelated variables. The calculated probability level is 0.01, so the null hypothesis is rejected, and the data are suitable for the factor analysis.

3.1.1.3. ACOST3: two variables of inverse asset turnover ratio and operational costs to sales ratio achieved from the factor analysis, indicating the agency costs index.

3.1.2. Independent variables:

Agency cost lag (ACOST(–1): to protect shareholder interests and lessen the conflict of interests, shareholders are willing to pay the agency costs. Given that, we could declare that the increase of operational costs to sales within a year is indicative of the decrease of the firm performance and, consequently, the decline of shareholders' interests. This could encourage the shareholders to incur more agency costs to prevent a higher decline in their firm's interests. Hence, we could say that a part of the agency costs has some endogenous reasons, signifying that the previous periods' agency costs could affect the present. Independent of changes in other exogenous variables, a firm with high agency costs in the t period would experience relatively higher agency costs in the upcoming period. Those structures

that shape during the working groups are often more willing to survive and double their attempts to preserve the previous conditions.

Financial leverage (DEBT): to measure the variable, firm debt is divided by the firm assets.

Audit committee (ACS): this variable is considered a dummy, such that if the firm has an audit committee, it takes 1; otherwise, 0.

Firm size (SIZE): in this paper, according to Dawar's (2014) study, we tried to assess the impact of firm size. Hence, to measure the firm size, the natural logarithm of firm assets is used.

State ownership (STATE): the criteria for measuring this variable is the index values. If the state is the shareholder, it takes 1; otherwise, 0.

CEO tenure (TENUE): to measure the variable, if the CEO tenure is more than 3 years, it takes 1; otherwise, 0.

Family companies (FAMILY-FIRM): this variable is an index, such that if the firm operates by a family, it takes 1; otherwise, 0 will be assigned.

Firm age (FIRM-AGE): the number of years passed from the firm establishment is considered.

4. Empirical data and analysis

4.1. Research findings

4.1.1. Descriptive statistics

The descriptive statistics of research variables are calculated for the initial data analysis and presented in Table 1. As depicted in Table 1, given the relative closeness of the mean and median in most variables, we could declare that all variables have an appropriate statistical distribution. Their standard deviation is not 0, so we can enter the desired variables into the model.

Table 1: Descriptive statistics

Variables	Mean	Median	Maximum	Minimum	Standard deviation	Skewness	Kurtosis
ACOST1	1.490	1.270	7.280	0.150	0.880	1.790	8.530
ACOST2	0.310	0.120	38.310	0.000	2.000	15.560	262.390
ACOST3	1.160	0.960	22.290	0.060	1.150	10.570	170.540
DEBT	0.670	0.640	3.060	0.060	0.330	2.440	14.810
FIRM_AGE	36.840	40	64	6	14.30	-0.220	1.800
SIZE	13.730	13.40	18.900	10.100	1.670	0.760	3.400

Source: Research Database

Table 1-2: Descriptive statistics (dummy variable)

Variables	Mean	Median	Maximum	Minimum	Standard deviation	Skewness	Kurtosis
ACS	0.530	1	1	0	0.490	-0.130	1.010
FAMILY_FIRM	0.080	0	1	0	0.270	2.970	9.860
STATE	0.800	1	1	0	0.390	-1.570	3.400
TENUE	0.490	0	1	0	0.500	0.030	1.000

Source: Research Database

Low standard deviation indicates low data scatter from the mean, and high standard deviation indicates high data scatter from the mean. In the table for non-dummy variables, as it is known, the age variable of the company with a standard deviation of 14.3 has the highest dispersion of the average, which is due to the definition of the variable and given that this variable always changes for each year. It is correct and logical. And the debt variable with a standard deviation of 0.33 has the lowest scatter of the average, which means that usually, the debt-to-assets ratio of companies does not change much over time. In the study of skewness coefficient, it is observed that all the studied variables have a positive skewness coefficient, i.e., higher than the normal distribution.

In the descriptive statistics table for dummy variables, as it is known, the TENUE variable with a standard deviation of 0.5 has the highest dispersion of the average. The FAMILY-FIRM variable with a standard deviation of 0.27 has the lowest dispersion of the average, meaning that companies run as a family, mostly running the same way and not changing throughout the year.

4.1.2. Pattern estimation

One of the drawbacks of the agency cost in the conducted studies is ignoring the agency's endogeneity issues. The present study, due to the presence of a lagged dependent variable in the right side of the equation and pattern estimation, is biased and incompatible, so use two-step estimation methods of 2SLS or Generalized Method of Moments (GMM) is necessary. 2SLS estimation model may, due to a problem in tools selection, provide large variances for the coefficients and, while the variables could affect the dependent variable, make the estimation statistically insignificant. Hence, the GMM method proposed by Arellano and Bond (1991) for this purpose is one of the major assumptions: the relationship between independent variables and the disruptive component (residuals) is not classic. When the method enters the lagged dependent variable method as an independent variable and the number of cross-sections is more than the number of periods, a relationship and correlation is established between the dependent variable (lagged dependent variable) and the disruptive component (residuals). Within the GMM method, instrumental methods are used to deal with the problem. The compatibility of the GMM's estimators depends on the variability of the applied instruments. Within the Sargan test, the null hypothesis is about the lack of correlation between instrumental variables and the disruptive component (instrument reliability). In contrast, the alternative assumption tests the correlation of instrumental variables and the disruptive component (invalidity of instruments and, consequently, the estimation). Within the test of serial correlation of regression model residuals, the disruptive sentences should have a first-order serial correlation AR (1), not the second-order serial correlation AR (2).

Table 2 depicts the results of the first model fitting.

Table 2: The results of the first model fitting

Model (ACOST1 is the dependent variable) The dependent variable	Coefficient	standard error	statistics	prob
Interrupt variable interrupt	0.070	0.026	2.870	***0.000
ACS	-0.100	0.022	-4.630	***0.000
DEBT	-0.910	0.0315	-2.890	***0.000
FAMILY_FIRM	1.060	0.990	1.070	0.280
FIRM_AGE	-0.010	0.007	-1.880	*0.060
SIZE	0.300	0.030	8.330	***0.000
STATE	-0.140	0.150	-0.940	**0.034
TENUE	0.060	0.010	5.250	***0.000

Notes: ***Significance level is 99% confidence, ** Significance level is 95% confidence and * Significance level is 90% confidence.

Source: Research findings

Based on the results, the lagged dependent variable's effect is positive and significant on the agency costs, which signals if the agency costs increase during the current period and increase and control in the next period. We still have time for the full adjustment of the agency costs, and such costs will be increased in the second run due to the escalation of the previous period. The audit committee's impact on the agency costs, as expected, is negative and significant and indicates that the presence of such a committee could curtail the agency costs.

The effect of financial leverage on agency costs, based on this model, is negative and significant.

In this paper, we assumed that firms operating by a family enjoy lower agency costs, and the increase of ownership and family shareholder management declines the agency conflicts. Still, the results show that family companies were also not able to prevent agency costs.

The impact of state ownership on the agency costs was not significant, which contrasts with the study's expectation.

Thus, results indicate that though management could lead to more experience, it caused higher agency costs and the rejection of managers' longer tenure efficiency in terms of agency costs.

The effect of firm age on agency costs is negative and significant, so companies with longer ages and establishment have lower agency costs.

In this model, dependent variable lags were used as the instrumental variables. The estimator validity of the GMM method depends on the validity of the instrumental variables. In this paper, the Sargan and serial correlation of model residuals tests were employed to assess the validity of the instrumental variables.

The results of the Sargan test showed that the statistic of this test is equal to 7.64, and its probability level is 0.36. So the test's null hypothesis is not rejected based on the statistic and probability level's value because the instrumental variables and the disruptive component are not correlated and have no validity.

The results of the serial correlation test of model residuals are presented in the following table.

Table 3: serial correlation test of the first model residuals

Autocorrelation order	Statistic	Probability level
First	24.700	0.000
Second	0.540	0.460

Source: Research findings

The following table presents the results of the estimation of the second model.

Table 4: the results of the second model fitting (dependent variable of ACOST2)

Model	Coefficient	Standard deviation	T statistic	Probability level
Lagged dependent variable	0.08	0.05	14.28	0.00
ACS	-0.125	0.020	-5.070	***0.000
DEBT	-0.480	0.070	-6.640	***0.000
FAMILY_FIRM	0.050	0.040	1.240	***0.000
FIRM_AGE	-0.030	0.010	-2.770	***0.000
SIZE	0.210	0.050	3.550	***0.000
STATE	-0.070	0.060	-1.200	0.225
TENUE	0.050	0.020	-2.480	**0.015

Notes: ***Significance level is 99% confidence, ** Significance level is 95% confidence and * Significance level is 90% confidence

Source: Research findings

According to the obtained results, the lagged dependent variable has a positive and significant effect. In the second model, where the dependent variable is the operational costs to sales ratio, the lagged dependent variable coefficient has the most value. This signals that the factors contributing to the agency costs are the agency costs value of the prior period. In other words, high operational costs to sales ratio in the t period cause the increase of this ratio in the upcoming period, even if their actuators exist no longer. The effectiveness of the audit committee on the operational costs is negative and significant.

The firm age effect on the operational costs is negative and significant. The relationship between firm size and agency costs is positive and significant. There is no such relationship between state ownership and agency costs, and the effectiveness of CEO tenure on the agency costs is positive and significant. The obtained results, in terms of significance and coefficient sign, are like model 1.

The results of the Sargan test showed that the statistic of this test is equal to 4.89, and its probability level is 0.670. So the test's null hypothesis is not rejected based on the statistic and probability level's value because the instrumental variables and the disruptive component are not correlated and have no validity.

The results of the serial correlation test of model residuals are presented in the following table.

Table 5: Serial correlation test of the second model residuals

Autocorrelation order	Statistic	Probability level
First	118.040	0.000
Second	0.020	0.880

Source: Research findings

The following table presents the results of the estimation of the third model.

Table 6: The results of the third model fitting (dependent variable of ACOST3)

Model	Coefficient	Standard deviation	T statistic	Probability level
Lagged dependent variable	0.230	0.080	2.690	0.000
ACS	-0.080	0.030	-2.530	0.010
DEBT	-0.340	0.190	-1.760	0.070
FAMILY_FIRM	0.080	0.140	0.610	0.545
FIRM_AGE	-0.020	0.010	-2.010	0.045
SIZE	0.290	0.050	5.440	0.000
STATE	-0.020	0.080	-0.250	0.750
TENUE	0.080	0.020	3.460	0.000

Notes: ***Significance level is 99% confidence, ** Significance level is 95% confidence and * Significance level is 90% confidence.

Source: Research findings

According to the obtained results, the lagged dependent variable has a positive and significant effect on the agency costs; the effects of the audit committee, financial leverage, and firm age were negative and significant. Family firms and state firms have no significant impact on agency costs, while the firm size and CEO positively significantly affect the so-called factor.

The results of the Sargan test showed that the statistic of this test is equal to 11.36, and its probability level is 0.330. So the test's null hypothesis is not rejected based on the statistic and probability level's value because the instrumental variables and the disruptive component are not correlated and have no validity.

The results of the serial correlation test of model residuals are presented in the following table.

Table 7: serial correlation test of the third model residuals

Autocorrelation order	Statistic	Probability level
First	71	0.000
Second	2.10	00.340

Source: Research findings

According to the results, the disruptive components have the first-order autocorrelation. But no second-order autocorrelation was observed, so the instrumental variables are valid.

5. Results and discussion

Since the number of companies is more than years, the dynamic panel model and generalized method of moments were employed to enter the lagged dependent variable into the model. Results indicate that in all 3 models, the lagged dependent variable has a positive and significant impact, so ignoring the factors that create or surge the agency costs affects the current period's costs and magnifies the future costs. The audit committee's effect on the agency costs in all three models is high and negative, so establishing an audit committee lowers the agency costs. In other words, we can attribute such a significance to the positive role of the audit committee in fulfilling its duties, so we recommend the companies establish an audit committee to lower the agency costs. Also, recommend the capital supervision institutions pass some laws to pave the way for the development and decline of the agency costs and necessitate the establishment of audit committees. On the other hand, investors can use this result to select companies that have lower agency costs. Financial leverage's effectiveness on the agency costs is negative and significant, which implies that higher debt to assets ratio could reduce the agency costs. Being afraid of bankruptcy and paying the debts is one reason, and managers, to prevent such a risk adopted some contraction policies and diminished the agency costs. The effectiveness of family firms and state ownership on the agency costs is rejected in all three models in terms of statistical significance, so owners cannot prevent agency costs. The agency costs are formed based on the necessity and the state by using supervisory tools and even families. However, it is expected that trust, cooperation, and supervision supersede the agency costs to affect the agency costs' decline significantly. The impact of age on agency costs is considered negative and significant in all three models, so a higher lifetime causes fewer agency costs. The influence of CEO tenure on the agency

costs is positive and significant in all three models, so results show that firms' longer management duration is not a positive issue and increases agency costs.

6. Conclusions

This study showed the importance of the impact of corporate governance components on agency costs. The results of all three models showed that among the four factors of corporate governance, the effect of agency cost interruption and CEO tenure on agency costs was positive and significant. In comparison, the audit committee's effect and financial leverage (as a control variable) on agency costs were negative and significant in all three models. There was also no relationship between family ownership and agency costs and state ownership and agency costs.

Researchers can add a dynamic element to the model in other aspects affecting agency costs and improve the fit by defining instrumental variables. On the other hand, the results pave the way for investors and capital market enthusiasts. In general, lower costs mean higher profits, so the results can help compare companies and choose the right portfolio. Given that all three models consider all three variables for agency costs, the results are the same. The coefficient and significance were obtained, considering that the amount of coefficients obtained is irrelevant in such studies. In addition to these results, the choice of indicators to represent the costs of representation is correct. On the other hand, researchers can use only one of them to do similar research.

Any attempt to reduce agency costs and reduce the current period will also reduce the agency costs in future periods (significant dependent variable interruption), requiring multiplicative accuracy in this area by managers. Financing through debt creation and leverage in companies is considered positive in terms of agency costs.

References

Alton. P. B. et al. (2007) "Improved global simulations of gross primary product based on a separate and explicit treatment of diffuse and direct sunlight", *Journal of geophysical research*, Vol. 112, No. 7, pp. 132–151, https://doi.org/10.1029/2006JD008022.

Anderson, R. C., Mansi, S. A., Reeb, D. M. (2003) "Founding family ownership and the agency cost of debt", *Journal of financial economics*, Vol. 68, No. 2, pp. 263–285, https://doi.org/10.1016/S0304-405X(03)00067-9.

Ang, J.S, Cole, R.A. and Lin, J.W. (2000) "Agency Costs and Ownership Structure", *The Journal of Finance*, Vol. 55, No. 1, pp. 81–106, https://doi.org/10.1111/0022-1082.00201.

Antia, M., Pantzalis, C. Park. J.C. (2010) "CEO decision horizon and firm performance: an empirical investigation", *Journal of corporate finance,* Vol. 16, No. 3, pp. 288–301, http://dx.doi.org/10.2139/ssrn.1107422.

Arellano, M., Bond, S. (1991) "Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations", *Review of Economic Studies*, Vol. 58, No. 2, pp. 277–297, https://doi.org/10.2307/2297968.

Arosa, B., Iturralde, T., Maseda, A. (2013) "The board structure and firm performance in SMEs: Evidence from Spain" *Investigaciones Europeas de Direccion*, Vol. 19, No. 3, pp. 127–135, https://doi.org/10.1016/j.iedee.2012.12.003.

Beshkooh, M. et al. (2015) "The relationship between audit quality and agency cost", *Journal of Basic and Applied Scientific Research*, Vol. 3, No. 2, pp. 516–525, https://www.textroad.com/pdf/JBASR/J.%20Basic.%20Appl.%20Sci.%20Res.,%203(2)516-525,%202013.pdf.

Brewer, B. and Featherstone, A.M. (2017), "Agency cost of debt: evidence from Kansas farm operations", *Agricultural Finance Review*, Vol. 77 No. 1, pp. 111–124, https://doi.org/10.1108/AFR-03-2016-0023.

Buchwald, A. (2016) "Competition, outside directors and executive turnover: Implications for corporate governance in the EU", *Managerial and Decision Economics*, Vol. 37, No. 4-5, pp. 213–371, https://doi.org/10.1002/mde.2781.

Byrd, J. (2010) "Financial Policies and the Agency Costs of Free Cash Flow: Evidence from the Oil Industry", International Review of Accounting, *Banking and Finance*, Vol. 2, No. 2, pp. 23–50, https://doi.org/10.2139/ssrn.1664654.

Chiu, C. M., Hsu, M. H., Wang, E. T. G. (2006) "Understanding knowledge sharing in virtual communities: An integration of social capital and social cognitive theories", *Decision Support Systems*, Vol. 42, No. 3, pp. 1872–1888, https://doi.org/10.1016/j.dss.2006.04.001.

Chrisman, J. et al. (2007) "Are family managers agents or stewards? An exploratory study in privately held family firms", *Journal of Business Research*, Vol. 60, No. 3, pp. 1030–1038, https://doi.org/10.1016/j.jbusres.2006.12.011.

Chrisman, J. J., Chua, J. H., Reginald A. L. (2004) "Comparing the Agency Costs of Family and Non-Family Firms: Conceptual Issues and Exploratory Evidence", *Entrepreneurship Theory & Practice*, Vol. 28, No. 5, pp. 335–354, https://doi.org/10.1111/j.1540-6520.2004.00049.x.

Dawar, V. (2014) "Agency theory, capital structure and firm performance: Some Indian evidence", *Managerial Finance*, Vol. 40, No. 12, pp. 1190–1206, https://doi.org/10.1108/MF-10-2013-0275.

Dey, A. (2005) "Corporate Governance and Financial Reporting Credibility" Working Paper, Northwestern University, Kellogg School of Management, Evanston, Illinois, https://www.proquest.com/openview/9a2b15dbdb6f054822b57f255dc8b0ce/1?pq-origsite=gscholar&cbl=18750&diss=y.

Fama, E. F., Jensen, M. C. (1983) "Separation of Ownership and Control", *Journal of Law and Economics*, Vol. 26, No. 2, pp. 301–325, https://www.jstor.org/stable/725104.

Firth, M., Fang, P. M. Y., Rui, O. M. (2008) "Ownership, governance mechanisms and agency costs in chinas listed firms", *Journal of asset management*, Vol. 9, No, 2, pp. 90–101, https://doi.org/10.1057/jam.2008.13.

Fleming, G., Heaney, R., McCosker, R. (2005) "Agency Cost and Ownership Structure in Australia", *Pacific Basin Finance Journal*, Vol. 1, No, 13, pp. 29–52, https://doi.org/10.1016/j.pacfin.2004.04.001.

Florackis, C. (2008) "Agency costs and corporate governance mechanisms: evidence for UK firms", *International Journal of Managerial Finance*, Vol. 4, No. 1, pp. 37–59, https://doi.org/10.1108/17439130810837375.

Garanina, T., Kaikova, E. (2016), "Corporate governance mechanisms and agency costs: cross-country analysis", *Corporate Governance*, Vol. 16, No. 2, pp. 347–360, https://doi.org/10.1108/CG-04-2015-0043.

Gonsales, B. et al. (2010) "Educational strategy on prevention of children's accidents for fundamental education", *Public knowledge project*, Vol. 6, No. 6, pp. 274–296.

Hong, B., Li, Z. H., Minor, D. (2015) "Corporate Governance and Executive Compensation for Corporate Social Responsibility", *Springer Science+ Business*, Vol. 136, No. 1, pp. 199–213, https://doi.org/10.1007/s10551-015-2962-0.

Hunzikera, S. (2014) "Internal Control Disclosure and Agency Costs – Evidence from Swiss listed non-financial Companies", *Technology and investment*, Vol. 2, No. 4, pp. 286–294, https://doi.org/10.5281/zenodo.2577842.

Ilaboya, O. J., Obaretin O. (2015) "Board Characteristics and Firm Performance: Evidence from Nigerian Quoted Companies", *Academic Journal of Interdisciplinary Studies*, Vol. 4, No. 1, pp. 283–290, https://doi.org/10.5901/mjss.2015.v4n1p283.

Jensen, M. C. (1986) "Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers", *American Economic Review*, Vol. 76, No. 2, pp. 323–329, http://dx.doi.org/10.2139/ssrn.99580.

Kilic, M. (2015) "The Effect of Board Diversity on the Performance of Banks: Evidence from Turkey", *International Journal of Business and Management*, Vol. 10, No. 9, pp. 182–192, https://doi.org/10.5539/ijbm.v10n9p182.

Kim, S., Pilotte, E., Yang, J. S. (2012) "Agency Costs and the Short-Run Stock Price Response to Capital Expenditures", *The Financial Review*, Vol. 47, No. 2, pp. 375–399, https://doi.org/10.1111/j.1540-6288.2012.00333.x.

Klein, A. (2002) "Economic determinants of audit committee independence", *The Accounting Review*, Vol. 77, No. 2, pp. 435–452, https://ssrn.com/abstract=291049.

Li, H., Cui, L. (2003)"Empirical Study of Capital Structure on Agency Costs in Chinese Listed Firms", *Nature and Science*, Vol. 1, No. 1, https://www.semanticscholar.org/paper/Empirical-Study-of-Capital-Structure-on-Agency-in-Li-Cui/2c6f495680cab9c05ab098e790bb642226be3c4c.

Li, H. X., Wang, Z. J., Deng, X. L. (2007) "Ownership, independent directors, agency costs a financial distress: evidence from Chinese listed companies", *Corporate Governance: The international journal of business in society*, Vol. 8, No. 5, pp. 622–636, https://doi.org/10.1108/14720700810913287.

Manos, R. et al. (2012) "Dividend policy and business groups: Evidence from Indian firms", *International Review of Economics and Finance*, Vol. 21, No. 1, pp. 42–56, https://doi.org/10.1016/j.iref.2011.05.002.

Moussa, F.B., Chichti, J. (2011) "Interactions between Free Cash Flow, Debt Policy and Structure of Governance: Three Stage Least Square Simultaneous Model Approach", *Journal of Management Research*, Vol. 3, pp. 1–34, https://doi.org/10.22495/cocv9i2art2.

Nazir S, Saita H.K. (2013) "Financial Leverage and Agency Cost: An Empirical Evidence of Pakistan", *Int. Journal of Innovative and Applied Finance–IJIAF*, Vol. 1, No. 1, https://www.semanticscholar.org/paper/The-Impact-of-Financial-Leverage-on-Agency-Cost-%3A-Nazir-Nawaz/838991c8fb017bd2ad976ce3d4bb6e135333cff4.

Obradovich, J., Gill, A. (2013) "The Impact of Corporate Governance and Financial Leverage on the Value of American Firms", Faculty Publications and Presentations, No. 91, https://digitalcommons.liberty.edu/busi_fac_pubs/25.

Rouf, M. A. (2011) "The relationship between corporate governance and value of the firm in developing countries", *International Journal of Applied Economics and Finance*, Vol. 5, No. 3, pp. 237–244, https://doi.org/10.3923/ijaef.2011.237.244.

Russell, L.A., Briggeman, B.C., Featherstone, A.M. (2017) "Financial leverage and agency costs in agricultural cooperatives", *Agricultural Finance Review*, Vol. 77 No. 2, pp. 312–323, https://doi.org/10.1108/AFR-09-2016-0074.

Salehi, M., Sadatifar, Z., Adibian, M. (2020) "The Impact of the Characteristics and Behaviors of the Board of Directors on Agency Costs in Iran", *Contaduría y Administración*, Vol. 66, No. 1, http://dx.doi.org/10.22201/fca.24488410e.2021.2384.

Salehi, M., Salimi, S. (2017) "The effect of suspicious executives on tax shelters in Iran", *Journal of Management Development*, Vol. 36, No. 4, pp. 598–610, https://doi.org/10.1108/JMD-04-2016-0060.

Singh, M., Davidson, W. N. (2003) "Agency costs, ownership structure and corporate governance mechanisms", *Journal of Banking & Finance*, Vol. 27, No. 5, pp. 793–816, https://doi.org/10.1016/S0378-4266(01)00260-6.

Wang, D. (2006) "Founding family ownership and earnings quality", *Journal of Accounting Research*, Vol. 44, No. 3, pp. 619–656, http://dx.doi.org/10.1111/j.1475-679X.2006.00213.x.

Yang, J. S., Krishnan, J. (2005) "Audit Committees and Quarterly Earnings Management", *Electronic copy available*, Vol. 9, No. 3, pp. 201–219, https://doi.org/10.1111/j.1099-1123.2005.00278.x.

YEO, H. (2012) "Impacts of the board of directors and ownership structure on consolidation strategies in shipping industry", *The Asian Journal of Shipping and logistics*, Vol. 28, No. 1, pp. 19–40, https://doi.org/10.1016/j.ajsl.2012.04.002.

Zhang, Y. (2010) "The effect of CEO tenure on CEO compensation: evidence from inside CEOs vs. outside CEO", *Managerial finance*, Vol. 36, No. 10, pp, 832–859, https://doi.org/10.1108/03074351011070224.

Odnos između karakteristika korporativnog upravljanja i agencijskih troškova

Mahdi Salehi[1], *Mohammad Sadegh Adibian*[2], *Zakiyeh Sadatifar*[3], *Ehsan Khansalar*[4]

Sažetak

Cilj ove studije je procijeniti čimbenike koji doprinose agencijskim troškovima u Iranu. S tim u vezi, tijekom perioda 2010. - 2016. proučavano je 112 tvrtki. Budući da je model dinamičan i zavisna varijabla ima svojstvo zaostajanja, generalizirana metoda momenata koristi se za oslobađanje neovisnih varijabli i ometajuće komponente. Nalazi ukazuju na značajno zaostajanje zavisne varijable u sva tri modela. Prisutnost odbora za reviziju značajno utječe na pad agencijskih troškova u sva tri modela. Štoviše, rezultati sugeriraju da obiteljska poduzeća i državni dioničari sva tri modela nemaju značajan utjecaj na agencijske troškove. Podudaranje financijske poluge prisutno je u sva tri modela što uzrokuje pad agencijskih troškova. Kad se promatra imovina, veće tvrtke temeljene na tri modela imaju i više agencijskih troškova.

Ključne riječi: *agencijski troškovi, dinamički panel, generalizirana metoda momenata, faktorska analiza i odbor za reviziju*

JEL klasifikacija: *M41, C18*

[1] *Izvanredni professor, Ferdowsi University of Mashhad, Postal code 9177948974, Mashhad, Iran. Znanstveni interes: revizija i financijsko izvješćivanje. Tel.:+989121425323. E-mail: mehdi.salehi@um.ac.ir. (Osoba za kontakt)*

[2] *Doktorand, Ferdowsi University of Mashhad, Mashhad, Postal code 9177948974, Iran. Scientific affiliation: ekonometrijske metode i modeli, korporativne financije. Tel.: 989157001093. E-mail: Adib.mohammad@gmail.com.*

[3] *Magistar ekonomskih znanosti, Imamreza International University of Mashhad, Postal code 916789412, Mashhad, Iran. Znanstveni interes: revizija i računovodstvo. E-mail: saadate94@gmail.com.*

[4] *Izvanredni profesor, Kingston University London, London, the UK. Znanstveni interes: financijsko izvješćivanje i računovodstvo. Tel.:+44 752 8593389, E-mail: e.khansalar@kingston.ac.uk.*

GUIDELINES FOR AUTHORS
– UPUTE AUTORIMA

Authors are kindly requested
to read carefully the Guidelines
amended with detailed methodological instructions

GUIDELINES FOR AUTHORS

Zbornik radova Ekonomskog fakulteta u Rijeci: časopis za ekonomsku teoriju i praksu/Proceedings of Rijeka Faculty of Economics: Journal of Economics and Business is an international peer reviewed journal open to scientists from all over the world in different fields of economic theory, economic policy and related research. As a rule, papers are published in English. However, the Journal may publish articles in other world languages.

Editorial procedure

The Editorial Board receives all manuscripts. After reviewing and accepting the manuscripts, Editor-in-Chief subjects them to the members of the Editorial Board for the assessment process, and in case of the specific content of the text, to external experts as well. After evaluation, Editor-in-Chief proposes Editorial decisions for further action including: (a) which manuscript, if necessary, should be returned to the author with suggestions, comments and recommendations for improvement, primarily methodological presentation of research materials, (b) which manuscripts could be sent to peer-review process, (c) which manuscripts should be rejected because of the reasons as follows:

- the subject matter does not meet the required scientific level,
- the article with a similar topic has already been published by the same author,
- the subject matter does not meet the criteria of the Journal, especially if:
  - the content is beyond the concept of scientific publishing orientation of the Journal (distinguished by the relevant databases), and
  - does not meet international scientific and methodological standards that the Journal must comply with.

If an article is not accepted, the Editorial Board sends a notification to the author, but the manuscript is not returned.

If the manuscript is improved adequately, it is sent to two reviewers for extramural review.

If the manuscript is considered for publishing, the author will receive the Authorship Statement (*Copyright Assignment Form*), which should be filled in, signed and returned to the editor. In this way the authors confirm the originality of the article and validity of authorship.

In order to avoid withdrawing the paper until it is published or rejected, by signing the Authorship Statement, the authors assert compliance with the review process.

Book reviews, reviews on doctoral dissertations, as well as reviews on international conferences and seminars are not submitted to extramural reviews. They are accepted or rejected by the Editor and co-editors.

Review process

All scientific articles submitted for publication in *Zbornik radova Ekonomskog fakulteta u Rijeci: časopis za ekonomsku teoriju i praksu/Proceedings of Rijeka Faculty of Economics: Journal of Economics and Business* are double-blind peer review by two academics appointed by the Editorial board: one from Croatia and one from abroad. Reviewers stay anonymous for the authors and so do the authors for the reviewers. The reviewers are asked to apply highest international standards in their assessment of the submitted work. Reviewers receive an article and a *Reviewer Evaluation Form* with instructions how to fill it in. If the article does not fulfill the primary criteria of originality and relevance to the subject, it should not be accepted.

The categories in which articles, if judged positively, might be classified are:

Original scientific paper is a scientific paper that includes new results based on the research. The information given in the article can be verified by:

a) reproducing methodological procedure and obtain the same/similar results or with tolerable degree of mistakes as estimated by the author himself, or
b) repeating the author's observations and judge his analyses, or
c) checking the author's analyses and deduction on which the author's analyses are based.

Preliminary communication is an article that includes at least one or more pieces of scientific information, but does not include the necessary details to check the scientific cognition.

Conference paper is an article that deals with the author's presentation at a conference, and has not been previously published as a full text.

Review article is an article that analyzes a special scientific problem already dealt with in published scientific works, but his approach is original and new.

Professional paper is an article that deals with specific problems in some professional areas.

After receiving the reviews, the Editorial Board will give clear general instructions to the author for further work on the manuscript. The comments and suggestions made by the reviewers should be addressed and closely followed by the author prior to final recommendation on acceptance or rejection made by the Editorial Board.

Only manuscripts with two positive reviews are published.

After completion of peer review and amendment of the text of the accepted articles by the authors and editors, Editor-in-Chief, proposes the sequence of accepted papers in the table of contents.

Criteria for the order are:

(1) categorization according to the degree of scientific excellence,
(2) in case of two different levels of categorization of a particular article by reviewers, Editor-in-Chief proposes a decision to the Editorial Board, and as a rule, in favour of the author, i.e. a higher category,
(3) appreciation of topical issues, authors and common interest of the Journal taking into account the competitiveness at the same level of scientific excellence (category).

In order to increase the quality and number of papers published, the Editorial Board strives to fasten the publishing process by informing the authors on the status of their papers within ten working days of the submission. Provisional deadline for finishing the reviewing process, technical revisions and online publication of the paper shall last no longer than two months. Moreover, as of 2018, the forthcoming papers that will be included within the regular biannual issues are initially published on our Journal's website.

Organization of the manuscript

The manuscript should include the research aim and tasks, with detailed methodology, the research objective, achieved results and findings, conclusions and a list of references.

The authors of the manuscript should conform to the format and documentation requirements that are given below:

The separate page should contain: the article title, the author's full name, academic affiliation (title, institution, scientific field), phone, fax, e-mail address and personal website. If there are more authors than one, full names, respective affiliations and addresses of co-authors should be clearly stated. Authors'academic affiliation should be:

– in the language of the article,
– in Croatian language,
– in English if the original language of the article is other than English.

The first page should contain: the article title, abstract, JEL classification and key words in the language of the article. At the end of the article all data should be also:

– in Croatian language,
– in English if the original language of the article is other than English.

Main body of the text should contain: introduction, headings, footnotes, references in the text, tables, figures, conclusions and references.

Technical requirements

The manuscript submitted for publication should be in Microsoft Office Word (Ver. 95+), with maximum length up to **8,000** words in length (16-20 A4 size pages), printed in font style Times New Roman (12 point), single-spaced, justified and

without any special styling. Should a word, a phrase or a sentence be highlighted, italic font style can be used and never bold. Paragraphs are divided by double spacing and all margins are at 2.5 cm. In case the paper exceeds the normal length, the Editors' consent for its publication is needed.

JEL classification should be suggested by the authors themselves according to the classification available on the Journal of Economic Literature website: http://www.aeaweb.org/journal/jel_class_system.html.

Footnotes could be used only as an additional explanatory section of the text and should be numbered consecutively in Arabic numerals.

Section headings (from Introduction to Conclusions) must be short, clearly defined and bear Arabic numerals. If there are subsection headings they are outline numbered (e.g. 1; 1.1.; 2.; 2.1.; 2.1.1. etc.)

All *tables and figures* should bear Arabic numerals and must have captions. Tables set in MS Word may be included in the text.

Note: If MS Excel or other programs are used for tables, figures or illustrations, make sure to enclose them as a separate file on disk, separately from the text.

Before submission of the manuscript, the authors of the manuscript are advised to conform to the format and documentation requirements.

Text organization and style

Authors should apply scientific methodology in presenting the contents of their papers complying with the standards of scientific publications ("Harvard style"). This implies the procedure as follows:

(1) Title and the content of the paper:

The title is the most important summary of a scientific article, which reflects the scope of investigation and the type of study. Therefore, the title should not contain words such as "analysis", "methods" and similar.

The content of the paper consists of:

- *Abstract* – below the title
- *Key words*
- *JEL classification.*

It is followed by the main body of the paper divided into sections. The section headings are as follows:

- *Introduction*
- *Literature review*
- *Methodology/method/model/conception of analysis* (the third section)
- *Empirical data (documentation background) and analysis* (the fourth section)
- *Results and discussion* (the fifth section)
- *Conclusions* (the sixth section).

(2) The content of some parts of the material presented:

a. Abstract – up to 100-250 words must contain:

- purpose and research objective,
- methodology/method/model/conception of analysis,
- main findings and results of research (analysis),
- the underlined conclusion of research.

The abstract should not be written in paragraphs!

b. Key words should disclose the essence of the article (up to 5 key words).

c. JEL classification – the author should classify the subject matter of the article according to the code of The Journal of Economic Literature (JEL).

d. Introduction – defines the problem and the subject matter of the research referring to recent bibliography and findings. However, these can more specifically be dealt with in the second section *Literature review*. The last part of the introduction is reserved for setting the hypothesis of the research that will be later on analyzed at the beginning of the conclusions. Finally, Introduction ends up by giving clues of the organization of the text.

e. Literature review – precedes a research section providing readers with a cutting-edge context of the referential literature dealing with crucial points of current knowledge based on the relevant results of the current research. Literature review should be a synthesis of previous research, justifying the theoretical and empirical contributions of the respective paper, a not a simple listing of previous scientific contributions.

f. Methodology/method/model/conception of analysis – usually in the third section of the paper, methodology/method/model/conception of the analysis should be transparently presented and pointed out in case of the research results being subjected to re-testing by interested researchers (it is one of the fundamental principles of the scientific methodology).

g. Empirical data and analysis – contain documentation background and the results of the empirical analysis. The data sample shall be elaborated and the obtained results shall be explained based on statistical and econometric features, and their economic meaning.

h. Results and discussion – explain the results, especially their economic significance and messages. In this section, the author(s) need to elaborate how their results and conclusions contribute to the scientific field and provide practical implications and recommendations.

i. Conclusions – is not supposed to be a summary! Conclusions are the author's original thoughts and evaluation of the obtained results including the items as follows:

- Explanation of the working hypothesis – proved or not proved.
- Assessment of the results of research/analysis with the focus on what can be classified as a new contribution to economic science.
- Attention drawn to research limitations and problems.

- Guidelines to future research.
- Assessment of institutional-systemic implications of the results obtained by the research (suggestions and recommendations for direction or changes of economic system, economic and financial policy, development policy, instruments, measurements or similar).

It is recommended not to write conclusion in paragraphs.

(3) References should include only the titles (sources) that have been referred to and quoted in the paper.

TABLES should be included in the text in order to present the exact values of the data that cannot be summarized in a few sentences in the text. Each column heading for numerical data should include the unit of measurement applied to all data under the heading. Large numbers can be expressed in smaller units with appropriate column headings (in thousands, millions, etc), and logical presentation of data using table grid option in MS Word for table lines (both vertical and horizontal). Each table should be self-explanatory, bearing Arabic numerals (e.g. Table 1, Table 2, etc.) with an adequate title (clearly suggesting the contents) and the source of the data should be stated below the table, if other than author's.

FIGURES (*GRAPHS, DIAGRAMS, ILLUSTRATIONS*) should also be included in the text. They should be numbered in sequence with Arabic numerals, followed by the figure title, and the legend to the figure that contains all the necessary explanations of symbols and findings. The source of the data presented in the figure should be stated below the figure if other than author's.

Note. The text should not simply repeat the data contained in tables and figures, i.e. the text and the data in tables and figures should be related in the text by means of reference marks.

REFERENCES. The ISI citations should be followed by all authors of *Zbornik radova Ekonomskog fakulteta u Rijeci: časopis za ekonomsku teoriju i praksu/ Proceedings of Rijeka Faculty of Economics: Journal of Economics and Business* (please, refer to http://www.isinet.com) and references to other publications must be in Harvard style. At each point in the text that refers to a particular document, insert the author's surname and publication year in brackets: (Rowley, 1996) or (Cutler and Williams, 1986), or in the case of more than two, the first author (from the title page) followed by "et al." (Matlock et al., 1986). If the author's name is repeated no ibid is used but his surname is repeated. If the author's name occurs naturally in the text, the year follows in the brackets: *The work of* Stevens *(2001) was concerned with what they teach at Harvard Business School.* In case of direct quotations the page numbers should be added, e.g. (Jones, 1995: 122–123).

At the end of the article a list of references is organized alphabetically as follows:

- **Books:** Surname, Initials (year) *Title,* Place of publication: Publisher. See example:

Callicott, J. B. (1994) *Earth's Insights: A* S*urvey of Ecological Ethics from the Mediterranean Basin to the Australian Outback,* Berkeley: University of California Press.

If there are two or three authors you put down their surnames followed by initials:

Riddersträle, J., Nordström, K. (2004) *Karaoke Capitalism Management for Mankind,* Harlow: Pearson Education Ltd.

If there are multiple authors (four or more) the first author's surname (from the title page) is followed by et al.:

Norton, M. B. et al. (1981) *A People and a Nation – A History of the United States,* Boston: Houghton Mifflin Company.

• **Journals:** Surname, Initials (year) "Title", *Journal,* Volume, Number, pages. See example:

Kostelich, E. (1995) "Symphony in Chaos", *New Scientists,* Vol. 146, No. 1972, pp. 36–39.

Fox, S. (1994) "Empowerment as a Catalyst for Change: An Example from the Food Industry", *Supply Chain Management,* Vol. 2, No. 3, pp. 29–33.

If there are multiple authors (four or more), the first author's surname (from the title page) is followed by et al. See example:

Di Noia, C. et al. (1999) "Should Banking Supervision and Monetary Policy Tasks be Given to Different Agencies?", *International Finance*, Vol. 2, No. 3, pp. 285–361.

If there are multiple works by the same author published in the same year, the "a, b, c" is used after the year. See example:

Quah, D. T. (1993a) "Empirical Cross-section Dynamics in Economic Growth", *European Economic Review*, Vol. 37, No. 2–3, pp. 426–434.

---------- (1993b) "Galton's Fallacy and Tests of the Convergence Hypothesis", *Scandinavian Journal of Economics*, 95, Vol. 95, No. 4, pp. 427–443.

---------- (1994) "Exploiting cross Section Variation for Unit Root Inference in Dynamic Data", *Economics Letters*, Vol. 44, No. 1–2, pp. 9–19.

---------- (1996a) "Empirics for Economic Growth and Convergence", *European Economic Review*, Vol. 40, No. 6, pp. 951–958.

---------- (1996b) "Regional Convergence Clusters across Europe", *European Economic Review*, Vol. 40, No. 6, pp. 951–958.

The author should provide **Digital Object Identifier (DOI)** for each reference that can be found whether it exists at CrossRef http://www.crossref.org/ and DOI appears in the form such as https://doi.org/10.5468/ogs.2016.59.1.1.

DOI is inserted by the author at the end of references as shown in the example as follows:

Hall, J.K., Daneke, G.A., Lenox, M.J. (2010) "Sustainable Development and Entrepreneurship: Past Contributions and Future directions", Journal of Business Venturing, Vol. 25, No. 5, pp. 439–448, https://doi.org/10.1016/j.jbusvent.2010.01.002.

• **Internet sources:** Author's/editor's surname (year), "Title of the article", *Title of the journal* [type of medium], date of publication, volume number, pagination or online equivalent, <availability statement> [date of accession if necessary]:

Martin, C.L. (1998) "Relationship Marketing: a High-Involvement Product Attribute Approach", *Journal of Product and Brand Management* [Internet], Vol. 7, No. 1, pp. 6–26. Available at: <http://www.apmforum.com/emerald/marketing-research-asia.htm> [Accessed: October 3, 2002]

• **Chapter/section from a book of collected writings:** Author of the chapter/section (year of publication) "Title of the Chapter/section". In Author/editor of collected work, *Title of collected works,* Place of publishing: Publisher. Example:

Porter, M.A. (1993) "The modification of method in researching postgraduate education". In Burges, R.G. ed., *The research process in educational settings: ten case studies,* London: Falmer.

• **Conference papers from conference proceedings:** Author of the conference paper (year of publication) "Title of the conference paper". In *Title of conference proceedings.* Place of publication: Publisher, pagination of section referred to:

Fedchak, E. & Duvall, L. (1996) "An engineering approach to electronic publishing". In *Proceedings of the International* W*orkshop on Multimedia Software Development,* 25–26 March, Berlin, Los Alimos, Ca: IEEE Comput. Soc. Press, pp. 80–88.

• **Theses and dissertations:** Author's name (year) *Title of doctoral dissertation,* the name of the awarding institution:

Whitehead, S.M. (1996) *Public and private men: masculinities at work in education management,* PhD thesis, Leeds Metropolitain University.

• **Official publications:** Title of publication/organisation/institution (year) *Title*, Place of publishing: Publisher. Example:

Department of the Environment (1986) *Landfilling wastes,* London: HMSO (*Waste management paper, 26*).

Guidelines for other publications

The Journal reserves the main printing space for scientific articles accepted from scientists all over the world. However, the other part is devoted to reviews of scientific achievements, which are classified by the editorial board as follows:

• **Book review.** A brief overview of the book is written in a clear and concise manner evaluating the structure, style and scientific achievements of a particular book. It starts with the title of the book, and the main data: the author's name, academic affiliation, title of the book, subtitle (if any), year of publishing, publisher, volume (including number of pages), type of publication (hardcover or paperback), language, ISBN and the author's contact address (e-mail address). If there are more authors than one, full names, respective affiliations and addresses of co-authors should be clearly stated. At the end of the text it is written "Reviewed by" stating the reviewer's name, academic title and affiliation. In addition to the book review, the copy of the cover page of the book is submitted.

• **Review on Doctoral Dissertations.** It starts with the following data: the name of the author of PhD dissertation, author's affiliation (institution he or she works for), the title of the PhD dissertation, the names of the members of the committee in charge, their affiliation, the date when the PhD dissertation was defended including the name of the awarding institution, and in which field of science has PhD been granted. The review evaluates the structure, style, research methodology and results. It analyzes theoretical and practical contribution to a particular scientific field, and implications for further research. At the end of the review, there is the reviewer's name, academic title and affiliation.

• **Reviews on International Conferences and Seminars.** It starts with the following data: title of the conference (seminar), organizer(s), date of the conference (seminar), venue, language, the name and e-mail address of the contact person, conference/seminar websites, and how, when and where conference material will be published and can be obtained (i.e. selected and reviewed conference papers). The review should provide a clear and comprehensive overview of the main objectives of the conference, mentioning the keynote speaker(s), participants' panel discussion on scientific achievements, research findings and suggestions for further research and pressing questions in need of answer. The reviewer's name is stated at the end of the text with his or her academic title and affiliation.

• **In Memoriam.** It is a short text (not longer than 1 A4 page) written in memory of a scientist or special contributor and his works. The author's name is stated at the end of the text with his or her affiliation.

• **Letters to the Editor.** Special section is available for comments, opinions and suggestions by readers, authors and other contributors.

Other important notes

If the author of the manuscript does not conform to the primary format and documentation requirements that are given in the instructions, editors reserve the right to reject the article, or adapt it to comply with the Journal standards, providing other acceptance criteria are fulfilled.

Therefore, avoid complex formatting; the text will be styled according to the Journal design specifications.

The editorial board makes the final decision on acceptance criteria and priority order in the table of contents.

The authors receive one copy of the journal in which their articles are published.

The author(s) should register via (https://orcid.org/signin) in order to obtain an ORCID identifier. The ORCID identifier is a researcher's unique and permanent identifier which allows for better visibility and interoperability of wide range of information systems.

Publisher does not charge "submission fee". If the paper is accepted for publication, the author receives notification on paying publishing fee (285 EUR) and should pay it prior to the publication of the paper. The author is obliged to cover bank charges.

Proofreading

Authors are responsible for ensuring that their manuscripts are accurately typed before final submission. One set of proof will be sent to authors, if requested, before the final publication, which must be returned promptly. At this stage, only misprints will be corrected.

Copyright

An article submitted to the journal should be authentic and original contribution of the author and should have neither been published before nor be concurrently submitted to any other journal as to avoid double publication.

Once the article has been accepted for publishing, the author commits him/herself not to publish the same article elsewhere without the Editorial Board's permission. In the event that the Editorial Board gave permission for publication in another journal, it should be stated that the article has previously been published in the journal *Zbornik radova Ekonomskog fakulteta u Rijeci: časopis za ekonomsku teoriju i praksu/ Proceedings of Rijeka Faculty of Economics: Journal of Economics and Business*.

Each manuscript, in order to avoid plagiarism, is checked by using **CrossCheck Service**.

Authors submitting articles for publication warrant that their paper is not an infringement of any existing copyright and will indemnify the publisher against any breach of such warranty. For ease of dissemination of scientific contributions and to ensure ethical principles of use, once accepted for publishing, papers and contributions become the legal copyright of the publisher unless otherwise agreed.

Submission of the manuscript

Electronic submission of the manuscript should be accompanied by the author's cover letter containing: the article title, the author's full name, academic affiliation (title, institution, scientific field), phone, fax, e-mail address and personal website. If there are more authors than one, full names, respective affiliations and addresses of co-authors should be clearly stated. Authors'academic affiliation should be:

- in the language of the article,
- in Croatian language,
- in English if the original language of the article is other than English.

The address is: zbornik@efri.hr.

More detailed information on the *Zbornik radova Ekonomskog fakulteta u Rijeci: časopis za ekonomsku teoriju i praksu/Proceedings of Rijeka Faculty of Economics: Journal of Economics and Business* can be obtained on the website of the Faculty of Economics University of Rijeka: http://www.efri.uniri.hr/en/proceedings.

EDITORIAL BOARD

Uredništvo skreće pozornost autorima
da pažljivo pročitaju upute koje su dopunjene
detaljnom metodologijom organizacije teksta

UPUTE AUTORIMA

Zbornik radova Ekonomskog fakulteta u Rijeci: časopis za ekonomsku teoriju i praksu/Proceedings of Rijeka Faculty of Economics: Journal of Economics and Business međunarodno je recenziran časopis, otvoren za suradnju znanstvenicima iz cijelog svijeta iz različitih područja ekonomske teorije i prakse. Tekstovi se objavljuju, u pravilu, na engleskom jeziku. Međutim, časopis može objavljivati tekstove i na ostalim svjetskim jezicima.

Politika uređivanja

Uredništvo zaprima sve rukopise. Glavni i odgovorni urednik tekstove, nakon pregleda i prihvaćanja, upućuje u postupak prosudbe ("assessment process") članovima Uredništva, ali i ekspertnim stručnjacima izvan Uredništva u slučaju specifičnog sadržaja teksta. Poslije prosudbe, glavni i odgovorni urednik predlaže Uredništvu odluke za daljnji postupak i to: (a) koje se rukopise, u slučaju potrebe, vraća autoru sa sugestijama, preporukama i primjedbama radi poboljšanja, prije svega, metodološke prezentacije građe istraživanja; (b) koje rukopise uputiti u postupak recenzija ("reviewing process"); (c) koje rukopise odbiti, budući da:

- tema ne zadovoljava zahtijevanu znanstvenu razinu;
- autor je članak sa sličnom temom već objavio;
- tema ne ispunjava kriterije časopisa, osobito ako je:
  - sadržaj izvan koncepcije znanstveno-publicističke orijentacije časopisa (uvažene od relevantnih baza referiranja) i
  - ne ispunjava svjetske znanstveno-metodološke standarde kojih se časopis mora pridržavati.

Ukoliko članak nije prihvaćen Uredništvo autoru šalje obavijest, ali rukopis se ne vraća.

Ukoliko je autor usvojio primjedbe i sugestije iz postupka prosudbe i poboljšao tekst prema zahtjevu navedenog postupka, rukopis se šalje u postupak recenziranja. U tom slučaju autoru se šalje formular "Izjava o autorskim pravima" koji treba ispuniti, potpisati i vratiti Uredništvu. Svojim potpisom autor potvrđuje izvornost svoga članka i svoje autorstvo.

Da bi se izbjeglo autorovo odustajanje od objave članka u tijeku recenzentskog postupka, autor se obvezuje svojim potpisom u "Izjavi o autorskim pravima" da prihvaća recenzentski postupak. Nakon toga slijedi odluka o odbijanju ili prihvaćanju članka.

Prikazi knjiga, doktorskih disertacija, međunarodnih konferencija i drugih znanstvenih skupova ne podliježu recenziji. Uredništvo odabire i uređuje prikaze koji su relevantni za objavljivanje u časopisu sukladno koncepciji uređivačke politike.

Postupak recenziranja

Svi znanstveni članci obvezno se recenziraju. Za svaki članak predviđena su dva recenzenta, jedan iz inozemstva i jedan iz Hrvatske, a oba su anonimna. Imena autora također su za recenzente anonimna. Recenzenti pišu recenziju prema dobivenim uputama i na propisanom formularu. Ukoliko članak, prema stajalištu recenzenta, ne udovoljava međunarodnim standardima i kriterijima časopisa, Uredništvo članak ne prihvaća. Ukoliko pak recenzent članak pozitivno ocijeni, može ga kategorizirati u jednu od kategorija vrsnoće:

Izvorni znanstveni članak (Original scientific paper) je originalno znanstveno djelo u kojem su izneseni novi rezultati fundamentalnih ili primijenjenih istraživanja. Informacije iznesene u članku potvrđuju da je moguće:

a) reproducirati metodološki i računski postupak i dobiti rezultate s jednakom točnošću ili unutar granice stupnja slobode, kako to navodi autor; ili
b) ponoviti autorova opažanja i prosuditi njegove analize; ili
c) provjeriti točnost analiza i dedukcija na kojima se temelje autorovi nalazi.

Prethodno priopćenje (Preliminary communication). Taj znanstveni članak obavezno sadrži jednu ili više znanstvenih informacija, ali bez dovoljno pojedinosti koje bi omogućile čitatelju provjeru iznesenih znanstvenih spoznaja.

Izlaganje sa znanstvenog skupa (Conference paper). Može biti objavljeno samo kao cjeloviti članak koji je prethodno referiran na znanstvenom skupu, a u obliku cjelovitog članka nije objavljeno u zborniku skupa.

Pregledni rad (Review article). Sadrži poseban problem o kojem je već publiciran znanstveni rad, ali mu se pristupa na nov način.

Stručni članak (Professional paper). Sadrži korisne priloge iz struke i za struku.

Nakon primljenih recenzija, Uredništvo analizira recenzije. Ukoliko je to potrebno, rad vraća autoru koji ga je dužan prilagoditi zahtjevima recenzenta. Rad se dostavlja autoru nakon primitka obje recenzije. Međutim, u slučajevima gdje se ne dovodi u pitanje kvaliteta i autoriziranost teksta, Uredništvo također može intervenirati. Nakon što autor ponovno dostavi rad, Uredništvo utvrđuje usklađenost članka s primjedbama recenzenata.

Objavljuju se samo kategorizirani radovi koji imaju dvije pozitivne recenzije.

Glavni i odgovorni urednik, nakon završetka postupka recenziranja te izmjena i dopuna tekstova od strane autora i Uredništva, predlaže redoslijed prihvaćenih članaka u sadržaju. Kriteriji redoslijeda jesu:

(1) kategorizacija sukladno stupnju znanstvene vrsnoće;

(2) u slučaju dva različita stupnja kategorizacije članka od strane recenzenata, glavni i odgovorni urednik predlaže odluku Uredništvu, u pravilu, u prilog autora, tj. višu kategoriju;

(3) u slučaju konkurentnosti radova iste razine znanstvene vrsnoće (kategorije) uvažava se aktualnost teme, autora i interes časopisa.

U okviru ciljeva povećanja kvalitete i broja objavljenih radova Uredništvo se obvezuje da će nastojati odgovoriti autorima o statusu poslanog rada u okviru od deset radnih dana. Također, od 2018. godine, objavljivat će se radovi u najavi na web stranici Časopisa koji će biti tiskani u redovnom polugodišnjem tiskanom izdanju. Okvirni rok završetka recenzentnog postupka, tehničkog uređivanja te online objave rada je dva mjeseca.

Sadržaj članka

Rad treba biti relevantan za međunarodnu znanstvenu i stručnu javnost s jasno naznačenim ciljevima i rezultatima istraživanja, zaključkom, referencama u tekstu i bibliografskim jedinicama na kraju rada. Ideje u radu moraju biti originalne i trebaju značajno doprinositi razvoju predmeta istraživanja, a metodologija mora biti jasno opisana.

Autori u članku moraju posebnu pozornost obratiti na odgovarajuće strukturiranje teksta sukladno priznatim standardima znanstvene metodologije u ekonomskim istraživanjima, kako je navedeno:

Posebna stranica treba sadržavati: naslov članka, ime i prezime autora ili ako je više koautora za svakog ponaosob znanstveno zvanje, stručnu spremu, znanstveni interes, odnosno područje kojim se autor bavi, naziv i adresu institucije u kojoj je autor zaposlen, broj telefona, broj faksa, e-mail adresu i osobnu web stranicu. Svi navedeni podaci moraju biti napisani:

- na jeziku članka,
- na hrvatskom jeziku,
- na engleskom jeziku ako izvorni jezik članka nije engleski.

Prva stranica članka treba sadržavati: naslov članka, sažetak, JEL klasifikaciju i ključne riječi na jeziku članka.

Na kraju članka isti podaci daju se na:

- hrvatskom jeziku, te
- na engleskom jeziku ako izvorni jezik članka nije engleski.

Tekst članka mora početi uvodom, a sadrži još glavna poglavlja, fusnote, tablice, grafikone, slike, reference u tekstu, zaključak i popis korištene literature.

Tehničko uređivanje članka

Tekst rada piše se u programu Microsoft Office Word (inačica 95 i viša). Opseg rada smije iznositi **do 8.000 riječi**, što je oko 16 stranica A4 formata, a tekst je pisan vrstom slova Times New Roman (veličine 12 točaka), s jednostrukim razmakom,

poravnan s obje strane, pisan od početka reda (bez uvlačenja prvog retka pasusa), s marginama od 2,5 cm. Ukoliko je u tekstu potrebno posebno označiti neku riječ ili rečenicu koriste se pisana kosa slova (italic), nikako ne podebljana (bold). Za odvajanje pasusa koristi se dvostruki razmak. Opseg rada može biti veći samo u dogovoru s glavnim i odgovornim urednikom.

JEL klasifikaciju predlaže autor u skladu s Journal of Economic Literature klasifikacijom koja je dostupna na web stranici: http://www.aeaweb.org/journal/jel_class_system.html.

Fusnote se rabe samo za dodatna pojašnjenja osnovnoga teksta. One se ne koriste kao poziv na Literaturu. Označavaju se na dnu stranice, u kontinuitetu, kroz cijeli članak, arapskim brojevima počevši od 1.

Naslovi poglavlja (od Uvoda do Zaključka) moraju biti kratki i jasni, te redom numerirani arapskim jednocifrenim brojevima. Poglavlja mogu imati i podpoglavlja koja se obavezno numeriraju s dvocifrenim odnosno trocifrenim brojevima. (primjer: 1; 1.1.; 2.; 2.1.; 2.1.1. itd.), ali ne više od toga.

Tablice, grafikoni i slike moraju imati, broj, naziv i izvor podataka. Numeriraju se u kontinuitetu arapskim brojevima (posebno grafikoni, posebno slike).

Važna napomena: Ukoliko tablica, grafikon ili slika sadržavaju posebne znakove te su rađeni u posebnom programu dostavljaju se u posebnom dokumentu s točno navedenim i označenim položajem na kojem dolaze u tekstu.

Članak mora zadovoljavati sve tehničke propozicije navedene u ovim uputama.

Stil i organizacija teksta

Autori se obvezno moraju pridržavati znanstvene metodologije prezentacije građe u pisanju tekstova koja je uobičajena u znanstvenim publikacijama (“Harvard style”). To zahtijeva sljedeći pristup:

(1) Naslov i organizacija prezentacije građe:

Naslov je najvažniji sažetak rada koji mora održavati sadržaj i svrhu rada. Ne smije biti “opisan” niti sadržavati riječi poput “analiza” ili “metoda”, i sl. Građu se raspoređuje u dijelove kao što su:

- *Sažetak (Abstract)* – ispod naslova
- *Ključne riječi*
- *JEL klasifikacija.*

Iza toga slijedi glavni dio rada podijeljen u odlomke:

- *Uvod*
- *Pregled literature*
- *Metodologija/metoda/model/koncepcija analize* (treće poglavlje)
- *Empirijski podaci (dokumentacijska podloga) i analiza* (četvrto poglavlje)
- *Rezultati i diskusija* (peto poglavlje)
- *Zaključci* (šesto poglavlje).

(2) Sadržaj pojedinih dijelova prezentirane građe:

a. Sažetak – ispisuje se u 100–250 riječi, a obvezno treba sadržavati:

- utvrđeni cilj istraživanja,
- metodu/model/koncepciju analize,
- glavni rezultat istraživanja (analize),
- temeljni zaključak istraživanja.

Sažetak se ne smije pisati u odlomcima!

b. Ključne riječi – moraju odražavati suštinu sadržaja rada, a navodi se do pet takvih riječi.

c. JEL klasifikacija – autor svoju temu mora razvrstati sukladno kodu časopisa The Journal of Economic Literature (JEL).

d. Uvod – sadrži definiranje problema i predmeta istraživanja s pozivom na recentnu literaturu odnosno rezultate istraživanja. Taj se dio može istaknuti i u posebnom, tj. 2., poglavlju kao *Literature review*. Pri kraju uvodnog dijela treba utvrditi radnu pretpostavku (hipotezu) istraživanja o kojoj se treba očitovati (kasnije) na početku poglavlja *Zaključak*. *Uvod* treba završiti s naznakom organizacije teksta.

e. Pregled literature – prethodi istraživačkom dijelu, a pruža čitateljima pregled referentne literature s ključnim točkama dosadašnjih spoznaja temeljenih na relevantnim rezultatima aktualnih istraživanja. Pregled literature ne smije biti taksativno navođenje prethodnog znanstvenog doprinosa, već autori trebaju izvršiti sintezu dosadašnjih istraživanja kako bi dokazali opravdanost teorijskog i empirijskog doprinosa vlastitog rada.

f. Metodologija/Metoda/Model/Koncepcija – obično se prezentira u trećem poglavlju; metoda/model/koncepcija analize mora biti transparentno istaknuta radi eventualnog ponavljanja testiranja rezultata od strane zainteresiranih istraživača (to je jedno od temeljnih pravila znanstvene metodologije).

g. Empirijski podaci i analiza – sadržavaju dokumentacijsku podlogu i rezultate empirijske analize. Potrebno je opisati i prikazati uzorak podataka korišten u analizi te prezentirati i objasniti statistička te ekonometrijska obilježja dobivenih rezutata uz tumačenje njihova ekonomskog sadržaja.

h. Rezultati i rasprava – autor objašnjava rezultate, osobito njihovo ekonomsko značenje i poruke. U ovom dijelu očekuje se argumentacija znanstvenog doprinosa, povezivanje rezultata rada s rezutatima te zaključcima dosadašnjih empirijskih istraživanja te preporuke za promjene javnih i drugih politika.

i. Zaključci – treba imati u vidu da taj dio teksta nije i ne smije biti sažetak! Zaključci su autorovo originalno mišljenje (ocjena) o dobivenim rezultatima i obvezno sadrže:

- očitovanje o polaznoj hipotezi – je li ili nije dokazana;
- ocjenu rezultata istraživanja/analize, novine, te koji je doprinos znanosti;
- osvrt na ograničenja i probleme u istraživanju;

- smjernice za buduća istraživanja;
- utvrđivanje institucionalno-sustavnih implikacija dobivenih rezultata istraživanja (kao npr. prijedlozi za promjene u ekonomskom sustavu, ekonomsko-financijskoj i razvojnoj politici, instrumenti, mjere i sl.).

Preporuka je da se Zaključak ne piše u odlomcima.

(3) Literatura – navesti samo one naslove (izvore) koji su korišteni u tekstu!

TABLICE dolaze unutar teksta. Svi podaci u tablici stavljaju se u redove i kolone odvojene jednostrukim tankim linijama. Svaka kolona sadrži naziv i uključuje numeričku jedinicu koja se odnosi na cijelu kolonu. Tako se za višecifrene brojeve rabe jedan ili dva broja, a u nazivu za određenu kolonu označuju se numeričke jedinice u tisućama, milijunima i sl. Tablice se numeriraju u kontinuitetu arapskim brojevima (Tablica 1, Tablica 2, itd.), a pored broja i naziva, moraju imati i izvor podataka.

Mole se autori da se pridržavaju sljedećih pravila:

- iza godine nikad ne dolazi točka;
- tisuće, milijuni i sl. odvajaju se zarezom: 2,000; 250,000; 3,555,284 i sl.; milijarde se označavaju s bn (billion); decimalni brojevi odvajaju se točkom: 2.32; 0.35 i sl.

GRAFIKONI I SLIKE dolaze unutar samog teksta. Moraju imati broj, naziv i izvor podataka. Numerira ih se u kontinuitetu arapskim brojevima (posebno grafikoni, posebno slike). Izvori podataka navode se ispod grafikona odnosno slika.

Napomena. U tekstu se ne prepričavaju i ne ponavljaju rezultati koji su navedeni u tablicama i grafikonima, već se rabe referentne oznake koje upućuju na podatke u tablicama ili grafikonima.

REFERENCE U TEKSTU. Citirane dijelove navodi se u tekstu, a ne u bilješkama. Stavlja ih se u zagrade i sadrže prezime autora i godinu izdanja npr. (Babić, 2003), a u slučaju citata navodi se još i stranica (Babić, 2003: 150), ili ako se radi o dvojici autora: (Babić i Courty, 2004), ili ako je više od dva autora navodi se prvi i piše: (Babić i suradnici, 2003). Svaka referenca navodi se kao i prvi put. Ne koristi se ibid i sl. Ukoliko se autor spominje u tekstu, u zagradi se navodi samo godina: *The work of* Stevens *(2001) was concerned with what they teach at Harvard Business School.* Svaka referenca mora se navesti u dijelu Literatura na kraju članka.

LITERATURA obuhvaća sve korištene izvore i potpune podatke o djelima koja se spominju u referencama u tekstu. Popis literature piše se bez broja poglavlja i dolazi na kraju rada (poslije Zaključka). Literatura se ne numerira. Uređuje se abecednim redom autora te kronološki za radove istog autora. Preporuča se autorima kao literaturu što više koristiti časopise referirane od strane ISI (Institute of Science Information).

Literatura se citira prema primjerima za knjige, časopise i ostale izvore:

• **Knjige:** Prezime, Inicijali (godina) *Naslov,* Mjesto izdavanja: Ime izdavača. Primjer:

Mohr, L. B. (1996) *Impact analysis for program evaluation,* 2nd ed., London: Sage.

Ukoliko su dva ili tri autora, redom navesti njihova prezimena i inicijale (godinu) *Naslov,* Mjesto izdavanja: Ime izdavača. Primjer:

Riddersträle, J., Nordström, K. (2004) *Karaoke Capitalism Management for Mankind,* Harlow: Pearson Education Ltd.

Perišin, I., Šokman. A., Lovrinović, I. (2001) *Monetarna politika,* Pula: Sveučilište u Rijeci, Fakultet ekonomije i turizma "Dr. Mijo Mirković".

Ukoliko su četiri ili više autora, navodi se prezime prvog autora nakon čega slijedi et al. Primjer:

Norton, M. B. et al. (1981) *A People and a Nation – A History of the United States,* Boston: Houghton Mifflin Company.

• **Časopisi:** Prezime, Inicijali (godina) "Naslov članka", *Naziv časopisa u kojem je objavljen,* volumen, svezak, broj, stranice. Primjer:

Fox, S. (1994) "Empowerment as a Catalyst for Change: An Example from the Food Industry", *Supply Chain Management,* Vol. 2, No. 3, pp. 29–33.

Ukoliko je više autora (četiri ili više), navodi se prezime prvog autora nakon čega slijedi et al. Primjer:

Di Noia, C. et al. (1999) "Should Banking Supervision and Monetary Policy Tasks be Given to Different Agencies?", *International Finance*, Vol. 2, No. 3, pp. 285–361.

Ukoliko je više radova istog autora objavljenih iste godine, uz godinu se rabe oznake "a, b, c":

Quah, D. T. (1993a) "Empirical Cross-section Dynamics in Economic Growth", *European Economic Review*, Vol. 37, No. 2–3, pp. 426–434.

---------- (1993b) "Galton's Fallacy and Tests of the Convergence Hypothesis", *Scandinavian Journal of Economics*, 95, Vol. 95, No. 4, pp. 427–443.

---------- (1994) "Exploiting cross Section Variation for Unit Root Inference in Dynamic Data", *Economics Letters*, Vol. 44, No. 1–2, pp. 9–19.

---------- (1996a) "Empirics for Economic Growth and Convergence", *European Economic Review*, Vol. 40, No. 6, pp. 951–958.

---------- (1996b) "Regional Convergence Clusters across Europe", *European Economic Review*, Vol. 40, No. 6, pp. 951–958.

Autor za svaku referencu treba navesti **Digital Object Identifier (DOI)**, ukoliko postoji. DOI je dostupan na adresi CrossRef-a http://www.crossref.org/ u obliku https://doi.org/10.5468/ogs.2016.59.1.1.

DOI autor upisuje na kraju reference prema primjeru:

Hall, J. K., Daneke, G. A. Lenox, M. J. (2010) "Sustainable Development and Entrepreneurship: Past Contributions and Future directions", Journal of Business Venturing, Vol. 25, No. 5, pp. 439–448, https://doi.org/10.1016/j.jbusvent.2010.01.002.

• **Izvori preuzeti s Internet stranica:** Prezime autora/urednika, Inicijali imena (godina) "Naslov članka", *Naslov Časopisa,* datum publikacije, godište, broj, stranice, Internet adresa [datum pristupa].

Martin, C.L. (1998) "Relationship Marketing: a High-Involvement Product Attribute Approach, *Journal of Product and* B*rand management*, Vol. 7, No. 1, pp. 6–26, //http:www.apmforum.com/emerald/marketing-research-asia.htm [pristupljeno: 3. 10. 2002]

• **Knjige sabranih dijela:** Autor poglavlja/odjeljka (godina) "Naslov poglavlja/odjeljka''. U Ime izdavača ili autora sabranih djela, *Naslov sabranih djela,* Mjesto izdavanja: Izdavač. Primjer:

Silobrčić, V. (2000) "Znanstvena proizvodnost i kriteriji vrednovanja znanstvenika u Hrvatskoj''. U Sunko, U.D. (ur.) *Znanost u Hrvatskoj na pragu trećeg tisućljeća,* Zagreb: HAZU.

• **Radovi u Zborniku skupa:** Autor (godina izdanja) "Naslov članka". U Naslov zbornika. Mjesto izdanja: Izdavač, stranice. Primjer:

Fedchak, E. & Duvall, L. (1996) "An engineering approach to electronic publishing". In *Proceedings of the International* W*orkshop on Multimedia Software Development,* 25-26 March, Berlin, Los Alimos, Ca: IEEE Comput. Soc. Press, pp. 80–88.

• **Teze i disertacije*:*** navodi se Ime autora (godina) *Naslov disertacije*, Institucija gdje je doktorska disertacija obranjena. Primjer:

Whitehead, S.M. (1996) *Public and private men: masculinities at work in education management,* doktorska disertacija, Leeds Metropolitain University.

• **Službene publikacije:** Naziv publikacije/organizacije/ustanove (godina) *Naslov,* Mjesto izdavanja: Izdavač. Primjer:

Department of the Environment (1986) *Landfilling wastes,* London: HMSO (*Waste management paper, 26)*

Ostali prilozi u Časopisu

Ostali prilozi dostavljaju se na isti način kao i članci. Ne recenziraju se, a Uredički odbor ih ocjenjuje i razvrstava u sljedeće vrste priloga:

• **Prikazi knjiga.** Kritička recenzija pisana jasnim i konciznim stilom u kojoj se procjenjuje struktura, stil i znanstvena dostignuća knjige. U naslovu Prikaza navodi se naslov knjige. Ispod toga osnovni podaci o autoru knjige (titula, ustanova u kojoj je autor zaposlen), naslov i podnaslov rada (ukoliko postoji), godina izdavanja, izdavač, broj strana, vrsta izdanja, jezik pisanja, ISBN, e-mail autora knjige te naslovnica knjige. Autor Prikaza potpisuje se na kraju. Uz ime autora prikaza navodi se i ustanova u kojoj je zaposlen.

• **Prikazi doktorskih disertacija.** U naslovu Prikaza navodi se autor disertacije. Ispod toga osnovni podaci o njemu (titula, ustanova u kojoj je zaposlen), naslov i podnaslov rada (ukoliko postoji) te članovi komisije za obranu doktorske disertacije. Dalje se navodi datum, godina te ustanova i mjesto obrane. U kritičkom prikazu opisuje se struktura, stil i vrednuju metodologija i rezultati istraživanja. Analiziraju se teoretski i praktični doprinosi u određenom znanstvenom području. Autor prikaza potpisuje se na kraju. Uz njegovo navodi se i ustanova u kojoj je zaposlen.

• **Prikazi konferencije ili drugih skupova.** Pišu se kao kritičke recenzije. U naslovu prikaza navode se: Naziv konferencije, organizator, datum održavanja, mjesto održavanja, jezik konferencije, kontakt osoba, e-mail, web stranica, podatak o materijalu s konferencije. Prikaz daje jasan i koncizan pregled glavnih ciljeva konferencije, imena glavnih izlagača te diskusije sudionika o znanstvenim dostignućima, rezultatima istraživanja i prijedlozima za daljnja istraživanja o ključnim pitanjima. Autor prikaza potpisuje se na kraju. Uz njegovo ime navodi se i ustanova u kojoj je zaposlen.

• **In Memoriam.** Ovaj prilog piše se na jednoj strani. Autor prikaza potpisuje se na kraju. Uz njegovo ime navodi se i ustanova u kojoj je zaposlen.

• **Pisma Uredniku.** Za čitatelje i autore izdvojen je zaseban prostor za komentare, sugestije, diskusije i mišljenja.

Ostale važne napomene Uredništva

Uredništvo pridržava pravo da tekstove koji ne odgovaraju kriterijima uputa vrati autoru, odnosno da radove u potpunosti prilagodi propozicijama Zbornika i standardima hrvatskog književnog jezika (u dijelu Sažetak), odnosno stranog jezika.

U pogledu ostalih tehničkih elemenata uređivanja tekstova za autore ne postoje posebni zahtjevi. Uredništvo sve članke ujednačuje.

Konačnu odluku o objavljivanju članaka kao i redoslijed članaka, određuje Uredništvo Zbornika.

Autor dobiva jedan primjerak Zbornika u kojem je njegov rad objavljen.

Preporučamo autorima da se registriraju (https://orcid.org/signin) i pribave ORCID identifikator. ORCID identifikator je jedinstveni i trajni identifikator istraživača i suradnika čije korištenje omogućava bolju vidljivost autora i interoperabilnost širokog kruga informacijskih sustava.

Izdavač ne naplaćuje pristojbu za prijem članka. Ukoliko je rad autora prihvaćen, obveza je autora platiti pristojbu za objavljivanje (285 EUR) i to prije objavljivanja rada. Obavijest o načinu plaćanja autor dobiva nakon prihvaćanja rada. Autor je dužan snositi bankarske troškove.

Korektura

Rad autora mora biti pisan standardnim jezikom i bez pravopisnih i gramatičkih pogrešaka. Autor dobiva probni otisak rada na korekturu. Taj postupak treba obaviti u najkraćem roku i Uredništvu vratiti ispravljeni tekst. Ispravljati se mogu samo tiskarske pogreške.

Autorska prava

Članak poslan u naš časopis mora biti autentičan i izvorni doprinos autora i nikad prije objavljen niti smije istovremeno biti poslan u neki drugi časopis da bi se izbjeglo dvostruko objavljivanje.

Jednom prihvaćeni članak za objavljivanje obvezuje autora da isti članak ne smije objaviti drugdje bez dozvole Uredništva časopisa koje je članak prihvatilo. U slučaju da je Uredništvo dalo dozvolu za objavljivanje u drugom časopisu, treba navesti da je članak prethodno objavljen u časopisu *Zbornik radova Ekonomskog fakulteta u Rijeci: časopis za ekonomsku teoriju i praksu/Proceedings of Rijeka Faculty of Economics: Journal of Economics and Business*.

Svaki rukopis, radi izbjegavanja plagijarizma, provjerava se koristeći **CrossCheck Service**.

Autori jamče da objavljivanje njihovog članka ne predstavlja kršenje autorskih prava i da će obeštetiti izdavača ukoliko dođe do kršenja toga jamstva. U cilju širenja znanstvenih doprinosa i etičkih načela korištenja, prihvaćanjem radova za objavljivanje, izdavač postaje nositelj autorskih prava ukoliko u sporazumu nije navedeno drukčije.

Dostavljanje radova

Radovi se dostavljaju elektronskom poštom uz dopis koji sadrži: naslov članka, ime i prezime autora ili, ako je više koautora, za svakog ponaosob znanstveno zvanje, stručnu spremu, znanstveni interes, odnosno područje kojim se autor bavi, naziv i adresu institucije u kojoj je autor zaposlen, broj telefona, broj faksa, e-mail adresu i osobnu web stranicu. Svi navedeni podaci moraju biti napisani:

- na jeziku članka,
- na hrvatskom jeziku, te
- na engleskom jeziku ako izvorni jezik članka nije engleski.

Adresa za dostavu radova je: zbornik@efri.hr

Detaljnije informacije o *Zborniku radova Ekonomskog fakulteta u Rijeci: časopis za ekonomsku teoriju i praksu/Proceedings of Rijeka Faculty of Economics: Journal of Economics and Business* nalaze se na web stranicama Ekonomskog fakulteta: http://www.efri.uniri.hr/hr/zbornik-radova.

UREDNIŠTVO

JOURNAL OF ECONOMICS AND BUSINESS

PROCEEDINGS OF RIJEKA

FACULTY OF ECONOMICS AND BUSINESS

SVEUČILIŠTE U RIJECI
UNIVERSITY OF RIJEKA

JOURNAL OF ECONOMICS AND BUSINESS

PROCEEDINGS OF RIJEKA

FACULTY OF ECONOMICS AND BUSINESS

ISSN 1331-8004

UNIVERSITY OF RIJEKA
FACULTY OF ECONOMICS AND BUSINESS

SVEUČILIŠTE U RIJECI
UNIVERSITY OF RIJEKA