Economic Horizons

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EDITORIAL

In addition to the endeavors of the Journal Editorial Board aimed at improving the quality of the published contributions as well as increasing the visibility of the Journal through including it in the referent bases of the academic journals EconLit, EBSCO, Cabell's Directories, ProQuest ABI/INFORM, Index Copernicus, Ulrich's Web, we point out - particularly in relation with the openness of the Journal for scientific contributions from abroad - that the six original scientific papers written by the authors from abroad have been published in the Volume 16, Issues 1, 2 and 3 of the *Economic Horizons*, after the double-blind review process and revisions.

We would like to inform the domestic and international academic community that *Economic Horizons* has valued positively within the Index Copernicus Journals Master List 2013, and - in relation to the ICV (Index Copernicus Value) in 2012 (4.71) - received the grade / the rating 5.65.

Issue 3 of Volume 16, Year 2014 of the *Economic Horizons* scientific journal contains four original scientific papers, two review papers, a book review, the Subject Index of the papers published in the Journal in 2014, and the List of the authors and all contributions published in the *Economic Horizons* during 2014.

Starting from the relevant fact that the importance of the international aspect of the corporate sector taxation is particularly emphasized in the conditions of the increasing complexity of international economic relations, *Srdjan M. Djindjic* critically evaluates the complex effects of the deferral of the repatriation and reallocation of international income as well as the effects of the reform tendencies in the countries from the European Union (EU) on the achievements of international tax planning in the Republic of Serbia (RS). The three hypotheses have been confirmed through the research process: a) There is an inverse relation between the length of the period of the deferral of the repatriation of international income in a parent company in the country of residence and effective tax paying by a resident transnational corporation (TNC); b) The intensity of the international reallocation of income is in the function of the size of international differences in statutory tax rates on corporate income; c) During the taxation of TNCs, i.e. their subsidiaries, each redesign of the corporation income tax in the destination country has to be integrally considered with tax solutions in the countries of a TNC's residence.

Assuming that a corporate crisis is an inherent feature of business activities and a component of the risk management process in the contemporary turbulent business environment, *Jarosław Kaczmarek* explores the phenomenon of a business failure and assesses the degree of the financial security of industrial companies in Poland during the period of the economic transformation (1990-2013), particularly singling out the global economic crisis (2007-2013). After identifying the types of crises and their causes, the symptoms of deteriorating financial conditions have been quantified. The degree of the financial security of industrial companies in Poland has been empirically measured, and the trends and dynamics of changes and the corresponding interdependencies have been considered. In addition to the presentation of industrial mezzo structures, it has been confirmed through the research process that the degree of financial security can be regarded as a relevant symptom of changes to macroeconomic business cycles.

Starting from the insight that the purpose of the periodic rebalancing of the securities portfolio is to improve the performances of the existing portfolio through its adjustment to the market circumstances,

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Mikica Drenovak and Vladimir Rankovic test two portfolio rebalancing strategies – the one being based on the optimal value of the market risk, and the other being based on the optimal risk-return tradeoff. As a criterion for the initial portfolio allocation and rebalancing over the observed period, the optimal volatility or the Sharpe ratio has been used. The two relevant hypotheses that the minimum volatility strategy results in a portfolio with better risk performances compared to chosen benchmarks as well as that the maximum Sharpe strategy results in a portfolio with a higher Sharpe ratio compared to chosen benchmarks have been confirmed through the research process.

Relying on the claim that the efficient market hypothesis is the one of the most important theories in finance and the one of the most significant research areas for both developed and developing stock markets, *Fatih B. Gümüş* and *Feyyaz Zeren* test the random-walk hypothesis for the main stock market of the G-20 countries. After determining the linearity of the series, the Fourier ADF unit root test has been applied to the stock markets with a linear structure, while the Fourier KSS unit root test has been used for the Japanese stock market as the only one such market a having non-linear structure. It is pointed out that the efficient market hypothesis is valid for nine of seventeen countries, for the countries that have developed economies and stock markets as well.

The complex process of the transformation of the International Financial Reporting Standards (IFRS) into a single global language of financial reporting is followed by the relevant problem of their inconsistent application in different countries, i.e. with the resulting negative consequences for the global comparability of financial statements. As the principal causes of inconsistent accounting practices, *Vladimir Obradovic* discusses the flexibility of the IFRS provisions, modifications during their incorporation into national regulatory frameworks, as well as the diversity and unequal efficiency of national mechanisms for their imposing and the supervision of their implementation.

After the preliminary determination of time equations as the mathematical basis of the Time-Driven Activity Based Costing (TDABC) system, *Mirjana Todorovic* considers the essential aspects of creating time equations and cost calculation, the issues of the application of the multiple factors of the duration of activities in time equations, as well as possible mistakes in time equations. The hypothesis that an application of time equations within the TDABC system enables an increasing accuracy of cost calculation and the determination of a cost price and enables us to simplify the procedure of costing with an acceptable cost/profitability ratio has been confirmed through the research process.

This issue of the Journal also contains a book review: Belch, E. G., & Belch, M. A. (2012). *Advertising and Promotion: An Integrated Marketing Communications Perspective.* New York, NY: McGraw Hill, written by *Katarina Radakovic.*

On behalf of the Editorial Board and my own behalf, I would, first of all, like to thank the authors of the contributions published in this issue. At the same time, we owe special gratitude to the reviewers for their efforts and constructive and critical comments and guidelines for the authors of the submitted manuscripts.

Besides the detailed Subject Index of the papers published in the Journal in 2014, this issue contains the List of the authors and all contributions published in *Economic Horizons* in 2014 as well.

Editor-in-Chief
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Slavica P. Petrovic is a Professor at the Faculty of Economics, University of Kragujevac, Serbia. She received her PhD degree in Business Economics and Management at the Faculty of Economics, University of Belgrade, Serbia. The key areas of her scientific interest and research are systems thinking, systems methodologies for structuring management problem situations, soft and critical management science, scientific research methodology

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EVALUATION OF THE EFFECTS OF INTERNATIONAL TAX PLANNING

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In this paper, the effects of the essential instruments of tax planning related to the effects of the deferral of the repatriation of international income, the effects of the reallocation of international income and the effects of the current and perspective reform tendencies in the EU member countries on the achievements of international tax planning in the Republic of Serbia are valorized. By a meaningful restructuring of its global business transactions, a transnational corporation can gain an „extra" reduction in the effective tax burden, compared to the level of the tax burden standard, overlooked within the officially established procedure of international tax planning (OECD). As long as there are differences in the corporate income tax rates among the countries, there is a realistic incentive for TNCs to locate their income in low-tax countries and their expenses in high-tax countries. The actual reform tendencies in the EU have a two-sided influence on the achievements of tax planning in the Republic of Serbia, in the form of activating non-tax instruments for an improvement of the competitiveness of the Serbian industry as well as in the form of prolonging international pressure on the budget of the Republic of Serbia.

Keywords: international taxing, international tax planning, transnational corporation, repatriation of international income, reallocation of international income

JEL Classification: H25, F23

INTRODUCTION

Globalization is the process of spreading a business activity beyond national borders. Transnational companies (TNCs) and multinational companies (MNCs) „are unfamiliar with" national borders, and they perform cross-border operations at a multinational level. International taxation, i.e. the corpus of the rules regulating the taxation of the income of a foreign source of a resident and the domestic income of a non-resident, was inspired by the mitigation and/or elimination of international double taxation existing because of the conflict between the resident country of a TNC and the destination country of the capital over the allocation of the tax „loot". The parent company registers the headquarters of its central management in the resident country, while, through its subsidiaries, it realizes cross-border operations throughout the world. The realization of business operations generates the overlapping of competencies between the nations involved. Which national jurisdiction is eligible to tax the international tax base (international income); what

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segment of the international tax base and at what rate? This question is raised in the ambience of global tax disharmony, i.e. in the ambience of various national systems, methods and principles of the taxation of the corporate sector. The tax disharmony affects the efficiency and fairness of international taxation, but also presents the basic assumption for the activation of international tax planning by a TNC (MNC); in other words, we mark the fact that the disharmonies of the actual procedure of international taxation and international tax planning are the complementary contents.

The subject of this paper is international tax planning, i.e. the allocation of the global tax transactions of TNCs or MNCs in order to achieve the minimum amount of paid taxes; in other words, to achieve maximum net income at the TNC (MNC) level. The instruments and scope of tax planning oscillate first of all depending on the character of the registered activity of the TNC (MNC) and the characteristics of the organizational structure, i.e. the residence of the central management and the tax authenticities of the countries where the subsidiaries are located.

The key initiators of analytic dilemmas in the area of disharmonic international taxation are:

- the repatriation of foreign-source income in the country of residence, when the moment of repatriation is a problem, and
- the act of allocation, i.e. reallocation of income and costs to different cross-border destinations, when the combined application of the transfer price is a problem, i.e. the price one dependent entity charges to another one for intra-company transactions within a TNC (MNC), and the corrective „arm's length" principle, i.e. the principle of taxation hypothetically treating intra-company transactions, transactions among related domestic and foreign entities, as transactions among unrelated entities.

This paper is aimed at presenting the results of the research in the area of the three central questions: How does the moment of the repatriation of international income affect the volume of a tax burden of TNCs (MNCs)? How does the reallocation of international income affect the volume of TNCs (MNCs)? How do the actual and perspective reform tendencies in the EU member states affect the range of international tax planning in the Republic of Serbia?

Based on the description of the subject and aim of the research, the three basic hypothesis were formulated:

H1 : There is an invert relation between the period of delaying the repatriation of international income to the parent TNC company in the country of residence, on the one hand, and the effective tax paid by the resident TNC, on the other.

H2 : The intensity of the international reallocation of income is in the function of the size of international differences in the statutory tax rates of corporate income tax.

H3 : When taxing transnational corporations, i.e. their subsidiaries, each redesigning of corporate income tax in the destination country must be observed integrally with tax effects in the TNC countries of residence.

For the purposes of conducting the research into the effects of international tax planning, the standard methodology, favored by respectable institutions and professional authorities, is utilized. For the purpose of the valorization of the TNC target function, the model of the present value of net income, tax expenses and tax savings is used (Hyman, 2011, 199; Schreiber, 2013, 27-32; OECD, 2014, 1-7). With respect to the procedure of the analysis and/or correction of transferring prices, the representative traditional method of the comparable market price is relevant (OECD, 2010b, 64; UN, 2013, 196-197; Službeni glasnik Republike Srbije, 61/2013, 8/2014, 5).

The paper is structured into eight parts. The second part of the paper discusses the description of the genesis of the key events, the state and perspective tendencies in the domain of international taxation. In the third part of the paper, the performances of the alternative systems of international taxation are analyzed together with those of the methods available for mitigating or eliminating international double taxation. In the fourth part, the methodology used in valorizing the effects of international tax planning is presented. The fifth, sixth and seventh parts of

the paper contain the results of the research into the effects of international tax planning, respectively related to the effects of delaying the repatriation of international income, the effects of the reallocation of international income and the effects of the current and perspective reform tendencies in the EU member states regarding the range of international tax planning in the Republic of Serbia. In the eighth part of the paper, the conclusions are presented.

THE GLOBAL TAX LANDSCAPE

Commenting on the international tax content during the first decades of the new millennium, the equivalent for the world tax system is the world tax disharmony. The international taxation procedure „rests" on the three fundamental conceptual-methodological pillars. The first pillar is valorization: international economic activities can be valorized. The second pillar is identification: transnational and multinational corporations and their globally located subsidiaries can be identified. The third pillar is theory: taxes can be charged in accordance with the flows of the economic activity on the territory of a particular country. Where is a value added formed? How should a fair share of the international tax base be operationalized between the countries whose rights to taxation overlap?

The OECD Convention Model on Income and Capital Taxation, Business Profits (Article 7) and Related Enterprises (Article 9), favors the combination of the separate taxation method and the following ALP principle, as an international standard for the allocation of income among domestic and foreign subsidiaries in the given MNC/TNC (OECD, 2010a; 2010b). However, the method is essentially approximate and often completely unusable. According to the unique analysis of the implications of the ALP principle (Devereux & Keuschnigg, 2009, 31), ALP prices are systematically different from the prices of independent entities, which is the indicator of the presence of tax evasion and international double taxation. The application of the ALP endangers the business activities of TNCs/MNCs, reducing the capacity of the borrowing and investing of foreign subsidiaries; it also disturbs the choice of the form of organizing investment performance on the world market. Although the ALP increases public revenue in the country of residence of the parent company, the bigger loss of welfare is in the country where its subsidiary is located, i.e. in the capital destination country.

Almost simultaneously with the EU (European Commission, 1998), the OECD identified the key factors of „harmful tax competition", i.e. aggressive tax planning (OECD, 1998, 25-35). During the first decade of the new century, the OECD was recognizable for its request to revoke preferential regimes for entities in the area of financial services. Concerning the character of the problems on the agenda today, the OECD reactivates the solving of the four central issues that were in their initial phase in 1998, but in the meantime, they have evolved with certain „new" issues which both dynamic globalization and technological-tele-communicational development are responsible for:

- establishing coherent international taxation of corporate income;
- the complete renewing of the effects and benefits of the international standards;
- ensuring transparency, including the promotion of certainty and predictability; and
- from the point of view of the harmonized tax rules, a quick implementation of tax measures is necessary (The OECD structured the four central aims into fifteen sub-central aims, the solving of which was postdated September 2014 and October 2015, OECD, 2013a, 3; OECD, 2013b, 15-25).

Permanently actual are the questions of tax avoidance. The OECD and G-20 of the developed nations marked the countries of „tax haven" and grouped them precisely according to their respective geographical location (Gravelle, 2013, 3), whereas the unique tax position of Switzerland has not been emphasized at all until recently. The federal rate in Switzerland is 8.5% of net income. The combined cantonal and local rate varies from about 12% (Lucern Canton) to 24% (Geneva Canton), with the average rate of about 18%. The key particularity is the tax incentive for holding companies (qualified companies only pay the federal tax of 8.5%, Deloitte Touche Tohmatsu Limited, 2013,

2; 6). This concept emphasizes the international competitiveness of Switzerland, shown in the form of the relocation of the headquarters of not just American MNCs in Switzerland (Foster Wheeler, Philip Morris, Transocean, Tyco International, Weatherford) but also the headquarters of the EU MNCs (Amgen, Cargill, Chiquita, E-Bay, Kraft Foods, McDonalds, Monsanto, Pfizer and yahoo; Steimle, 2014, 3).

International taxation is not operated by multilateral agreements but it is rather dominated by bilateral agreements: that *per se* point out to a limitation, the localization of international cooperation, and are complement to the crown international rule saying that there are no consistent rules of international taxation. There are national tax principles, which are then applied to international activities. Not only do harmonized pragmatic rules precede the principles of international taxation but their results must be acceptable for all respectable countries, i.e. the rules must be in accordance with the „big boys' rule" (Bird & Mintz, 2003, 426).

There is a „flood" of intangible assets on the global market. Only a year after the key and still valid documents of the OECD (OECD, 2010a; 2010b) had been passed, the official justification, authorized by the Director of the Center for Tax Policy and Administration of the OECD, Caroline Silberztein, was stated, saying that the question of dematerialization was far from a definite solution (Silberztein, 2011, 3):

> „Numerous specific questions for intangible assets stayed aside in the revision of the OECD Guidelines for the applications of the rules of transfer prices for multinational enterprises and tax administration from 2010. The complexity of the problem leads to monetary important misunderstandings about the transfer prices all over the world, with the risks of either double taxation or the absence of taxation".

Since the business has stepped into the „digital economy" and begun the realization of „e-commerce", the meanings of the terms: valorization, identification and territory were approximately defined. The visualization of the reality shows that the fundament of the actual world tax content has been sinking.

Commenting the twenty-eight national tax systems of the European Union in the interval of the first decades of the new millennium, the description of the tax situation in the EU as a tax disharmonized one is not a surprise, nor does the fact surprise us that institutional and business leaders keep looking for a way to a more efficient, supranational, European mode, according to the treatment of a group of related entities, which realizes and integrates business across the EU, as a „European TNC/MNC", not as Dutch, Italian or Austrian corporations, for example, operating as a separate entity in the remaining EU member states.

In order to describe the European landscape for the tax reform, the variations in the rates and first of all in the corporate income tax bases are so big that it is impossible to recognize the common denominator between the central elements of the base. The thirteen new member states have reduced the average level of the rate but they have also increased the variations in the income taxation systems.

The European Union is moving in a new, Anglo-American, tax direction, reasoning that: by using only one, i.e. European set of tax rules, a transnational (multinational) European Union corporation should only count one, i.e. European, tax base, the Common Consolidated Corporate Tax Base („CCCTB"), which would then be allocated among the member states where the subsidiaries of the European multinational corporation are located, according to a predetermined formula for such allocation. At the same time, like a sample solution, the flexibility of the system is reflected through leaving it to the twenty-eight nations to make decisions on the tax base, with certain member states autonomously establishing and applying them to their share in the total income of the multinational corporation made at the level of the European Union.

Why has the reform course from separate to unitary taxation been slowed down? Because change was radical since it represents splitting up with the hundred-year-old European tax tradition, and complex. The methods of taxation are imperfect surrogates of the ideal hard to obtain both in theory and in practice. For a business to unitarily be integrated, there must be a value flow among the related entities; however, such a value flow is not an easy one to follow along the non-transparent corridors of the European and

the world tax systems, especially because of the non-withering tendency of the corporate management towards tax planning, proving their inventiveness and expert superiority related to tax offices and their threatening actions with respect to control auditing and monitoring.

The traditional European method, the method of separate taxation, requires from a resident transnational (multinational) company to count a separate tax base in each member state of the European Union for each foreign subsidiary within the related group, but in such a way that each of such foreign subsidiaries is an independent entity independently operating on the European Union market, where they fall into the normative trap of their own normative protocol.

The unitary taxation method requires from the resident multinational corporation to establish and allocate a single tax base, according to the shares that dependent subsidiaries make in the total business activity, where such shares are demonstrated by the triad of criteria, its own size of the available assets, engaged labor and trading income (European Commission, 2011, 49).

Where are the source of and a motivation for the implementation of the new reform idea? Unitary taxation is a completely new method for the EU as an economically integrated whole. However, Spain used unitary taxation until the middle of the 20th century, in order to tax foreign enterprises. Germany utilizes the formula method for its local tax in the area of trading, the so-called „local trade tax" (Schon, 2010, 78). The European Commission sees the Anglo-American approach to the taxation of, in this case, the multistate corporations of the USA as a logical direction of the development of the taxation of transnational (multinational) corporations in the European Union (for more about the specific features of the tax systems of the USA and Canada, see: Repetti, 2010; Arnold, 2010). Why? The tax history of the USA and Canada illustrates that, by adopting the „new" method, they have successfully solved the typical „old" tax problems, namely: (a) the multiplicity of the tax systems, 50 state systems in the USA, or 28 national systems in the European Union; (b) a lack of compensation for cross-border losses; (c) the eliminating of the need to precisely determine transfer prices for intra-company transactions, which, as we will see, are the Achilles heel of separate taxation.

The disharmony of international taxation is a matrix for formulating the basic presumptions of this paper:

- there is an invert relationship between the postponing period of the repatriation of international income in the parent TNC in the country of residence, on one hand, and the effective tax paid by the resident TNC, on the other;
- the intensity of the international reallocation of income is in the function of the size of international differences in the statutory rates of corporate income taxes; and
- when taxing transnational corporations, i.e. their subsidiaries, each redesigning of corporate income tax in the destination country must be observed in integration with the corresponding tax effects in the TNC's countries of residence.

INTERNATIONAL TAXATION SYSTEMS

National companies verify their business affirmation within the borders of the country, which is the multidimensional limiting factor of maximizing the present value of net income. „Local" enterprises are not, among other things, eligible to the corpus of tax preferrentials, which is an exclusive privilege of the standard procedure of international taxation. TNCs and MNCs primarily realize their business operations on the integrated world market of goods and services. Parallel to alluring macro- and microeconomic benefits, the catalyst of international business performance is often of tax provenances, because of desirable consequences for investments, net income and the „trade name". What is in the focus is the responsiveness of the central management of a TNC to a different corporate income tax design in various countries, to the disharmony of international taxation.

Transnational corporations and their subsidiaries account for „a group of related companies". Related entities are originally characterized by formal independence since subsidiaries formally function as independent economic entities in destination countries

and by factual dependence, because of the factual convergence of economic aims and the power of decision making projected by the central management of the parent entity in the country of residence (all the forms of organizing related companies with mutual participation in the capital are included in the status forms of concentrations, characterized by expansiveness and spreading beyond the borders of the country; Službeni glasnik Republike Srbije, 36/2011; 9/2011, Zakon o privrednim društvima čl. 550, 551). Globalization, as the synonym for an increase in international trade, flows of capital, work and income, practically means that companies are tax payers of various countries. In the open-economy environment, the overlapping of national tax jurisdictions and competences emphasizes a big question of eliminating and/or mitigating international double taxation.

Who has the right to tax the income of certain companies dispersed all over the world? The global tax content is disharmonic because there are two alternative systems of international corporate income taxation and four alternative methods of eliminating/ mitigating international double taxation. The first one is a global system based on the concept of the world income, meaning that the country of residence is the one to have the right to tax the total, „world" income of resident corporations, regardless of the fact whether such income originates from a domestic or a foreign source. The second one is the territory system, which, based on the concept of destinations, means that the resource country is entitled to tax the total income generated within its country borders, regardless of the fact whether the recipient of such income is a resident (i.e. has its headquarters) in the territory of that particular country or outside its territory. During the international process of the taxation of the corporate sector, each country can have two opposing tax-investment roles: the role of the country of residence and the role of the destination country.

Although countries show a tendency to accomplish the standard aims of the tax policy, which first of all is to build a fair tax system and accomplish an efficient international allocation of capital, in the context of maximizing the world or national income, they vary in the ways and criteria used for making such accomplishments. Because of that, international taxation overshadows the imperative of the coordination of the national taxation rules. How can a country of residence react to the previous tax of a destination country in order to eliminate/ mitigate international double taxation? There are four available methods (1-4), the first of which is important for the purpose of this paper, because it is present in the practice of certain countries (the USA, Japan, the UK, Ireland, Serbia, for example; Russo, 2007, 65). Firstly, the country of residence can approve „a foreign income tax credit" paid in the destination country, in a full or partial amount, by means of which it recognizes foreign tax as its own. This method is based on a professional argument that, from an international point of view, tax fairness implies that the foreign tax of the destination country is equally worth to the domestic tax of the country of residence.

Secondly, the country of residence can exempt foreign income from the taxation process, by means of which it practically waives a possibility to tax repatriated income tax. Thirdly, the country of residence can forbid any deduction of the previously paid foreign tax in the destination country, and apply its own tax to repatriated foreign income on the gross base, net income increased by the tax of the destination country. Fourthly, the country of residence can charge its own tax on repatriated foreign income on the net base, considering such foreign tax as a „deduction" from the tax base. This method is based on a professional argument that, from the national point of view, the foreign tax of the destination country represents an expense for a resident tax payer.

THE METHODOLOGY

Transboundary business transactions are treated through the two alternative systems of international taxation which can be operated by the four alternative methods (1-4), for the purpose of avoiding international double taxation. What is important for this paper is the global system of international taxation and the method of foreign tax credit.

A transnational corporation (TNC) is a corporation performing the international business activity in several different countries at the same time. For the purpose of this paper, the important one is a

transnational corporation constituted of one parent company, i.e. one central management in the country of residence (PCR), and one foreign subsidiary, i.e. one formally independent company, because it operates in compliance with the laws of the foreign country in which it was founded, complying to the laws of the destination country of capital (FSD).

The central management of the transnational company applies the common business strategy on the common world market, including the domestic market in the country of residence. The target function of the TNC is the structuring of transactions with the aim to maximize the present values of net income at the transnational corporation level. The tax system is non neutral, because tax is a factor of business decision making; in other words, the valorization of the present value of net income must incorporate all the business expenditures and business incomes, including tax costs and tax savings as the results of international tax planning. The present value of net income at the TNC level and/or at the level of its constituents, PV_{NI}, as the indicator of the present value of the business result after paying corporate income tax, is established according to the following formula (Hyman, 2011, 199; Schreiber, 2013, 27-32; OECD, 2014, 1-7)

$$PV_{NI} = \sum_{t=0}^{n} \frac{NI_t}{(1+i)^t} \quad (1)$$

where PV_{NI} is the present value of net income, NI_t, made on the world market during particular fiscal years, t, for the observed period of n years. The counting of the present value of net income is based on the standard presumptions of the financial analysis of the non-existence of the fluctuation of the business risk in the function of the time component, so that the discount rate, i, is constant during the observed period and is 5%.

The concept of transfer prices has three different functions (Schon, 2012, 47). First, from the point of view of realizing the TNC's business activity, transfer prices are used for counting the intra-company transactions, i.e. the transfer of assets, and for forming obligations based on the value of the acquisition and sale of business results within a group of intra-dependent companies located all over the world. Second, from the point of view of international taxation, transfer prices combined with the ALP serve to allocate international income amongst dependent companies within the parent TNC, on the one hand, and amongst foreign countries in which the subsidiaries are registered, on the other. Third, from the point of view of a tax jurisdiction, transfer prices are the starting point of the procedure of the prevention of tax avoidance/evasion. For the purpose of this paper, the respectable ones are the first two functions of transfer prices.

The „arm's length prices" (ALP) are an exogenous variable. Each chosen method for the analysis of transfer prices must, as its final effect, have a reasonable evaluation of the results in accordance with the „arm's length" principle. For in the purpose of the procedure of the analysis and/or correction of the transfer prices carried out in this paper, the relevant method is the representative traditional method of the comparable price on the market (OECD, 2010b, 64; UN, 2013, 196-197; Službeni glasnik Republike Srbije, 61/2013; 8/2014, 5).

THE EFFECTS OF POSTPONING INTERNATIONAL INCOME REPATRIATION

According to the global system, the parent corporation pays corporate income tax in the country of residence, regardless of the fact where such income has been earned. The tax paid by a foreign subsidiary in the destination country can be credited against the tax liability of the parent company in the country of residence. This solution is based on a professional argument that, because of the available foreign tax credit, national and transnational corporations bear the same corporate income tax rate, the corporate income tax rate of the country of residence, completely independent of how a transnational corporation located its subsidiaries in the country and abroad. However, national and transnational corporations do not bear the identical tax rate. International tax planning, which can ensure a double tax benefit for a TNC, i.e. an increase in net income at the level of a TNC, are immanent in the procedure of international taxation: based on the postponing of the repatriation of international income and based on the reallocation of international income.

Can, in real life, the parent corporation from the country of residence use its own foreign subsidiary in the destination country as a „tax shelter" from its own tax administration? The first tax advantage of the transnational organizational form stems from the authentic conceptual characteristic of the credit method that enables a legal possibility of postponing the repatriation of foreign income in the country of residence. A transnational corporation, a group of related entities, consisting of one parent company in the country of residence (PC_R), where it has paid 30% of corporate income tax in the current year (2014), and one foreign subsidiary (FS_D), which pays 10% of corporate income tax in the destination country on 1000000 monetary units (m.u.) of income generated in the current year 2014, are the subject of our analysis. How big is the isolated tax effect of the five-year postponed repatriation of foreign income? To be precise, how much is corporate income tax in the country of residence in the case of the five-year postponing of the repatriation of the generated income, i.e. the postponing of such repatriation until 2019, for instance, compared to the amount of the tax that the TNC would pay in the country of residence in the case of the repatriation of the foreign income of the current year (2014), with a 5% discount rate? The country of residence reacts to the previous tax of the destination country by approving a „foreign tax credit" in order to eliminate (mitigate) international double taxation (Table 1).

A transnational corporation is interested in spreading its business activities beyond the national borders of its own country because of the possibilities of tax planning. When a foreign subsidiary earns net income abroad, such „foreign income" is not considered as a part of the country-of-residence income, until the parent company decides to repatriate it. However, by reinvesting the foreign subsidiary's income in the destination country, for instance, the parent company can endlessly postpone the paying of corporate income tax in the country of residence. Tax planning in the form of postponed taxation ensures tax reduction for a TNC. In the analyzed example, because of the five-year postponing of the foreign income repatriation in the country of residence, tax is reduced by 43200 m.u. Does the official procedure of international planning ensure the central management the following yet conceptually–methodologically unforeseen and unintended strategy of the expatriation of income; is it complementary to the target function of TNCs? In the ambience of the global system of international taxation and the foreign tax credit method, the standard result of the officially established procedure of international taxation is the effective rate of 20% (OECD). However, by the restructuring of investments in the direction of maximizing the present value of net income at the level of transnational corporation, as the target function, the TNC additionally reduces the effective tax burden to 15.7%. We have noticed that there is an invert relationship between the length of the postponing repatriation period of the foreign subsidiary in the parent corporation, on the one hand, and the effective tax that the resident parent corporation (TNC) pays, on the other.

When, in real life, can a TNC's postponed taxation be manifested in the form of the reduction of the tax burden in the country of residence? Tax reduction is only possible if the income of the foreign subsidiary in the destination country is taxed at a lower tax rate than its counterpart rate in the country of residence, i.e. in the circumstances of a credit deficit. Why is it so? Because the volume of a credit limit for foreign tax is determined by the country of residence. In the opposite case, when the tax rate in the destination country is higher than the tax rate in the country of residence, the foreign tax of the destination country is higher than the credit limit, i.e. it is higher than the amount of the foreign tax which the country of residence wants to credit, which brings the parent corporation into the position of a credit surplus. What does „excess" practically mean? The only tax for the parent company based on foreign source income is the tax that the foreign subsidiary paid in the destination country in the year which such income was generated in. Credit surplus, a difference in the corresponding tax in the country of residence and the tax in the source country, can be used by the parent company by carrying backward to the previous tax years, or forward, into the following tax years, when there is a possibility that a credit deficit will appear. Low taxes in the destination country are a strong agent for the activation of international tax planning, the postponing of the foreign income repatriation in the country of residence (the presented tax scenario is very similar to the tax advantage that the income of capital

Table 1 The valorization of the effects of postponing the repatriation of international income on tax reduction at the TNC level

Description	The sum of income or tax (in monetary units)
Corporate income tax in the destination country in the current year (2014)	
1.The income of a foreign subsidiary, FS_D, generated in the destination country	1000000
2. The statutory tax rate in the destination country	10%
3. The income that the FS_D pays in the destination country in the income generating year (1000 000 x 0.1)	100000
The corporate income tax in the country of residence in the case of the repatriation of income in the current year (2014)	
1. The corporate income tax base	1000000
2.The foreign income repatriated in the parent company, PC_R	900000
3. The statutory tax rate in the country of residence	30%
4. The tax credit paid in the destination country	100000
5. The tax the PC_R pays in the country of residence in 2014 [(1000000 x 0.3) – 100000 of the foreign tax credit]	200000
The comparative review of the effects of the current and postponed repatriations of foreign income in the country of residence	
1. The tax that the PC_R pays in the country of residence, when the FS_D makes the repatriation of foreign income tax in the year which such income was generated in (2014)	200000
2. The present value of the tax the PC_R would pay in the country of residence if the FS_D postponed the repatriation of the income generated in 2014, until no later than 2019 (200000 x 0.784)	156800
3. The reduction of tax at the TNC level caused by the isolated influence of postponing the foreign income repatriation in the country of residence	43200
The isolated quantitative effect of the five-year-long postponing of the repatriation of foreign income in the country of residence	
1. The global tax rate	20%
2.The effective tax rate in the country of residence	15.7%

Source: Author

character has: the procedure of capital gains taxation is performed based on realization instead of real generation, i.e. the effective tax rate is reduced because taxes are not paid at the moment of real generation but will be paid in the future, at the moment of realization).

EFFECTS OF INTERNATIONAL INCOME REALLOCATION

The key issues of TNC taxation are initiated by the procedure of precisely defining the character of and sharing international income among the countries involved. According to the globally current concept of separate taxation, a TNC establishes the transfer price on an ALP basis for every international transfer of goods, services and intangible assets transferred to its globally dispersed subsidiaries. In real life, separate taxation confirms to have some respectable advantages as well as disadvantages.

At the beginning of the last century, the international community adopted separate taxation, giving it the status of the superior concept of counting the amount of

the income that a TNC has earned by certain countries of the capital destination. The concept was traditionally favored by some immanent characteristics. First, the TNC taxation procedure is inspired by a professional argument that each group of related entities as merely a single form of organizing business activities must be put in the same tax plan together with alternative organizational forms. The treatment of related and „unrelated" enterprises on the same ALP basis derives strong attractiveness. Second, the international community came to a consensus about the concept of the distribution of the international base, which is a reasonable excuse for its usage at the global level.

Nowadays, renowned institutions/experts are disturbed by a lack of vision because the topics on the agenda belong to the corpus of the elementary issues of international taxation, „establishing coherent international taxation", „the recovery of the effects and benefits of the international standards" and „providing transparency", which were once believed to have been put *ad acta* at the end of the last century. The expert public faced a test of historical changes. There are „good" reasons to give up on separate taxation. First, the impossibility of determining ALP prices for numerous intra-company transfers, which is confirmed by the OECD Action Plan for 2014/2015. Second, increasing the total costs of the implementation of separate taxation for both taxpayers and the administration (obeying the ALP principle is an expensive process). Third, there is contemporary governments' concern about the erosion of their own public revenue because of the correlation of the intensifying of global investments and international income reallocation.

The concern is stressed in the corpus of the developed countries which apply in practice high corporate income tax rates. According to the data for 2014, the corpus of the developed countries with a high corporate income tax rate include: Argentina (35%), Australia (30%), Austria (25%), Belgium (33.99%), China (25%), Denmark (24.5%), France (33.33%), Germany (29.58%), Italy (31.4%), Japan (35.64%), Luxemburg (29.22%); Holland (25%), Norway (27%), South Africa (28%), Spain (30%), Sweden (22%), UK (21%), USA (40%). (2014) The global directions of international income reallocation, as the function of the international differences in corporate income tax rates, can be anticipated in the context of the data related to the average corporate income tax rates by particular continents (2014): Africa - 27.85%, America - 27.62%, North America - 33.25%, Latin America - 27.15%, Oceania - 27%, Europe - 19.68%, the EU Member States - 21.34%, the OECD Member States - 24.11%, the global average rate for 136 observed countries - 23.57% (KPMG, 2014).

The reallocation of the international income can be under the influence of heterogenous factors. We focus on the interaction of the height of the tax rate and the intensity of the reallocation of income in a hypothetical ambience of the immobilization of all the remaining potential determinants. Two business ambiences will be compared in order to isolate the influence of different national rates of corporate income taxes on the reallocation of international income: (a) the standard market business ambience, when market prices are meritory, and (b) the business ambience of a TNC, with the meritory transfer prices. In order to ensure the comparability of the data between the two business ambiences different in character, a presumption of income equivalence is introduced: the total income from regular operations prior to taxation is identical in both observed business ambiences (40000 m.u.) (Table 2).

First, the market ambience of operating is observed. The business transactions between one separate operating company in the „R" country (the equivalent to the country of residence), SC_R, (where corporations are taxed at the rate of 10%), which, at the market prices, delivers final products to a separate trading company in the „D" country (the equivalent to the destination country), SC_D, (where corporations are taxed at the rate of 30%) (Table 2) are analyzed. When market prices are meritory, the management of unrelated entities are individually concentrated on maximizing their individual business results. There is no international tax planning because the tax component is a separate factor of business decision making in two unrelated companies. Business relations between two unrelated entities are typically manifested in reducing the total of the realized net income at the level of the two unrelated companies (the sum of the net income of the two unrelated companies, SCR and SCD, is 33000 m.u.) (Table 2), and in an increase of the net income of the

unrelated trading company in the „D" country (the net income of the SCD is 10500 m.u.) (Table 2).

The business ambience of the TNC applying the unitary business strategy on the world market in the presence of international tax planning is now observed. The business transactions between the parent operating company in the country of residence, PCR (where the rate remained the same as in the „R" country, i.e. 10%) (Table 2), which, at the transfer prices, delivers final products to the related trading subsidiary in the destination country, FSD (where the rate, also remained the same as in the „D" country, i.e. 30%) (Table 2) are analyzed. The aimed function is the

Table 2 The valorization of the effects of the reallocation of international income on the reduction of tax at the TNC level

The allocation of net income among the unrelated entities (in monetary units)	
The business transactions of the unrelated operating company, SC_R, in the „R" country (the equivalent to the country of residence)	
1. The revenue from the sale of final products	100000
2. The costs and expenditures made	75000
3. The income from regular operations prior to tax	25000
4. Corporate income tax (10%)	2500
5. Net income	22500
The business transactions of the unrelated trading company, SC_D, in the „D" country (the equivalent to the destination country)	
1. The revenue from the sale of goods	200000
2. The costs of the acquisition of final products	100000
3. The costs and expenditures made	85000
4. The income from regular operations prior to tax	15000
5. Corporate income tax (30%)	4500
6. Net income	10500
The reallocation of net income among the related entities (in monetary units)	
The business transactions of the parent operating company, PC_R, in the country of residence	
1. The revenue from the sale of final products	110000
2. The costs and expenditures made	75000
3. The income from regular operations prior to tax	35000
4. Corporate income tax (10%)	3500
5. Net income	31500
The business transactions of the related trading subsidiary, FS_D, in the destination country	
1. The revenue from the sale of final products	200000
2. The costs from the acquisition of final products	110000
3. The costs and expenditures made	85000
4. The income from regular operations prior to tax	5000
5. Corporate income tax (30%)	1500
6. Net income	3500

Source: Author

one of maximizing net income at the TNC level. Since the unified tax component is within the competence of the central management, the resultant of international tax planning and the valorization of the intra-company transactions in accordance with the transfer prices, i.e. the resultant of the convergence of the economic aims of the group members of the related persons, is an increase in net income at the TNC level (to 35000 m.u.) and a reduction of the net income of the foreign subsidiary in the destination country (to 3500 m.u.) (Table 2).

Although the initial income of regular operations prior to taxation were identical in both business ambiences (40000 m.u.) because of a possibility of international tax planning, the TNC realizes bigger net income (35000 m.u.) compared to the total net income of the two unrelated entities (33000 m.u.). The increase in the net income of the group of the related entities by 2000 m.u. (Table 2) is the result of the isolated influence of the difference in the tax rates on the reallocation of international income from the country with higher corporate income tax (30%) to the country with lower corporate income tax (10%). In other words, international tax planning ensured the tax saving of 2000 m.u. for the TNC. The unrelated entities, in other words the two „national" companies, are handicapped since they have not been given a possibility of international tax planning because of which they pay higher taxes altogether by 2000 m.u., and consequently make a worse total business result.

The increase in international differences in the corporate income tax rates encourages the international reallocation of income. The bigger an international difference in corporate income tax rates, the bigger a benefit from manipulating in the area of price determining for intra-company transactions. As long as there are differences in the corporate income tax rates among countries, there is a realistic incentive for TNCs to locate their income in low-tax countries and their costs in high-tax countries.

EFFECTS OF REFORM TENDENCIES IN THE EU

When the reallocation of international income is observed in the context of the alternative methods (1-4) which the country of residence can use to react to the prior tax of the destination country with an aim to mitigate international double taxation, we find ourselves in the position to formulate the following professional comments:

- When the country of residence of a TNC applies foreign tax credit, the incentive for the reallocation depends on the position the TNC has reached in relation to foreign tax credit (if the TNC is either in the credit deficit position or in the credit surplus position) as well as on the statutory possibilities of postponing tax payment in the country of residence (whether the parent company can use such excess credit by carrying it either backward or forward).
- When the country of residence of the TNC applies an exclusion or deduction method of foreign tax, the TNC always has an incentive to reallocate international income in a low-tax country.
- When a new tax system to cover certain territory (the EU) is being developed, then the EU TNC has an incentive to reallocate its income beyond the territory boundaries of the EU-28, in the Republic of Serbia, for instance.

In the recent past, the EU has intensified the question of the essential reform of corporate income tax by the phase application of the „common consolidated corporate tax base" (the CCCTB) in order to promote the global competitive superiority of the EU. At the dawn of the European tax discourse, which relations can be expected on the territory of the Republic of Serbia? First of all, the essence of the current and perspective tax reform tendencies can reduce the national tax sovereignty of the countries gravitating towards the Euro zone, including the two central implications for the scope of international tax planning in the Republic of Serbia.

The first implication implies the activation of non-tax instruments for improving the competitiveness of Serbia's economy. The European Union chose a two-sided combination of supranational autonomy, meaning the existence of one, consolidated tax base at the level of the European Union, and national autonomy, meaning different tax rates at the level of

the 28 European Union Member States. Serbia must understand this two-sided strategy in three ways:

- as a partial loss of control in the tax incentives segment,
- as an indicator of the tendency of reducing the significance of tax competition in the corporate income tax rate segment, and
- as the inhibiting of the developing-propulsive potential of tax preferential instruments in favor of the growth of the relative significance of non-tax subsidies.

Since a single, European tax base is to be determined, Serbia is implicitly provided with a reduced possibility of autonomously leveling the effective tax burden of corporations by tax incentives, i.e. of influencing the mobilization of international capital by a set of tax preferrentials. Because the possibility of competing by varying the size of the tax base is reduced, the remaining possibility is to compete by varying the height of the tax base. Can the strategy of the atypically low tax rate of 15% (until 2012, the rate was 10%), which, within the EU, is still only used in Bulgaria (10%), Cyprus (where traditionally the rate of 10% was used, but in 2013, the rate was increased to 12.5%, which is the rate that is still in use) and Ireland (12.5%) be an effective instrument of the promotion of the economic space of the Republic of Serbia? No, it cannot. Serbia finished its race from „top" in 1992 to „bottom" in 2012 (Službeni glasnik Republike Srbije, 25/01, 80/02, 43/03, 84/04, 18/10, 101/11, 119/12, 47/13, 108/2013, 68/2014).

Serbia realized an impressive trend of reducing the enterprise profit tax rate. The authorities then (1992) started with the fantastic rate level of 40% (Službeni glasnik Republike Srbije, 76/1991) only to reduce the rate to 30% in 1994 (Službeni glasnik Republike Srbije, 43/1994). After that, on 1st January 1999, the authorities reduced the rate from 25% to 20%, so, for the first time, the rate in Serbia was lower than the correspondent „average rate" of the corporate income tax of the EU Member States (26%). However, the strategy of the tax rate reduction went on to charm the following generations of authorities as well, who, by „forgetting" the international aspect of the tax content, „reached" 2012 and established the „atypical reduction of the rate" to 10% („the bottom"). What professional comments does the presented regressive scenario deserve (1992-2012)? When taxing transnational corporations, every redesigning of corporate income tax in the destination country, in Serbia, must be observed integrally with the corresponding tax effects in the countries of residence of TNCs in the EU member states. When the rate in Serbia is below „the average rate", and particularly when it is significantly below „the average rate" of developed countries, TNCs in the majority of developed countries are not in the „credit surplus" position but rather find themselves in the „credit deficit" position. In other words, when the rate in the destination country is lower than the credit limit of the country of residence of the parent TNC, tax requirements are allowed because the TNC has a surplus of unused (approved) credit by its country of residence. Then, each further reduction of the rate reduces the relative importance of the very tax subsidy and increases the importance of the non-tax subsidies that are to be met. By making a clear intersection of the attitudes previously presented, we point out that the strategy of the continuous rate reduction (1992-2012) took away the status of an exclusive owner of comparative advantages for the mobilization of foreign capital from enterprise profit tax.

In 2013, the Serbian government introduced the logic of discontinuity with the previous twenty-year period of the „pro-European designing" of enterprise profit tax by increasing the rate from 10% to 15% (the average rate in the EU-28 was 22.75% in 2013, and 21.34% in 2014). So, we all find ourselves at the „beginning" once again (2013-2014). The Government is being faced with a question of a possibility of including, by means of non-tax subsidies, extreme requirements for a direct reduction of the price of conducting the entrepreneur's registered activity in the Serbian economy, reorganizing the realization of competitive tendencies in order to attract foreign investments. Nowadays, RS is faced with a pronounced need for the rebalancing of the relationship on the relation net inflow of international capital – the net loss of public revenue based on the non-standard reduction of the tax rate.

The second implication points out the fact that no increase in the collected public revenue based on the

taxation of TNCs in Serbia can be expected; what we can expect is the prolonging of international (TNC) pressure on the budget of the Republic.

The doyens among the old members of the European Union, who themselves are faced with the failure of the Lisbon Agenda and who hurriedly work on the implementation of the Europe 2020 Strategy (EC, 2010), will choose the definition and the way of sharing the consolidated base, i.e. the „external" link towards countries outside the EU-28, in such a way so as to, in the first place, satisfy the interests of the European transnational (multinational) corporation. The consolidation of the tax base at the level of the European multinational corporation makes it possible for the central management to reduce the tax burden of the European subsidiaries present in Serbia by combining the instruments of international tax planning with the effects of the ratified bilateral agreements. The combination of the noted factors can objectively imply a reduction of income from enterprise profit tax, i.e. it can prolong the existing pressure on the budget of the Republic of Serbia (revenue from enterprise profit tax in Serbia is standardly below 1.5% of the GDP, which is almost two times as small as the EU average).

The first task of the State of Serbia must be a skillful navigation through the process of a „real" public-private partnership. Serbia must carefully enter into an interactive partnership with big transnational (multinational) corporations by co-financing and co-producing the vital components of the public-economic-political results in an atmosphere of cooperation and competition. The national public financial and economic social results should be achieved according to the circumstances of the porous borders between the public and the private sectors, on the one hand, and between the areas of the domestic and foreign economic (tax) policies, on the other.

CONCLUSION

The aura of intra-version had shaded the content of the public finances for too long. The local coloration and the national predetermination, i.e. the favorability of the public finance development, have in the meantime been rethought. The global challenges have added new functions to the national public finances in the context of a reaction to the globalization of its main activities and competences.

The growing complexity of international economic relations emphasizes the importance of the international aspect of the corporate sector taxation. The globalization practically means that a transnational corporation is a taxpayer in multiple countries, conditioning an overlapping of national tax jurisdictions and opening a big question of international double taxation. Since the actual global tax content is represented by a disharmony between the national tax system, on the one hand, and the internationally efficient allocation of resources and the fair sharing of the international tax base, on the other, the search for a methodological form able to optimize the burden of international double taxations continues.

As the direct outgrowth of the disharmonic official procedure of international taxation, international tax planning can take different forms. By studying the effects of the basic forms of international tax planning, we have come to particular results.

By thoughtfully restructuring its global business transactions, a transnational corporation can achieve an „extra" reduction of the effective tax burden compared to the level of the tax burden standardly predetermined within the officially established procedure of international taxation (OECD). This statement directly originates from the first research hypothesis, which stresses the existence of an invert relationship between the length of the period of the postponing of the repatriation of foreign income from a foreign subsidiary into the parent corporation in the country of residence, on the one hand, and the effective tax paid by the parent corporation (TNC), on the other.

The bigger international difference in the corporate income tax rate, the bigger benefit from manipulating in the area of determining prices for intercompany transactions. As long as there are differences in corporate income tax rates among countries, there is a real incentive for TNCs to locate their income in low-tax countries and their costs in high-tax countries. Based on the presented statements, the second research

hypothesis can be defended and a conclusion can be drawn that the growth of international differences in the corporate income tax rates encourages the international reallocation of capital.

By confirming the third hypothesis of the paper, we explicitly came to conclusion in this paper that, when defining the methodology and valorization of the effects of TNC taxation, every redesigning of corporate income tax in the destination country, in Serbia, must be observed integrally with the corresponding tax solutions in the countries of residence of TNCs, in the EU Member States. The actual reform tendencies in the EU influence the range of tax planning in the Republic of Serbia in two ways, namely in the form of activating non-tax instruments for improving the competitiveness of the Serbian economy and in the form of prolonging international pressure on the budget of the Republic of Serbia.

The main affirmative specificities of this paper are represented by the standard methodology, namely an original illustration of the treated problems and the argumented justifications of the results obtained. The main disadvantage of this paper is its partial approach to the analyzed problems since numerous respectable instruments of international tax planning have not been included in the analysis.

The paper is important not only for the academic community but also for the creators of the tax policy. In the Republic of Serbia, analyses of multidimensional issues of international tax planning and/or similar problems from the broader corpus of „international taxation" are relatively rarely carried out. In this particular area, the Republic of Serbia is at the back of the group of countries of South-East Europe because there is an absolute absence of normative and practical development especially in the segment of the administrative control of transfer prices. This paper can be an inspiration for researchers who, in their professional work, are tangent to the problems in focus. In further researches, attention should be directed towards the fifteen open questions zoomed by the OECD in its Action Plan 2014 and 2015.

The paper is important from the practical point of view and is also problem illustrative for the creators of the tax policy in the Republic of Serbia since it implies the complexity and challenges of international tax planning. The research done enables us to formulate particular instructional messages for the needs of the creators of the tax policy of the Republic of Serbia.

The first instructional message is initiated by the question of the effects of the postponing of international income repatriation: When speaking about the position of the country of the placement of capital, i.e. the position of Serbia, what are the objective potentials of the tax preferring of the corporate sector with respect to attracting foreign capital? We stress the marginal example of the foreign tax credit method. Tax policy creators must have in mind the fact that the country of the origin of capital activates its own tax regime at the moment of the repatriation of income, which can have negative consequences for the tax incentives previously approved in the country of capital placement. To the extent a tax incentive in the country of capital results in a tax liability smaller than a tax liability determined in the country of origin, the tax benefits approved in the country of placement can be taxed again in the country of origin. If the presented marginal scenario is really played, the onerous curiosity is in fact the transfer of tax revenues from the Treasure of the country of placement (Serbia) to the Treasure of the country of origin (the EU).

The second instructional message is initiated by the question of the effects of the reallocation of international income: What are the basic methodological-practical challenges of the subject matter of the transfer prices in Serbia? The increasing significance of TNCs (MNCs) in Serbia is manifested through the non-existence of separate enterprises in numerous economic activities. The increasing complexity of operations performed by TNCs (MNCs) in Serbia should be answered by the simplification of the taxation procedure, which is based on knowing the nature of a business transaction and the evaluation of the risk of the appearing of manipulations with the transfer prices by certain activities/big entities. Because of the international implications of the transfer prices, while building of one's own database, the Amadeus database should be used – the database of comparable financial information for public and private companies in Europe (https://amadeus.bvdinfo.com/). The Serbian

tax administration should be focused on the actual concept of the „Advance Pricing Agreement". The resultant of the APA concept is a cost efficient result, the realization of a certain level of reducing the tension in the taxpayers-administration relationship, at the lowest possible total costs.

The third instructional message is initiated by the question of the actual and perspective reform tax tendencies. With respect to the mobilization of capital, how far is it justified in the country of capital placement, i.e. in Serbia, to apply the strategy of the reduction of the enterprise profit tax rate? The benchmark is the parallel relation of the volume of the tax paid in the country of capital placement and foreign tax credit in the developed country of capital origin.

The previously stated instructional messages are the founded ideas that, from different „aspects", run down to the same professional „source": the character and potentials of a tax system are the realistic reflection of the achieved level of economic development. The tax system in Serbia is not, or cannot be, an individual „predecessor" but rather the „parallel" and most often the „follower" of the achieved level of the total economic-technological-social-political emancipation. The development-propulsive scopes of the tax content will directly be proportionally increased with the intensification of the logistic support from the very fundament of such development: (a) from the development of an internationally recognizable entrepreneurial climate, when the business ambience of the Republic of Serbia has become a pro-European outgrowth rather than the resultant of frequent, sometimes daily, but in any case short-term bound, non-strategic reform movements; (b) from the professional and institutional stateliness and responsibility, when the credibility of not just tax actors, as the most miraculous and crucial prerequisite of a success and business reputation, has become an outdated question.

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A CRISIS AND A THREAT *VERSUS* THE FINANCIAL SECURITY ASPECTS OF A GOING CONCERN

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The paper focuses on the phenomenon of a business failure and the assessment of the degree of the financial security of Polish companies, mainly industrial entities, during the period of the economic transformation (1990-2013), with special attention paid to the last economic crisis (2007-2013). With regard to the theoretical and cognitive aspects of the presented issues, attention is paid to corporate crises, the types of crises and their causes as well as the identification and quantification of the symptoms of deteriorating financial conditions. In its empirical dimension, the paper aims to measure the degree of the financial security of Polish industrial companies as well as the trends and dynamics of changes and the corresponding interdependencies. Additionally, the author presents the characteristics of industrial mezzo-structures from the perspective of their stability and the frequency of the movement of objects (changes to ranging positions). Finally, the paper confirms that the degree of financial security can be seen as a symptom of changes to macroeconomic business cycles.

Keywords: corporate crisis, risk management, financial security, early warning systems

JEL Classification: G 33

INTRODUCTION

The contemporary economy is characterized by the turbulent business environment and the fast-paced and radical character of changes - it is becoming increasingly unstable. The dysfunctionalities of the economy resulting from its changes increase the risk of corporate crises and the likelihood of business failures. Exposure and vulnerability to corporate threats take diversified forms and can be presented as a model. It should be assumed that a corporate crisis is not a deviation from the normal state or a form of aberration - it is an inherent characteristic of business activities and a component of risk management processes. Corporate crises are characterized by their complexity and the fact that they result from a combination of several factors which take the form of a chain of events and cause-effect relationships as well as distinct routes of escalation. The factors leading to crises are either exogenic or endogenic in character, with the major role played by internal factors, especially management errors. The identification of threats based on the Early Warning System (EWS) makes use of a number of various methods and tools. The identified measures

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quantify anticipated early warning signals, acting as predictors of threat.

With regard to the theoretical and cognitive aspects, the paper focuses on corporate crises and their types, the reasons for their occurrence and the identification and quantification of the symptoms of the deterioration in companies' financial standing. The empirical research studies are to achieve the following objectives, namely to:

- measure and assess the level of the security of Poland's industrial companies and the trends and dynamics of changes;
- determine the impact of correlations between financial security and the percentage of insolvency procedures; and
- identify the characteristics of the analyzed sample in terms of the stability and frequency of the movement of objects.

The identified objectives constitute a basis for formulating three research hypotheses, which are verified in the course of the empirical research:

H1: The value of the measure of court-filed bankruptcy cases is correlated with changes to their percentage in relation to the core business, and industrial companies are characterized by higher-than-average values;

H2: There is a reversely proportional correlation between the value of a financial security measure and the percentage of court-filed bankruptcy cases, and the degree of financial security is a symptom of business cycle changes (GDP) in a proportional correlation; and

H3: An economy's mezzo-structure demonstrates stability with relatively unchangeable concentrations and the dominant representation of traditional types of the activity.

The assessment of financial security is based on a logistics regression model reflecting the likelihood of a threat to a going concern and the risk of business failure.

THE ESSENCE OF A CORPORATE CRISIS, ITS DETERMINANTS AND SYMPTOMS

Companies operating in the real economy are affected by regulation and are vulnerable to crises caused by external conditions and factors. These factors occur in the immediate environment (the microenvironment) and a more remote environment - the mezzo- and macroeconomic environments. Other factors are related to an organization itself. Deteriorating conditions have a negative impact on companies and can lead to crises.

A crisis in a macroeconomic approach can be treated as a stage of a business cycle and an effect of the changing pace of economic growth. A business cycle is described as the recurring and irregular fluctuations of the pace of economic growth. The explanations of such fluctuations are offered by a number of economic theories, including the monetary theory (M. Friedman), J. A. Schumpeter's innovation concept, von F. A. Hayek's overinvestment theory, A. C. Pigou's psychological theory and W. D. Nordhaus's political theory.

From the microeconomic perspective, crises can also be viewed in different ways, depending on various schools of and trends in the science of companies. Generally, crises result from unplanned events that disrupt or threaten normal business operations. They can be seen as the occurrence of negative changes in business activities and poor performance which, importantly, affect all company operations, posing a threat to a going concern. An analysis of crises is based on the assumption that they represent a phase in companies' life cycles. C. K. Prahalad and G. Hamel refer to a crisis as a turninge point between the two phases (in terms of quality) of corporate expansion, and J. Argenti (1976), and O. P. Kharbanda and E. A. Stallworthy (1985) define the major types of corporate lifecycle stages. L. E. Greiner (1972) identifies development stages and the stages of crises that follow.

Companies vary in terms of their exposure and vulnerability to threats. C. F. Smart, W. A. Thomson and I. Vertinsky (1978) propose a model which describes companies' vulnerability to a crisis. The explanatory variables include three groups of factors

causing a crisis, while the dependent variable is described by vulnerability to a crisis combined with market efficiency (Smart *et al*, 1978). In the case of Polish economic conditions, the level of exposure and vulnerability is very high - both in organizational and financial dimensions. A number of empirical research studies suggest that it results from the uncertainty and changeability of Polish companies' strategic potential - the factors which may lead to crises. In addition to that, the on-going process of parallel transformations increases the risk and uncertainty of business operations, the effect of which is even greater in the context of the current economic slowdown. Also, the area of strategic management - which is of key significance in the conditions of economic slowdown - is generally disregarded by Polish companies. It enhances strategic uncertainty and leads to the so-called domino effect (Mączyńska, 2011).

A company's crisis is currently believed not to be the case of a deviation from its normal business operations (the case of „aberration") but rather an inherent feature of the economic activity. It represents the area of risk management which aims to secure a company's operations and retain its value. A review of the concepts which explain the phenomenon of corporate crises indicates that crises can lead to both negative effects (a possible business failure) and positive ones - a threat of a crisis can also be seen as a development opportunity. This idea is confirmed by L. E. Greiner and W. H. Stahehle - who claim that corporate development is stimulated by a crisis. The condition between stabilization and chaos - on the verge of chaos - is a normal and desirable condition, leading to effective corporate operation (Foester's theory of order out of chaos).

From the time perspective, i.e. from the moment of the occurrence of the first symptoms to the outbreak of a crisis, two types of crisis can be defined: a sudden crisis (circumstances which occur without a warning and leading to a shock) and a smoldering crisis (the occurrence of new problems and symptoms - a lasting process); a sudden crisis can lead to after-shock effects - a smoldering crisis.

The determinants of crises are defined by authors as various types of factors originating from various sources (Table 1). Undoubtedly, corporate crises are complex phenomena caused by a combination of

Table 1 The determinants of corporate crises according to the selected authors

Authors	Determinants of a crisis
R. Kaplan, D. Norton	• a low activity in the area of strategic management • a lack of correlation between the use of resources and strategy • a lack of correlation between a motivating system and goals • a lack of understanding of the company vision and strategy assumptions
C. F. Smart, W. A. Thomson, I. Vertinsky	• variables related to the competition and the environment • the characteristics of the executive staff • organizational attributes
P. F. Drucker	• a failure of products on the market • an assessment of the situation based on accrual - non-cash methods • inefficient management manifesting itself at the time of rapid expansion • falling into a routine at the time of stabilization
S. Slatter, D. Lovett	• external: economic downturn, competition, unfavorable price changes • internal: poor management, ineffective financial control, high costs, poor marketing, overtrading, acquisitions, the financial policy

Source: Author, according to: Kaplan & Norton, 1996; Smart *et al*, 1978; Drucker, 2006; Slatter & Lovett, 2001.

several factors forming a sequence of cause-effect events and marking a distinct path of escalation if appropriate measures are not taken in due time. The factors causing crises can be exogenic or endogenic in character. A number of authors (including J. Argenti, S. Slatter, D. Lovett, I. I. Mitroff, E. I. Altman and H. Albach) claim that endogenic factors are of key significance, especially poor management. Moreover, most companies failing as a result of crises record positive financial results but scarce financial resources (Altman, 1983; Argenti, 1976).

The symptoms of a crisis occur as a result of external and internal factors leading to crises and, in a similar manner, differ in character and do not occur separately from other symptoms. In most cases, the symptoms of a crisis are defined as a company's failures affecting its general condition, especially in the economic and financial areas. The corporate value is frequently referred to as a dependent variable in the context of symptoms. However, a corporate crisis is a vague concept - it is „felt" but it is difficult to describe the quantitative dimension of its symptoms (Obłój, 1987).

AN EARLY IDENTIFICATION OF THREATS TO COMPANY OPERATIONS

In their integrated company expansion model B. Quinn and K. Cameron note that the ability to counteract crises is as important as the ability to predict and prevent them (Quinn & Cameron, 1983). Therefore, companies must develop and implement solutions enabling them to diagnose indications of a crisis - the so-called Early Warning Systems (EWS). They are tools for optimizing risk as part of quantitative risk management methods (Crocford, 1982).

The EWS is generally classified from the point of view of who creates it and who it is designed for, or from the perspective of the selection of tools and assessment methods (Altman & Narayanan, 1997; Platt & Platt, 2002). The EWS should be seen as one of the areas of assessing a company's economic and financial condition. Its objective is to reveal the symptoms of a deteriorating situation, but it does not identify any corrective measures. It is also justified to say that the EWS in the context of its objectives should not be viewed as a bankruptcy prediction method.

In identifying threats, the EWS makes use of a number of tools applied in technical, economic and financial analyses as well as statistical methods used in predicting financial threats, going concern issues and bankruptcy prediction. The identified measures quantify early warning signals, thus becoming threat predictors. According to H. I. Ansoff (2007), such systems make use of three types of information: alarm signals, deviations from standards and weak signals (weakly structured) (Lam, 1985).

General trends in research studies indicate an increasingly complex and advanced character of analytical processes. A more significant role is played by statistical methods, which are commonly used and continuously developed. The EWS methods are usually classified on the basis of the character of the analyzed factors and the manner of formulating conclusions. The first criterion distinguishes quantitative, qualitative and mixed methods, while the second one distinguishes logical deductive and empirical inductive methods. According to C. Zavgren (1983), the classification of the methods is based on solutions employing a discriminant analysis (one- and multiple variable models) and a conditional probability (multiple variable models). Thus, it is the area exclusively represented by empirical inductive methods, commonly regarded to be appropriate ones.

Among the methods distinguished on the basis of the character of factors, the most frequently used ones include a financial ratio analysis and scoring models (with one synthetic measure) as well as multi-criteria models (quantitative and qualitative models). Because the effectiveness of one-measure financial analysis is often questioned, it is advisable to use the economic concept of Economic Value Added (EVA), the Shareholders Value Added (SVA) and the Market Value Added MVA. This concept is based on the fundamental goal of a company's operations - an increased corporate value should increase owners' benefits (Kaczmarek, 2014). Research studies conducted in the Polish business environment indicate the lack of

a statistically significant correlation between the above measures and financial threats to a going concern and the risk of a business failure.

Logical deductive methods use a financial analysis in assessing a company's condition (quantitative and qualitative assessments and hierarchical systems). Empirical inductive methods are examples of comparative analyses based on statistical methods (an analysis of the groups of threatened and non-threatened companies). Depending on the number of variables, these methods are referred to as one- or multivariable methods, whereas their major characteristic is efficiency (the ability to identify threatened and non-threatened companies). Additional benefits include a possibility of planning activities in advance, testing in stable conditions and a proper identification of critical conditions.

The development of econometric modelling in the prediction of financial threats to corporate operations originates from the first works of W. Rosendal and P. J. Fitzpatrick - they developed a pair-based comparative analysis (a threatened *versus* non-threatened entity). C. L. Merwin applied the methods of a profile analysis and the arithmetic mean for groups of objects, while W. H. Beaver verified the usefulness of financial ratios in threat prediction. This area of research was also undertaken by P. Weibel, who proved that an increased number of explanatory variables did not lead to significantly better results in risk assessment.

The works of these authors are classified as those representing one-measure methods (the so-called dychotomic tests), while further research focused on the multi-measure threat prediction methods. The dominating methods include a multi-measure discriminant analysis, with a great contribution made by the logit model. It allows for detecting a financial threat or a threat to a going concern and the risk of failure. The multiple discriminant analysis was developed by E. I. Altman, who - working individually or in cooperation with other researchers - developed a number of models (Z-score) for listed and other companies, for developed and emerging markets (developing) (Altman, 1983; Altman, 1993).

THE MEASUREMENT OF CORPORATE FINANCIAL SECURITY IN ASSESSING THE ECONOMIC TRANSFORMATION IN POLAND

A multi-aspect, holistic understanding of an economy and its processes is reflected in the extensive research of the Polish economic transformation - a unique process in terms of systemic changes and related economic policies. In this approach, an economy, understood in its broad sense, includes mutually interlinked elements constituting a system of reforms - a cause-effect sequence.

A transformation process is characterized by a wide range of complex relationships which describe and affect an economy - their simultaneous occurrence creates a picture of a number of parallel transformations. The introduced changes aim to ensure effective and sustained economic growth, and the specific goals are as follows (Kaczmarek, 2012a):

- structural changes,
- increased competitiveness,
- restructuring and privatization, and
- improvements in and stabilization of company finances.

Development is a process of changing structures - gradual changes result in improvements, achieving higher standards and increasingly complex and more effective forms of an activity. Development - leading to a greater complexity - is a process taking place in time, and the dynamics of structural changes are described by the changeability of development stages observed in the course of time. Qualitative changes are related to the use of intensive factors, and considering the fact that quantitative changes (growth) do not occur independently of qualitative changes, growth is regarded to be an integral part of development along with mutual relations between respective changes. Development as a dynamic process can be considered from the perspective of the dynamics of the volume and structural changes as well as effectiveness. Assuming that structural changes and effectiveness describe qualitative changes, and volume changes

describe quantitative changes, conclusions can be formulated with regard to the development of a given structure.

The objective of the Polish economic transformation is to ensure sustained economic growth through an effective use of available resources - the replacement of conditions by factors. Therefore, the key processes describing and affecting efficiency are the ones that help achieve the specific goals of the transformation process (Kaczmarek, 2012b):

- structural changes,
- increased competitiveness,
- restructuring,
- increased financial security,
- value creation.

The assessment of a financial threat, a going concern threat and the bankruptcy prediction models offered in the literature - from the perspective of the objectives and scope of research into economic transformations - indicate the necessity of developing a new analytical model. In creating this model, apart from the use of innovative methods and tools, a different approach was adopted with respect to the definition of the obtained result. It is defined as the extent of financial security and the activities aimed at counteracting financial threats related to a going concern and a possibility of business failures. The objective of this change was to define a stimulant in the model for assessing the effects of the economic transformation. It provides a synthetic description of the financial condition of entities, groups of entities and economic mezzo-structures.

The logistic regression model was estimated for the needs of assessing the degree of financial security. This measure has two distinct characteristics:

- it allows for analyzing differences in and the dynamics of the financial condition of entities and groups of entities (the components of the economic structure); and
- it relativizes the result of this analysis in relation to a threat of business failure.

The estimated model of financial security is presented in Table 2, according to the adopted methodology.

The values of this measure range from 0% to 100%, with higher values indicating higher probability of

Table 2 The parameters of the estimated financial security model

Name of indicator	Symbol of indicator	Transformation of indicator	Assessment of parameter
Absolute term	-	1	- 0.70
Asset productivity ratio	W_1	$Z_1 = (W_1 - 1.89)/1.09$	- 0.42
Self-financing ratio	W_3	$Z_2 = (W_3 - 0.39)/0.31$	- 0.93
Short-term debt ratio	W_6	$Z_3 = (W_6 - 0.47)/0.27$	+ 0.65
Asset operating profitability ratio	W_{19}	$Z_4 = (W_{19} - 2.94)/13.46$	- 0.73

$$SBF = \left(1 - \frac{1}{1 + exp\ [-(-0{,}70 - 0{,}42\,Z_1 - 0{,}93\,Z_2 + 0{,}65\,Z_3 - 0{,}73\,Z_4)]}\right) \cdot 100\,\%$$

Model	Number of threatened companies	Number of non-threatened companies	Sensitivity	Specificity	AUC
SBF	426	1,936	82.4%	82.1%	0.894

Source: Kaczmarek, 2012b

maintaining financial security within the period of one year. It allows for a quantitative description of changes to financial security in a dynamic approach as well as for comparisons of various types and groups of companies. The existing models offered in the literature do not have such characteristics. The values of the model's estimated efficiency measures confirm its high prediction potential, which qualifies the model for conducting empirical research (Kaczmarek, 2012c).

THE EXTENT AND STRUCTURE OF BUSINESS FAILURES IN POLAND

The response stage of crisis is characterized by visible difficulties in a company's operations, posing a threat to its economic existence. It is the last stage at which a crisis can be overcome - otherwise, a company faces a business failure. It usually results from a long-lasting financial crisis - a smoldering crisis.

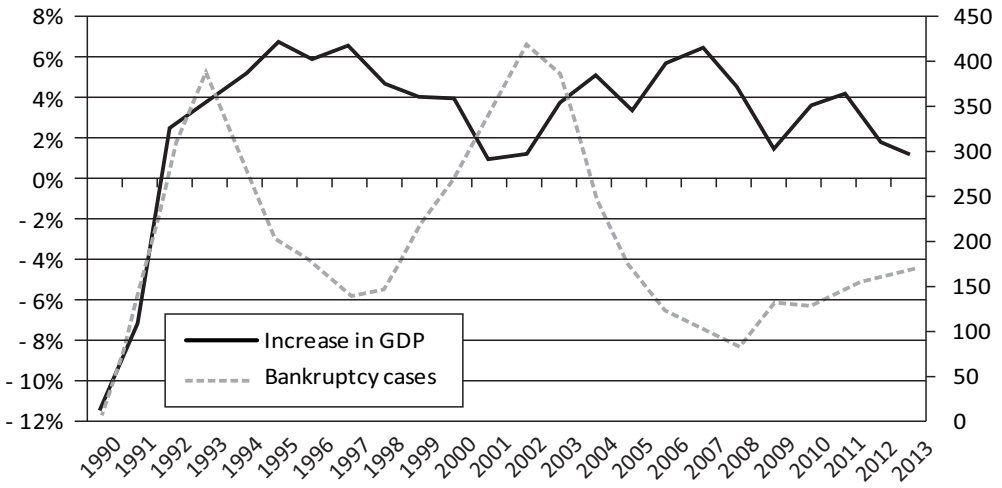
Failure/bankruptcy is a legal term for a company's crisis from the perspective of insolvency and recovery procedures, in which insolvency (a *sensu stricto* failure, bankruptcy filed in a court) is the key idea. In a broad perspective, a business failure is an economic phenomenon resulting from an entrepreneur's right to freely carry out business activities and the acceptance of business risk which can lead to a loss of foundations for independent corporate activities - a company's failure (a *sensu largo* failure, economic distress). It can result from two types of factors (economic and financial), corresponding to the respective types of failure: economic distress and financial distress. A business failure as an economic condition is referred to by some authors as bankruptcy (to distinguish it from the Polish legal term), which makes it difficult to understand the concept in the context of international law. Moreover, the context of insolvency law is broader - it also includes recovery procedures.

Business failures can also be considered in a macroeconomic dimension. The number of companies which file bankruptcy is regarded as one of the symptoms of deteriorating macroeconomic conditions. It is seen as a barometer of economic soundness and government policies implemented in the spirit of the two trends of economic theory related to business failures - positive and normative theories (Schwartz, 2005). The results of the conducted study point to a correlation between the current business cycle and the number of failing companies; this correlation is much stronger for advanced (stabilized) economies than for developing ones (characterized by weak economic conditions) due to a number of economic distortions.

The first three years of the Polish transformation represent a period of the transformational recession - the radical implementation of stabilization programs, the rapid decreases in the GDP and a great number of business failures, mainly those of state-owned companies (Figure 1). The 1993-2008 period records the triple occurrence of the above phenomena: an increase in the GDP - a decreased number of court-filed bankruptcy cases, a decrease in the GDP - an increased number of bankruptcy cases (the correlation coefficient $r = -0.71$, $P < 0.05$). The period of the economic slowdown in Poland, caused by the 2008 global financial crisis, is characterized by the lower intensity of the previously observed phenomena.

It can be concluded that the pace of the GDP growth in 2010-2013 was not high enough to counteract the effects of the crisis, which is reflected in the increasing percentage of bankruptcy cases as of 2008. Even if the expected GDP growth in 2014 reaches the level of approx. 2.5%, it can be a pessimistic scenario for the sector of non-financial institutions in Poland (accounting for more than 45% of the GDP and nearly 53% of value added). It is only a considerable and sustained increase in the GDP values that can decrease the number of business failures (a 3.5% increase in the GDP is an empirically proven threshold value).

The 2008 crisis started in the financial sector, which, by its very nature of avoiding risk, transferred the crisis to the company sector by restricting its lending activities. It hindered corporate growth, while a decrease in consumer and mortgage loans reduced household demand. The beginning of 2008 was marked by the first indications of deterioration in companies' condition in Poland. A considerable decrease was recorded in sales revenues, the value of assets and, in particular,



Notes: GDP (%) (the left axis); the percentage of court-filed bankruptcy cases per 10,000 companies (the right axis)

Figure 1 The GDP growth and the percentage of the court-filed bankruptcy cases in Poland in 1990-2013

Source: Author, based on: The Statistical Yearbook, GUS Warszawa, retrieved on August 10, 2014, from http://www.stat.gov.pl; Raport wniosków o upadłość/ Bankruptcy applications, Coface Warszawa, retrieved on August 14, 2014), from http://www.coface.pl

investment activities. Companies' financial results were unsatisfactory, many of them running a deficit. The number of companies and their staff decreased.

The number of business failures increased - this trend started in 2007, accelerating rapidly as of 2009 (Figure 2). The number of failure-related settlements increased, accompanied by an increasing number of company liquidations - restructuring processes were implemented in the unfavorable business conditions.

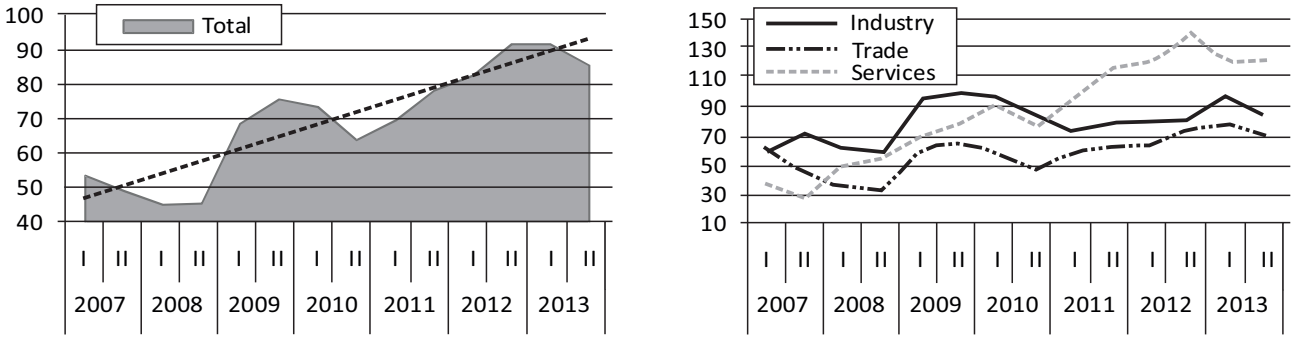
An analysis of the concentration values[1] of the court-filed bankruptcies indicates that it is at above-average levels in industrial companies up to the end of 2010, while trading companies record lower-than-average values in the entire analyzed period. Service companies are characterized by a steady increase, reaching above-average levels as of 2009.

The concentration values of the court-filed bankruptcies are related to the companies' core activities. The relatively low fluctuations and the absence of increasing trends are recorded by trading activities, with the peak values occurring in 2009 and 2013. Increased values are recorded in industrial activities (the highest levels in 2009-2010, and another negative trend in the first half of 2013). The highest concentration values are recorded in the service sector (a visible increase starting in the middle of 2008). Because of the high share of the construction sector, the concentration values reach record levels as of 2010.

THE DEGREE OF FINANCIAL SECURITY - POLISH INDUSTRIAL COMPANIES

Similarly to the above analysis of corporate failures, the estimated model can be applied in assessing the degree of financial security in the economy's institutional sector (divided into production, trading and service activities). The key role in production activities is played by industrial activities, accounting for nearly 94% of value added in production activities[2], hence its significance in the conducted study.

The beginning of the Polish systemic transformation (1990-1993) is marked by a rapid decrease in the



Note: Per 10,000 companies, figures for six-month periods

Figure 2 The percentage of the court-filed bankruptcy cases in Poland in 2007-2013

Source: Author, based on: Raport wniosków o upadłość/Bankruptcy applications, Coface Warszawa, retrieved on August 14, 2014, from http://www.coface.pl; System Gospodarka, Pont Info Warszawa, retrieved on August 8, 2014, from http://www.pontinfo.com.pl; Fijorek, Kaczmarek, Kolegowicz & Krzemiński, 2014

financial security of production activities, including industrial and trading companies (unlike the service sector). The subsequent years are characterized by short-term improvements in companies' financial condition. The year 1997 marks the beginning of a rapid downturn in all types of activities. A breakthrough process started in 2002 (the pre-accession period and accession to the EU in 2004), characterized by relatively stable business conditions. Deterioration in economic conditions was recorded in 2008 (the financial crisis). The negative trend prevailed in the service sector in the subsequent years (Figure 3). An in-depth analysis

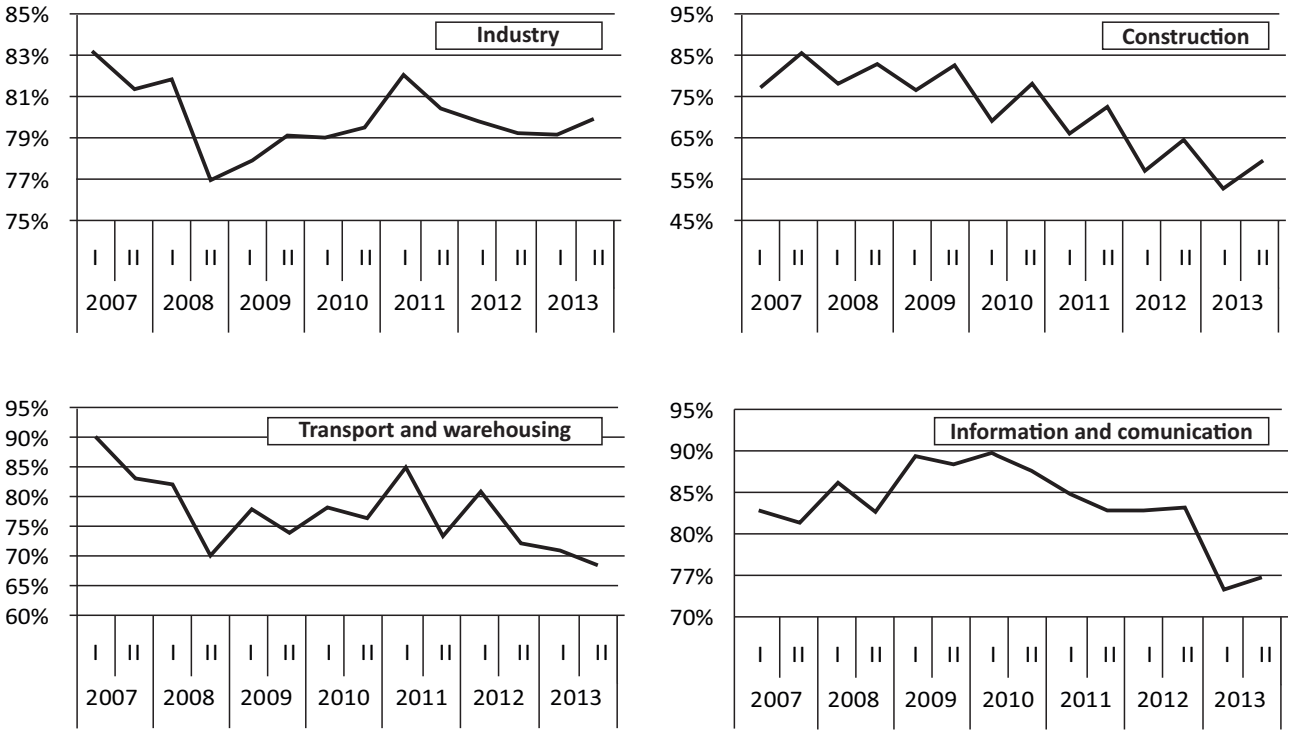
Figure 3 The degree of financial security - industrial, trading and service companies in Poland in 1990-2013 (%)

Source: Author, based on: Raport wniosków o upadłość/Bankruptcy applications, Coface Warszawa, retrieved on August 14, 2014, from http://www.coface.pl; System Gospodarka, Pont Info Warszawa, retrieved on August 8, 2014, from http://www.pontinfo.com.pl; Fijorek, Kaczmarek, Kolegowicz & Krzemiński, 2014

of financial security by economic sections (PKD) at the beginning of the financial crisis indicates that, in 2008-2009, the crisis affected industrial companies, followed by transport and warehousing activities. In later periods, the indications of the crisis were recorded in construction-, information- and communication-related activities. The most disturbing changes hit the construction industry, in which considerable fluctuations of financial security absolute values were recorded as of the middle of 2010 (the lowest financial security values amongst all PKD sections). Following the distortions in the second half of 2008, industrial companies recorded improved the values of financial security. Business cycle fluctuations are also recorded in transport and warehousing activities, with disturbing negative trends in the last two years. The highest degree of financial security is recorded in information and communication companies, being also negatively affected as of the middle of 2010 (Figure 4).

An in-depth analysis of PKD industrial sections (30 out of the 69 economic sections) includes an assessment of their ranging position. The assessment is negative - the changes that occur retain the economy's industrial mezzo-structure. Attention should be paid to a small number of changes to the highest and lowest ranging positions. It can be concluded that PKD sections with the highest and lowest degree of financial security tend to retain their respective positions (Kaczmarek, 2012b).

The identification of PKD industrial sections with high financial security values is based on a synthetic



Note: Financial security figures for 6-month periods

Figure 4 The degree of financial security in the selected sections of Poland's national economy in 2007-2013 (%)

Source: Author, based on: Raport wniosków o upadłość/Bankruptcy applications, Coface Warszawa, retrieved on August 14, 2014, from http://www.coface.pl; System Gospodarka, Pont Info Warszawa, retrieved on August 8, 2014, from http://www.pontinfo.com.pl; Fijorek, Kaczmarek, Kolegowicz & Krzemiński, 2014

measure comprising the assessment of the two categories - average ranging positions and their changeability expressed by a standard deviation (Figure 5).

The Industrial PKD sections characterized by a relatively high and stable degree of financial security include the following: metal ore mining; manufacture of basic pharmaceuticals; generation and supply of electricity, earth gas, water vapor, hot water, etc; oil and earth gas mining; manufacture of chemicals; manufacture and processing of coke and petroleum refined products; manufacture of paper and related products.

The PKD sections with the lowest degree of financial security and high changeability are as follows: manufacture of textiles; manufacture of electrical equipment; coal and brown coal mining; manufacture of computers, electronics and optical devices; manufacture of transport equipment.

In conclusion, the PKD sections occupying high ranging positions in the economy's mezzo-structure and characterized by large concentrations and stable positions are represented by traditional business activities.

Correlations between measures related to business failures in their economic and legal dimensions cannot

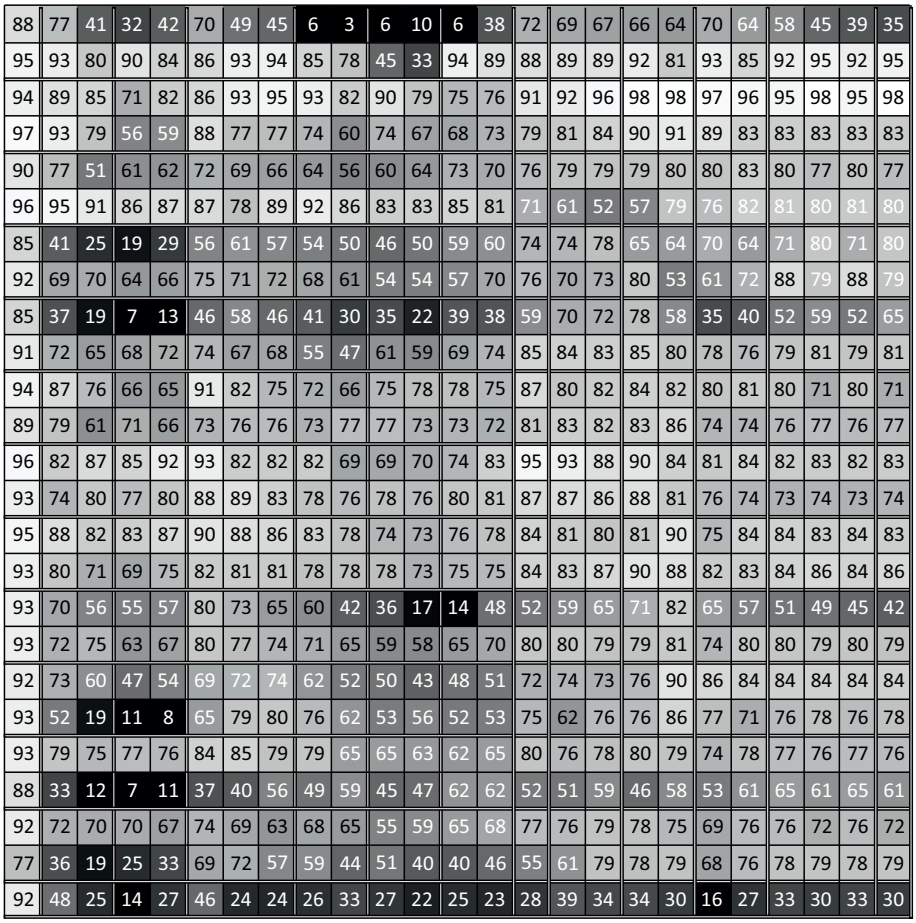


Figure 5 The PKD industrial sections by ranging position based on financial security and ranging position changeability in 1990-2013

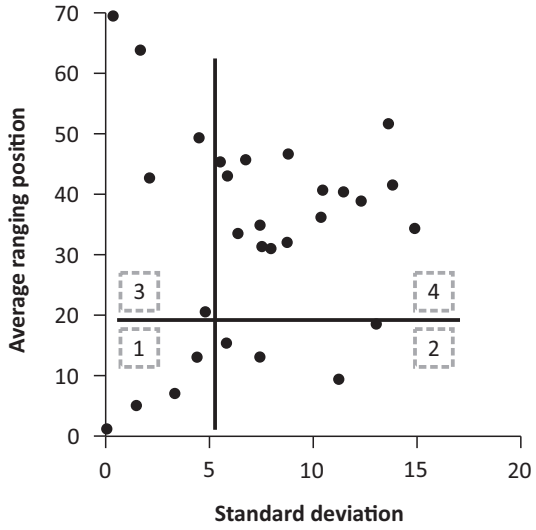


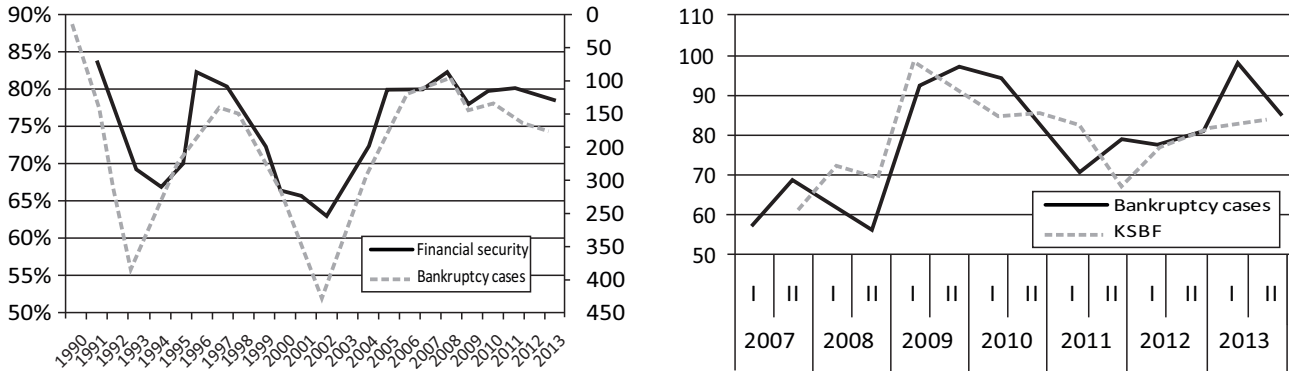
Figure 5 (Continued) The PKD industrial sections by ranging position based on financial security and ranging position changeability in 1990-2013

Source: Author, based on: Raport wniosków o upadłość/ Bankruptcy applications, Coface Warszawa, retrieved on August 14, 2014, from http://www.coface.pl; System Gospodarka, Pont Info Warszawa, retrieved on August 8, 2014, from http://www.pontinfo.com.pl; Fijorek, Kaczmarek, Kolegowicz & Krzemiński, 2014

be identified without distinguishing the content represented by these measures. The comparative analysis of financial security and court-filed bankruptcy cases indicates that the two categories are characterized by similar long-term (1990-2013, all companies) and mid-term values (2007-2013, industrial companies).

It is another argument in favor of the estimated financial security model. The assessment of the correlations is based on the correlation time series tests indicating that there is a strong and statistically significant correlation ($r = -0.78$, $P < 0.05$) between financial security and the number of the court-filed bankruptcy cases (for all companies).

The calculated time series allow for determining a calibration equation for the two measures, based on the linear quantile regression model (industrial companies, $r = -0.77$, $P < 0.05$). The calculated parameters create a linear equation for the median of the bankruptcy cases to financial security. It allows for a comparative analysis of companies with the use of the financial security measure scaled in units corresponding to the number of the bankruptcy cases (with the use of the calibrated financial security measure - the KSBF) (Figure 6).



Notes: The bankruptcy cases and financial security for all companies (left); the bankruptcy cases and the KSBF for industrial companies (right), the bankruptcy cases per 10,000 companies

Figure 6 The degree of financial security and the percentage of the court-filed bankruptcy cases in Poland in 1990-2013

Source: Author, based on: Raport wniosków o upadłość/Bankruptcy applications, Coface Warszawa, retrieved on August 14, 2014, from http://www.coface.pl; System Gospodarka, Pont Info Warszawa, retrieved on August 8, 2014, from http://www.pontinfo.com.pl; Fijorek, Kaczmarek, Kolegowicz & Krzemiński, 2014

CONCLUSION

In their theoretical and methodological dimension as well as from the perspective of empirical research, the conclusions and effects of the paper are as follows:

- The development and use of measures for a comparative analysis of trends and changes in the areas of financial security and corporate failures;
- The existence of a strong and statistically significant correlation between financial security and bankruptcy cases at the company level in the longer periods of time (1990-2013) and in the economy's mezzo-structure in the midterm (2007-2013);
- The correlations between financial security and the bankruptcy cases confirm the positive assessment of the effectiveness of the estimated model for assessing the degree of corporate financial security;
- The negative assessment given to changes to the Polish economy's industrial mezzo-structure in 1990 -2013 in terms of the ranging positions of the PKD sections;
- The industrial mezzo-structure is characterized by slight changes to the highest and lowest ranging positions of the PKD sections;
- The PKD sections with the lowest and highest financial security values demonstrate a relative stability in terms of retaining their positions;
- Traditional business activities rank the highest amongst the PKD sections;
- It is confirmed that the degree of financial security can be regarded as a symptom of changes to the macroeconomic business cycles described by means of changes to the GDP, and that the two measures are directly proportional ($r = 0.71$, $P < 0.05$).

The results based on the empirical research allow for a positive verification of the three research hypotheses formulated in the introduction to the paper. In the case of the first hypothesis, the negative assessment is attributed to changes in an economy's industrial mezzo-structure due to a higher-than-average concentration of court-filed bankruptcy cases. Similarly, the verification of the third hypothesis demonstrates a picture of an inappropriately formed industrial mezzo-structure. It is characterized by visible objects with high stability. Moreover, it is dominated by the traditional and financially secure types of the activity. The positive verification of the second hypothesis confirms the high efficiency of the estimated model for determining the degree of financial security. Thus, the model can be broadly used as a tool for assessing a company's financial condition (groups of companies - economic mezzo-structures), and the degree of financial security can be seen as a symptom of changes to macroeconomic business cycles.

The conducted research reveals a weakness of the estimated model - its limited content allowing for the interpretation of the obtained results. This measure describes the likelihood of maintaining a company's financial security without giving consideration to its economic potential. Further research at the theoretical, methodological and empirical levels aims to incorporate the assessments of possible business failures (a loss of financial security) into new estimated models. Results will be scaled on the basis of such categories as cuts in jobs, a decrease in sales revenues, a loss of value added, and a decrease in the flows of taxes and contributions to the state budget.

ENDNOTES

1 This measure is a relative assessment of the concentration of failing companies in a specific group of entities in relation to the total number of entities - the members of the analyzed group, and in relation to all companies in the national economy. Values greater than one indicate higher-than-average concentrations in a given group.

2 Industrial activities include the three sections of the Polish classification of economic activities (PKD): B - Mining, C - Industrial processing, D - Generation and supply of electricity, earth gas, water vapor, etc. Production activities also comprise Section E - Supply of water, waste and sewage management, re-cultivation.

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MARKOWITZ PORTFOLIO REBALANCING WITH TURNOVER MONITORING

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Active portfolio management implies periodic rebalancing, i.e. a change in the structure of the existing portfolio. Rebalancing is aimed at improving the performance of the managed portfolio by adjusting it with respect to the given objective. The main objective of this research is to test two portfolio rebalancing strategies, one based on market risk and another on optimal risk-return tradeoff. We use optimal volatility or Sharpe of portfolio as a criterion for the initial portfolio allocation and rebalancing over the observed period. In order to obtain solutions that can be applied in practice, we impose rebalance triggers designed to control the portfolio turnover and corresponding transaction costs. the results suggest that the minimum volatility strategy can be accepted as an eligible investment alternative for risk adverse investors since it provides superior risk performance compared to the reference S&P 100 index and 1/n portfolio, with a relatively low level of turnover and a low rebalance frequency.

Keywords: portfolio management, volatility, Sharpe ratio, portfolio rebalancing, turnover

JEL Classification: C44, C61, G11

INTRODUCTION

Portfolio management starts with asset allocation. There is a consensus that asset allocation plays an important role in determining portfolio performance (Arshanapalli, Coggin & Nelson, 2001). Active portfolio management implies the rebalancing of the existing portfolio by buying and selling assets. The aim of rebalancing is to improve the performance of the managed portfolio by adjusting it to the current market conditions. However, portfolio rebalancing induces transaction costs which impact the overall portfolio return. Therefore, transaction costs must be considered when the aim is to develop dynamic portfolio models that perform satisfactorily under the real market conditions (Choi, Jang & Koo, 2007; Kozhan & Schmid, 2009).

For decades, market risk has typically been defined as a variance of portfolio returns. Traditionally, portfolio allocation is based upon H. M. Markowitz's mean-variance setup (Markowitz, 1952; Fabozzi, Focardi & Jonas, 2007). In this paper, we follow Markowitz's setup in choosing portfolio rebalancing strategies.

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Two different strategies are analyzed: 1) the periodic minimization of portfolio risk measured by volatility and 2) the periodic maximization of the portfolio W. F. Sharpe ratio (1966). The aim of the research is to test two rebalancing alternatives: the first one being based on market risk and the other one on the optimal risk-return tradeoff.

Portfolio allocation is always about a tradeoff between two opposing objectives - risk minimization and return maximization. Market risk (Alexander, 2008) is a risk resulting from adverse movements in the prices of liquid financial instruments. As long as regulators are concerned about the risk profiles of the portfolios under their consideration (Jaksic, 2012), investors seek return and only consider risk in relation to return (either realized or expected). As a rule, portfolio managers report on portfolio performance in terms of realized return per unit of risk taken in the observed period. The Sharpe ratio is the standard in reporting portfolio performance, such ratio being defined as return per unit of the standard deviation (Bacon, 2008).

Whether the periodic optimization of portfolio volatility (or, alternatively, the optimization of the Sharpe ratio) based on the past performance of constituent assets can result in a better-performing portfolio relative to chosen benchmarks is examined. Hence, two hypotheses are tested:

H1: The minimum volatility strategy results in a portfolio with better risk performances compared to chosen benchmarks.

H2: The maximum Sharpe strategy results in a portfolio with a higher Sharpe ratio compared to chosen benchmarks.

In order to control the turnover of the managed portfolios, different rebalancing triggers are introduced. For the purpose of this research, the opportunity set of securities composed of 40 constituents of the U. S. market index S&P 100 during the rebalancing period of two years are exploited. The risk-return and turnover performance of the managed portfolios to the performance of the S&P 100 index, adopted as the market benchmark[1], and the 1/n portfolio, adopted as a naïve portfolio strategy benchmark are compared.

Different investment objectives determine the rebalancing strategies to be applied (Hsu, 2012). B. Arshanapalli *et al*. (2001) examine the impact of asset allocation on the performance of the fixed-weight and different dynamic portfolios with and without a transaction costs assumption. C. Donohue and K. Yip (2003) examine the implied portfolio performance, the result of common heuristic rebalancing strategies, in terms of risk, return, the Sharpe ratio, turnover and transaction costs. The results intuitively suggest that there is a tradeoff between the optimal rebalancing and transaction costs[2]. K. Sippel (2013) analyzes the impact of the portfolio turnover on the performance of the specific strategy indices designed to target the required level of portfolio risk. The author introduces transaction buffers with the aim to decrease turnover and improve the cost-adjusted performance of the managed portfolio. V. DeMiguel, G. Lorenzo and U. Raman (2009) evaluate the out-of-sample performance of the portfolios with the optimal asset allocation, using Markowitz's model and its extensions (14 different models in total). The authors demonstrate that the naïve 1/n optimization rule generates a good proxy of the optimal portfolio that can be confronted with more complex portfolio designs. A. A. Gaivoronsky, S. Krylov and N. Van der Wijst (2005) analyze the portfolio selection approach when portfolio performance is defined relatively to the given benchmark (the benchmark tracking approach). The authors have developed several portfolio selection algorithms based on different risk measures, and they have tested them through a number of numerical experiments. The results show that their approach, based on benchmark tracking, can be an attractive investment strategy. In their study, J. R. Yu and W. Y. Lee (2011) analyze five different portfolio rebalancing models based on the combination of different rebalancing criteria, including risk, return, the short selling constraint and the skewness and kurtosis of return distribution, taking the transaction cost into consideration.

Upon the outbreak of the subprime crisis, investors and regulators became increasingly concerned about the risk of extreme quantiles. The risk of extreme quantiles is defined with the aim to estimate the impact of unfavorable and highly improbable events. Despite its unfavorable mathematical properties (Artzner,

Delbaen, Eber & Heath, 1999; Szego, 2002), VaR is the predominantly used risk measure of extreme quantiles, in particular upon the introduction of the new banking regulations in 1996 (Basel Committee on Banking Supervision, 1996[3]). By t regulation, a bank's internal VaR estimates are incorporated into a capital charge which aims to provide a sufficient buffer for cumulative losses arising from adverse market conditions. For this reason, the VaR values of the examined portfolios will be calculated and presented here.

The remainder of this paper is organized as follows: in Section 2, the concepts of portfolio return and turnover are introduced. The risk and risk-adjusted measures that we base our rebalancing upon are introduced in Section 3. The optimization model is introduced in Section 4. In Section 5, the proposed rebalancing strategies are presented. Section 6 provides the empirical results. Our conclusions and suggestions for future research are given in Section 7.

THE MATHEMATICS OF PORTFOLIO RETURN AND TURNOVER

In this section, the basic relationships of the portfolio theory exploited in this research are introduced.

Percentage one-period return of the portfolio at time t is defined as:

$$r_{p,t} = \sum_{i=1}^{N} w_{i,t-1} r_{i,t} \quad , \tag{1}$$

where $r_{i,t}$ denotes the percentage one-period return of asset i at time t, and $w_{i,t}$ denotes the proportion of the capital invested in asset i at time t.

Expression (1) is the fundamental relationship in portfolio mathematics (Alexander, 2008).

Weighting factor $w_{i,t}$ is defined as:

$$w_{i,t} = \frac{n_i p_{i,t}}{\sum_{i=1}^{N} n_i p_{i,t}}, \quad i = 1,...,N \ , \tag{2}$$

where n_i is the number of the shares of asset i and $p_{i,t}$ is the price per share of asset i at time t.

The number of shares n_i remains the same for each asset i for the period between the two rebalances (i.e. the portfolio remains static). On the other hand, the proportion of the capital invested in each asset $w_{i,t}$ changes over time, whenever the price of any asset in such portfolio changes.

Transaction (trading) costs, as a consequence of rebalancing, may have a great impact on the overall portfolio return. In practice, a portfolio manager must control the level of transaction costs in order not to ruin the overall portfolio performance. As a result, transaction costs are always considered as an important constraint in portfolio management. Transaction costs depend on multiple factors and follow different patterns; however, as a rule, they are directly affected by portfolio turnover (a trading volume). In this research, we restrain ourselves from going deeper into those different patterns. Due to simplicity, portfolio turnover as a proxy for transaction costs is used. Portfolio turnover at time t, expressed as the percentage of the portfolio value, is calculated using the following formula (DeMiguel *et al*, 2009):

$$Turnover(t) = \sum_{i=1}^{N} \left| w_{i,t} - w_{i,t-1} \right| \tag{3}$$

RISK AND RISK-ADJUSTED MEASURES USED AS THE OPTIMIZATION CRITERION

Volatility

Portfolio variability is commonly calculated as the variance of portfolio returns:

$\sigma_p^2 = \frac{1}{T} \sum_{t=1}^{T} (r_t - \bar{r}_p)^2$, where r_i is portfolio return at time t, $\bar{r}_p$ is the average portfolio return. Often, investors use the standard deviation σ_p, i.e. the squared root of the variance, as the measure of portfolio variability, given that the standard deviation is of the same order as the average return. The benchmark measure of portfolio variability is volatility, calculated as the annualized standard deviation of portfolio returns[4]:

$$volatility = \sigma_p \sqrt{252} \tag{4}$$

Sharpe ratio

The Sharpe ratio[5] measures portfolio return as per the unit of risk. It is one of the most frequently used measures of the risk-adjusted portfolio performance and quantifies the risk-return tradeoff. The return is commonly calculated relative to the given risk-free rate, while risk is measured using the standard deviation of portfolio returns. Of the two portfolios with the same return, a higher Sharpe ratio will favor the portfolio with less variability in returns, measured by the standard deviation. The Sharpe ratio is suitable for evaluating portfolios with different returns and different levels of risk for the same period. Formally, it is defined as:

$$Sharpe = \frac{\bar{r}_p - r_f}{\sigma_p}, \tag{5}$$

where $\bar{r}_p$ is the average portfolio return, r_f is the risk-free rate and σ_p is the standard deviation of portfolio returns.

OPTIMIZATION MODEL

This research analyzes two different portfolio rebalancing strategies based on: a) the minimization of portfolio volatility and b) the maximization of the portfolio Sharpe ratio. The general form of the optimization model is defined as follows:

$$\begin{aligned} &\text{a)}\ min\ \ volatility\ (r_p(\boldsymbol{w})) \\ &\text{b)}\ max\ \ Sharpe\ (r_p(\boldsymbol{w})) \end{aligned} \tag{6}$$

$$\sum_{i=1}^{N} w_i = 1 \tag{7}$$

$$0 \leqslant w_i \leqslant 1,\ i = 1,\ldots,N, \tag{8}$$

where $\boldsymbol{w}$ denotes the vector of weighting factors w_i, *volatility(rp(**w**))* denotes the volatility of a portfolio, *Sharpe(rp(**w**))* denotes the Sharpe ratio and N is the total number of assets.

Equation (6) defines the optimization models; Equation (7) describes the standard budget constraint requiring that weighting factors must sum up to 1; Equation. (8) describes the constraint that no short sales are allowed, implying that none of the weighting factors can be negative.

We emphasize that the optimization criterion (volatility or the Sharpe ratio estimate) of the portfolio is calculated using the time series of the realized portfolio returns (we fix portfolio holdings). To calculate the time series of the realized returns of the candidate portfolio, the daily recalculations of its weighting factors $w_{i,t}$ are needed.

REBALANCING STRATEGIES

The proposed rebalancing strategies are based on the daily portfolio optimization with respect to the chosen criterion (Equation (6)).

On the first day of the sample period, as the initial portfolio, we chose the optimized portfolio (in terms of: (a) minimal volatility, b) the maximal Sharpe ratio). The initial portfolio is defined by the set of weighting factors w_i. These weighting factors are transformed into portfolio holdings, assuming that the initial portfolio value is equal to $1 million.

For each next day within the observed rebalancing period, the portfolio optimization procedure is applied. If the stated minimal improvement of the optimization criterion is achieved and if the rebalancing condition (the trigger) is satisfied, the rebalance is performed so that the optimized portfolio becomes the actual portfolio to be managed in the future. Otherwise, the existing portfolio remains unchanged. Here, we set the minimal improvement condition to be 1%.

DATA AND RESEARCH RESULTS

In this section, the computational results obtained by applying the proposed strategies to the historical data set are displayed. For the purpose of this research, the 40 constituents of the S&P 100 index (based on: the historical prices of the S&P 100 index and its

constituents) with the highest market capitalization as of September 6th, 2013 are exploited[6].

Rebalancing was performed within the period of two years (504 trading days), starting on January 2nd, 2009 and ending on December 31st, 2010. For volatility and the Sharpe estimation, 500 daily return observations were used.

In order to evaluate the performance of the proposed portfolio strategies, the performance of the managed portfolios are compared to the performance of the 1/n portfolio and the reference S&P 100 index.

Figure 1 shows the market value of the portfolios managed by applying minimal volatility (Min Volatility), the maximal Sharpe ratio (Max Sharpe) and the 1/n portfolio strategy together with the normalized level of the S&P100 index.

Pursuant to the Basel regulations framework, the 1-day ahead of 1% VaR estimate will be reflected in the level of the capital requirements for financial institutions. Figure 2 shows the evolution of the historical 1% VaR estimates over the rebalancing period for Min Volatility, Max Sharpe and the 1/n portfolios and the S&P100 index.

Table 1 accounts for the performance statistics for the managed portfolios.

As expected, the Min Volatility strategy provides the lowest volatility, and in addition, the lowest 1% VaR estimates over the rebalancing period. The Max Sharpe strategy results in the highest estimated Sharpe ratio accompanied by the highest volatility over the observed period. The high volatility of the Max Sharpe portfolio is the result of the extreme changes in the portfolio structure (see Table 1 for the total turnover statistics). The time series of the VaR estimates reveal the significant changes in the VaR level for the Max Sharpe portfolio as the result of the radical changes of the portfolio structure.

The results accounted for in Table 1 show that the Max Sharpe strategy provides a maximum return (the total and average daily return) and the maximum Sharpe

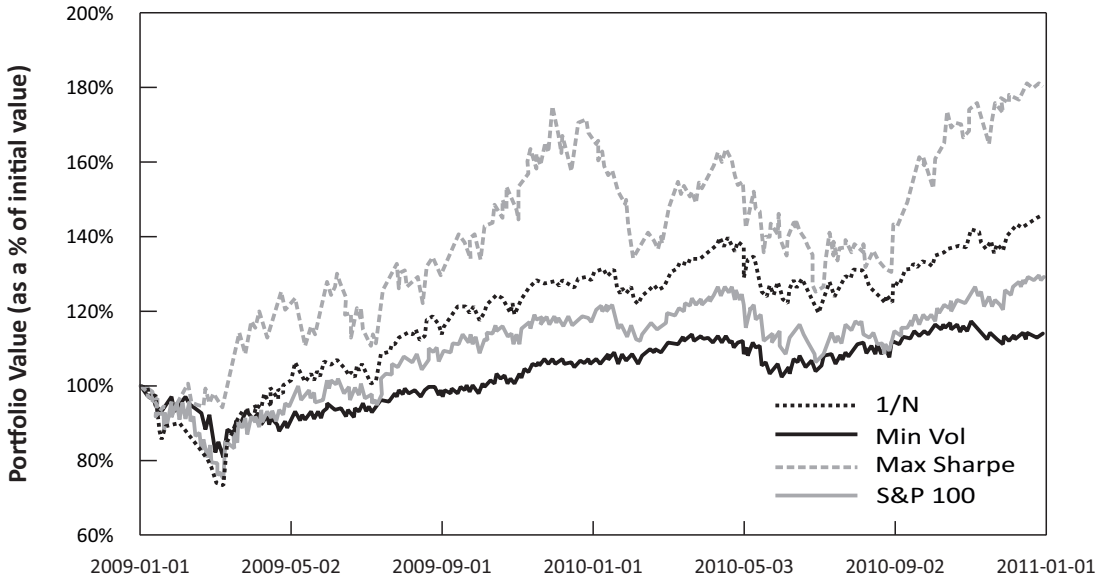

Figure 1 The market value of the managed portfolios obtained by using the Min Volatility and Max Sharpe rebalancing strategies, the 1/n portfolio strategy and of the benchmark S&P 100 index for the period from January 2nd, 2009 to December 31st, 2010

Source: Authors

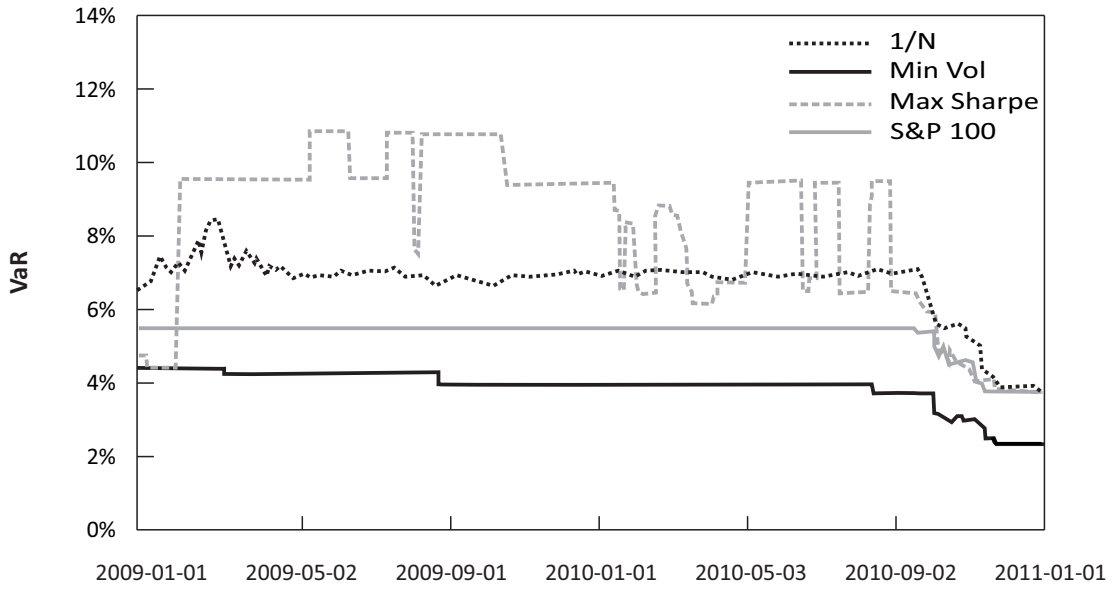

Figure 2 The time series of the 1%VaR estimates of the managed portfolios obtained by using the Min Volatility and Max Sharpe rebalancing strategies, the 1/n portfolio strategy, and of the benchmark S&P 100 index for the period from January 2nd, 2009 to December 31st, 2010

Source: Authors

Table 1 The performance statistics of the managed portfolios obtained by applying the Min Volatility and Max Sharpe rebalancing strategies, the 1/n portfolio strategy, and of the benchmark S&P 100 index for the period from January 2nd, 2009 to December 31st, 2010

	Min Volatility	Max Sharpe	1/N	S&P 100
Total return	11.18%	79.12%	43.68%	27.31%
Total turnover	204.06%	3658.67%	569.25%	-
No. of rebalances	7	46	504	-
Avg. return (ann.*)	6.31%	34.48%	21.11%	14.45%
Volatility	14.18%	32.56%	24.35%	21.70%
1%VaR	2.77%	4.65%	4.62%	4.05%
Max drawdown**	-8.03%	-8.97%	-8.56%	-7.84%
Sharpe***	0.42	1.05	0.86	0.65
Avg. no. of assets	7.2	1.6	40	100

*annualized

** The max drawdown is calculated as a maximum 3-day loss with the assumption that a 3-day horizon is the period long enough for closing the position in liquid markets.

*** The Sharpe ratio is calculated by applying the 1-year U.S. Treasury rate of 0.29% as of December 31st, 2010 as the risk-free rate. (The U.S. Department of Treasury)

Source: Authors

ratio at the expense of a very high turnover (over 36 average portfolio values). On the other hand, the Min Volatility strategy provides the lowest volatility and the 1%VaR at the expense of the lowest return. If compared to the performance of the benchmark S&P 100 index, the Min Volatility strategy provides a lower return as well as a significantly lower volatility and the 1%VaR (the same applies if compared to the 1/n strategy). Additionally, the VaR estimates over the observed period are the lowest for the Min Volatility portfolio and the highest for the Max Sharpe portfolio which implies a more (less) efficient use of regulatory capital. The naïve 1/n strategy delivers performance in between the Min Volatility and the Max Sharpe strategies, which is expected for the fixed-weighting-factor portfolio strategy (Arshanapalli *et al*, 2001).

It is emphasized that, as long as the rebalance frequency of the Max Sharpe strategy is acceptable in practical terms, the turnover values of individual rebalances are high in most occurrences. On the other hand, the 1/n strategy implies daily rebalancing. Consequently, each of these three strategies results in a very high total turnover, which implies transaction costs impossible to sustain under real market conditions.

In order to decrease the total turnover, the following turnover constraints are imposed:

For the Min Volatility and the Max Sharpe strategy, rebalancing is only performed if turnover is less than 50% of the total portfolio value (the sum of the total selling and the total buying), whereas in the case of the 1/n strategy, rebalance is only realized if turnover is greater than 5% of the portfolio value. Otherwise, the existing portfolio remains.

Figure 3 shows the market value of the portfolios managed by applying the Min Volatility, Max Sharpe and 1/n portfolio strategies with turnover constraints imposed, while Figure 4 shows the evolution of the VaR estimates over the rebalancing period for the same portfolios.

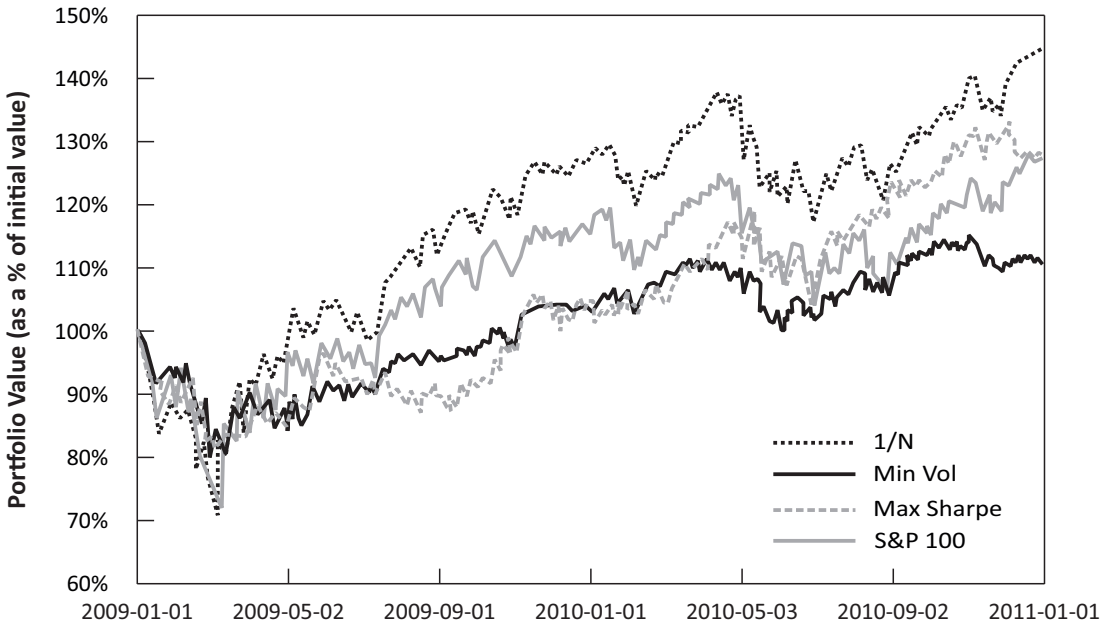

Figure 3 The market value of the managed portfolios obtained by using the Min Volatility and the Max Sharpe rebalancing strategies, with the maximum turnover constraint, the 1/n portfolio strategy with the minimum turnover constraint and of the benchmark S&P 100 index for the period from January 2nd, 2009 to December 31st, 2010

Source: Authors

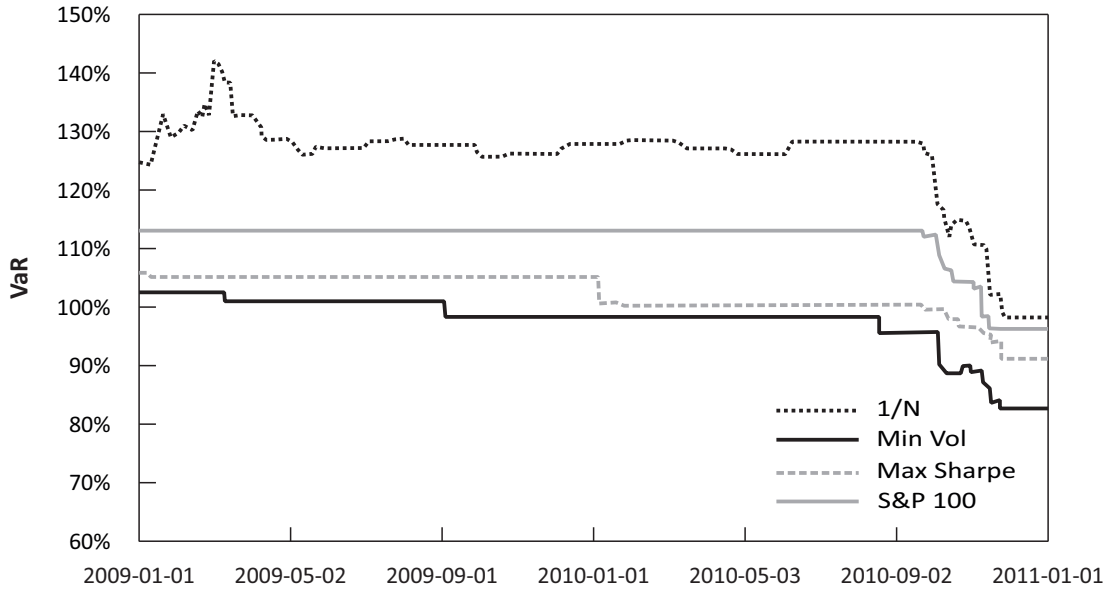

Figure 4 The 1%VaR estimates of the managed portfolios obtained by applying the Min Volatility and the Max Sharpe rebalancing strategies with the maximum turnover constraint, the 1/n portfolio strategy with the minimum turnover constraint and of the benchmark S&P 100 index for the period from January 2nd, 2009 to December 31st, 2010

Source: Authors

In Table 2, we present the performance statistics for the managed portfolios with the turnover constraints imposed.

After imposing the turnover constraints, the Min Volatility portfolio remains the same. On the other hand, the total turnover of the Max Sharpe strategy decreases to 13.73%, with only three realized rebalances with a decrease of more than 50% in the total return compared to the unconstrained version of the strategy. Furthermore, the Sharpe ratio is no longer the highest in the sample (but the VaR estimates are significantly lower).

Then again, the Min Volatility strategy delivers the lowest standard deviation and the 1%VaR.

Imposing the turnover constraint to the 1/n strategy results in the significantly lower total turnover (158.48% vs. 569.25%) within 29 instead of 504 rebalances, while the balanced overall performance still remains.

The aim of portfolio allocation is to induce diversification effects, i.e. to exclude the idiosyncratic risk of individual assets and deliver more balanced risk/return characteristics. Portfolio theory suggests that the more assets included the greater is the diversification effect (Markowitz, 1952). In practice, investors try to achieve maximum diversification effects with the minimum portfolio cardinality, thus avoiding high management costs. The presented strategies are applied to the opportunity set of 40 assets[7]. Including no more than two assets on average, the Max Sharpe strategy provides poor diversification effects, regardless of whether the turnover constraint is imposed or not. Simultaneously, the Min Volatility strategy delivers superior effects on risk values (volatility and VaR) relative to the 1/n strategy and the benchmark S&P 100 index, including only 7 assets on average, but at the expense of a modest return.In order to check the robustness of our results with respect to the observed period, the same tests for the new period of two years (504 trading days), starting on September 1st, 2011 and ending on September 4th, 2013 have been performed (S&P 100 index, https://finance.yahoo.

Table 2 The performance statistics of the managed portfolios obtained by applying the Min Volatility and the Max Sharpe rebalancing strategies with the maximum turnover constraint, the 1/n portfolio strategy with the minimum turnover constraint and of the benchmark S&P 100 index for the period from January 2nd, 2009 to December 31st, 2010

	Min Volatility turnover <50%	Max Sharpe turnover <50%	1/N turnover>5%	S&P 100
Total return	11.18%	27.72%	43.76%	27.31%
Total turnover	204.06%	13.73%	158.48%	-
No. of rebalances	7	3	29	-
Avg. return (ann.)	6.31%	14.08%	21.14%	14.45%
StdDev (ann.)	14.18%	19.09%	24.36%	21.70%
VaR1%	2.77%	3.05%	4.45%	4.05%
Max drawdown	-8.03%	-4.89%	-8.23%	-7.84%
Sharpe	0.42	0.72	0.86	0.65
Avg. no. of assets	7.2	2.0	40	100

Source: Authors

com). For the purpose of brevity, we only present the performance statistics of the portfolios obtained by applying the Min Volatility and the Max Sharpe rebalancing strategies with the maximum turnover constraint in Table 3. The results are consistent with those obtained for the 2009-2010 period (except for the fact that, this time, the Max Sharpe strategy has resulted in a higher number of rebalances and a higher turnover). For the reasons of comparability, the same Treasury rate of 0.29% as in the previous tests is used.

Table 3 The performance statistics of the managed portfolios obtained by applying the Min Volatility and the Max Sharpe rebalancing strategies with the maximum turnover constraint, the 1/n portfolio strategy with the minimum turnover constraint and of the benchmark S&P 100 index for the period from September 1st, 2011 to September 4th, 2013

	Min Volatility turnover <50%	Max Sharpe turnover <50%	1/N turnover>5%	S&P 100
Total return	23.54%	35.05%	43.92%	36.33%
Total turnover	82.15%	273.03%	67.19%	
No. of rebalances	5	9	14	
Avg. return (ann.)	11.14%	16.15%	19.39%	16.69%
StdDev (ann.)	10.45%	14.82%	15.15%	15.24%
1%VaR1	1.87%	2.37%	2.60%	2.59%
Max drawdown	-3.70%	-4.89%	-8.23%	-5.89%
Sharpe	1.04	1.07	1.26	1.07
Avg. no. of assets	5.4	3.4	40	100

Source: Authors

CONCLUSION

This paper presents two alternative portfolio management strategies: the first one is based on the minimization of volatility and the other one is based on the maximization of the Sharpe ratio. The resulting performance is compared to the benchmark, the 1/n portfolio strategy and the reference S&P 100 index.

Consistent to Hypothesis H1, the Min Volatility strategy delivers a portfolio with the minimum risk (in terms of volatility and 1%VaR). The Max Sharpe strategy delivers a portfolio with the maximum return (on an absolute and risk-adjusted basis, expressed by the Sharpe ratio) consistent to Hypothesis H2. Although theoretically appealing, the Max Sharpe solution portfolio is not feasible under real market conditions due to a very high total turnover[8]. In order to control the portfolio turnover, turnover constraints have been introduced.

It has turned out that imposing a turnover constraint on the Sharpe strategy in a way it is proposed here is not eligible since it induces a portfolio solution with very poor performances. However, the Min Volatility strategy still provides a superior risk performance in comparison with the reference S&P 100 index and the 1/n portfolio with a relatively low level of turnover and a low rebalance frequency. Therefore, this is an acceptable investment alternative to market capitalization and the equal-weighting-factor-based approach for risk adverse investors.

There is an empty room for future research into the impact of different transaction cost patterns on chosen rebalancing criteria. How a different length of historical data impacts the final solution should also be explored. There are two extreme rebalancing scenarios that have been applied in this paper: the one with no turnover constraint and the other with constraints imposed in a way that any turnover exceedance prevents the execution of a rebalance. It would be worthwhile to expand research into the rebalancing solutions that conform to the predefined daily level of turnover.

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ENDNOTES

1 Nowadays, market indexes are easily investable through exposure to exchange-traded funds. See, for example, the factsheet for the iShares S&P 100 ETF (Ticker: OEF).

2 The optimal rebalancing strategy is the one minimizing the expected future transaction costs and the tracking error, defined to be a distance from the current asset ratios to the target ratios.

3 The 1988 Basel Capital Accord created the first risk-based capital adequacy requirement for banks, while the 1996 amendment to the Capital Accord brought some improvements of the original accord regarding market risk.

4 The number 252 stands for the number of trading days per year, while 250 is often alternatively used

5 The Sharpe ratio is initially introduced as a reward to the variability ratio (Sharpe, 1966; Bacon, 2008).

6 The first 40 S&P 100 constituents with the data available as at Dec. 3rd, 2007 are included in the sample.

7 These 40 assets (out of the 100 index constituents) comprise more than 70% of the market capitalization of the underlying S&P 100 index portfolio.

8 In addition, the unreported results show that the Max Sharpe strategy induces occasional, very large changes in the portfolio composition.

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ANALYZING THE EFFICIENT MARKET HYPOTHESIS WITH THE FOURIER UNIT ROOT TESTS: EVIDENCE FROM G-20 COUNTRIES

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The efficient market hypothesis is one of most important theories in finance and one of the most important research areas for both developed and developing stock markets. In this study, the random-walk hypothesis is tested for the main stock markets of the G-20 countries. The linearity of the series is determined in the first stage. In this context, 16 of 17 markets have a linear structure; therefore, the Fourier ADF unit root test that uses trigonometric functions in order to capture deviations greater than the average of the dependent variable and takes into account multiple structural breaks, is applied to these series. Furthermore, the Fourier KSS unit root test that has the same functions as the Fourier ADF unit root test is used for the Japanese stock market, being the only one market with a non-linear structure. As the result of these analyses, while the markets of the nine countries are observed as effective in the weak form, this hypothesis is not valid for the remaining eight countries. While the prediction of the future price of all of these nine markets will be impossible through a technical analysis, investors in the remaining eight markets can provide returns by carrying out the same analysis.

Keywords: efficient market hypothesis, random walk, international markets, linearity test, Fourier unit root tests

JEL Classification: G14, G15

INTRODUCTION

The Efficient Market Hypothesis was developed by E. F. Fama (1970), related to the effects of data obtained in relation with the securities on their prices. As there are previous studies supporting the hypothesis developed by E. F. Fama, he was the first to present the issue systematically. E. F. Fama associated competitive economic theory with an information-based perspective to the prices of securities (Ball, 2009, 26). Thousands of academic studies have been conducted related to the efficient market hypothesis until today. The efficiency concept in the efficient market hypothesis refers to informative efficiency and one of the most important assumptions of the hypothesis is that no investor may have extraordinary returns using

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any information (Bayraktar, 2012, 38). According to the hypothesis, since the price of securities completely reflects all the existing information in the market, no investor would obtain differentiated returns. The core idea of the Efficient Market Hypothesis is that if information is not blocked and if it is rapidly reflected by stock prices, then tomorrow's price changes would reflect tomorrow's news and would be independent of today's price changes. In addition, if news may be estimated, then price changes may not be estimated and they are incidental. When prices completely reflect information, investors who may not access information and purchase a diversified portfolio from the market may also obtain returns as much as by specialists (Malkiel, 2003, 59). That is to say the portfolios, examined for a long time and created by specialists, may also provide returns to an investor who may not access information in a timely manner as much as they may to other investors. Today's markets mostly reflect this reality, too. Even if income such as rental income from investment to house, income from an interest and profit shares in capital, income through trade differ from each other in the short term, then the markets balance each other in the course of time and come to a position to provide income to each other in not a long time. This is realized by making investors invest more in areas providing higher profits. If an excessive profit in the market is in question, then there will be new accessions to the market, which will either eliminate or reduce profitability (Ball, 2009, 5).

According to the Efficient Market Hypothesis, the more local and foreign investors find an opportunity to access the market the more information is reflected in the current price (Kawakatsu & Morey, 1999, 386). An increase in the number of foreign investors will contribute both to the HEM market efficiency and to the fair determining of the price.

It is suggested that the information related to stock prices through the Efficient Market Hypothesis has an impact on the price at three different degrees, which results in three different markets.

According to the categorization, the first market is the weak efficient market. All the information related to shares is reflected in the stock prices in this market. Thus, since the stock prices reflect all the information, it is senseless to estimate the future prices of these shares, because, according to this hypothesis, the prices of the shares traded in the market occur randomly. Therefore, it is very difficult to estimate the prices that have accidently occurred through scientific methods. The term Random-Walk Hypothesis is sourced from here. According to this hypothesis, it is not possible to forecast the future price of shares using historical share prices (Fama, 1970). It may be formulated as follows:

$$Y_t = Y_{t-1} + u_t \quad (1)$$

where: Y_t represents a future share price, Y_{t-1} represents historical share prices, u_t represents the stochastic error term. The model has a zero mean and constant covariance. Moreover, there is no autocorrelation problem in this model.

If the weak efficient market conditions are in question, then stock prices are characterized by the unit root (Lee, C. C., Lee, J., & Lee, C. 2010, 49). The weak efficient market hypothesis is intended for testing the existence of the unit root (Çevik & Yalçın, 2003, 21). Successive stock prices are independent of each other under these market conditions.

The second type of the market is the semi-strong efficient market. All information open to the public is reflected in the stock prices in that market. However, information not open to the public and referred to as in-company information is not reflected in prices.

In the categorization, the third one is the strong efficient market hypothesis. All information, including both information open to the public and private information usually not shared, is reflected in the stock prices in this market type (Timmermann & Granger, 2004)

There are many studies worldwide revealing that stock prices follow a random walk. Such studies have covered the period from the 1970s to today. M. C. Jensen (1978) claimed he had carried out a study which other econometric works having stronger pieces of evidence consistent with the efficient market hypothesis were not able to. This has been the dominant paradigm in the finance sector for years. Besides this, there are studies revealing that stock prices in many markets in

the world do not follow the random walk differently from the efficient market hypothesis and that stock prices may be estimated on a certain basis. The significant majority of studies inconsistent with such type of the Efficient Market Hypothesis were being carried out during the 1980s and the 1990s (Sewell, 2011, 7). One of the important and striking objections against the Efficient Market Hypothesis was the one pursued by S. J. Grossman and J. E. Stiglitz. According to these authors (1980), the existence of an excellent efficient market regarding information is not possible due to reasons such as a higher cost of information, never perfectly reflecting information by prices. That is to say, prices will never be fully efficient. The majority of many financial econometricians suggest that stock prices may not be estimated with respect to dividends, the price-return ratio and past returns (Malkiel, 2005, 2). This leads us to the efficient market hypothesis being inconsistent with certain stock-exchanges in certain intervals of time. For example, as the efficient market hypothesis refuses possible higher income returns, shares with a lower price/income value tend to have a higher price/return ratio in the future, according to the price-return hypothesis (Basu, 1977, 680). Thanks to this, price-return theory asserts that it is possible to estimate shares providing a higher performance. Many studies have been carried out to prove this hypothesis in the academic environment. J. Fox (2009) stated that since investors and regulators strongly believed in that prices reflected all information according to the efficient market hypothesis, they did not examine in detail whether securities had correct values or not, which led to price bubbles and financial crises.

The results that differed from each other have been obtained in connection with the efficient market hypothesis in the world stock markets. As one meets randomly stepping in stock prices in certain studies, some studies provided us with findings saying that price estimations for the future by using the data of the past would lead to higher returns.

So, why have the results, inconsistent with the efficient market hypothesis, intensively been obtained in many academic works, especially recently? One of the most important reasons is that the academic works discussed have been carried out according to the methods working in different periods, under different assumptions and in countries having different characteristics and being at different development levels.

This work is a study of whether stock prices on the stock-exchanges of the 17 G-20 countries where different periods were discussed followed a random walk or not. Firstly, the studies carried out for this purpose until now have been put in an order providing the method used, time intervals and the results obtained. Secondly, the work discusses which country's stock-exchange data are used in which time interval, the methodology showing which methods and tests are implemented and the data section is provided. Thirdly, the works are submitted in the tables and figures, and the results that may be obtained from the work are provided in the final section.

LITERATURE REVIEW

Numerous academic works can be found in the literature on testing the hypothesis of efficient markets. However, this chapter addresses some of these academic works in the literature on testing the efficiency of the market hypothesis in stock markets using either the time series or panel unit root test.

The academic work conducted by M. Hasanov and C. Omay (2007) analysed the efficiency of the stock markets in Bulgaria, the Czech Republic, China, Hungary, Poland, Romania, Russia and Slovakia, using the nonlinear unit root test. In their work, they identified the unit root in price series in the stock markets of Bulgaria, Slovakia, Hungary and the Czech Republic and concluded that these markets were efficient in the weak form.

Another academic work conducted by T. Choudhry (1997) analysed six Latin American states, namely Argentina, Brazil, Chili, Colombia, México and Venezuela, using the ADF unit root test for the period from January 1989 to December 1993, and deduced that these markets were efficient.

In his study, M. R. Borges (2008) tested market efficiency in the stock markets of France, Germany, the UK, Greece, Portugal and Spain, for the period

from January 1993 to December 2007. He applied the correlation test, the run test, the ADF test and the Lo-Mackinley multivariate ratio test on the basis of daily and weekly data, thus revealing that weekly costs and returns were consistent with random walk theory.

K. Chaudhuri and Y. Wu (2003) analysed stock markets in 17 developed countries using the ADF and PP unit root tests for the period from January 1985 to February 1997, on the basis of weekly data, and deduced that these markets were efficient. They also analysed the same stock markets using the SURADF panel unit root test for the period from January 1985 to April 2002, on the basis of weekly data, and reached a conclusion that these markets were not efficient.

Another academic study conducted by K. P. Narayan and A. Prasad (2007) analysed the stock exchange markets of 17 countries using three different panel unit root tests, namely the LLC, the SURADF and the MADF tests, for the period from January 1988 to March 2003, and revealed that these markets were consistent with the efficient market hypothesis.

K. P. Narayan (2008) analysed the stock markets of the G7 countries using one and two break panel LM unit root test on the basis of weekly data for the period from January 1975 to April 2003 and identified inefficient market findings. In another study of his, using the ADF unit root test on the basis of weekly data, K. P. Narayan deduced that the stock prices in Australia and New Zeeland were consistent with the efficient market hypothesis.

K. P. Narayan and R. Smith (2007) tested random walk theory by using different unit root tests in the G7 countries on the basis of weekly stock market data, taking different time sequence for each country, and they revealed the random-walk hypothesis in these markets.

Another study conducted by H. H. Lean and R. Smyth (2007) tested the efficiency of the share market in 8 Asian countries using one and two break LM panel unit root test for the period from January 1998 to June 2005, and deduced that these markets were inefficient. According to this study, prices in stock markets were consistent with the random-walk hypothesis.

In their work, H. Kawakatsu and M. Morey (1999) analysed the stock markets of 16 developing countries using the DF-GLS and the KPSS unit root tests for the period from January 1976 to December 1997 and deduced that these markets were inefficient.

C. C. Lee *et al.* (2010) applied the KPSS unit root test to the stock markets of various countries. As a result of their study, the stock shares of 32 developed and 26 developing countries were of a stationary structure. The results were inconsistent with the efficient market hypothesis and a profitable arbitrage potential existed.

A. Abraham, F. Seyyed and S. Alsakran (2002) tested the random-walk hypothesis in Kuwait, Bahrain and Saudi Arabia using the variance ratio on the basis of weekly index data for the period from October 1992 to December 1998. According to this study, the market efficiency in these three countries was in the weak form and while the results of Saudi Arabia and Bahrain were consistent with the random-walk hypothesis, the results of Kuwait were inconsistent with the random-walk hypothesis. In another study, K. Hamid, M. T. Suleman, S. Z. A. Shah and R. S. I. Akash (2010) examined 14 Asia Pacific countries in the study using the ADF test and concluded that the random-walk hypothesis was invalid.

In another study, J. C. Dias, L. Lopes, V. Martins and J. M. Benzinho (2002) tested the efficiency of the markets in Portugal and Spain using the ADF unit root test and the variance ratio test. The study resulted in both markets being consistent with the random-walk hypothesis. In another study that examined market efficiency by applying the variance ratio test, A. Haque, H. C. Liu and F. U. Nisa (2011) tested Pakistan's stock markets and concluded that the random-walk hypothesis was invalid for this stock market.

G. Smith and H. J. Ryoo (2003) tested the random-walk hypothesis in the stock markets of Greece, Turkey, Hungary, Portugal and Poland using the multivariate ratio test for the period from April 1991 to Agust 1998 on the basis of weekly data and 385 observations. Except for Istanbul, the results of stock exchanges in the other 4 countries were inconsistent with the hypothesis. As a result of high turnover in the 1990s, the results for Istanbul Stock Exchange were consistent with the random-walk hypothesis.

A. C. Worthington and H. Higgs (2004) applied the correlation test, the run test, the ADF test, the KPSS unit root test and the multivariate test to 20 European states for the period from August 1995 to May 2013 on the basis of daily returns. As a result of the study, the only one stock exchange that was consistent with the random-walk hypothesis was the stock exchange of Hungary, which was efficient in the weak form. Amongst developed countries, Germany, Ireland, Portugal, Sweden and the UK showed findings consistent with the hypothesis.

As seen in the foregoing literature, in order to test the consistency of stock quotations in markets by means of the random-walk hypothesis, the variance ratio test, autocorrelation and the linear or nonlinear unit root tests are used.

In contrast to other studies, the series in this study are not classified according to the assumptions of their being either linear or nonlinear. Their being linear or nonlinear is determined according to the linearity test developed by D. I. Harvey, S. J. Leybourne and B. Xiao (2008). Thereafter, in order to test the efficient market hypothesis, the Fourier ADF test is applied to the linear series and the Fourier KSS unit root test is applied to the nonlinear ones. It is our aim to reach more reliable results through these new tests.

METHODOLOGY AND DATA

The Fourier series is an expansion of the periodic y_t function as the sum form of cosines and sinuses. The Fourier ADF and the Fourier KSS tests developed by D. K. Christopoulos and M. A. León-Ledesma (2010) use trigonometric functions in order to capture deviations greater than the average of the dependent variable (Zhou & Kutan, 2014). The advantage of this test is its taking into account the plurality of temporary smooth structural breaks (Yılancı & Eriş, 2013). The econometric model of this test can be explained as follows:

$$y_t = \lambda_0 + \lambda_1 \sin\left(\frac{2\pi kt}{T}\right) + \lambda_2 \cos\left(\frac{2\pi kt}{T}\right) + \nu_t \quad (2)$$

where, T, λ_1 and λ_2, π and k represent the sample size, the Fourier coefficients, the number of 3.1416 and the used frequency value in order to find the optimal value minimizing the sum of the least square residuals, respectively.

In order to apply this test, first, k representing the sum of the least square residuals must be determined. After determining a suitable frequency *(k)*, the significance of the F-statistics obtained from this model will be checked according to the critical values stated in R. Becker, W. Enders and J. Lee (2004). In the last stage, the residual series of the model with the determined k value is created and the conventional ADF or the KSS unit root tests is applied to this residual series depending on the linearity structure. In this way, the Fourier ADF and the Fourier KSS test can be made (Anoruo & Nwala, 2014). According to these tests, while the zero hypothesis represents the existence of the unit root, the alternative hypothesis claims the stationarity of the series (Christopoulos & León-Ledesma, 2010).

The feature of one series in the long term can be revealed by determining how the value of a variable in the previous period affects the following period. Although many methods have been developed, the most commonly used ones are the unit root tests (Tarı, 2012, 386). If a series has a unit root, the random-walk hypothesis is said to be valid for this series. When series are stationary, the efficient market hypothesis will not be valid for those stock prices (Gujarati, 2011, 718).

The focal point of our study is examining whether the stock markets of G20 countries with data from different periods are weak-effective. In weak-effective markets, the prices of stock prices are random; therefore, stock prices allegedly determined at a random or unpredictable manner will be tested in this study whether stock prices actually seems to be moving in this way.

In our monthly data used study, the stock market consists of various start dates since we could not reach equally spaced data, and the Harvey linearity test results are listed in Table 1. All the data are obtained from the www.uk.finance.yahoo.com website. Moreover, although Saudi Arabia and South Africa are

among the G20 countries, they are excluded from the analysis since the fundamental market data for these countries are not obtained.

EMPIRICAL FINDINGS

In the time series, the analysis has been performed by considering the series to be either linear or non-linear in almost all studies in the literature. However, testing the linearity of the series by conducting various analyses will be a more accurate approach. In this respect, the linearity test developed by Harvey *et al.* (2008) will serve a purpose. The results of this test are shown in Table 1. According to the test, the series are linear if the W-lam values are smaller than the critical values, on the one hand, and the series are non-linear if it is the other way round. By the results, 16 out of the 17 examined countries have a linear structure and the Japanese stock market is in the non-linear form. The reason why so many countries are in the linear form lies in their using data monthly. Moreover, daily data is used in a similar study made by F. Zeren and A. M. Konuk (2013) via the Harvey linearity test (2008), and the series tend to be rather non-linear with more observations.

After determining the linearity of the series, the weak-form efficiency of the stock markets will be investigated by means of the unit root tests. In this study, the Fourier unit root test (the Fourier ADF) based on the linear unit root models is used for country stock markets in the linear form, the Fourier unit root test (the Fourier KSS) based on the non-linear unit root models is used for country stock markets in the non-linear form. According to the Fourier ADF unit root results in Table 2, the Efficient Market Hypothesis is valid for Germany, the USA, Argentina, Australia, France, India, the UK and Italy, i.e. for the eight countries in

Table 1 Harvey Linearity Test Results

Stock-Market	Starting Date	W-Lam	Critical Values			Results
			%10	% 5	% 1	
Germany	Jan-1991	0.55*	4.64	4.68	4.76	Linear
USA	Mar-1950	2.67*	26.92	27.54	28.67	Linear
Argentina	Oct-1996	12.81*	17.08	17.34	17.80	Linear
Australia	Jan-2001	1.57*	2.49	2.51	2.54	Linear
Brazil	Apr-1993	0.88*	14.52	14.68	14.97	Linear
China	Dec-1990	3.76*	24.60	24.72	24.94	Linear
Indonesia	Jul-1997	0.65*	2.65	2.70	2.81	Linear
France	Mar-1990	1.80*	4.46	4.49	4.53	Linear
South Korea	Jul-1997	0.53*	6.66	6.73	6.88	Linear
India	Jul-1997	0.36*	9.15	9.47	10.05	Linear
UK	Apr-1984	7.08*	15.62	15.78	16.05	Linear
Italy	Jan-1998	6.71*	8.22	8.30	8.45	Linear
Japan	Jan-1984	6.15	5.66	5.70	5.77	Non-Linear
Canada	Apr-1984	12.50*	19.63	19.90	20.38	Linear
Mexico	Nov-1991	1.50*	4.79	4.91	5.11	Linear
Russia	Sep-1995	6.16*	15.46	15.58	15.78	Linear
Turkey	Feb-1986	8.27*	13.07	13.67	14.83	Linear

Note: *Represents linearity at the 1% significance level.

Source: Authors

Table 2 Fourier ADF Unit Root Test Results

Country	Min SSR	k	FADF	F(k)
Germany	17.15	1	-1.87	443.49
USA	60.26	1	-2.34	7752.17
Argentina	17.64	4	-2.59	530.28
Australia	2.84	3	-1.75	83.24
Brazil	97.90	1	-8.02 ***	466.53
China	39.68	1	-3.41 *	350.04
Indonesia	8.64	3	-3.34*	1499.05
France	12.78	4	-2.10	333.27
South Korea	8.36	3	-3.23*	483.17
India	8.21	4	-2.46	1000.90
UK	8.34	1	-2.60	1673.38
Italy	8.17	1	-2.35	148.30
Japan	6.48	3	-3.74**	2574.45
Canada	9.50	2	-3.21*	3877.00
Mexico	42.13	4	-3.37*	506.16
Russia	57.69	2	-3.82**	10776.06

Note: *, **, *** represent the 10%, 5% and 1% significance levels, respectively. In the model with the constant and the trend, the critical values for the F statistics are 4.162, 4.972 and 6.873 for 100 observations and the 10%, 5% and 1% significance levels, respectively. These values are 3.928, 4.669 and 6.315 for 500 observations. Suitable critical values for observations between 100 and 500 are chosen whether 100 or 500 accordance to closeness. (These critical values are obtained from: Becker *et al*, 2004, 389).

Source: Authors

total. Again, according to these results, this hypothesis is not valid for Brazil, China, Indonesia, South Korea, Canada, Mexico, Russia and Turkey, whose series are stationary. Moreover, Min SSR represents the sum of the least residuals square in the situation when k is the optimal value, and F(k) represents the F statistics.

Table 3 accounts for the Fourier KSS unit root test results. The series is observed with the unit root and thus, the Efficient Market Hypothesis is valid for the Japanese stock market.

In Figure 1, the comparison of the series in the form after a logarithmic transformation and the transformed forms of these series according to the Fourier functions are given. Here, an adjustment in order to capture changes greater than the dependent variable average and to see how the structural breaks of the Fourier functions are taken into consideration can clearly be seen.

Table 3 Fourier KSS Unit Root Test Results

Country	Min SSR	k	FKSS	F(k)
Japan	21.46	5	-1.99	232.53

Note: The asymptotic critical values for the KSS test statistics constant and trend model are -3.93, -3.40 and -3.13 for 1%, 5% and 10%, respectively. (These critical values are obtained from: Kapetanios, Shin & Snell, 2003, 364).

Source: Authors

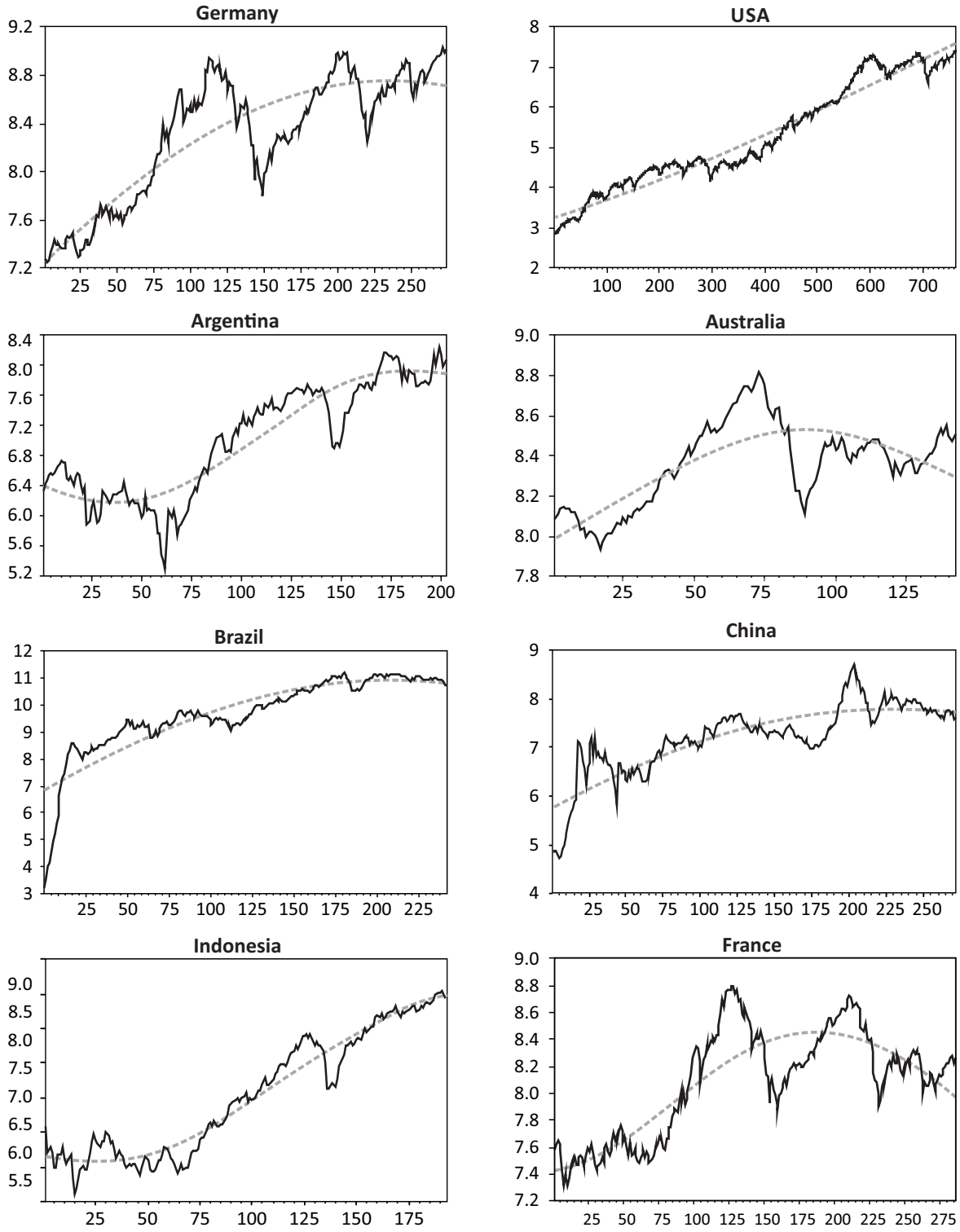


Figure 1 Stock Market Index of G-20 Countries and Related Fourier Functions

Source: Authors

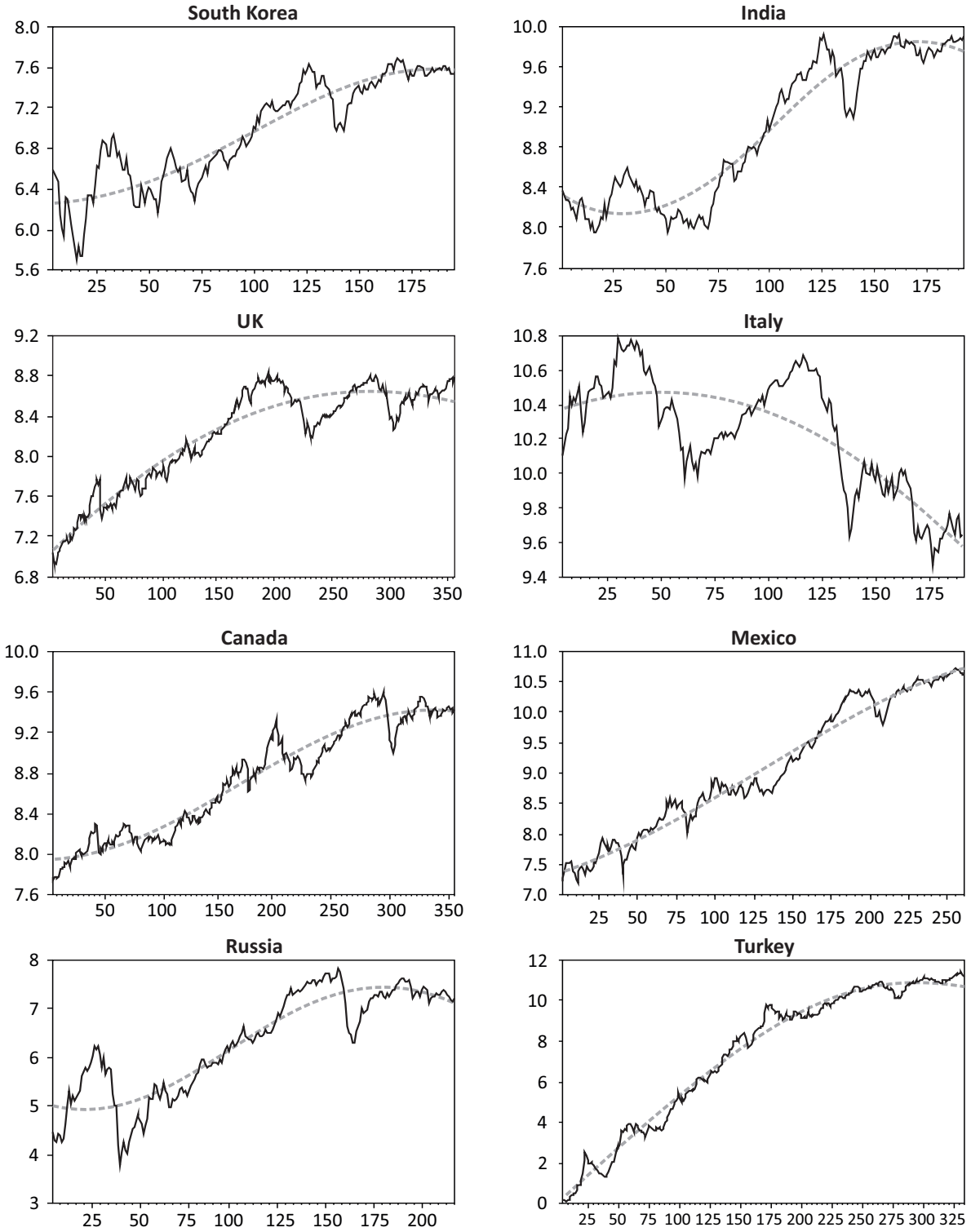
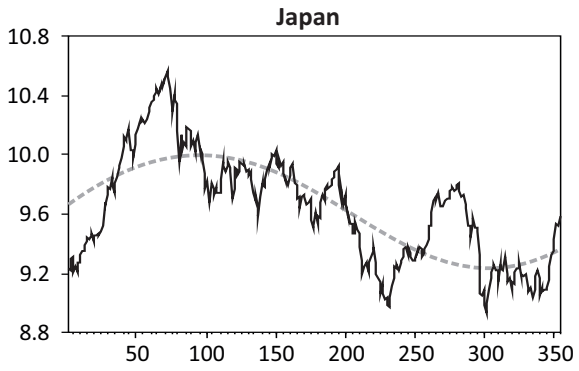


Figure 1 (Continued) Stock Market Index of G-20 Countries and Related Fourier Functions

Source: Authors



Note: While the lines (——) represent the logarithmic forms of the series, the lines (– –) represent the series changed into the Fourier function and thus, the forms applied to the analysis. Moreover, the horizontal and the vertical sections represent the observation number and logarithmic values, respectively.

Figure 1 (Continued) Stock Market Index of G-20 Countries and Related Fourier Functions

Source: Authors

CONCLUSION

Science is created and developed by a hypothesis and testing the hypothesis. Each one of the hypotheses will be up to date and supported until studies with stronger and more scientific hypotheses and powerful supportive researches into these hypotheses have been carried out. In this context, although the Efficient Market Hypothesis is not supported by striking and powerful studies as once it used to be, it still stands for a significant paradigm in the finance literature. Although the efficient market hypothesis is not up to date, the testing of the existence of the efficient market hypothesis with new techniques is important against the behavioral finance flow.

In this study, the weak-form market efficiency of the exchanges of the G20 countries is tested via the Fourier ADF and the Fourier KSS. As a result of the study, the market efficiency hypothesis is valid for 9 out of the 17 countries and is not valid for the eight of them. Using the technical analysis method may be useful to obtain excessive profits in these eight markets.

In our study, testing weak-form market efficiency, the validity of the efficient market hypothesis is confirmed for Germany, the USA, Argentina, Australia, France, India, the UK, Italy and Japan. It is possible to obtain differentiated, consistent and stable return for these markets. However, this hypothesis is not valid for Brazil, China, Indonesia, South Korea, Canada, Mexico, Russia and Turkey. It is noticed that the efficient market hypothesis is confirmed for countries such as Germany, the USA, Australia, France, UK and Italy, who have developed economies and stock markets as well. This result leads us to finding out that the efficient market hypothesis is more likely to be valid for developed countries. As the supporting findings of our study, M. R. Borges (2008), C. C. Lee *et al*. (2010), G. Smith and H. J. Ryoo (2003), A. C. Worthington and H. Higgs (2004) and K. P. Narayan (2008) point the existence of a relationship between the development level of countries and weak-form market efficiency.

In this paper, one of the appropriate unit root tests is applied to the time series analysis for each country. Nonetheless, it should not be ignored that there is a strong correlation between the G-20 Stock Markets. Moreover, this correlation may affect the results. Therefore, using the panel root test based on the Fourier function again can provide more advanced and accurate results for further studies. Besides, this paper does not take into account behavioral finance theory, which is an important constraint of the paper.

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INCONSISTENT APPLICATION OF INTERNATIONAL FINANCIAL REPORTING STANDARDS

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The transformation of the International Financial Reporting Standards (IFRS) into a single global language of financial reporting is well under way and followed by a problem of their inconsistent application from country to country, with negative consequences for the global comparability of financial statements. Starting from this, the main purpose of this paper is to give an overview of the main causes of the diversity of financial reporting practices between those countries declaring themselves to be the followers of the IFRS, as well as to identify the ways of overcoming this diversity. Applying the qualitative research methodology, it has been found that the flexibility of the IFRS provisions, which is inevitable in many cases, modifications in their incorporation into national regulatory frameworks and the diversity and unequal effectiveness of national mechanisms for their enforcement and the supervision of their implementation stand for the main causes of inconsistent accounting practices. In order to reduce the inconsistency, national financial reporting regulators should increase their engagement and coordination among themselves, and the International Accounting Standards Board should make additional efforts, which should primarily be focused on the global promotion of the fundamental basis of the IFRS.

Keywords: financial reporting, International Financial Reporting Standards (IFRS), International Accounting Standards Board (IASB), inconsistent application

JEL Classification: M41

INTRODUCTION

Under the influence of business globalization, especially the globalization of capital markets, the issue of the globalization of the financial reporting standards has assumed greater importance. Bearing in mind the undisputed belief that „differences in accounting practices act as a barrier to capital flow" (Saudagaran, 2009, 2-34), it is obvious why a single set of high quality global financial reporting standards that would be applied in a consistent manner in all countries of the world is something which „global capital market participants have long been hoping for" (Cabrera, 2008, 36). In recent years, the need for such standards has become particularly noticeable, because they would enable an easy and accurate comparison of the financial position and performance of companies from different countries by investors, creditors and other users of financial statements.

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Today, the International Financial Reporting Standards (IFRS) issued by the International Accounting Standards Board (IASB) represent the most important and widespread financial reporting standards worldwide and have a great potential to become universal at the global level. The conversion of the IFRS into a single set of global standards is already in progress, which is confirmed by the fact that the number of countries following them is continuously growing, while many countries that still have their own standards (such as the USA) intend, in the near or distant future, to adopt them. Worldwide, the IFRS are regarded as standards of very good quality (Epstein, 2009, 27), i.e. as „a satisfactory global platform with the opportunity for further advances" (PricewaterhouseCoopers, 2007a, 3), while the fact that they have been developed taking into consideration viewpoints from different parts of the world inspires further confidence in them. The IFRS offer great opportunities to improve the transparency and comparability of financial statements globally, with positive effects on the development and integration of capital markets, and global economic growth and development in general. Its setter, the IASB, has managed to acquire the status of the world's most respected institution for the development of financial reporting standards.

However, as a private sector body, the IASB does not have the ability to directly impose its standards on companies because it has no authority over any auditor and preparer of financial statements or regulator of financial reporting (Stevenson, 2008, 34). In this respect, its position is quite different from the position of national standard-setters who operate within a national regulatory framework and have clearly defined authorities. The IASB, therefore, has no other choice but to develop standards as a public good and put them at the disposal of any country or company that wants to adopt and apply them, at the same time encouraging national regulators to accept them, in line with its abilities and influence.

In addition, since the IASB has no direct authority over preparers and auditors of financial statements or national regulators of financial reporting, it is unable to ensure a consistent application of the IFRS in all countries which declare themselves as the followers of the IFRS. It is the very problem of the inconsistent application of the IFRS around the world that has become increasingly noticeable in recent years. Unlike previous decades, when overcoming the differences between national standards was the central issue, nowadays it is the inconsistent application of the same standards – the IFRS – that is more and more often identified as a problem.

Namely, cultural and other environmental factors may result in different interpretations of the same standards and different levels of enforcing those standards in various countries, with negative consequences on the comparability of financial statements (Doupnik & Perera, 2007, 103). Adopting the IFRS in a country is one thing, while their implementation is quite another. The mere fact that a country has adopted the new accounting principles and rules does not guarantee their quick, effective and full implementation, because the „old mentalities and ways of doing things have to be replaced, which might take a generation" (McGee, 2006, 202). With this in mind, the statement that the „convergence of accounting standards may be easier than overcoming the cultural differences and perspectives determining the interpretation and application of the IFRS" (Deloitte, 2008, 4) seems to be quite correct. Without a consistent application of the IFRS, there can be no single global language of financial reporting. Global standards applied in an inconsistent manner are only global in their name (Ernst & Young, 2012, 1).

The research subject of this paper is the diversity of the financial reporting practices of the countries declaring themselves to be the followers of the IFRS, and the main purpose of the research is to give an overview of the main causes and ways to overcome this diversity. In the research process, the following hypothesis shall be tested: The features of the very IFRS, the procedures of their incorporation into national regulatory frameworks and the weaknesses of national incentive mechanisms create a room for diversity in the application of the IFRS worldwide.

The previously formulated hypothesis shall be tested using the qualitative research methodology based on the descriptive analysis. Starting from the relevant literature, which includes a theoretical discussion and

the analysis of the specific cases, general conclusions about this problem shall be derived. The method of induction will have particular importance, because, using this method, general conclusions about the characteristics of the IFRS shall be drawn on the basis of the provisions of individual standards; on the other hand, general conclusions about the shortcomings of the mechanisms of converting the IFRS into national standards and the mechanisms to ensure their consistent application shall be drawn, based on the examples of some countries. The method of comparison, based on the comparison of the features of the regulatory regimes and financial reporting practices of different countries, will also be used in the paper.

The following three sections of the paper are devoted to the main causes of variations in the financial reporting practices of the countries following the IFRS. The room for variations in practices, which is left by the flexibility of the IFRS themselves, is the subject of consideration in the first section; the factors of the occurrence of the national versions of the IFRS are considered in the second section, while the weaknesses of national incentive mechanisms are the subject of consideration in the third section. The fourth section, being the last one in the paper, points to the possibilities of reducing variations in the application of the IFRS.

THE FLEXIBILITY OF IFRS

The IFRS are flexible by their nature and, as such, leave considerable room for a choice of accounting practices. The factors of an inconsistent application of the IFRS in practice associated with the characteristics of the IFRS themselves are (Nobes, 2013, 91-93):

- gaps in the standards,
- open options in the standards,
- hidden options in the standards and imprecise criteria for the recognition of the elements (items) of financial statements, and
- the need for a judgment in measuring financial statement items.

Although the IASB continually develops new standards and improves the existing standards in accordance with changes in business practice, certain gaps in standards, in terms of the lack of solutions to some specific accounting problems, are practically impossible to avoid. The IASB itself is aware of it, and, in its standard dedicated to the accounting policies, changes in accounting estimates and errors (IAS 8), points out that, in the absence of standards or interpretations dealing with a specific transaction or event, the preparers of financial statements should use their judgment and rely on other (national) standards and interpretations devoted to similar problems, and the IASB's conceptual framework.

An example of a standard that makes considerable room for a wide range of accounting practices is IFRS 4 (Pacter, 2013, 55), which only deals with the general issues of accounting for insurance contracts, without offering solutions to all the problems in this area. Additionally, IFRS 6 leaves plenty of room for different solutions to the accounting problems occurring in the oil and gas industry.

Coping with gaps in the IFRS, the preparers of financial statements may decide to continue with a long-term national tradition, i.e. a tradition established prior to the adoption of the IFRS. In any case, they have a maneuvering space that could have negative consequences for the global comparability of financial statements. National regulators could also fill the gaps in the IFRS by creating standards that would supplement the IFRS. That is exactly what the Australian standard setter did by releasing its own standard dealing with some issues of insurance contracts not addressed in the IFRS, as well as with other issues specific to the national environment (PricewaterhouseCoopers, 2010, 141). A possibility that national standard setters around the world solve the problems the IASB has not addressed in different ways poses an additional threat to the global comparability of financial statements.

One of the important features of the IFRS is the existence of open options, i.e. different possibilities for the accounting treatment of the same accounting problems, which is an important source of differences in the practical application of the IFRS around the

world. The typical examples of situations in which the current IFRS offer options are determining the value of end inventories and the cost of inventories disposed, where the choice between the FIFO method and the average cost method is allowed, and the measurement of property, plant, equipment and certain intangible assets after the initial recognition, where a choice between the historical cost model and the fair value model is allowed. When making a decision on the choice of a particular method from a set of offered methods, the tradition established before the adoption of the IFRS comes to the forefront again. For example, based on the rooted tradition, it can be expected that British companies will be using the FIFO method of accounting for inventories, and German companies will be applying the average cost method (Nobes & Parker, 2010, 160-161).

Generally speaking, the number of open options in the standards has a declining tendency (Alfredson *et al*, 2007, 33) due to the gradual elimination of the previously established options. However, the development of the IFRS makes new options emerge, and the most recent example is an increase in the number of the options for measuring investments in subsidiaries, associates and jointly controlled entities in separate statements after changes to IAS 27, made in August 2014. Namely, the third option – measurement using the equity method – was added to the two already available options (measurement at cost and measurement at fair value) (Deloitte Global Services Limited, 2014).

A specific category of open options is a set of options offered by IFRS 1, which deals with the problem of companies' transition from national standards to the IFRS. Among other things, this standard allows preparers of financial statements to choose between the revaluation of goodwill and taking its previous amount (i.e. the amount determined by the pre-existing national standards) without any revaluation, in the preparation of the first statements based on the IFRS. As national standards significantly differ in terms of accounting for goodwill and as the first financial statements based on the IFRS represent a starting point for a series of subsequent statements, it is clear that the options related to the amount of goodwill in the first statements based on the IFRS may have a negative impact on the global comparability of financial statements in the long term.

Another specific category of open options is one stemming from the flexible effective dates of new or revised standards. Namely, when publishing each standard, the IASB determines its effective date, in the form of the statement that „an entity should apply the standard for annual periods beginning on or after January 1, 20XX", whereby companies (entities) are usually allowed to apply it before the established deadline. For example, the IASB replaced IAS 14 with IFRS 8 at the end of 2006. The effective date for IFRS 8 was 1 January 2009, but there was also a possibility of an earlier adoption. This practically means that two different standards dealing with the same accounting problem (segment reporting) – IAS 14 and IFRS 8 – existed simultaneously in 2007 and 2008, and it was possible for companies to apply either of them. At the beginning of 2007, the IASB revised the standard dedicated to borrowing costs (IAS 23), with 1 January 2009 as the labeled effective date of the revised version of the standard and a possibility of an earlier application, which means that the two versions of the same standard coexisted until the mentioned deadline. Flexible deadlines for adopting standards have essentially the same effect as the options in the standards themselves. Although the period of the coexistence of two alternative standards or two versions of the same standard (the old and the new ones) does not last long (no more than 2-3 years), the continual creation and improvement of standards bring new cases of coexistence and, therefore, generate new sources of differences in the practical application of the IFRS not only globally but also at the level of one particular country.

In addition to open options, the IFRS contain many hidden options and imprecisely defined criteria for the recognition of the elements of financial statements (assets, liabilities, revenues and expenses), which further increases a possibility for preparers of financial statements to make a choice. Analyzing the IFRS effective in 2013, C. Nobes (2013, 95) identified a large number of the situations in which preparers of statements face hidden options or imprecise criteria for recognition. Some of these examples, updated in

accordance with the subsequent changes to the IFRS, are:

- the determination of the materiality (significance) of certain items (IAS 8);
- the classification of leases as finance and operating depending on whether there is a transfer of „substantially all the risks and rewards" from the lessor to the lessee, without numeric criteria (IAS 17);
- the determination of the functional currency (IAS 21);
- the identification of subsidiaries on the basis of the „power to govern" (IFRS 10), of associates on the basis of the „significant influence" (IAS 28) and of joint ventures on the basis of the „rights to the net assets of the arrangement" (IAS 28);
- the recognition of provisions based on the „probability of an outflow of resources" (IAS 37); and
- the capitalization of development costs (IAS 38).

The above-mentioned situations as well as a number of other unmentioned ones are the unavoidable consequences of the nature of accounting, which makes it impossible for standards to provide an answer to each possible question. They also result from the IASB's quite a correct orientation towards the principles-based standards, which are based on the position that the purpose of standards is to define the space given to accountants to make decisions within, i.e. to exercise their judgments that remain an integral part of accounting and financial reporting. Since the IFRS do not contain clear and precise criteria for the accounting treatment of a number of transactions and events, it is essential that preparers of financial statements perceive their economic substance and decide on the proper treatment on the basis of their judgments. The manner in which preparers of financial statements interpret the economic substance of transactions and events largely depends on the environment in which they live and work, that is, on the values of the society which they belong to. For example, there is a study revealing that, under the influence of differences in cultural values, German accountants interpret the word „probable", which is common in the IFRS, with more caution than U.S. accountants (Doupnik & Richter, 2004, 1-20).

Accounting judgments are not only related to the recognition of the positions of financial statements, but they are also of utmost importance in determining their values on the basis of the IFRS. In fact, in all situations where exact and objective criteria for measuring do not exist, accountants' reasonable judgments are the only solution, wherein accountants from different countries exhibit different preferences, under the influence of the respective culture, tradition and tax regulations.

The depreciation of property, plants and equipment is the area in which the need for judgment is clearly visible, especially in the determination of the useful life, the estimation of the residual value and choosing the method of depreciation. Analyzing the depreciation practices of the European countries, C. Nobes and R. Parker (2010, 163) point out that British companies traditionally tend to have simpler depreciation regimes, which involves the application of the straight-line method, the residual value equal to zero and the useful life of 10 years, while, under the influence of tax regulations, companies in some countries of the continental Europe, traditionally utilize the accelerated depreciation method, with a tendency towards a shorter useful life. Determining the fair value of assets and liabilities also involves judgment and is considered to be a very sensitive area of financial reporting. In addition, the net realizable value of inventories, the amount of the impairment of property, plant and equipment, and the values of provisions are inevitably the subjects of estimation.

The estimated amounts in financial statements of companies from one country depend on whether the preferences for conservatism or optimism have the dominant role in that particular country. For example, if there is a prevailing tendency towards conservatism, it is more likely that companies will choose the accelerated method of depreciation, with a shorter useful life and a lower estimated residual value, and that they will measure provisions in higher amounts.

Based on the previous observations, it can be concluded that, on the one hand, the IFRS make progress in increasing the international comparability and consistency of companies' financial statements, whereas on the other, they allow financial reporting in each country to simultaneously keep national colors, i.e. to still bear the stamp of the previous national standards. That fact is clearly reflected in the results of one empirical study focusing on the 16 accounting issues regarding which the IFRS permit variations, and where international differences existed before the adoption of the IFRS by the countries which the observed companies originate from. The study shows that the differences remained even after the transition to the IFRS, i.e. the companies kept their national traditions (Kvaal & Nobes, 2010). The second study, focusing on the 26 open (explicit) options offered by the IFRS, reveals that the country of domicile and its previous financial reporting standards have the greatest impact on companies' accounting choices (KPMG & von Keitz, 2006).

NATIONAL VERSIONS OF IFRS

In addition to the characteristics of the IFRS themselves, i.e. many open questions, the final answer to which should be given by preparers of financial statements, there is significant room for differences in the accounting practices of the companies following the IFRS is created during the incorporation of the IFRS into such countries' regulatory frameworks of financial reporting. The lack of the direct authority of the IASB has led to the fact that in some countries a modified version of the IFRS is applied instead of their original version published by the IASB (Alali & Cao, 2010, 79). In other words, in addition to the original IASB's version, there are also national versions of the IFRS, which, to a greater or lesser degree, deviate from the original one.

After the consideration of the relevant literature (IFRS Foundation, 2014; Nobes, 2013, 89-90; Nobes & Parker, 2010, 158-159), it can be concluded that the most important reasons for the emergence of the national versions of the IFRS are:

- the modification of the IFRS provisions by the national regulator;
- a delay in the incorporation of the new or amended standards or a delay in their implementation; and
- mistakes in the translation of the IFRS.

Many countries adopt the IFRS in an indirect way, by transferring them into their own standards, with a more or less complicated procedure of approval by the applicable regulatory authority, which can be national (such as, for example, in Australia), or common for a group of countries (as it is the case of the European Union countries). In addition, the IASB's standards can be incorporated into a national regulatory framework without any modifications, which is most often the case, or modified in a certain manner in order to adapt to specific circumstances.

In some cases, such modifications only refer to the elimination of some options for the accounting treatment. For example, when incorporating the IFRS into Brazil's regulatory framework, the provisions allowing for the periodic revaluation of financial statements' positions were deleted (IFRS Foundation, 2014). The elimination of some options leads to deviations of national standards from the IFRS; however, it cannot be said that companies consistently complying with national standards derogate from the IFRS.

However, a much more serious problem for the global comparability of financial statements arises if a country or a group of countries substantially modifies the provisions of the IFRS, as the European Union did with the provisions of IAS 39. Namely, the IASB revised IAS 39 in 2003 and 2004, which caused strong reactions in the EU, while the major objections were related to the accounting treatment of financial derivatives and hedging, and expanding the use of the fair value for the purposes of measuring financial assets and liabilities in comparison with the previous version of the same standard (Armstrong *et al*, 2010, 34-35). The above-mentioned objections resulted in the adoption of a modified version of IAS 39 by the European Commission (EU) in November 2004, whereby the modifications relate to the elimination of the controversial provisions regarding hedge

accounting and the use of the fair value. These modifications made the version of the IFRS followed by the companies from the EU different from the original, i.e. the IASB's version. Later, under the pressure of the EU, the IASB revised IAS 39 once again and limited the use of the fair value only to the situations in which it can reliably be measured. The EU adopted the changes, thereby eliminating a significant difference between the original version of IAS 39 and the version of the same standard applied at the EU level.

Taking into consideration the previously mentioned facts, it is clear that the process of incorporating the IFRS into the EU regulatory framework effectively created the new - EU - standards (Tokar, 2005, 49). A favorable circumstance is that the differences between the original version of the IFRS and their versions applied by the EU companies do not really have a great practical importance, as the differences refer to the financial reporting of only a small number of companies (Pacter, 2014, 8).

The process of incorporating any new or revised standard and interpretation into the national regulatory framework is carried out differently from one country to another and has a different length. If a country does not adopt a standard or an interpretation in time, i.e. by the date the IASB marked as the effective day, there will be differences between the version of the IFRS followed in that particular country and the version followed in other countries that have completed the adoption process in time.

The Republic of Serbia (RS) belongs to those countries that have not harmonized their own financial reporting regulation with the IFRS in a sufficiently timely manner so far. Namely, the first official translation of the IFRS, including the conceptual framework and all the International Accounting Standards (IAS) but not the respective interpretations, was published in December 2003. The translation of IFRS 1 was published in January 2004; after that, there was a four-year break in the publication of the translations, during which period the IASB published six new standards entering into force in the same period (IFRS 2-7) and also revised a significant number of the existing standards (for example, in December 2003, the IASB amended IAS 2, abolishing the possibility of using the LIFO method for inventory accounting, while the revised standard came into force on 1 January 2005). Due to the lack of the activity in publishing the official translations of the new and revised standards by the authorized regulatory bodies, the version of the IFRS applied by companies in RS was significantly different from the original version. In February 2008, the new translations of the IFRS were finally published, replacing the translations of 2003 and 2004. For the first time, the translations of the interpretations were published together with the translations of the standards; yet, there was no translation of the supplementary materials (the basis for conclusions, illustrative examples, guidelines, comments and opposing views), which can be considered as a disadvantage, because the listed appendices would facilitate the understanding and implementation of the standards. In this regard, the translations of 2008 are a step backwards compared to the translations of 2003, which included the additional materials (appendices). The next version of the IFRS translations was published in October 2010, while the latest version was published in March 2014. If we take into account the fact that the IASB's standard dedicated to small and medium-sized entities, adopted in 2009, was not incorporated into the regulatory framework of RS until 2013, which means that the companies which the standard refers to (i.e. companies without public accountability) did not have an opportunity to use a simpler version of the IFRS and decrease the cost of the preparation of their financial statements, it is clear that the past activities in updating the financial reporting regulatory framework of Serbia in accordance with the IFRS changes could not be evaluated as satisfactory. So far, the publication of the official translations of the IFRS has generally run late, which means that the version of the IFRS applied in RS has generally been different from the IASB's version. It should be added that the bylaw act brought in 2009 permitted Serbian companies to use the accounting treatment that is not consistent with the provisions of IAS 21 dealing with foreign currency transactions (Bogicevic, 2013). This option was in effect until September 2014. Moreover, the National Bank of RS requires from financial institutions to apply the accounting procedures not fully compatible with the requirements of the IFRS.

The timely adoption of new or amended standards does not automatically guarantee the timely beginning of the application of the same, as the national regulator may allow companies (all or some of them) to postpone the beginning of the application for a specific time. For example, the application of the six standards has been delayed in Taiwan (IFRS Foundation, 2014).

The translation of the IFRS from English, as the language of their original and official version, into other languages inevitably involves the risk of changing their meaning. In fact, the full equivalence of any text translation and its original version is not easy to achieve, while the risk of not conveying the meaning of the original text increases with the number of technical terms used. The IFRS contain a significant number of technical terms, which are often difficult to translate adequately. A particular problem is the provisions of IFRS that contain new concepts or deal with problems that are not fully understood or are even completely unknown in many national cultures. Even the most accurate translation of these provisions does not guarantee a complete transfer of their essence and logic. Therefore, a situation might occur, where the words, but not the concepts, may be understood (Zeff, 2007, 296).

The following three examples clearly show the extent of discrepancies in the translations of the original IFRS provisions.

According to the original version of IAS 41, an unconditional government grant related to a biological asset should be recognized as income when the company acquires a receivable on that basis, while according to the translation of the same standard into the Norwegian language, published in 2006, the recognition of income is related to the moment of a cash inflow on the basis of the grant.

In the original version of IAS 7, cash equivalents are defined as investments with a „short maturity of, say, three months", as a result of the IASB's attempt to avoid the formulation of a rigid rule. However, in the Portuguese translation, the word „say" is omitted, which turned a flexible principle into a strict rule. Therefore, in Portugal, it is harder to defend the position that an investment with a maturity of slightly more than three months is essentially a cash equivalent compared to any other country where the translation is correct.

According to the original version of IAS 19, the discount rate for pension liabilities is determined on the basis of interest rates on corporate bonds, while according to the German version of the same standard, it is determined on the basis of interest rates on industrial bonds, which are a subcategory of corporate bonds (Nobes & Parker, 2010, 159).

The analysis of jurisdiction profiles (which are mostly, but not always, consistent with independent countries), created between June 2013 and September 2014, and published on the website of the IFRS Foundation (the entity responsible for managing, monitoring and financing the IASB), reveals that there are a significant number of jurisdictions in which the IFRS have been modified in some way. Out of the 127 analyzed jurisdictions, where at least some companies are required or permitted to use the IFRS, in 53 jurisdictions (42%), a version different from the current IASB's version is applied due to the modifications of the IFRS provisions, delays in the incorporation of the new or amended standards, or delays in the implementation of some standards or interpretations. In three jurisdictions, the modifications only refer to the elimination of the options offered by the IFRS. The most analyzed jurisdictions in which the modified versions of the IFRS are applied (28) belong to the European Union. Modifications were also made when incorporating the IFRS for Small and Medium-Sized Entities in certain national regulatory frameworks, although to a lesser extent. Out of the 77 analyzed jurisdictions in which the use of the IFRS for Small and Medium Sized Entities is required or permitted or in which it served as the basis for the development of national standards for small and medium-sized entities , they have been modified in ten (13%) of them (IFRS Foundation, 2014).

UNEQUAL EFFICACY OF INCENTIVE MECHANISMS

A strict application of the IFRS by companies around the world, and thus an increase in the global comparability of financial statements, cannot be

achieved without effective incentive mechanisms, i.e. the systems encouraging their use, whose construction is under the exclusive auspices of national regulators. These are the mechanisms that include an obligation to audit companies' financial statements, the supervision of auditors by relevant authorities, and the sanctioning of any violation of laws and standards. Based on this, an unequal efficiency of incentive mechanisms could be an important source of differences in the practical application of the IFRS globally, and could also cause an uneven quality of financial reporting in different countries, which is maybe more dangerous. Moderate or inefficient incentive mechanisms allow companies to deviate from the provisions of the IFRS with impunity, making their financial statements incomparable with the statements of the companies from the countries in which the IFRS are strictly applied.

In this respect, the results of one empirical study, based on Egyptian companies' disclosures after transition to the national standards based on the IFRS, could be interesting. The research has shown that the companies were less willing to comply with the provisions of the new standards which were relatively unknown to them (Abd-Elsalam & Weetman, 2003, 63-84). These results confirm the importance of effective incentive mechanisms, which should ensure strict compliance with all the provisions of the IFRS.

Another study, focusing on the quality of information on the impairment of assets in the financial statements of European companies for 2010 and 2011, reveals that the degree of compliance with the provisions of the IFRS regarding the disclosure of impairment varies from one country to another, indicating an uneven application of the IFRS. The same research finds that high-quality reporting on the impairment of assets is characteristic of companies operating in a more solid institutional and regulatory environment, as is the case with companies in the UK and Ireland, while, in contrast, information on impairment provided by companies in countries with weaker regulatory control are of a lower quality. Additionally, companies in countries with strong incentive systems show a greater degree of timeliness in the recognition of impairment losses on assets than companies in countries with weaker incentive systems (Amiraslani, Iatridis & Pope, 2013, 2).

OVERCOMING DIFFERENCES IN PRACTICAL APPLICATION OF IFRS

In the opinion of many, the different manners of applying the IFRS throughout the world represent „a significant challenge to the adoption of the IFRS as a truly global reporting model" (Securities and Exchange Commission, 2010, 10). Differences in the economic, legal and cultural environment are highlighted as the key obstacles to the consistent application of the IFRS. The insufficient knowledge of the IFRS and the inadequate level of the understanding of their potentials in certain countries as well as the widespread resistance to changes are important obstacles as well.

A situation when a multitude of the national versions of the IFRS exist could be even more dangerous than a situation when each country follows its own standards. When investors (and other users of financial statements) know that each country follows its own standards, as was the case in the past, they adapt their behavior in terms of studying foreign accounting systems, requesting a higher return rate on the basis of a higher expected risk or the cancellation of foreign investment. However, if all countries identify themselves as the followers of the IASB's standards, while each follows its own version of the IFRS, applying various procedures of auditing and the supervision of the implementation of such standards, investors can be misled regarding the comparability of the financial statements of companies from different parts of the world and, therefore, make wrong decisions. They may conclude that the financial statements of companies from different countries are comparable, although they are not comparable indeed, and may abandon their attempt to transform the statements to a comparable basis.

Reacting to the modifications of the IFRS in their incorporation into national regulatory frameworks, the International Organization of Securities Commissions (IOSCO), in its document published in

2008, recommends that companies should provide clear and precise information about the standards used as the basis for the preparation of financial statements in order to facilitate their understanding by investors. However, the IOSCO recommendations cannot be considered as a long-term solution. The only correct long-term solution is the incorporation of the IASB's standards into national regulatory frameworks without any modification (Willemain, 2008, 1).

The IFRS Foundation has also recognized the dangers of the inconsistent application of the IFRS. In a document from 2012, which outlines its own strategy for the ten-year period, the IFRS Foundation emphasizes that countries opting for the application of the IFRS should avoid „creating national or regional variants of IFRS" (IFRS Foundation, 2012, 12), and that any incomplete application of the IFRS should be clearly indicated, which is similar to the recommendation of IOSCO. According to the IFRS Foundation, the IASB's contribution to increasing consistency in the application of the IFRS should consist of a publication of clear, understandable and applicable standards, providing guidelines for implementation as well as illustrative examples for understanding and the consistent implementation of the standards if necessary, and cooperation with national regulators and other stakeholders in order to identify the areas in which differences in the practical application of the IFRS between countries are present, and to improve the standards or the interpretations addressing these areas (IFRS Foundation, 2012, 5-6).

On the other hand, all stakeholders (preparers, auditors and analysts of financial statements, national regulators and others) should actively be involved in the process of creating new or revising the existing standards, through their comments on the IASB's proposals, and, if necessary, should require the IASB to clarify the standards. This would prevent differences in the interpretation of standards (Ernst & Young, 2012, 8).

An important role the IASB has in making efforts to overcome differences in the practical application of the IFRS, and in particular differences of judgments caused by cultural factors, should be that of the conceptual framework for the IFRS, which, in fact, is „the IASB's statement about its own accounting culture" (Whittington, 2008, 497). To achieve true accounting convergence, it is necessary that the conceptual framework, which so far has primarily been aimed at ensuring the consistency of the standards and providing guidelines for situations not covered by the standards, should gain a new role of the promotion of the fundamental basis of financial reporting in a manner that overcomes the existing cultural differences between countries. The process of the conceptual framework reform, which is well under way and whose essence reflects in the review and modification of that fundamental basis, is a good opportunity to move the framework closer to interested parties around the world through their involvement in the reform process and by respecting their needs and interests. The reform of the conceptual framework, as one of the most important segments of the project of convergence between IFRS and U.S. Generally Accepted Accounting Principles (GAAP), should provide an opportunity for those who did not participate in the creation of the previous version of the framework (such as many EU countries) to express their views. Therefore, in order to achieve greater uniformity in financial reporting practices at a global level, the formal acceptance of the IFRS by national regulators should be followed by achieving as great a degree of a global consensus on the fundamental principles embedded in the framework as possible. The IFRS conceptual framework should promote the objectives, assumptions and fundamental principles of the IFRS worldwide, thus helping to better understand their philosophy and harmonize judgments from country to country.

It is impossible to achieve a consistent quality of the audit of financial statements on the global scale as a prerequisite of the consistent application of the IFRS without a single global set of auditing standards, which are being under construction. The International Standards on Auditing (ISA) issued by the International Federation of Accountants (IFAC) stand for the basis of the process of the global convergence of the auditing standards in the same way that the IFRS are the basis of the global convergence of the financial reporting standards. In addition to the harmonization of the auditing standards between countries, it is very important to harmonize the standards of professional

ethics which accountants and auditors adhere to, and it is necessary to build an effective and globally harmonized system of licensing auditors, control and disciplining, so that investors could have absolute confidence in financial statements prepared and audited in different countries (Willemain, 2008, 2). Finally, there should be high-quality and consistent systems for educating accountants.

It is clear that a ultimate success in increasing the consistency of the IFRS application primarily depends on national financial reporting regulators, i.e. their willingness to consistently (without modification) incorporate the IFRS into their national regulatory frameworks and ensure the strict implementation of the same. National regulators also need to refrain from publishing their own IFRS interpretations and guidelines. Instead, in the case of any doubt or disputed issues, they should consult the IASB.

The reform of the worldwide regulatory environments, as a prerequisite of the ultimate success of the process of the global convergence of the financial reporting standards, is a long-term and challenging process (PricewaterhouseCoopers, 2007b, 4). Financial reporting regulators around the world need to work together in order to prevent occurrences of significant differences in regulatory environments.

The problem of national variations in the IFRS application could partially at least be overcome through the global supervision of the IFRS application. Thanks to global supervision, users of financial statements would be able to learn whether companies from a country declaring itself to be a follower of the IFRS truly apply all their provisions or not. Under conditions of global supervision, countries themselves would be interested in a consistent and timely adoption and strict implementation of the IFRS because putting a country on the list of those that do not strictly follow the IFRS would make it harder for their companies to attract foreign capital and would also have a negative impact on its international image. In recent years, the IASB has undertaken activities in this field by publishing jurisdiction profiles, in which, among other things, it specifies the areas where the national versions of the IFRS differ from the original version and explains the procedures of the national regulatory framework harmonization with the changes in the IFRS, including the translation of the IFRS.

CONCLUSION

The adoption of the IFRS by many countries in the world globally contributed to the harmonization of accounting practices. However, the research conducted in this paper has shown that a single global accounting practice is still far from reality, i.e. the characteristics of the IFRS themselves, the procedure of their incorporation into national regulatory frameworks and the weaknesses of national incentive mechanisms create a room for diversity (variations) in the application of the IFRS, thus confirming the main hypothesis of the study. Today, as a result of weaknesses and inconsistencies in the procedures of the incorporation of the IFRS into national regulatory frameworks, instead of a single version of the IFRS, there are a significant number of their nationally colored versions worldwide.

The key contribution of the paper reflects in identifying the causes of variations in the application of the IFRS, using the three-layer model based on dividing the causes to those related to the characteristics of the IFRS themselves, those related to the process of the incorporation of the IFRS into national regulatory frameworks, and those related to the implementation of the adopted IFRS (in the original or a modified form) at the national level. The contribution is also visible in pointing out the main activities to be undertaken in order to overcome the above-mentioned variations and the key actors to implement them – the IASB and national regulators. In addition to this, the paper highlights the need for the globalization of the financial reporting standards to be followed by the globalization of the auditing standards and the procedures for the supervision of auditors by the authorized government bodies as well as the need for the education and training of accounting professionals due to the fact that the lack of an adequate effort in any of these areas can significantly counteract the efforts made in establishing the global financial reporting standards. The idea of the establishment of the global

supervision of the application of the IFRS is also discussed.

The analysis of the activities in the updating of the financial reporting regulatory framework in the Republic of Serbia in accordance with the development of the IFRS, together with the general remarks on the ways how to overcome the variations in the application of the IFRS, suggests opportunities for improving the implementation of the IFRS in RS in the future. The Serbian financial reporting regulators should take care of the up-to-date translation of all the relevant IASB documents, with a continuous review and improvement of the translation quality, and should continuously strengthen mechanisms for disciplining auditors. Also, the national regulators should strive to refrain from adopting the regulations that would modify the provisions of the IFRS, wherein any modifications should only be made in a case of an extreme necessity. The accounting profession should work on the continuous improvement of training programs for accountants, with an emphasis on the proper understanding of the conceptual foundation of the financial reporting based on the IFRS. To the extent possible, regulators and the accounting profession should actively be involved in the development of the IFRS, primarily by their being allowed to make comments on drafts of the standards and interpretations and, should there be any dilemmas regarding the provisions of the already adopted IFRS, by their addressing the IASB.

The research in this paper is mainly focused on the estimation of the room for national variations in the application of the IFRS, which is also the major limitation of the paper. Therefore, the actual variation in the financial statements of companies from different countries declaring themselves to be the followers of the IFRS could be the subject of future research in this area. Taking into consideration the fact that special attention in the paper is paid to the incorporation of the IFRS into Serbia's regulatory framework, the comparability of the financial statements of the Serbian companies with the financial statements of companies from the other countries that have adopted the IFRS and the problems that RS accountants face in applying the IFRS are also the potential subjects of future research.

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THE KEY ASPECTS OF THE BUILDING AND APPLICATION OF TIME EQUATIONS IN COST CALCULATION

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In addition to the capacity cost rate, the key parameter of Time-Driven Activity Based Costing – the TDABC is the time required for the realization of each business activity. In accordance with the TDABC methodology, the above-mentioned time is calculated by using time equations. Therefore, the total time required for the realization of a certain business activity is obtained by adding a normal (standard) time to the additional time required for performing modified forms of one and the same activity. The aim of this paper is to analyze the role and importance as well as various aspects of the building of time equations from the perspective of the organizational and methodological preparation for the realization and functioning of the TDABC. The research results show that the application of time equations leads to the increased accuracy of the calculation of costs and a product cost, reduces the complexity of the organizational and methodological preparation for the implementation and functioning of the TDABC system, i.e. enables the realization of a more effective and efficient costs calculation.

Keywords: calculation of costs, Time-Driven Activity Based Costing, capacity cost rate, time equations, time drivers

JEL Classification: M41, M49

INTRODUCTION

Time-Driven Activity Based Costing – the TDABC is thought to have originated from Activity Based Costing – the ABC in the early 1990s. It was the result of collaboration between S. Anderson and R. Kaplan. The TDABC was promoted as a system of exceptional information performances enabling gaining a full insight into historical and future performances, efficient and effective short-term and long-term decision making and the evaluation of effectiveness in resource, activities and the management of a company's business processes (Everaert & Bruggeman, 2007; Everaert, Cleuren & Hoozee, 2012; Kaplan & Anderson, 2007a; Kaplan & Anderson, 2007b).

The TDABC methodology only requires the two sets of estimates: the capacity cost rate (the cost rate) and the time required for the realization of certain business tasks, activities or processes (Gilbert, 2007;

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Everaert, Bruggeman, Sarens, Anderson & Levant, 2008; Everaert, Bruggeman & De Creus, 2008; Kaplan & Anderson, 2007a; Kaplan & Anderson, 2007b; Malinić i Todorović, 2011; Todorović, 2013a). The capacity cost rate per unit of time is determined by dividing the total cost by a practical capacity. Total costs are the costs of specific pull resources, i.e. the costs of all resources required to perform a specific business activity. Therefore, the starting point in the TDABC is the costs in their total, collective (aggregated) amount (Antić, 2012; Antić i Georgijevski, 2010; Kaplan & Anderson, 2007a; Szuhta, 2010).

The total available practical capacity is expressed in the time of all the resources engaged, e.g. employees who effectively work on the realization of a specific business activity. The TDABC identifies the quantity of the resources that actually perform specific business activities. The traditional ABC (Janjić i Todorović, 2012) is based on the assumption that all supplied resources of an enterprise are actually spent, thereby unjustifiably allocating costs of the unused capacity to cost objects. The TDABC represents a new generation of the cost accounting system based on the assumption that not all supplied resources (the capacity of an enterprise) are actually used resources. It seeks to identify and determine the volume of the costs of unused resources. Making a distinction between the costs of used and unused resources aims to correctly allocate costs to cost objects, i.e. to allocate the costs of resources to cost objects only when such resources are actually consumed (Antić i Georgijevski, 2010; Buchheit, 2003; Szuhta, 2010). The TDABC is characterized by a specific treatment of production costs, where only costs actually spent in activities of creating output are considered as production costs, which causes that all costs of an unused capacity are treated as costs of the period (Tse & Gong, 2009).

In order to adequately allocate costs of resources to cost objects, based on the capacity cost rate, and to determine a product cost, it is necessary to determine the time required for the realization of specific business activities. The time variable is the basic cost driver and the key parameter of the TDABC. It is determined by time equations.

Accordingly, the segment of the organizational and methodological preparation for the TDABC application related to the creation and application of time equations for the purposes of determining the time required for the realization of business activities is the subject of research in this paper. Time equations are simple linear equations representing the quantitative basis of the TDABC. They allow an assessment of demand for resources (a capacity expressed in time) of each cost object.

Hence, the aim of the paper is to consider the role, importance, and different aspects of the building of time equations from the perspective of the organizational and methodological designing of the TDABC in the context of a more accurate cost allocation and determination of a product cost.

In accordance with the presented subject and aim of the research, the paper will test the following hypothesis: The application of time equations in the methodology of the TDABC enables the realization of a more effective and efficient calculation of costs. The effectiveness is related to an increased accuracy of cost calculation and the determination of a product cost, and the efficiency is related to the simplification of the calculation of cost procedures at an acceptable ratio of costs/profitability.

To test the hypothesis defined in the paper, the methodological procedures and techniques inherent to the social sciences will be applied, which means the qualitative methodology based on the study and a descriptive analysis of the defined subject of the research. Consulting the relevant literature, based on a theoretical analysis and examples from international practice, should provide the synthesis and drawing of general conclusions.

The paper consists of the four parts. The first part deals with the issues of the substantial determination of time equations and their importance from the perspective of the TDABC functioning. Since time equations are linear equations, the second part is devoted to various aspects of their design as well as to their being used for the purposes of the calculation of costs. The third part of the paper discusses multiple time drivers as the constitutive variables of time equations, whose

application allows the building of an efficient and effective model of cost calculation in terms of frequent changes in operating conditions (which may induce changes in the cost calculation model) and complex business processes. The last, fourth part of the paper deals with the issues of the importance of the precision of time equations for cost calculation and the determination of a product cost, potential errors that appear in time equations and possible approaches to overcoming these errors.

THE SUBSTANTIAL DETERMINATION OF TIME EQUATIONS

The practice of measuring the required (spent) time of the engaged labor force and/or equipment in business processes, production in particular, is neither new nor unknown. Almost more than a century ago, the meaning and purpose of determining time included our understanding of the effects of the labor force and equipment and short-term quantitative improvements in accordance with the goals of mass production as well. The practice of measuring time is certainly important; from the perspective of the TDABC, however, the application the purpose of and an approach to measuring time for the realization of business activities (business processes), on the basis of the direct labor force, are neither sustainable nor acceptable for at least two reasons. Firstly, for the purposes of adequate cost management, it is not necessary that an absolutely accurate system (which would be based on more decimals) should be built; instead, it should be a system reflecting the actual situation. Secondly, the TDABC is applied for the purpose of detecting possibilities and making an initiative for long-term improvements rather than short-term goals and results. Hence, determining the time required for the realization of a certain business activity as the main TDABC parameter should be implemented in a substantially different manner and with a different meaning.

The calculation of the time required for the realization of a certain business activity in the TDABC depends on the usual or standard time required for its realization as well as an additional consumption of time in the case of new or different circumstances causing variations in the manner of the realization of such an activity. Thus, the total time required for the realization of a certain business activity is calculated by adding the usual (standard) time to the time required for the execution of the modified forms of the same activity caused by its variations. The complexity of determining the usual time as well as variations in the duration of some business activity caused by the influence of many factors can, in terms of the TDABC application, be overcome using time equations.

The quantitative i.e. mathematical basis of the TDABC consists of time equations. Time equations are linear equations allowing the determination of the time spent for the realization of a certain business activity. When applying time equations, the time required for the realization of a certain business activity is expressed as a function of different time drivers. In other words, the duration of a certain business activity depends on the specific characteristics of the activity itself, the conditions, and the manner of its carrying out, i.e. the above-mentioned time drivers. Time drivers are variables determining the time needed for an activity to be conducted. They represent the key constitutive variables of time equations and can take the form of (Todorović, 2013b):

- continuous variables (the weight of a pallet or a distance in kilometers),
- discrete variables (the number of orders, the number of credit cheques), or
- indicator variables (the type of customer: old vs. new; the type of order: regular vs. urgent).

Due to time equations and time drivers (as well as duration drivers, as opposed to the traditional ABC system predominantly based on transaction cost drivers), the TDABC makes an important step forward compared to the traditional ABC. By applying time equations, the TDABC relatively easily incorporates variations in the time required for the realization of various types of business activities, on the one hand, or rejects a simplistic assumption that the realization of certain business activities always requires the same amount of time (Malinić i Todorović, 2011), on the other. The realization time for a certain business activity will not be the same, e.g. in the case of an order being processed for an old or a new buyer, or in the case

of receiving either a regular (ordinary) or an urgent order. In this case, the type of customer or the type of order is a time driver determining the duration of an activity. The different time required for the realization of a certain business activity (time is the cost driver i.e. value determining the amount of a cost) will determine a corresponding amount of costs to be allocated to appropriate cost objects and an amount of a product cost. Organizational and methodological solutions designed in this way directly affect an increase in the reporting performances of the TDABC, or the overall information strength of cost accounting and the entire accounting information system (Todorović, 2008).

BUILDING TIME EQUATIONS AND COST CALCULATION

The building of time equations requires the identification of business activities and the determination of the drivers causing variations in the consumption of time for each business activity. It is, then, necessary to assess the required usual (standard) time for the realization of a business activity and the time required for the realization of modified forms of the same activity caused by the effect of time drivers, too. Based on the aforementioned data, a time equation is created. In general, the time required to perform a particular business activity can be expressed as a function of various characteristics, i.e. the so-called time driver. Hence, the time required to perform event *K* of activity *J*, with *P* possible numbers of time drivers X, generates the following time equation (Everaert & Bruggeman, 2007, 17):

$$t_{j,k} = \beta_0 + \beta_1 \times X_1 + \beta_2 \times X_2 + \beta_3 \times X_3 + \ldots\ldots\ldots + \beta_p \times X_p, \text{ where} \quad (1)$$

$t_{j,k}$ - the time required to perform event *K* of activity *J*,

β_0 - the constant amount of time for activity J, independent of the characteristics of the event,

β_1 - time consumption for one unit of time driver 1 (β_0, β_1,...β_p are constants in time consumption for different time drivers)

X_1 - time driver 1, X_2 - time driver 2, X_p - time driver *p*,

p - the number of time drivers determining the time needed to perform activity .

This procedure can be presented in a hypothetical example of order processing at a sales department (Kaplan & Anderson, 2007a, 29). The business activity of „order processing" includes: entering the order, entering every order line, setting up a new account (if it is a new buyer), the processing of urgent orders (checking the availability of the required items and the determination of the price) and the order confirmation. The starting assumptions of the analysis are as follows:

- the average time required for the realization of each of the business activities carried out at the sales department is determined, and
- all employees working in sales use the standard software, and the time required for each activity can easily be determined.

The processing of an order depends on three time drivers: X_1 - the number of order lines, as the discrete time driver, X_2 - the type of customer (a new vs. the existing one), as the indicator time driver, and X_3 - the type of order (ordinary *versus* urgent), as the indicator time driver. The indicator variable takes value 1 in the case of a new customer (or an urgent order) and 0 for an existing customer (or an ordinary order). The analysis of the time required for the realization of such activities indicates the following: entering information about the received order takes two minutes and entering information about each order line takes two minutes. Setting up a new account takes six minutes (if it is a new customer). Upon receiving an emergency order, it is necessary to check the availability of the requested items, which takes seven minutes, and determine the cost, which takes three minutes. The total increase in the time of „order processing", in the case of receiving an urgent order, is 10 minutes (due to the simplification of the analysis, the activity of receiving an urgent order will be considered as the whole, i.e. the aggregate amount of the time required will be used). The last activity relates to the development and validation of a delivery order, which takes one minute (this time is independent of the time driver in the case of „order processing", and will be abstracted for the purpose of the analysis).

After identifying the average time needed for the realization of all business activities at the sales department in the case of „order processing" as well as the additional time spent due to the drivers (factors) of variation in time consumption, it is possible to create a time equation. In the case of the sales department, the sales time (*t*) can be determined as follows (Todorović, 2013a, 162):

t = entering order + entering every order line + setting up a new account + processing of urgent orders.

Mathematically expressed by the general time equation, it is as follows:

$$t = \beta_0 + \beta_1 \times X_1 + \beta_2 \times X_2 + \beta_3 \times X_3. \quad (2)$$

In this case, the time equation for calculating the time of the processing of one single order (*t*) has the following form:

$$t = 2 + 2 \times X_1 + 6 \times X_2 + 10 \times X_3. \quad (3)$$

If one were to assume that an urgent 10-item order was received by the company from a new customer, the time equation would result in the following time of the processing of a single order:

$t = 2 + 2 \times 10 + 6 \times 1 + 10 \times 1 = 38$ minutes.

It is apparent that the time equations allow an efficient inclusion and involvement of complex business operations in cost calculation. However, the key requirement for the successful functioning of cost accounting, based on the application of the TDABC and the time equations, is an adequate information (software) support. The aggressive emergence of information technologies in the field of accounting, particularly in management accounting, has resulted in changes not only in its conceptual and organizational basis, but primarily in the development and implementation of new methodological approaches to the realization of accounting procedures. An important step in this direction has been made by designing the software that not only supports the realization of activity-based costing (for example), but the software creates itself on the basis of it. The performance of the contemporary cost accounting systems without an adequate software support is almost inconceivable. The ERP-type software shows an outstanding performance in terms of the availability and accessibility of inputs required for the creation of time equations and the functioning of the TDABC. Therefore, calculating the time required for the realization of various business activities is far simpler in terms of the application of the ERP systems.

After having designed time equations and determined the duration of business activities, the calculation of costs follows by multiplying the time required for the realization of a certain business activity by the cost capacity rate. Since the time required for the realization is determined according to each specific case, in accordance with its characteristics, the cost (*T*) of individual event *K*, of activity *J* shall be determined according to the following formula:

$$T = t_{j,k} \times c_{min}\text{,, where} \quad (4)$$

c_{min} - is the cost per time unit (minute),

$t_{j,k}$ - is the time consumed by event *K* of activity *J*.

The total cost for a cost object is estimated by summing up all the activity costs:

$$Total\ costs = \sum_{i=1}^{n} \sum_{j=1}^{m} \sum_{k=1}^{l} t_{j,k} \times c_{min}\text{, where:}$$

n - is the number of resource pools,

m - is the number of activities, and

l - is the number of times activity J is performed.

Companies that have already mapped their processes, in the processes of the organizational and methodological designing of the TDABC, can directly build their time equations. Those without process maps can start at a simpler level by estimating the minimum time needed to perform the process, which will be marked with β_0. Then, in accordance with the effect of activity variations (caused by time drivers), time will be added (from β_1 to β_p) to the time equation. If we observe the storage department or the product

packaging department, for example, the packaging of a standard item in the package can be assumed to take one minute. Longer transport necessitates a specific package, which takes additional seven minutes, and if the product is transported by plane, additional two minutes are needed. Instead of individually defining the duration of each activity for each possible combination of product characteristics, the approach based on time estimates the demand of the department for resources using the time equation, according to which, on the basis of the assumptions, the time of packaging is 1 + 7 + 2. For low-cost or low-variability processes, a single time driver can be sufficient (it is not necessary to build time equations). Building a time equation is mandatory for high-cost processes and for processes with a significant variability.

With regard to the design and realization of time equations, it is necessary to (Kaplan & Anderson, 2007a, 35-36):

- start the TDABC with high-cost and time-consuming processes;
- precisely define the scope of the processes, what initiates them and when;
- correctly determine the key time drivers for each activity, or the most significant factor which influences time consumption (the capacity);
- use readily available cost drivers;
- strive to simplicity, and
- engage employees to help build and validate the cost model.

In addition to the project team, who are responsible for designing the model of time equations, the role of all employees directly involved in the realization of activities and business processes should be emphasized. Employees are the most important source of information concerning the scope and complexity of activities or the time required for their realization. The building of time equations requires that workers be interviewed. However, the subject of such an interview is not information on the percentage allocation of time to activities , as it is the case in the traditional ABC, but rather on the actual consumption of time. Data on the time spent per activity may in some cases be directly estimated or identified, i.e. they may be obtained from the company's information system, with no need to interview workers.

THE APPLICATION OF MULTIPLE TIME DRIVERS IN TIME EQUATIONS

One of the first studies on the practical application of the TDABC and time equations was carried out in Belgium, in the case of wholesale trade. One of the primary goals of the research was to analyze the ability of the TDABC to cover complex business activities in logistics, and therefore result in accurate cost calculation. The results showed that complex business activities in logistics cannot be included in the cost model without using time equations with multiple time drivers (Everaert *et al*, 2008, 187). Time equations designed on the basis of a number of different time drivers are much more realistic since the duration of an activity not only depends on many factors but also on their mutual relation. The authors of the study discussed the impact of the application of multiple time drivers and their mutual relationship on the duration of activities through various hypothetical examples (Everaert & Bruggeman, 2007, 19).

For the purposes of illustrating the impact of the interdependence of time drivers on the time of the realization of a certain business activity, two cases will be analyzed. The first relates to the existence of a two-way interaction in time drivers and the second one is related to the existence of a three-way interaction in time drivers. The basis of the analysis that follows will include the already discussed example of „order processing" at a company's sales department. Please be reminded that the processing of an order depends on the three time drivers: X_1 - the number of order lines, as the discrete time driver, X_2 - the type of customer (new vs. existing), as the indicator time driver, and X_3 - the type of order (ordinary vs. urgent), as the indicator time driver. The indicator variable takes value 1 in the case of a new customer (or an urgent order) and 0 for an existing customer (or an ordinary order). In the case of the existence of a two-way interaction in time drivers, taking into account the earlier assumptions, it

is further assumed that a complex order from customer *X* arrives in the sales department. Complexity refers to the existence of detailed technical data in the order, which causes an increase in the time required for the entry of this order items from two to ten minutes. In this case, the time equation must include a new time driver. A new time driver is marked with X_4 and determines the processing time per item of a complex order. The driver has an indicator character, which means that it will have the value of 1 if the customer is *X* or the value of 0, in the case of any other customer. Based on the earlier assumptions, the general time equation can be mathematically expressed as follows:

$$t = \beta_0 + \beta_1 \times X_1 + [\beta_4 \times X_1 \times X_4] + \beta_2 \times X_2 + \beta_3 \times X_3. \quad (6)$$

In this case, the time equation for calculating the time processing of one order (*t*) has the following form:

$$t = 2 + 2 \times X_1 + [8 \times X_1 \times X_4] + 6 \times X_2 + 10 \times X_3. \quad (7)$$

If a complex 10-item order of customer X is assumed to have been received by the company, the time equation would result in the following time of the processing of a single order:

$t = 2 + 2 \times 10 + 8 \times 10 \times 1 + 6 \times 0 + 10 \times 0 = 102$ minutes.

In the case of the existence of a three-way interaction in time drivers, the assumption of Case Number 2 will be retained, that is the assumption of the appearance of a technically complex order. However, an additional assumption will be made, according to which it will take eight minutes to process, if such an order is processed by an administrative department worker, while if it is processed by a person with appropriate technical knowledge, such processing will take three minutes. For these reasons, it is necessary that a new driver X_5, which will indicate the type of order depending on the person processing it, of an indicator character, should be introduced. This means that it will have the value of 1, if the order is processed by an administrative worker, or the value of 0, if it is processed by technical staff. Based on the abovementioned, the general time equation for determining the processing time of one single order (*t*) is as follows:

$$t = \beta_0 + \beta_1 \times X_1 + \beta_4 \times X_1 \times X_4 + [\beta_5 \times X_1 \times X_4 \times X_5] + \beta_2 \times X_2 + \beta_3 \times X_3 \quad (8)$$

or, in this specific case, the time equation for calculating the time of the processing of one order (*t*) has the following form:

$$t = 2 + 2 \times X_1 + 3 \times X_1 \times X_4 + [5 \times X_1 \times X_4 \times X_5] + 6 \times X_2 + 10 \times X_3. \quad (9)$$

The time equation assuming that the received order is from customer *X*, contains three items and is processed by an employee with required technical competencies results in the following time of the processing of one single order:

$t = 2 + 2 \times 3 + 3$ ff$\times 3 \times 1 + 5 \times 3 \times 1 \times 0 + 6 \times 0 + 10 \times 0 =$ 17 minutes.

The example clearly indicates a three-way interaction in the number of items in the order (the discrete factor), the type of customer and the type of order depending on the person processing it (both indicator factors).

The application of multiple time drivers, together with their inclusion in time equations, provides companies with the simplified acceptance of their own complexity without a need to increase the complexity of costing models. Instead of defining new activities and sub-activities, new time equations are introduced (or the existing ones are extended) and the whole process is simplified. This is another very important advantage of using time equations alongside their contribution to an increase in the accuracy in cost calculation. To encompass the increasing complexity of the operations or variations of a business activity, the traditional ABC requires the decomposition of business operations into specific activities and sub-activities, i.e. the creation of the Register of Activities. The costing model, which is the basis of the TDABC, is getting linearly complicated with the increasing complexity of corporate operations, rather than exponentially as a calculation model being the basis of the traditional ABC. There are cases in which, by the implementation of the TDABC, over 900 identified business activities in the Register of Activities are replaced with only 100 time equations. Due to multiple time drivers, the TDABC model is based on a smaller number of time

equations than the number of activities that would be necessary in the cost model based on the traditional ABC, whereas simultaneously, it allows a much greater variety and complexity of business operations (Kaplan & Anderson, 2007b, 17).

POTENTIAL ERRORS IN TIME EQUATIONS

In the process of creating time equations, there are two types of errors that may arise: identification errors and errors in estimates. The emergence of an identification error is caused by a high level of detail in data for the creation of time equations and a possible omission of certain time drivers. The consequence of their omission is an insufficiently precisely determined time for the realization of business activities (Hoozee, Vermeire & Bruggeman, 2012, 442).

Errors in estimates or measurement errors are numerous and occur for several reasons. In this regard, it should be keep in mind that inputs for the formation of time equations are either the existing or ex-post data, obtained by directly engaged operational staff, a company's management, and/or from a company's existing information system. The first cause of measurement error is associated with incorrect estimates of time by employees, concerning the parameters of time equations. In addition to accidental errors, incorrect time estimates can deliberately be made, with a bias. Incorrect estimates can arise as the consequence of the fact that the staff are required to estimate the duration in percentages rather than in minutes (Cardinaels & Labro, 2008, 736). Some psychological studies show that systematic errors in estimates of time, either an underestimation or an overestimation, are related to the length of time interval which time is estimated for. The results of the studies have showed that time is often overestimated for shorter time intervals (Fortin & Rousseau, 1998, 271).

As a frequent cause of misestimates of time, there are inaccurate or unreliable data contained in a company's information system, from which they are withdrawn for the purposes of creating time equations and calculating costs. The imprecision and inaccuracy of inputs results through inadequately formulated time equations in low-quality outputs, i.e. the incorrect time of the realization of business activities (business processes or transactions) (Labro & Vanhoucke, 2007, 940) and has a negative effect on the calculated costs.

The last group of causes of errors in estimates of time are associated with the organizational and methodological aspects of the TDABC implementation and are usually a consequence of an inadequate level of the aggregation of business activities defined in the costing system or a high level of correlation between tasks within activities (business processes). This is exactly one of the most emphasized potential disadvantages of the TDABC. The identification and selection of business activities aims to create a clear and reliable basis of the bookkeeping, encompassing and calculation of costs. It is a complex process directly determined by the size and organizational structure of a company, the type of activity, the objectives of cost calculation and many other factors. The creating of adequate organizational and methodological solutions in this regard goes beyond the framework of the issue of time equations or touches the fundamental questions of the organization and functioning of the TDABC.

Errors in estimates and identification errors can be found in specific mutual relations. The consequence of increasing the level of detail through the expansion of time equations in order to reduce the identification of potential errors in the determination of the time required for the realization of certain business activities is a more accurate calculation (more accurate data and information) as well as higher costs of creating such information. Since inputs of time equations are subject to error estimation, it is uncertain whether making an increase in the level of detail would really contribute to the determination of the accurate time of the realization of activities, i.e. business processes. The existence of potential errors in estimates may cause the extension of time equations to result in an increase in error in determining the time of the realization of an activity rather than in an increase in the accuracy of a calculation. Hence, when designing time equations, one should strive to establish an optimal relation,

i.e. a balance between the errors in estimation and identification errors.

Bearing in mind that the possession of information on the magnitude of potential errors is important for designing a cost system and users of its information, numerous studies have attempted to analyze this problem in detail. The applied approaches differed from one another, ranging from simulation (Labro & Vanhoucke, 2007, 941) to statistical and mathematical ones. Statistical and mathematical models are very successful for determining the impact of expanding time equations (by adding parameters, i.e. time drivers) on the accuracy of the determined time for the realization of activities. These models observe the relationship between the magnitude of the estimation error and the identification error and their impact on the accuracy of the determined time for the realization of an activity. An analysis based on the application of statistical and mathematical models should result in minimizing potential errors when designing and applying time equations. Some recommendations involve the expansion of time equations with time drivers, according to priority (based on statistical parameters: the mean and the variance) and merging a variety of drivers into a single one, if there is a significant correlation between them, in order to minimize the identification error. The models insist on the application of certain practical tools and general procedures when creating time equations so as to eliminate or minimize potential errors.

CONCLUSION

The fact that the TDABC is founded on time equations and time drivers (and therefore duration drivers) provides it with significant methodological advantages and a high reporting performance comparing to the previous solutions of activity-based costing. The most important are the following ones:

- The TDABC provides a greater accuracy of cost calculation, i.e. determined product costs. The accuracy of the TDABC is based on an adequate allocation of costs to cost objects in accordance with the actual consumption of resources. Increasing the accuracy and flexibility of cost calculation does not increase the complexity of calculation, due to a possibility of designing time equations with multiple time drivers;
- for the purposes of the system update, the application of the traditional ABC requires that almost at the end of each accounting period interviews with employees should be done in order to re-estimate the time required for the realization of business activities. A need to re-estimate the time required can be due to the introduction of new products, new processes, the emergence of new customers, and the like. In terms of the TDABC application, time equations constantly change with as there is an increase in the number and complexity of activities, in terms of introducing new products, processes, customers or distribution channels, thus enabling a more efficient system update. Furthermore, any omission of some important variations of a process, sub-process, or activity in terms of applying time equations is simply overcome by having them expanded;
- time equations have a special use value from the perspective of a company's management. Since they include the basic factors provoking demand for the process capacity, including changes in the efficiency of the process, production volume and mix, and the like, time equations are very suitable for the simulation of a future, for implementing a what if analysis, for improving the budgeting process and for an efficient analysis of a company's capacity;
- the process of designing time equations often results in identifying the process, activity, or certain phases of an activity that are inefficient and cause unnecessary spending, i.e. waste of resources. This ensures a kind of initial impulse to propose an initiative of improving business processes, i.e. time equations provide the basis for the continuous operational improvements of business processes (Everaert *et al*, 2012, 41; Hoozee & Bruggeman, 2010, 185).
- during the process of creating time equations, identification errors or estimation errors might

emerge. Numerous empirical studies have dealt with the analysis pf and manners how to eliminate these potential errors (Hoozee *et al*, 2012; Cardinaels & Labro, 2008; Fortin & Rousseau, 1998; Labro & Vanhoucke, 2007). The findings suggest the application of specific practical tools and techniques (simulation, statistical and mathematical) and general procedures for creating time equations in order to eliminate or minimize errors.

The key attributes of the methodology, i.e. of the costing model, based on time equations are as follows: its simplicity and flexibility, convenience for customization and expansion, high precision and accuracy, and simplified maintenance and updating. In other words, due to time equations, the TDABC enables an effective and efficient calculation of costs and the determination of a product cost. Challenges of time and changes will provide us with the answer to the question of the long-term viability and applicability of this modern cost accounting system. However, the analysis carried out and the conclusions drawn confirm the hypothesis stated at the beginning of the work.

The conducted analysis and the presented conclusions contribute to the understanding of the essence, methodology and reporting performance of the TDABC system and have a significant practical value from the perspective of the application and dispersion of this system in Serbian companies. The shown examples concerning the process of building time equations provide a foundation for the improvement of the TDABC systems in companies that have already been applying it. Also, they help overcome problems and fulfil the assumptions of the organizational and methodological preparation for the implementation and functioning of this system for potential users.

The overall research efforts in this paper, predominantly oriented towards the organizational and methodological aspects of the TDABC, have opened numerous questions and dilemmas. The analysis of these issues will attract the attention of researchers in the future, primarily concerning the building of the accounting model based on the TDABC in companies' practices. The broader theoretical and methodological foundation and the diffusion of the TDABC in practice will enable the realization of other statistical and mathematical research methodologies. The analysis of numerous studies in the world practice concerning the TDABC application can serve as a useful basis for future studies.

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ADVERTISING AND PROMOTION: AN INTEGRATED MARKETING COMMUNICATIONS PERSPECTIVE

Belch, E. G., & Belch, M. A. (2012). New York, NY: McGraw Hill,
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Due to modern information technologies, the emphasis is shifting from the mass media to a more segmented approach that provides more information about consumers at individual levels. Striving to reach sales of goods and services and to improve the market position of a company, advertising proves to be one of the key marketing activities.

In the book titled *Advertising and Promotion, An Integrated Marketing Communications Perspective,* the authors E. G. Belch (professor at San Diego State University, USA) and M. A. Belch (professor at San Diego State University, USA) explain promotion as a segment of the marketing mix, also deeply considering the perspective of integrated marketing communications. The purpose of this book is to give a comprehensive explanation of promotion activities as well as to identify plans for their evaluation, implementation and control. The focused problems are aimed at researches whose field of interests is the modern aspect of communication with consumers. The book consists of seven major parts organized into several chapters.

The first part of the book, titled *Introduction to Integrated Marketing Communications* (pp. 3-64) consists of two chapters and examines the basic elements of the promotional program, paying special attention to the contemporary perspectives of its development. Moreover, it presents the reasons for the growing use of the integrated marketing communications concept, with the dominant role of the development of databases. Another subject of examining is the competition analysis as well as the analysis of the demographic, behavioral and geographic variables are used as the most common criteria for market segmentation.

The second part of the book, divided into two chapters and titled *Integrated Marketing Communications Program Situation Analysis* (pp. 67-142), analyzes the complex process of creating and the implementation of integrated marketing communications programs. Specialized agencies, which, due to their expertise

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in marketing services, management and finances, contribute to the improvement of a company's competitiveness are often hired for their realization. The authors here also examine the importance of the motivation research as well as external factors influencing the decision-making process of the consumer.

The third part of the book is titled *Analyzing the Communication Process* (pp. 145-175) and consists of two chapters. This part focuses on the importance of a company's communication with various groups of stakeholders, having positive implications on an increase in the rate of return on investments. The most important communication models are explained. It also presents opinions and approaches of different authors, whose comparative analysis enables the reader to modify the given models in accordance with specific situations as well as to identify relations among the applied communication elements and consumer responses.

The forth part, titled *Objectives and Budgeting for Integrated Marketing Communications Programs* (pp. 213-252) examines the models (above all the DAGMAR model) contributing to the logical setting and evaluation of communication objectives and to the differentiation of advertising goals and marketing goals which are often equaled due to a lack of their clear differentiation. Considering the size and the potential of a market, the authors present the concept basis of the marginal analysis and the allocation of funds, based on the arbitrary method, the percentage-of-sales or competitive parity method, using numerous charts and tables.

The fifth, and the most comprehensive, part is titled *Developing the Integrated Marketing Communications Program* (pp. 255-594) and consists of ten chapters. At the very beginning, it elaborates on the determinants of creativity and its contribution to advertising as well as on the most important techniques of qualitative researches, like focus groups. This segment also explains planning activities, the implementation and evaluation of advertising strategies and various types of appeals, the creation of which requires certain interdisciplinary knowledge. Further, answers are given to the most frequently asked questions related to advertising activities in the media, the reach, frequency and identification of market segments. The authors highlight the advantages and shortcomings of the elements of the promotional mix, such as the television, the radio, the print media and sales enhancement, and elaborate on their educational and informative importance as well as their role in the advertising process. They present the integration of direct marketing into the communication strategy of a company, whereas internet marketing is covered in a separate chapter, due to its rapidly growing importance in advertising. Some relevant determinants of public relations are highlighted; however, when examining them, public relations in situations of crises have not been taken into consideration, which often impose a need to change business principles and require that specific strategies and tactics should be applied.

The sixth part of the book, titled *Monitoring, Evaluation, and Control* (pp. 595-630), is the segment where factors in favor of the evaluation of promotional campaigns (like the evaluation of alternative strategies) and factors relating to opposing attitudes to this problem (i.e. expenses) are identified. Some evaluation methods developed by renowned market researching companies are explained. Such indicators can provide some directions for future researches; however, possible obstacles, like quantifying the results or financial limitations for the realization of this process, should first be explored.

The final, seventh part of the book, titled *Special Topics and Perspectives* (pp. 631-707), consists of four chapters, the first two being included in the printed book and the final two being available in an online form. Due to globalization and growing competition, promotional programs of companies on the international market should be created by taking into account economic, legal and political factors, the importance of which is specially highlighted. The social, ethical and economic aspects of the advertising process are also explained as well as criticism from the perspective of an influence on the consumer behavior.

Due to the authors' extensive experience in scientific and research work and their engagement authors in developing the integrated marketing communications of the renowned world companies (Microsoft, DuPont, McDonald's), this book represents a significant

contribution to the contemporary development of integrated marketing communications. The examples from practice introducing every chapter of the book enable the valorization of theoretical aspects. Moreover, the authors also refer to online publications, which, using numerous case studies, give a possibility of broadening the existing knowledge and skills. A very important fact is that the book recognizes and appreciates the importance of the coordination of all the elements of the promotional mix with the aim to develop an efficient communication program.

When explaining advertising and promotional programs, the authors mainly consider the experiences of developed countries. To incorporate less developed economies into the study could provide a comparative analysis of integrated marketing communication programs and identify their critical success factors.

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THE SUBJECT INDEX

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