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# ASSESSING CROATIAN GDP COMPONENTS VIA ECONOMIC SENTIMENT INDICATOR

***ABSTRACT***

*This paper is an attempt of applying Business Survey results in creation of a holistic macroeconomic model for Croatia. Since the BUSY model (1982.), there exists an aspiration for forming a statistical business survey model that will forecast main GDP components for individual EU countries in the short run. However, the idea hasn't yet been applied in practice in Croatia. Therefore the statistical relationship between the Economic Sentiment Indicator (ESI) and corresponding official statistics series will be analyzed in order to see how the changes in ESI reflect on various segments of economic activity in Croatia. On the basis of two VAR models it can be seen that ESI can help in short-run forecasting of Croatian GDP and private consumption as its main component. It was shown that other GDP components don't exhibit a strong statistical connection with ESI.*
***Keywords****: ESI, business survey, VAR model, GDP components*

## INTRODUCTION

As most economic decisions are determined by economic agents' opinions, perceptions and expectations, cyclical economic analysis witnesses a substantial growth in the importance of various Business and Consumer Surveys (BCS). The European Commission conducts business surveys in accordance with the Joint Harmonised EU Programme of Business and Consumer Surveys at the EU level (Goldrian *et al*., 2001). In Croatia BCS are put into practice by two different institutions. *Privredni Vjesnik* (*Centar za poslovna istraživanja*) carries out the business surveys, while the *Croatian National Bank* implements Consumer Surveys). BCS are quarterly surveys based on businessmen's and consumers' perceptions of their economic environment. Based on a multi-sector approach, they cover the Croatian manufacturing industry, construction, retail trade and consumer sector. For each of the mentioned sectors a Composite Confidence Indicator is formed[1]. Here the focus will be placed on the Economic Sentiment Indicator (ESI), which reflects and represents total economic activity. On the EU level and for all countries-participants of the Programme, ESI was designed in 1985, and has had some modifications since then (European Commission, 2007). ESI components are variables used in calculating Confidence indicators in industry, construction, retail trade, service sector and consumers, where each of them is assigned a

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1 Industrial Confidence Indicator, Construction Confidence Indicator, Retail trade Confidence Indicator and Consumer Confidence Indicator are formed for manufacturing industry, construction, retail trade and consumer sector, respectively. An in depth analysis of BCS composite indicators on the EU level and in Croatia is presented in (Čižmešija, 2008)

different weight.[2] Variables and the weighting system used in the calculation of Croatia's ESI reflect structural changes in the Croatian economy. (Bahovec *et al.,* 2007,a; Nikić *et al.,* 2004). Business surveys in Croatia are conducted quarterly, from 1995 in manufacturing industry, construction and in retail trade. Structure of weights in the calculation of Croatian ESI indicator is determined as follows: industry 40%, construction 25%, retail trade 35%. Consumer surveys in Croatia started later and have therefore not been included in the calculation of the ESI for the first time[3].

The ESI series can be compared to the corresponding referent series published by the official National Bureau of Statistics.[4] The most commonly used referent series for ESI is GDP because it reflects movements in the economy as a whole.

The aim of this paper is to analyze how accurate are Croatian economic subjects' perceptions relating to GDP and it's main components. In other words, it is essential to examine how useful is the information inherent in ESI for predicting cyclical development of private consumption (C), investments (I) , government consumption (G), exports volume (X)  and imports volume  (IM).

## LITERATURE REVIEW

In assessing certain country's cyclical economic movements, the issue of prior interest is the construction of leading indicators that are able to offer valuable and timely information about the direction of changes in the national economy. There are a few milestone papers dealing with the issue of inspecting ESI's leading indicator properties regarding country's macroeconomic aggregates.

The first dilemma that researchers and policy holders face is whether to use measurable, real economic variables as leading indicators[5] or survey-based indicators. Fritsche and Marklein (2001) observed a wide range of indicators (from real economic monetary and fiscal variables to qualitative Business and Consumer Surveys). All of them were analyzed in a vector autoregressive framework in order to question their possibility of improving short-run predictions of Euro Area industrial production. ESI turned out to have the best predictive properties (six months lead with respect to industrial production) comparing to all other indicators, including real economic variables.

Gayer (2005) considered a whole set of BCS indicators and their possible contribution to GDP forecasts of the Euro Area.  Applying bivariate vector autoregressive models revealed ESI as the best leading indicator in the class of BCS indicators. Both Granger causality tests, impulse response analysis and variance decompositions corroborated such conclusions.

Silgoner (2006) analyzed a variety of BCS indicators and their predictive properties at the Euro Area level and for each country individually. Using correlation analysis, Granger causality tests and panel data models it was found that  ESI  offers the highest "added value" in short-run predictions of industrial production growth rate, with a lead of several months. Additionally, panel data analysis offered evidence that new EU member states have somewhat lower forecasting quality with respect to industrial production. There is a firm rationale behind such conclusions: new member states have significantly less experience in

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[2] Structure of weights (EU level): industry 40%, construction 5%, retail trade 5%, services sector 30%, consumers 20%.

[3] Surveys in the services sector started in the 3rd quarter of 2008

[4] At the EU level ESI series is compared to referent series published by Eurostat.

5 There is a whole variety of literature on constructing composite indicators on the basis of real economic data. See e.g.  (OECD, 2008), or (Ahec-Šonje, 2000) for two different approaches.

implementing Business and Consumer Surveys. Both institutions that carry out the surveys and the respondents need experience to properly assess the economy's cyclical movements.


## METHODOLOGICAL GROUND

The ESI quarterly series (1997/I=100) is compared with the corresponding series of GDP indices (1997/I=100), and GDP components, as published by the Croatian Bureau of Statistics. The dataset refers to the time period 1997Q1-2008Q1. All used series are seasonally adjusted[6] and expressed in natural logarithms.


Earlier studies and analysis of business cycles using BCS data in Croatia were based on fundamental statistical methods such as correlation analysis or the analysis of coincidence in the direction of change of leading indicators and referent macroeconomic series (Čižmešija, 2001). In addition, in more recent studies the Granger causality tests were also applied (Lang, 2001; Bahovec *et al.*, 2007,b). The essential and the most important reason for implementing the mentioned techniques is the fact that Business surveys have been launched in 1995 in Croatia, so until now the observed time series haven't had enough observations to apply more advanced and robust techniques such as VAR analysis.  From today's perspective, a respectable dataset has been formed, which enables the application of VAR modeling done here.

In order to analyze the interrelations between the observed variables, two vector autoregressive models (VAR) were formed. Generally, such models can be presented in the following way:


$$y_t = A_0 + A_1 y_{t-1} + \ldots + A_p y_{t-p} + u_t \qquad (1)$$

where $y_t$ is a $k$ x 1 random vector, $A_0$ is a $k$ x 1 vector of intercept terms, the $A_i$ are $k$ x $k$ matrices of coefficients  and $u_t$ is a $k$ x 1  vector of error terms, $k$ being the number of observed variables[7] (Asteriou, 2006).

**Empirical results**

The first VAR model captured the relationship between ESI and GDP, while the other one enabled the exploration of ESI's predictive properties regarding GDP's components[8].

First of all, variables of interest were formally tested for unit root presence using the Augmented Dickey-Fuller (ADF) test. The results given in the following table unambiguously suggest that all variables exhibit mean-reverting properties after differencing. Therefore all series can be treated as *I(1), i.e.* integrated of order one.

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[6] DAINTIES seasonal adjustment method is applied.

[7] k equals 2 in the first VAR, and 6 in the second one.

[8] Considering that GDP is composed of all other observed real economic variables, this dichotomic approach was applied in order to avoid multicolinearity problems.

**Table 1:**

**ADF unit root test for all observed series in level**

| Variable | ADF value trend and constant included | ADF value Constant included | ADF value |
|---|---|---|---|
| *GDP* | -2.125436 (0) | 0.313437 (0) | 4.056350 (0) |
| *C* | -1.994790 (0) | 1.162818 (2) | 2.952208 (2) |
| *I* | -1.665788 (0) | 0.613548 (0) | 3.087548 (0) |
| *G* | -2.931466 (1) | -2.464232 (1) | 0.634071 (1) |
| *X* | -2.157752 (1) | 0.418953 (1) | 2.676092 (1) |
| *IM* | -2.177024 (0) | 1.142019 (1) | 3.413062 (1) |
| *ESI* | -2.893707 (0) | -1.251110 (0) | 0.495043 (0) |

Notes: Optimal lag number is given in brackets.

**Table 2:**

**ADF unit root test for all observed series in first differences**

| Variable | ADF value trend and constant included | ADF value Constant included | ADF value |
|---|---|---|---|
| ΔGDP | -7.698766**(0) | -7.684656**(0) | -5.594424**(0) |
| ΔC | -6.181264**(1) | -5.713618**(1) | -5.669688**(0) |
| ΔI | -5.791028**(0) | -5.729571**(0) | -4.795939**(0) |
| ΔG | 4.101476*(0) | -4.163127**(0) | -4.145272**(0) |
| ΔX | -6.874538**(0) | -6.768126**(0) | -2.844850**(2) |
| ΔIM | -7.645071**(0) | -7.217000**(0) | -2.361790*(2) |
| ΔESI | -7.833185** (0) | -7.830337** (0) | -7.853829** (0) |

Notes: Δ is the first difference operator. One (two) asterisk(s) denotes rejection of the null hypothesis at 5% (1%) significance level. Optimal lag number is given in brackets.

Hence all following VAR modeling will be conducted using variables in first differences.
At this point the analysis is carried out for the bivariate VAR model. The optimal lag number in the first VAR was set at 2 using AIC information criterion.
From the aspect of economic policy holders in Croatia, the time of precedence (in months or quarters) of ESI to GDP would represent extremely useful information. Therefore the issue of highest relevance here is to examine the possibility of using ESI as a short-run predictor of

main macroeconomic variables. At this step the Granger causality test was conducted. It questions whether current and past values of ESI help to forecast future values of GDP (Enders, 2004.).

**Table 3:**

**Granger causality test for ESI and GDP**

| Null hypothesis: | F-statistic | p-value |
|---|---|---|
| ΔESI does not Granger cause ΔBDP | **3.06260** | **0.05878** |
| ΔBDP does not Granger cause ΔESI | 1.89782 | 0.16420 |

According to the obtained test statistics, it seems that ESI can be used by economic researchers and policy holders as a short-term indicator of future Croatian economic movements[9]. In other words, ESI Granger causes GDP because the shifts in the sentiment indicator precede to those of GDP. The causality, however, isn't valid in both directions.
The dynamics of the observed relationship could be more perceptible using impulse response analysis.

**Figure 1:**

**Impulse response of ΔGDP to ΔESI**
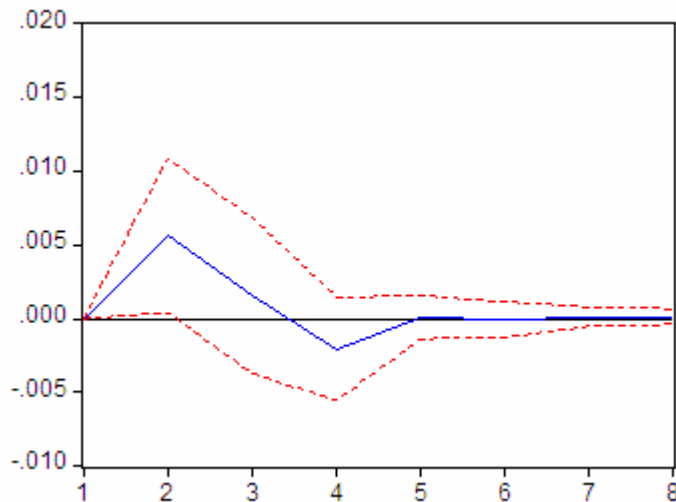


As a result of a one standard deviation rise in the variable ΔESI, ΔGDP reacts after one quarter, and with a 0.5% improvement. Afterwards the shock in ESI fades away and GDP stabilizes.
The so far conducted analysis will be corroborated with the variance decomposition.

**Table 4:**

**Variance decomposition of GDP**

| Period | ΔGDP | ΔESI |
|---|---|---|
| 1 | 100.0000 | 0.000000 |
| 2 | 89.37147 | 10.62853 |
| 4 | 87.44268 | 12.55732 |
| 6 | 87.46499 | 12.53501 |
| 8 | 87.45828 | 12.54172 |

The results show that the variable ΔGDP itself explains 100% of it's forecasting error variance in the first future period. Here ΔESI becomes relevant with two quarters ahead when

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[9] At 10% significance level

10.63% of the error in the forecast of $\Delta$GDP is attributed to it. Afterwards ESI's influence stabilizes at around rather high 12.5%.

In the second VAR model 4 lags were used, as suggested by the AIC criterion.

**Table 5:**

**Granger causality test for ESI and GDP components**

| Null hypothesis: | F-statistic | p-value |
|---|---|---|
| $\Delta$ESI does not Granger cause $\Delta$C | **5.66579** | **0.00153** |
| $\Delta$C does not Granger cause $\Delta$ESI | **3.19193** | **0.02632** |
| $\Delta$ESI does not Granger cause $\Delta$I | 0.74884 | 0.56632 |
| $\Delta$I does not Granger cause $\Delta$ESI | 1.83965 | 0.14635 |
| $\Delta$ESI does not Granger cause $\Delta$G | 0.72973 | 0.57854 |
| $\Delta$G does not Granger cause $\Delta$ESI | 1.11568 | 0.36690 |
| $\Delta$ESI does not Granger cause $\Delta$X | 0.89695 | 0.47761 |
| $\Delta$X does not Granger cause $\Delta$ESI | **3.19742** | **0.02614** |
| $\Delta$ESI does not Granger cause $\Delta$IM | 0.64384 | 0.63535 |
| $\Delta$IM does not Granger cause $\Delta$ESI | **2.76871** | **0.04463** |

Here it is clearly visible that there exists Granger causality in both directions between $\Delta$ESI and $\Delta$C. Such results are actually quite expected and can easily be economically interpreted. Namely, throughout the whole observed period private consumption has been a major part of Croatian GDP, with mild fluctuations around a 60% share level (www.dzs.hr, author's calculation)[10]. Therefore the obtained results point out that Croatian private sector reacts to the improvement of business climate by directing it's capital excess in consumption. It should also be remarked that changes in Croatian foreign trade results (either the exports or imports) reflect on economic subject's perceptions of the total business climate. Considering the fact that Croatia is a small open economy, it is fairly logical that, from the aspect of economic agents, alternations of foreign goods and services accessibility and the Croatian exports variations signify shifts in Croatian economy *per se*.

**Table 6:**

**Variance decomposition for private consumption**

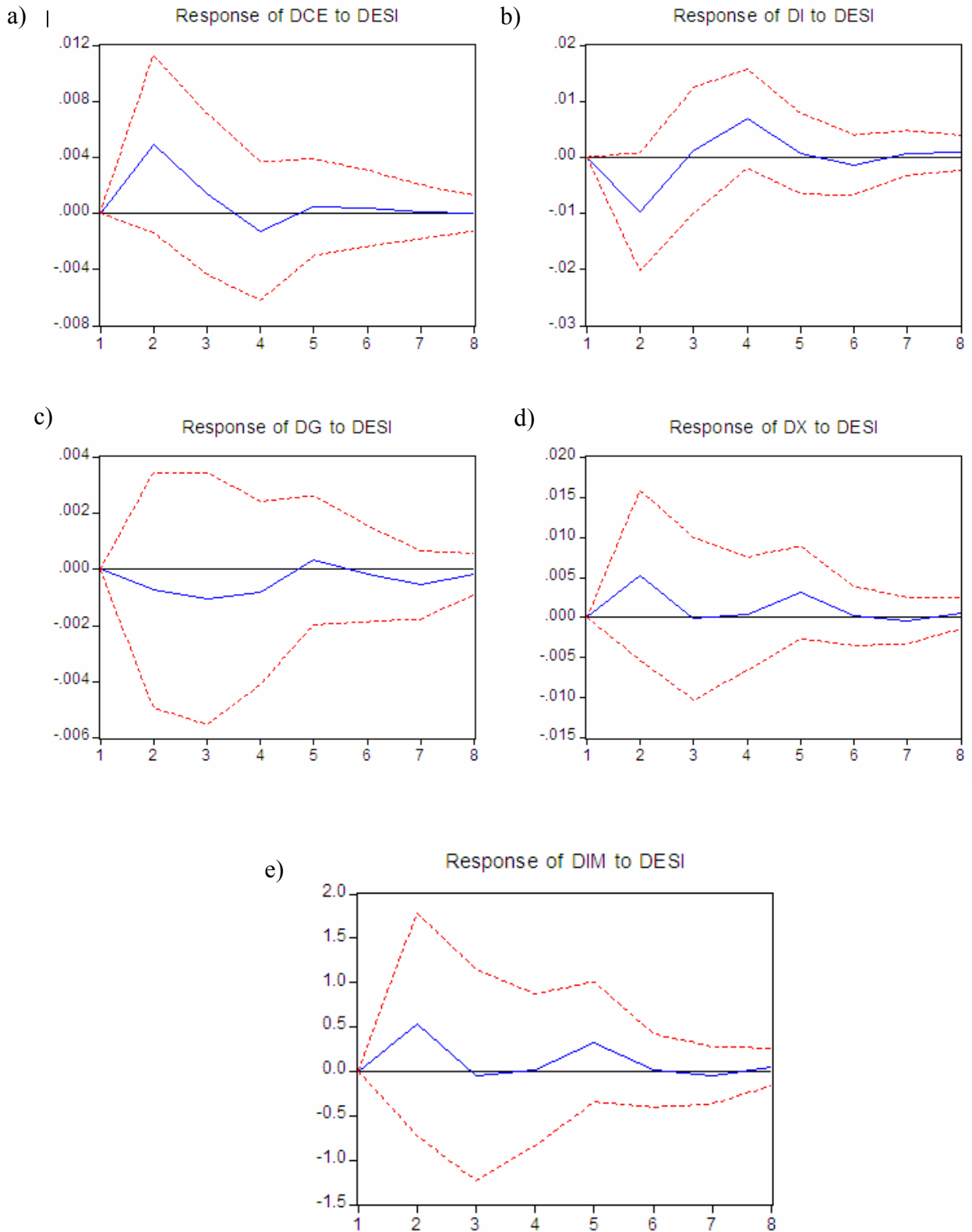| Period | $\Delta$ C | $\Delta$ I | $\Delta$ G | $\Delta$ X | $\Delta$ IM | $\Delta$ ESI |
|---|---|---|---|---|---|---|
| 1 | 100,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| 2 | 36,97 | 0,96 | 54,57 | 1,24 | 0,45 | 5,81 |
| 4 | 28,50 | 17,59 | 35,95 | 2,19 | 10,82 | 4,95 |
| 6 | 29,31 | 14,69 | 35,50 | 3,37 | 9,05 | 8,08 |
| 8 | 28,36 | 15,11 | 33,88 | 4,16 | 9,64 | 8,85 |

It is easily observable from Table 4 that ESI exhibits a moderate, but still existing influence on the private consumption in Croatia (the share of forecast error variance explained by ESI is 5,81% after two quarters, rising up to 8,85% after two years).[11]

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[10] For a more thorough analysis of personal consumption's role in generating Croatian GDP, see e.g. (Lovrinčević and Mikulić, 2003)

[11] According to this analytical tool, ESI turned out to have unsatisfactory prognostic properties (which was previously indicated by the Granger causality test). The remaining variance decomposition results are not shown in order to save space but can be obtained by the authors upon request.

The remaining figure captures the influence of a one standard deviation shock in ESI on all observed GDP components.

**Figure 2:**

a)

Response of DCE to DESI

b)

Response of DI to DESI

c)

Response of DG to DESI

d)

Response of DX to DESI

e)

Response of DIM to DESI

From the first two parts of the figure a certain pattern can easily be observed. Namely, an initial response to a shock in *ESI* is a rise of private consumption and a downfall of investments, which indicates the existence of the so-called crowding-out effect. Such interrelations can dominantly be addressed to the structure of Croatian GDP (*i.e.* prevailing of private consumption component in Croatian GDP). Another factor that easily might influence such results is the ESI weighting system in Croatia. Namely, retail trade accounts for a respectable 35% weight in ESI calculation[12]. Construction sector, on the other hand accounts for a smaller, 25% weight. Inspecting *a)* and *b)* graphs more carefully discovers that the mentioned opposite movements of *C* and *I* coincide in every future period, revealing the presence of cyclical behavior in Croatian economy. Such cyclical properties are also observed for all other GDP components of interest here. It is also worth mentioning here that, due to the imports dependence of Croatian economy, imports react most intensively on ESI movements. Such unsatisfactory ESI's leading indicators properties vis-à-vis smaller GDP components can partly be attributed to a rather short period of implementing the BCS (less experience of institutions and respondents) in comparison to most EU members.

## CONCLUDING REMARKS

This paper investigated the possibility of using ESI indicator as a short-term predictor of Croatian GDP and it's main components. Through a bivariate VAR it was shown that GDP movements can more aqurately be described using ESI series. The second model resulted in somewhat different results. Namely, it was shown that ESI Granger causes only Croatian private consumption, while other GDP components haven't revealed a significant statistical relationship. To sumarize, according to the models proposed in this paper it is obvious that ESI can be used both to identify the tipping points of Croatian economy as a whole and those of private consumption as the largest Croatian macroeconomic aggregate. Other components, however, can not be statistically explained by ESI movements. Policy implications of these results are fairly straightforward. ESI represents a timely and efficient signal for economic policy holders in anticipating recessional movements of the national economy as a whole and of personal consumption as the main component of Croatian GDP. That way it is possible to undertake appropriate countercyclical measures even before the actual economic downfall. Therefore this confirms the necessity of supplementing conventional macroeconomic forecasting tools with Business Surveys. Nevertheless, in assessing other GDP components, specificities of individual sectors should be taken into account instead of applying a wide composite indicator such as ESI.

Moreover, the benefit of this research is not only for professional economists and policy holders, but for all non-economists faced with every day decisions about consumption, investments of any type, savings etc. Timely information about e.g. recession development would significantly improve the quality of their economic decisions.

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[12] For a more detailed discussion on the interdependence between the consumers and retail trade sector, see e.g. (Dudek, 2008) and (Nahuis and Jos Jansen, 2004)

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## PROCJENA KOMPONENTI HRVATSKOG BDP-A UZ POMOĆ POKAZATELJA EKONOMSKOG RASPOLOŽENJA

### *Sažetak*

*Ovaj rad je pokušaj primjene rezultata konjunkturnih istraživanja u kreiranju holističkog makroekonomskog modela za hrvatsko gospodarstvo. Intencija formiranja kratkoročnog prognostičkog modela osnovnih komponenata BDP-a korištenjem konjunkturnih indikatora postoji u zemljama članicama EU još od BUSY modela (1982.). Takva ideja, međutim, dosad nije u praksi primijenjena u Hrvatskoj. Stoga će ovdje biti analiziran statistički odnos između Pokazatelja ekonomskog raspoloženja (ESI) i odgovarajućih nizova službene statistike, i to s ciljem analize utjecaja promjena ESI indikatora na pojedinačne gospodarske sektore u RH. Na osnovi dva VAR modela zaključuje se da se ESI može koristiti u kratkoročnom prognoziranju hrvatskog BDP-a, i privatne potrošnje kao njegove osnovne komponente. Također se pokazalo da ESI ne karakterizira snažna veza s ostalim komponentama BDP-a.*

***Ključne riječi***: *ESI, konjunkturna istraživanja, VAR model, komponente BDP-a*

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# EQUITY INVESTMENT STRATEGIES: THE CASE OF CROATIA

### *ABSTRACT*

*This paper aims to analyze an investment strategy employed by particular equity investment fund in Croatia, i.e. to detect the fraction of passive funds which claim to be active. In order to test for bilateral long-run co-movements between fifteen selected mutual funds and CROBEX in time period from their start to the end of 2009, we use bivariate Johansen cointegration procedure. Results reveal that most of the Croatian equity funds share long run comovements with benchmark equity market index, representing the "closet indexers". Obtained results are to some extent unexpected given spotted inefficiencies on Croatian equity market that should have been exploited by active stock pickers.*

*Keywords: investment approach, market efficiency, equity investment funds, cointegration*

## 1. INTRODUCTION

Depending on investor's goal, risk preference and preferable time span of the investment, equity market investor may choose to put money in various types of mutual funds that can follow active or passive investment strategy. While passively managed fund replicate the return on an index with a strategy of buying and holding all index stocks in the official index proportions, actively managed mutual funds attempt to add value to their shareholders by selecting a portfolio of securities expected to provide a superior risk-return trade-off and monitoring and revising their portfolios continuously in response to the market conditions. Since actively managed funds generate more expenses than the passively managed ones, active management benefits the shareholders only if the excess returns on actively managed portfolios are larger than the incremental cost incurred by the shareholders (Shukla, 2004).

As an alternative to institutional investing, investors may choose to trade on equity market by using individual stock picking skill. The latter approach is considered to be a "high risk-high returns" investment vehicle. Along with higher risk exposure, individual stock picking assumes higher transaction costs in comparison to costs of investment funds due to more frequent individual trading on equity market and costs of market research. On the other hand, investing in mutual funds requires little research, although it is harder for investor to monitor the investment. Having in mind that it is very hard to detect individual stock picking techniques, focus of this paper is put on investing in Croatian equity funds.

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In efficient markets[1] investors would be better off investing in broad market indices, since active management would fail to add value sufficient to outweigh administration costs and fees given that hard competition between investors results in lack of both abnormal performance on average and persistence in performance. Therefore, significant shift from active to passive management over the 1990s can be partially assigned to market efficiency of developed equity markets which has been showed in earlier studies i.e. Kendall (1953), Fama (1970), Fama and French (1988), Poterba and Summers (1988). In addition to rise of popularity of truly index funds, there is a great number of *closet indexers* i.e. funds that score low on active management while still claiming to be active (Cremers and Petajisto, 2009).

Active management should be more successful on emerging financial markets due to their high performance and inherent inefficiencies. These markets have exhibited significant growth opportunities, but also high political and economic risks, making emerging markets more volatile than mature markets (De Santis and Imrohoroglu, 1997). It is general belief that inefficiency is inherent to the emerging markets. Emerging markets are generally perceived to be less efficient than developed markets since most of those markets are accompanied by thin trading issues and potential manipulation by larger players.[2] Therefore, one might expect that there are more opportunities for fund managers to find abnormal returns in emerging than developed markets (Huij and Post, 2008). In particular, financial markets of Central and Eastern European countries experienced the great growth after orientation towards market-based economy was adopted, foremost due to strong performance over this period with yields in some markets far exceeding those of the industrial financial markets (Cohen, 2001). Investors' interest in these markets became even more pronounced with beginning of a sharp rise in stock prices that coincided with the announcement of EU enlargement in 2001[3]. However, recent developments in equity mutual funds industry in CEE countries should be observed in light of financial crisis.

This paper aims to examine investment approaches on Croatian equity market and thereto fill the gap of existing literature on trading strategies of funds investing in Croatian equity market as well as market efficiency. Until the end of 2007, when first index fund- OTP Index has been introduced, all mutual funds on Croatian equity market were actively managed. However, it is possible that some of the equity funds, although declared as active funds, were following the CROBEX anyway. Therefore, it is our intention to distinguish between truly active investment funds and closet indexers. In order to test for such possibility, we use bivariate Johansen cointegration procedure to detect bilateral long-run co-movements between fifteen selected mutual funds and CROBEX in time period from their start to the end of 2009. In other words, we measure active management by measuring the degree of deviation from passive management.

The rest of the paper is organized as follows. After reviewing some of the literature on mutual funds performance with respect to chosen investment strategy in section 2, in section 3 data and methodology employed are presented. Last two sections, 4 and 5, offer discussion of results of the paper and concluding remarks.

## 2. LITERATURE REVIEW

Number of studies was dealing with performance of mutual funds. Evaluation of managed funds has been concerned on assessing the performance of actively managed investment portfolios. Grossman and Stiglitz (1980) argue that market efficiency in a strict sense cannot

occur without accounting for informed investors holding costly information. Active investment managers will only incur expenses in obtaining information to become informed when they can be compensated for acquiring price sensitive information. In line with that, these managers should be able to at least earn excess returns equal to the fees levied on the actively managed portfolio in order for capital market efficiency to be in equilibrium. Among studies that support Grossman and Stiglitz (1980) hypothesis one should distinguish those by Daniel et al. (1997) and Wermers (2000) suggesting that the average mutual fund outperforms the benchmark, attributing much of this performance to the characteristics of the stocks held by funds. The latter researcher points out the importance of determining whether the industry as a whole or perhaps industry subgroups has stock-picking talents that justify the trading costs it incurs and the management fees and expenses that it charges.

However, majority of studies dealing with mutual funds performance suggest that actively managed funds fail to earn superior returns to an appropriate benchmark proxy portfolio or index, which is consistent with the efficient markets hypothesis (for example Jensen, 1969; Grinblatt and Titman, 1989, 1993; Elton, Gruber, Das and Hlavka, 1993; Malkiel, 1995; and Gruber, 1996). The literature also confirms that funds do not successfully 'time' the market (Treynor and Mazuy, 1966; Kon, 1983; Chang and Lewellen, 1984; Henriksson, 1984; Lee and Rahman, 1990; Coggin, Fabozzi and Rahman, 1993; Ferson and Schadt, 1996; Daniel, Grinblatt, Titman and Wermers, 1997; and Becker, Ferson, Myers and Schill, 1999; Kothari and Warner, 2001). In most cases, conclusions on performance evaluation are based primarily on the risk-adjusted measures, bringing some concerns regarding misspecification of the model, misspecification of the benchmark or survivor-biased samples of funds. Frequent trade has generally been perceived as an indicator of active management, causing high turnover in the mutual fund portfolios. Shukla (2004) concludes that mutual fund shareholders are not getting any return for the expenses associated with the frequent portfolio revision component of active management. Funds that generate the highest excess returns have small and more concentrated portfolios, and do not have the highest turnover.

It should be pointed out that aforementioned mutual fund literature mainly treats all mutual funds as one homogeneous group. However, Cremers and Petajisto (2009) develop methodology that distinguishes between different types of active funds as well as focuses on the ones that are truly active. They point out that active management of all equity mutual funds should be measured in two dimensions: tracking error and Active Share. Tracking error measures the volatility of portfolio return around a benchmark index, whereas Active Share measures the deviation of portfolio holdings from the holdings of the benchmark index. Such approach facilitates identification of following types of active management: diversifed stock picks, concentrated stock picks, factor bets, closet indexing, and pure indexing. Results show that funds with the highest Active Share, smallest assets, and best one-year performance seem very attractive even after fees and transaction costs, outperforming their benchmarks by about 6% per year. A possible explanation for the performance results is that there are enough small inefficiencies in the pricing of individual stocks to allow the most active stock pickers to generate a positive alpha, and this is the dimension captured by Active Share. Furthermore, about half of all active positions at the fund level cancel out within the mutual fund sector, thus making the aggregate mutual fund positions even less active. Economically, these results suggest that the most active diversified stock pickers and concentrated stock pickers have enough skill to generate alphas that remain positive even after fees and transaction costs. In contrast, funds focusing on factor bets seem to have zero to negative skill, which leads to particularly bad performance after fees. Hence, it appears that there are some mispricings in individual stocks that active managers can exploit, but broader factor portfolios are either too

efficiently priced to allow any alphas or too difficult for the managers to predict. Closet indexers, unsurprisingly, exhibit zero skill but underperform because of their expenses.

Aforementioned findings are mostly based on performance of fund industry in developed markets. On the other hand, there is serious lack of related literature on emerging markets, especially ones in Central and Eastern Europe. Gottesman and Morey (2007) investigate predictability in the performance of emerging market funds by employing a regression framework and testing the ability of several fund characteristics, including the expense ratio, turnover, fund size, manager tenure and past performance, to predict emerging market fund performance. Surprisingly, they find that the expense ratio is the only fund characteristic that appears to consistently predict future fund performance. Specifically, emerging market funds with lower expenses show better performance. Moreover, authors find some limited evidence that passive management may outperform active management in emerging market funds.

Huij and Post (2008) suggest that emerging market funds generally display better performance than US funds. They show that there is strong persistence in the performance of emerging market funds with the winner funds outperforming the market by more than 4 percent per annum. Their results are consistent with the view that emerging markets are less efficient than developed markets, and that there are more opportunities for fund managers to find abnormal returns in emerging markets. Moreover, one of the differences between emerging market funds and other funds is that use of short selling and derivatives was relatively limited in the previous two decades because such instruments were not as readily available as they are in developed capital markets (Eling and Faust, 2010).

Although individual stock picking is not going to be assessed in this paper, it should be noted that Bhattacharya and Galpin (2009) developed a metric to measure the maximum fraction of volume explained by stock picking in a market. In other words, aforementioned researchers assume that every person in the world chooses between a risk-free portfolio and a value-weighted portfolio, hence trading volume in particular stock should be explained completely by the weight of the same stock in the value-weighted portfolio. Results showed that stock picking was declining although there was more of it in emerging markets than in developed countries. Moreover, stock picking is more prominent in markets where there is less public disclosure of stock-specific information, because stock pickers can only make money when they have better information than everyone else (Bhattacharya and Galpin, 2009). Improvement of disclosure over time should make stock picking less profitable and, therefore, less popular investment approach. Morck et al. (2000) showed that public information disclosure is better in developed markets than in emerging markets, and in both markets, public information disclosure is improving over time. Therefore, individual stock picking should be more popular in emerging markets than in developed markets.

Similarly, Khorana et al. (2005) argue that countries with more stringent regulatory approval and disclosure requirements for funds tend to have a larger fund industry. In other words, stronger regulation that specifically protects fund investors may be beneficial to the fund industry. Furthermore, they find that wealthier countries have larger mutual fund industries. These effects are particularly pronounced for the equity funds, which may require a higher level of investor sophistication. Moreover, mutual funds are more developed in countries in which a larger fraction of pension plans are defined contribution plans. Finally, countries whose trading costs are lower have more developed fund industry, which indicates that the ability to offer liquidity at a low cost is important for the industry's growth. Overall, these results suggest that mutual funds thrive in more developed economies.

## 3. DATA AND METHODOLOGY

### 3.1. DATA

The data set consists of time series representing net asset value of particular investment fund and closing prices of the general index of Zagreb Stock Exchange (CROBEX) on daily basis. Time series are denominated in local currency and we used logarithmic transformation of original data. Regarding fund selection, among 48 equity investment funds in Croatia we took into consideration 15 of them that put more than 50% of the fund's assets in stocks and hold more than one third of its portfolio in stocks listed on Zagreb Stock Exchange. The observed funds are: A1, Capital Two, Erste Adriatic Equity, Erste Total East, FIMA Equity, HI-Growth, HPB Equity Fund, KD Victoria, OTP Meridien 20, PBZ Equity, Poba Ico Equity, Prospectus JIE, Raiffeisen C. Europe, RBA HR Stocks and ST Global Equity. It is important to outline that none of these investment funds are index funds with a declared aim to replicate the performance of the market portfolio or benchmark exactly.[4] Time span for various series in data set is not unique given that investment fund industry in Croatia is rather young. Thus, particular data series representing NAV of the investment funds begins with the fund's first working day, while all data series terminate on December 31st, 2009. The source for investment funds data was web portal [www.hrportfolio.com](www.hrportfolio.com), providing us with internal data, while the data for official index of Zagreb Stock Exchange CROBEX were taken from Zagreb Stock Exchange database.

### 3.2. METHODOLOGY

Financial data series usually follow a random walk pattern and in most cases exhibit non-stationarity in levels. Augmented Dickey-Fuller procedure (Dickey and Fuller, 1979) will be used to test for existence of unit roots in both the price levels and first difference of stock market index CROBEX and net asset value of particular investment fund. The test for a unit root has the null hypothesis that $\gamma = 0$. Optimal number of time lags is to be determined by Modified Akaike Information Critera (MAIC).

In order to test weather investor could earn above-average returns on Croatian equity market by using merely technical analysis. After performing ADF test, if the time series is difference stationary, further analysis is needed since presence of a unit root is not a sufficient condition for a random walk (Campbell, Lo, MacKinlay, 1997). Therefore, tests of autocorrelation are employed in order to examine randomness in data.

In order to test for a potential long run equilibrium relationship between particular mutual fund and CROBEX, i.e. to test whether particular investment fund could have served as a substitute for direct portfolio investment from the standpoint of a long-term investor, cointegration analysis will be employed. Cointegration analyses consider a setting where between two time series, typically non-stationary in levels, exists a linear combination of the same "d" integrability order that exhibit I(<d) property. If two series are cointegrated, that implies they move together over time maintaining long term equilibrium, although short term disturbances are allowed (Engle and Granger, 1987). To test for the presence of such relationship, we use Johansen cointegration procedure which assumes that for *n* variables there might exist *n-1* different linear combinations of variables that are stationary. Johansen (1991) offers a procedure which detects cointegration by testing cointegration rank and by identifying and estimating cointegrating coefficients matrix.

If $n$ number of variables exhibit nonstationarity in levels and are cointegrated, vector autoregression model (VAR) should be transformed into vector error correction model[5] (VECM) as follows:

$$\Delta Y_t = \Pi Y_{t-k} + \Gamma_1 \Delta Y_{t-1} + \Gamma_2 \Delta Y_{t-2} + .... + \Gamma_{k-1} \Delta Y_{t-(k-1)} + u_t \qquad (1)$$

where $\Pi = (\sum_{i=1}^{k} \beta_i) - I_n$ stands for long run parameters, while $\Gamma_i = (\sum_{j=1}^{i} \beta_j) - I_n$ stands for short run parameters.

Matrix $\Pi$ is defined as a product of two matrices, $A$ and $B'$, of dimension (g x r) and (r x g), respectively, i.e. $\Pi = AB'$. The matrix $B$ gives the cointegrating vectors (betas), while $A$ gives the adjustment parameters (alphas) which determine the amount of each cointegrating vector entering each equation of the VECM.

## 4. RESULTS

The results of the empirical analysis are reported in tables 1-4. Table 1 shows results of unit root tests in levels and first differences for logarithmic transformation of CROBEX and net asset values of selected equity investment funds. Results reveal that the null hypothesis about unit root existence in levels can not be rejected in case of any variable. Null hypothesis about unit root existence in first differences is rejected for all variables. Therefore, empirical analysis will be proceeded to the second step by assuming that investment funds' NAVs and CROBEX are integrated of order 1, i.e. I(1).

**Table 1**

**ADF unit root tests – in levels and in differences**

| Variable | Time period (dd.mm.yy) | ADF in levels | | ADF in differences | |
|---|---|---|---|---|---|
| | | t-value (trend included) | p-value | t-value (trend included) | p-value |
| CROBEX | 07.10.99–31.12.09 | -1.95636 (15) | 0.3065 | -9.72357* (17) | 0.0000 |
| KD Victoria | 07.10.99–31.12.09 | 1.094588 (13) | 0.9999 | -9.06352* (18) | 0.0000 |
| ST Global Equity | 02.01.02–31.12.09 | -0.81746 (15) | 0.9627 | -8.24926* (22) | 0.0000 |
| HI-Growth | 25.02.02–31.12.09 | -1.37182 (15) | 0.8689 | -7.51320* (19) | 0.0000 |
| FIMA Equity | 01.06.04–31.12.09 | -0.89488 (20) | 0.9549 | -5.33292* (19) | 0.0000 |
| RBA Central Europe | 19.04.05–31.12.09 | -1.60132 (18) | 0.7923 | -5.05831* (18) | 0.0002 |
| PBZ Equity | 05.09.05–31.12.09 | -1.54895 (15) | 0.8121 | -5.35055* (15) | 0.0000 |
| HPB Equity Fund | 04.10.05–31.12.09 | -0.69686 (11) | 0.8454 | -6.10645* (13) | 0.0000 |
| Erste Adriatic Equity | 10.10.05–31.12.09 | -0.93614 (17) | 0.7769 | -5.05702* (19) | 0.0002 |
| Prospectus JIE | 30.01.07–31.12.09 | -1.942512 (3) | 0.6310 | -4.44122* (18) | 0.0020 |
| Capital Two | 07.04.07–31.12.09 | -0.524415 (3) | 0.8837 | -4.76669* (16) | 0.0006 |
| Poba Ico Equity | 27.07.07–31.12.09 | -1.12693 (10) | 0.9224 | -4.15146* (18) | 0.0056 |
| Erste Total East | 02.10.07–31.12.09 | -0.415471 (3) | 0.9868 | -3.5370** (16) | 0.0365 |
| OTP Meridien 20 | 08.04.08–31.12.09 | -0.900797 (2) | 0.9537 | -3.6201** (17) | 0.0293 |
| A1 | 19.05.08–31.12.09 | -1.594124 (2) | 0.4847 | -4.78037* (11) | 0.0006 |
| RBA HR Stocks | 08.04.08–31.12.09 | -2.540536 (3) | 0.3084 | -2.8830** (15) | 0.0485 |

Note: optimal number of time lags determined with Modified Akaike Information Criterion (AIC) and is presented in parenthesis; * null hypothesis about existence of unit root rejected at 1 percent level, ** null hypothesis about existence of unit root rejected at 5 percent level, *** null hypothesis about existence of unit root rejected at 10 percent level.

Results of unit roots tests show that CROBEX index exhibits nonstationarity in levels and stationarity in first differences. Regarding the fact that presence of a unit root is a necessary but not a sufficient condition for a random walk process, further analysis is needed in order to examine weather CROBEX developments are predictable. Therefore, autocorrelation analysis is performed for 12 lags of daily, weekly and monthly data.[6]

Results of autocorrelation analysis performed on daily, weekly and monthly returns are presented in Table 2. Within entire observed period of daily data significant (positive sign)[7] autocorrelation coefficient is found at 3rd, 5th, 8th and 10th lag, while significant (negative sign) autocorrelation coefficient is detected at 7th lag. Weekly data exhibit significant (positive sign) autocorrelation coefficient at 1st, 2nd and 6th lag. Finally, significant (positive sign) autocorrelation coefficient is found exclusively at 1st lag of monthly data. The results of autocorrelation tests are consistent with the findings of significant predictability in emerging market returns (Harvey, 1994; Claessens, Dasgupta and Glen, 1995). One of the possible reasons for serial correlation in daily returns of CROBEX is low market liquidity that was pronounced in period 1997-2000.[8] In addition to infrequent trading other reasons such as improved regulatory and institutional structure, valuation of listed shares and higher degree of financial integration may be offered as a possible explanation of such tendency.

**Table 2**

### Autocorrelation of CROBEX returns, 1997-2009

| Lag | Daily returns | | Weekly returns | | Monthly returns | |
|---|---|---|---|---|---|---|
| | $\tau_k$ | Q | $\tau_k$ | Q | $\tau_k$ | Q |
| 1 | -0.021 | 1.467 [0.226] | 0.233* | 33.04 [0.000] | 0.222* | 7.67 [0.006] |
| 2 | 0.016 | 2.332 [0.321] | 0.120* | 41.75 [0.000] | 0.048 | 8.04 [0.018] |
| 3 | 0.068* | 17.62 [0.001] | 0.009 | 41.79 [0.000] | 0.037 | 8.36 [0.039] |
| 4 | -0.031 | 20.72 [0.000] | 0.026 | 42.19 [0.000] | -0.017 | 8.41 [0.078] |
| 5 | 0.033* | 24.33 [0.000] | 0.003 | 42.19 [0.000] | 0.061 | 8.99 [0.109] |
| 6 | -0.030 | 27.24 [0.000] | 0.092* | 47.45 [0.000] | -0.129 | 11.68 [0.0.69] |
| 7 | -0.042* | 33.01 [0.000] | 0.017 | 47.63 [0.000] | 0.037 | 11.91 [0.104] |
| 8 | 0.064* | 46.39 [0.000] | 4.047 | 48.99 [0.000] | 0.084 | 13.06 [0.110] |
| 9 | -0.014 | 47.03 [0.000] | 0.003 | 49.01 [0.000] | -0.032 | 13.23 [0.152] |
| 10 | 0.043* | 53.06 [0.000] | -0.019 | 49.22 [0.000] | 0.064 | 13.92 [0.177] |
| 11 | 0.036 | 57.44 [0.000] | 0.031 | 49.81 [0.000] | -0.021 | 13.99 [0.233] |
| 12 | 0.008 | 57.66 [0.000] | 0.027 | 50.26 [0.000] | 0.037 | 14.22 [0.287] |

*significant auto-correlation at two standard error limits

Although results of performed autocorrelation tests suggest existence of inefficiencies on Croatian equity market, in line with aforementioned arguments, hypothesis about possibility of earning above average returns by simply using technical analysis can not be neither accepted nor rejected. Therefore, in further research, more developed predictive models should be built and potential profitability of the formed trading rules should be examined. Being impossible to conclude that all investors had beaten the market all the time, we might presume there some individual investors could have take advantage of some observed inefficiencies.

In the next step of our analysis we intend to distinguish truly active investment funds from closet indexers. In line with our aim, we use bivariate Johansen cointegration procedure to detect bilateral long-run co-movements between fifteen selected mutual funds and CROBEX in time period from their start to the end of 2009. In other words, we measure active management by measuring the degree of deviation from passive management. Results of bivariate Johansen cointegration procedure are summarised in Table 3.

**Table 3**

**Results of Johansen cointegration procedure for pairs of variables**

| | Lags | Hypothesized no. of CE(s) | Eigen value | λtrace | 5 % critical value | λmax | 5 % critical value |
|---|---|---|---|---|---|---|---|
| CROBEX-KDVictoria | 1 | None | 0.012484 | 35.49291 | 25.87211 | 31.99676 | 19.38704 |
| | | At most 1 | 0.001372 | 3.496154 | 12.51798 | 3.496154 | 12.51798 |
| CROBEX-A1 | 1 | None* | 0.152048 | 70.79998 | 25.87211 | 66.79735 | 19.38704 |
| | | At most 1 | 0.009834 | 4.002628 | 12.51798 | 4.002628 | 12.51798 |
| CROBEX-HPB Equity | 7 | None* | 0.046946 | 54.98755 | 25.87211 | 50.87289 | 19.38704 |
| | | At most 1 | 0.003882 | 4.114664 | 12.51798 | 4.114664 | 12.51798 |
| CROBEX-CapitalTwo | 2 | None* | 0.059524 | 46.27766 | 25.87211 | 41.36274 | 19.38704 |
| | | At most 1 | 0.007266 | 4.914915 | 12.51798 | 4.914915 | 12.51798 |
| CROBEX-ErsteAdriatic | 7 | None* | 0.072376 | 84.66163 | 25.87211 | 79.18601 | 19.38704 |
| | | At most 1 | 0.005182 | 5.475614 | 12.51798 | 5.475614 | 12.51798 |
| CROBEX-ErsteTotalEast** | 3 | None | 0.039874 | 24.46504 | 25.87211 | 22.78697 | 19.38704 |
| | | At most 1 | 0.002992 | 1.678074 | 12.51798 | 1.678074 | 12.51798 |
| CROBEX-FimaEquity | 3 | None* | 0.046481 | 74.39153 | 25.87211 | 66.63400 | 19.38704 |
| | | At most 1 | 0.005526 | 7.757532 | 12.51798 | 7.757532 | 12.51798 |
| CROBEX-HIGrowth | 7 | None* | 0.013921 | 28.98312 | 25.87211 | 27.53356 | 19.38704 |
| | | At most 1 | 0.000738 | 1.449567 | 12.51798 | 1.449567 | 12.51798 |
| CROBEX-OTPMeridien20 | 2 | None* | 0.144141 | 69.35542 | 25.87211 | 65.06152 | 19.38704 |
| | | At most 1 | 0.010220 | 4.293893 | 12.51798 | 4.293893 | 12.51798 |
| CROBEX-PBZEquity | 7 | None* | 0.053360 | 64.43827 | 25.87211 | 59.16843 | 19.38704 |
| | | At most 1 | 0.004872 | 5.269840 | 12.51798 | 5.269840 | 12.51798 |
| CROBEX-PobaIcoEquity | 3 | None* | 0.146416 | 98.02511 | 25.87211 | 95.93670 | 19.38704 |
| | | At most 1 | 0.003440 | 2.088145 | 12.51798 | 2.088415 | 12.51798 |
| CROBEX-ProspectusJIE | 3 | None* | 0.119448 | 97.32846 | 25.87211 | 92.73353 | 19.38704 |
| | | At most 1 | 0.006283 | 4.594931 | 12.51798 | 4.594931 | 12.51798 |
| CROBEX-RBAC.Eur | 7 | None* | 0.045933 | 60.77604 | 25.87211 | 55.27686 | 19.38704 |
| | | At most 1 | 0.004673 | 5.499185 | 12.51798 | 5.499185 | 12.51798 |
| CROBEX-RBAHrStocks | 3 | None* | 0.293438 | 119.1410 | 25.87211 | 109.0659 | 19.38704 |
| | | At most 1 | 0.031577 | 10.07507 | 12.51798 | 10.07507 | 12.51798 |
| CROBEX-STGlobal | 1 | None | 0.008304 | 18.53333 | 25.87211 | 16.73501 | 19.38704 |
| | | At most 1 | 0.000896 | 1.798325 | 12.51798 | 1.798325 | 12.51798 |

\* denotes rejection of hypothesis at the 0.05 level; \*\*according to $\lambda_{max}$ there is one cointegrating vector
Note: optimal number of time lags selected using Hannah-Quinn criteria obtained after VAR estimation of all endogenous variables and used in VECM

We found one cointegrating vector in almost all tested bilateral cases between CROBEX and particular investment fund. The exceptions were cases of KD Victoria, Erste Total East and ST Global Equity fund on the one side and CROBEX on the other. This means that those three investment funds are truly active. All other tested investment funds exhibit long run relationship with CROBEX, representing the fraction of passive funds which claim to be active. In other words, results of our analysis reveal those investment funds to be *closet indexers*.

In Table 4 we present the results of the tested hypothesis about both the parameters in the cointegrating vector and their loading in the VECM.

**Table 4**

**Parameters in the cointegrating vector and adjustment parameters from VECM**

| | Cointegrating Vector Parameters (betas) | | | Adjustment parameters in VECM (alphas) | |
|---|---|---|---|---|---|
| | CROBEX | Investment Fund | Constant | CROBEX | Investment Fund |
| **CROBEX-A1** | 1.00000 | -2.171842* (1.849559) | 1.849559 | -0.041887 (-5.24371) | -0.005075* (-1.14464) |
| **CROBEX-HPB Equity** | 1.00000 | -1.180780 (-48.7077) | -1.920673 | -0.056559 (-6.03970) | -0.016176 (-3.65640) |
| **CROBEX-CapitalTwo** | 1.00000 | -1.933259 (-12.4700) | 0.734147 | -0.044474 (-6.35700) | -0.004781* (-1.49206) |
| **CROBEX-ErsteAdriatic** | 1.00000 | -1.395559 (-83.2322) | 1.777094 | -0.109431 (8.94554) | -0.005390* (-0.83881) |
| **CROBEX-FimaEquity** | 1.00000 | -1.034005 (31.9847) | -2.030021 | -0.026481 (-6.42615) | -0.009656 (-5.01131) |
| **CROBEX-HIGrowth** | 1.00000 | -1.645669 (-16.2503) | -0.226529 | -0.014497 (-5.17497) | 0.001199* (0.84996) |
| **CROBEX-OTPMeridien20** | 1.00000 | -1.374592 (-33.9605) | -1.819010 | -0.146095 (-8.31593) | -0.008594* (-0.82666) |
| **CROBEX-PBZEquity** | 1.00000 | -1.121232 (-66.6624) | -1.838147 | -0.085132 (-7.66018) | -0.006786* (-0.98566) |
| **CROBEX-PobaIcoEquity** | 1.00000 | -1.605326 (-37.4021) | 6.366389 | -0.134621 (-10.0544) | -0.011469* (-1.43311) |
| **CROBEX-ProspectusJIE** | 1.00000 | -0.974238 (-37.2833) | -3.855888 | -0.111786 (-9.74536) | -0.009934* (-1.25899) |
| **CROBEX-RBAC.Eur** | 1.00000 | -0.956162 (-59.4298) | -0.295846 | -0.067253 (-7.24717) | -0.012258 (2.02129) |
| **CROBEX-RBAHrStocks** | 1.00000 | -1.102222 (-69.2252) | -3.580329 | 0.012136* (0.24676) | 0.326321 (11.2720) |

Note: t-statistics in parenthesis. * denotes statistical insignificance.

All of cointegrating vector parameters presented in Table 4 have expected sign and are statistically significant (except in case of A1 fund). The final result of cointegration analysis are following long run equilibrium relationships:

$Crobex_t$ = 1.180780 $HpbEq_t$ + 1.920673
$Crobex_t$ = 1.933259 $CapTwo_t$ - 0.734147
$Crobex_t$ = 1.395559 $ErsteAdr_t$ – 1.777094
$Crobex_t$ = 1.034005 $FimaEqt_t$ + 2.030021
$Crobex_t$ = 1.645669 $HIGrowth_t$ +0.226529
$Crobex_t$ = 1.374592 $OtpMer20_t$ + 1.819010
$Crobex_t$ = 1.121232 $PbzEquity_t$ + 1.838147
$Crobex_t$ = 1.605326 $PobaIcoEq_t$ - 6.366389
$Crobex_t$ = 0.974238 $Prospectus_t$ +3.855888
$Crobex_t$ = 0.956162 $RbaCEur_t$ + 0.295846
$Crobex_t$ = 1.102222 $RbaHrSt_t$ + 3.580329

The interpretation should be as follows: for example, in case of cointegration between CROBEX and HPB Equity Fund, increase of CROBEX by 1% leads to the rise of the Fund by 1.18078%. The rest of the cointegration equation should be interpreted in the same manner.

We proceed to the analysis of adjustment coefficients that are results of VECM and are also presented in the Table 4. The adjustment coefficients measure the speed of adjustment (in one period) at which short run deviations are brought back to long run equilibrium. For example, in case of CROBEX and HPB Equity Fund, if CROBEX diverges from the long run equilibrium, it will fall/rise by 5.66% daily in order to return to the equilibrium. That implies it takes 40 days till approximately 90% adjustment is achieved. In the same vein, if HPB Equity Fund is under/below the long run equilibrium, its net asset value will fall/rise by 1.62% daily to return to the equilibrium. Adjustment coefficients for other pairs of variables will not be interpreted in the text for the sake of space savage, but follow the manner of interpretation.

# 5. CONCLUSION

In efficient markets investors would be better off investing in broad market indices, since active management would fail to add value sufficient to outweigh administration costs and fees given that hard competition between investors results in lack of both abnormal performance on average and persistence in performance. Therefore, significant shift from active to passive management over the 1990s can be partially assigned to market efficiency of developed equity markets. In addition to rising popularity of pure index funds, there is a great number of *closet indexers* i.e. funds that score low on active management while still claiming to be active.

On the other hand, active management should be more successful on emerging financial markets due to their high performance opportunities and inherent inefficiencies accompanied by high volatility, thin trading issues and potential manipulation by larger players. Hence it is generally perceived that emerging markets offer more opportunities for fund managers to find abnormal returns on average. Croatian equity market, like other equity emerging markets, experienced the great growth in last decade, foremost due to strong performance over this period with yields in some markets far exceeding those of the industrial financial markets. Moreover, results of performed autocorrelation analysis indicate that CROBEX does not follow random walk model. Despite that, transaction costs and infrequent and non-synchronous trading that are usually inherent to emerging equity markets should be accounted when deciding on market efficiency.

Having analyzed the possibility of generating above average returns due to market inefficiencies, the main aim of this paper is to detect investment strategy employed by particular equity investment funds in Croatia in order to distinguish between truly active equity investment funds and closet indexers in Croatia. Results of Johansen cointegration analysis reveal that A1, Capital Two, Erste Adriatic Equity, FIMA Equity, HI-Growth, HPB Equity Fund, OTP Meridien 20, PBZ Equity, Poba Ico Equity, Prospectus JIE, Raiffeisen Central Europe, RBA HR Stocks are *closet indexers*. More precisely, aforementioned funds share long run comovements with benchmark equity market index representing the fraction of passive funds which claim to be active. On the other hand, KD Victoria, Erste Total East, ST Global Equity follow truly active investment strategy. Obtained results are to some extent unexpected given spotted inefficiencies on Croatian equity market that should have been

exploited by active stock pickers. However, we might presume there some institutional as well as individual stock pickers could have taken advantage of some observed inefficiencies. However, in order have clear understanding, more developed predictive models should be built and potential profitability of the formed trading rules should be examined. Nevertheless, recent developments in equity investment funds industry on Croatian equity market should be observed in light of financial crisis. Investment funds sharing the long run comovements with CROBEX could be explained with a fact that entire market has been facing the same downturn trend since the end of 2007.

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**ENDNOTES:**

[1] Efficient market hypothesis implies that all available information are reflected in security prices preventing participants to gain above-average returns. According to Fama (1970), depending on completeness and speed of information incorporation in securities prices, there are three levels of informational efficiency: (a) the weak form, (b) the semi-strong form, and (c) the strong form.

[2] Two groups of studies dealing with emerging market efficiency can be distinguished: ones that confirmed weak form efficiency despite the problems of thin trading (Dickinson and Muragu, 1994; Ojah and Karemera, 1999; Chun, 2000; Abrosimova et al., 2002) and others that report significant serial correlation in equity returns (Claessens, Dasgupta and Glen, 1995; Harvey, 1994; Nivet, 1997; Gilmore and Mcmanus, 2001).

[3] In period from the announcement and July 2004 (NMS entered EU on May 1st, 2004), stock prices in the eight Central and Eastern European candidates countries increased on average by over 90 percent in dollar terms compared with the world market index returning about 8 percent during the same period (ECB, 2005).

[4] The first purely index fund on Croatian equity market (OTP Index Fund) strated on December 27, 2007.

[5] VECM is restricted VAR model in which restrictions are embedded into model specification and it is used for nonstationary variables that are cointegrated. VEC specification steers long run comovement between endogeneous variables to converge towards cointegration equilibrium, allowing wide range of short run disturbances from the equilibrium.

[6] Aforementioned number of lags is considered as most appropriate taking into account the facts that small number of lags could prevent test from detecting serial correlation at high-order lags. On the other hand, exaggeration in number of lags employed could reduce the power of test as the significant correlation at one lag may be diluted by insignificant correlations at other lags.

[7] Distinction between positive (or persistence) over short horizons and negative (or mean reversion) autocorrelations over long horizons can be practically employed in different trading strategies. In this instance, as the investment horizon lengthens, an investor would invest more (less) in stocks if the relative risk aversion is greater (less) than unity, than if the returns were serially independent.

[8] It should be noted that authors have performed more extensive empirical analysis of CROBEX developments. In particular, CROBEX was tested for autocorrelation in daily, weekly and monthly returns in different subperiods. Aforementioned data are available upon request from the authors.

# STRATEGIJE ULAGANJA U VRIJEDNOSNICE: SLUČAJ HRVATSKE

## SAŽETAK

*Ovaj rad analizira investicijske strategije koje koriste odabrani dionički investicijski fondovi u Hrvatskoj. S tim ciljem koristi se Johansenova kointegracijska metoda kako bi se testirala dugoročna zajednička kretanja između 15 odabranih fondova i CROBEX-a u razdoblju između osnutka pojedinog fonda i kraja 2009. godine. Rezultati analize pokazuju da većina hrvatskih dioničkih fondova replicira dugoročna kretanja tržišnog indeksa, što implicira da se radi o tzv. prikrivenim indeksnim fondovima. Uzmu li se u obzir pronađene neefikasnosti na hrvatskom tržištu kapitala i popratna motivacija fond managera da iskoriste iste, dobiveni rezultati su u određenoj mjeri neočekivani.*

*Ključne riječi: investicijske strategije, tržišna efikasnost, dionički fondovi, kointegracija*

*JEL CLASSIFICATION CODES: G11, G14, G23*

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Review
Pregledni rad

# ECONOMIC EFFECTS OF PRIVATISATION OF PUBLIC SERVICES SECTOR IN THE REPUBLIC OF CROATIA EMPHASISING MARITIME-PASSENGER TRAFFIC

## ABSTRACT

*Economic effects of every strategic decision on national economy level are important aspect of total economic policy and are strong determinant of generating future economic prosperity and development from the microeconomic, thru mezoeconomic pending to macroeconomic level of observing competitive performances. In this scientific work the analysis of economic effects of privatization is carried out in dependence on the particularities of the public services sector. The methodology of scientific work includes the comparison of specific sensitivity of these sectors caused by specific long-term position, which are a strong determinant and limiting factor in adoption of optimal decisions about their privatization. The purpose of this scientific work is, in the context of complex issues about selection of time frame and the model of privatization in case that privatization is final decision, to modulate basic parameters to make optimal decisions. The results of the research show that the economic outputs of privatization of the public services sector depend primarily on the chosen model of privatization and the implementation time framework, what indicates that privatization of such sector requires a sui generis approach to determinants of the privatization process since they incorporate important characteristics of a public good, and the problem extends from the pre-phase elements of privatization and market position consolidation of the privatization object to the care for the creation of preconditions for successful accomplishment of micro-competitiveness in the sector and institutional environment to promote growth and competitiveness.*
*Keywords: economic effects, privatisation, entrepreneurship, public good, public services, maritime-passenger traffic*

## 1. INTRODUCTION

Economic effects of every strategic decision on national economy level of individual national economy are important aspect of total economic policy and are strong determinant of generating future economic prosperity and aggregative development. Particularities of public services sector and specific sensitivity of this sector caused by specific long-term position are the strong determinant and limiting factor in decisions adoption about their privatization, also in decisions for privatisation in time horizon and privatisation model selection.

In Republic of Croatia maritime-passenger transport sector can serve as an example of public services sector considering economical and geopolitical determinants of Croatian part of Adriatic Sea. Privatisation of such sector demands sui generis approach to all significant determinants in privatisation process, from pre-phase privatisation elements and privatisation objects market position strengthening to concern about achieving preconditions for successful competitiveness achievement in competitive sector and for institutional environment for growth and competitiveness improvement. One of the most important elements in

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privatisation process preparation phase is microeconomic strengthening of future privatisation object, and defining clear market position in competitive conditions trough total financial and economic strength verification, what requires maintaining, development and improvement of business and competitive position.

Privatisation process, so as business continuity maintenance, and its development and improvement in privatisation context, demand optimal volume of financial assets obtained in optimal conditions. Obtaining financial assets from other resources is complex process which contains many decisions, and one of the most important decisions is choosing an external resource of financing in specific case, in order to optimise charging process.

In Republic of Croatia, business financial business aspects of key companies in sector are important determination of whole maritime-passenger transport sector situation. Total economic effects of maritime-passenger transport sector and Jadrolinija d.d. development are seen as insurance of higher level quality in maritime-passenger services, with achieving effective business processes and better economic results of those business processes. Maritime traffic service, as a public good, has a strategic importance for total Croatian economy development and represents one of the most important components in competitive improving spectrum, especially in total island and costal region, but decision making person has to decide whether to choose privatisation or further prevailing government ownership.

## 2. OVERVIEW OF PREVIOUS RESEARCHES

In preliminary phases of turning from social ownership to market economy in transitional countries, institutional assumptions for public capital privatisation are created by conversion processes. All this processes are argued with tendencies towards modern economic trends that in privatisation find fundamental assumption for transition from socialistic to modern market economy and growth of its efficiency and competitiveness (Kalogjera, 1993). Gregurek (Gregurek, 2001) also brings out statement which declares that fast public sector privatisation is favourable in order to faster ensure company efficiency, whereas country manifested as a bad entrepreneur, and that privatisation is precondition for normalisation business of not privatised companies. However, that argumentation can only partly be acceptable and with significant limitations considering all functioning elements of present transitional countries, modern market economies and less developed countries which are strengthening their economy very fast and record high growth rate.

In transition and later phase of country development at the end of transitional processes, as well as after process of transition, and in the phase of developed evolved economy, many modern authors believe that privatisation is dominating precondition for economic success. By observing only transitional countries which had crisis in 80s of last century for specific reasons, and which found their way out in turning to market economy, it is possible to say that privatisation in that time had extremely dominating importance, but it is needed to emphasise also, that privatisation processes and their particular methods had an essential role in further competitive economy achievement. Privatisation processes were the main determination of bigger or smaller success, or even failure in achieving good economy and sector structure, as well as achieving wanted economic results of total national economy (Gouret, 2007).

## 3. ECONOMIC ASPECTS AND EFFECTS OF PRIVATISATION

Many researches, like ones that were carried out by Zinnes and associates (2001.), Bennett and associates (2004.), and Gouret (2007.), were made in order to determine intensity and direction of whole privatisation and its processes, with achieving outputs level of national

economy in transitional countries and achieving level of average annual GDP-a growth rate. Results indicate some main conclusions. Privatisation *per se* does not have any influence on output level. There is expired result which shows that transitional countries with gradual privatisation, achieves higher output levels than countries which had privatisation by mass and fast public property abandonment.

Economical treatment of privatisation effects and its implications is made by IBDP measure usage, as index of real GDP in relative relation to GDP of observed European transitional countries in year 1989., in way that value 100 is taken as a basic measure of GDP achieved in year 1989. This simplified model reflects also recovery index of every observed national economy, representing GDP in time *t* as a percentage of pre-transitional GDP.

This model of economic privatisation effects analyze issue comes from the fact that transitional phase did not started in all transitional countries at the same time, and in order to minimise inconsistency it is needed to take into consideration specific time for each observed transitional national economy, when the pre-transitional system had stopped to operate and was exchanged with new system. Therefore is also used IBDPTRY indicator, as a real GDP index in relative relation to pre-transitional output. Making further accuracy of model for measuring economic privatisation-transitional effects, it is possible to identify indicator IBDPTRY as index of real GDP in relation to real GDP in year before dominate privatisation model has been adopted in observed national economy. The aim of such settlement of IBDPTRY indicator is to solve issues that appear in transitional phases, and which were manifested in a way that elapsed time between the moment of transition to new system till the moment of implementation of dominant privatisation model was not the same in all transitional countries. Privatisation model and its economic effects are objects of the main interest, therefore is needed to "clean" data from time gap influence meaning time period between turning to new system in formal way and time of specific dominate privatisation model implementation.

In observing economic effects of privatisation, it is also used indicator CFDIpc which indicates cumulative direct foreign investments *per capita*, made in way of putting in relations net direct foreign investments with population, as it is shown in formula:

$$CFDI_{pc_{it}} = \sum_{T=1989}^{t} FDI_{i,T}/Nstan_{i,T} \tag{1}$$

Where is:
*Nstan – number of residents*

This research model *sensu lato* includes observing three basic privatisation models in majority transitional countries in year 1990, which European Bank for Reconstruction and Development defines as (Gouret, 2007):
  1) mass – MASS – fast mass voucher privatisation
  2) middle – MEBO (managers/employee buy out) – managerial and working privatisation
  3) gradual – VEN – gradual selling/privatisation

Results are indicating to the situation of dominative usage of privatisation models in Republic of Croatia, which in 1990. was not clearly defined, and then in phase from year 1991. till year 2001. was dominating fast privatisation model with relative important managerial and working privatisation share.

In conducted research, summarising dominative models for all European transitional countries and putting this result in correlation with recovery output indicators and cumulative direct foreign *per capita* investments, it is obtained summarised casual connection

relationship of economic privatisation effects in dependence on chosen dominative model, actually on privatisation implementation time frames. (cf. Table 1).

**Table 1:**
**Average recovery output of all transitional countries in dependence of dominative privatisation method**

| PRIVATISATION METHOD | IBDP IN YEAR 2001. | IBDPTRY |
|---|---|---|
| **mass** | *average* | *average* |
| | 62,47 | 69,71 |
| | *standard deviation* | *standard deviation* |
| | 19,68 | 16,89 |
| **middle** | *average* | *average* |
| | 87,02 | 88,98 |
| | *standard deviation* | *standard deviation* |
| | 18,89 | 19,26 |
| **gradual** | *average* | *average* |
| | 107,31 | 107,28 |
| | *standard deviation* | *standard deviation* |
| | 16,61 | 10,39 |

Source: Author analysis according to Gouret, F. (2007). "Privatization and output behavior during the transition: Methods matter", Journal of Comparative Economics; Mar2007, Vol. 35 Issue 1, p3-34, 32p.

Analysed period from year 1990. till year 2001., is chosen because until year 2001., in observed countries, was carried out important part of privatisation processes, and for some of them can be concluded that they had already came out from transitional phase. That is dominative reason why researches do not consist observed economic performances after year 2001. It is necessary to mention, if period after year 2001. had been included, the results of direct foreign investments movements in other group of countries, which represents south-eastern Europe countries, would have been significantly different because these countries achieved considerable FDI income in further years.

**Table 2:**

> **Average cumulative direct foreign investments per capita in all transitional countries expressed in American dollars in dependence of dominative privatisation method**

| PRIVATISATION METHOD | CFDIPC IN YEAR 2000. |
|---|---|
| **mass** | *average* |
| | 492,83 |
| | *standard deviation* |
| | 597,16 |
| **middle** | *average* |
| | 290,26 |
| | *standard deviation* |
| | 291,54 |
| **gradual** | *average* |
| | 4.727,59 |
| | *standard deviation* |
| | 586,94 |

Source: Author analysis according to Gouret, F. (2007). "Privatization and output behavior during the transition: Methods matter", Journal of Comparative Economics; Mar2007, Vol. 35 Issue 1, p3-34, 32p.

By observing the average index value of real GDP and comparing it to the real GDP in 1989 (Table 1 and Table 2), it is obvious that the transition countries which implemented gradual privatization have accomplished, on average, 72% higher GDP recovery rate than those who implemented privatization by using a model of mass and fast sales and state ownership solutions. Furthermore, transition economies which implemented gradual privatization processes have generated, on average, 23% stronger output recovery that those countries which implemented privatization by using a model of medium-fast privatization, which includes management and employees. By taking into account index value of real GDP in comparison with real GDP in the year which preceded the implementation of predominate privatization model into the considered national economy, the results show that countries which implemented gradual privatization accomplished, on average, 54% higher GDP recovery rate that countries with fast privatization, as well as 21% stronger recovery than countries with medium-fast privatization.

Analysis of the size of cumulative foreign direct investments per capita in transition countries shows that countries which implemented privatization by using a model of gradual privatization of public companies acquired in the period between 1990 and 2001, on average, as much as 860% higher cumulative foreign investments per capita than countries with mass and fast privatization, as well as 1529% higher cumulative foreign investments than countries which implemented privatization by using a model of medium-fast privatization with management and employee privatization.

A survey shows that countries which favored gradual privatization of public companies have higher output recovery rate than those countries which gave advantage to mass and fast privatization. By analyzing annual growth rate, the survey shows that there is no difference in achieved level of GDP growth rates between these two privatization types of transition countries. From this survey, the authors concluded that privatization methods which

lead to permanent changes in ownership structure have different influences on output level, but do not have influence on annual growth rates, as it is schematically shown hereafter.

**Scheme 1:**
**Different influence of privatization methods on the achieved output level and annual growth rates**

| Privatization method | Different influence on achieved output level | Different influence on annual growth rate |
|---|---|---|
| Gradual privatization | YES ↑ | NO – |
| Fast and strong privatization | YES ↓ | NO – |

Source: Author analysis according to Gouret, F. (2007). "Privatization and output behavior during the transition: Methods matter", Journal of Comparative Economics; Mar2007, Vol. 35 Issue 1, p3-34, 32p.

Accordance with obtained results, which show that privatization methods are key element of influence on economic performances of national transitional economy, similar to those resulting from Gouret's research, was discovered also earlier by Roberts' (1999) research, in which the author concludes that the influence of privatization on national economy varies in dependence with selected and implemented privatization scenario, which largely has influence on economic variables (Roberts, 1999).

Researches have partially confuted common theoretical conclusions that privatization can be equalized with efficiency increase. In many theoretical analyses, privatization is the same as efficiency increase, but, if we take into account results of empirical researches, this equality cannot be accepted completely and with certainty.

Further consideration of the issue of privatization in transition countries and of privatization policy as an antecedent of privatization model excels Bolton's and Roland's analysis (Bolton, et al, 1992), where the authors ascertain the influence of privatization policy on economic performances, especially concerning budget, and the results of the conducted research, emphasize that it is likely that, on a scheme of fast renunciation of public ownership, privatization will create budgetary crisis, by developing and stimulating inflation, and thus destabilizing young and fragile economy of a transition country.

The argument for this statement is in the loss of cash-flow at budgetary level, which is caused by the loss of ownership of, up till then, big public companies, which are now privatized. Furthermore, insufficiently developed institutional framework, in a situation when privatization was faster than the development of stabile institutions necessary in the system of modern market economies functioning, can cause difficulties in orderly tax levying after the public companies become privatized. Also, one of the significant problems which occurred in privatization processes of transition countries was evident in the fact that privatization was, in some cases, implemented without the inflow of fresh capital, neither domestic nor foreign, on the 'paper privatization' principle. Therewith, one of the most important economic benefits brought by privatization process is neglected, and that is inflow of fresh capital which will enable growth and development of a privatized company. In that very year, but on the example of Soviet reform, similar conclusions were made by Fischer and Frenkel (Fischer, et al, 1992) in their research.

Taking into account the specificities of market structure and the research results, it is evident that restructuring and final economic outcome largely depend on the distribution of ownership rights and the choice of privatization method. Functionality of mass and fast privatization is not evident, and such a model does not lead to establishment of favorable

economic equilibrium, and the change of ownership *per se* has got little influence on long-term productivity trend.

By validating common claims that privatization is basic cure for monopoly often made by big public companies, the importance of characteristics determinations of each individual monopoly is shown, as well as the need for comprehensive analysis of situation in entire economic environment before making final decisions about privatization.

By abstracting the results of empirical research and certain theoretical considerations, it is possible to conclude that privatization, as one of the key, but also wider socio-political, events in transition economies of 1990s, had a strong influence on economic performances, but largely not the influence proportional to the intensity and speed of implemented privatization, but opposite and dependent on the specific privatization model.

Besides the influence on GDP and FDI, privatization model with its modalities affects the progress of employment in the observed economy, as well as accomplished degree of work productivity. As explicitly stated before through achieved economic results, the influence of privatization process is mirrored also in the domain of export and balance of payments, as well as in the structural aspect of technology transfer. In addition to these influences, it is also possible to additionally define the influence on the transport system through the parameters of transport economics and multiplicative influence on an entire range of sectors which rely on it.

The results of empirical research (Kallianiotis, 2009) indicate the possibility of the implemented privatization to increase productivity, as well as liquidity on financial markets, taking into account the fulfillment of fresh capital inflow prerequisite. However, it is possible that it simultaneously causes the increase in unemployment, dependent on foreign capital and multinational corporations, as well as the decrease in welfare of an average citizen, together with the loss of national wealth in the sense of the ownership of, up till then, public company of public significance. The conclusion is directed towards the need for additional engagement by the public sector, in an endeavor to increase productivity and efficiency of the public sector, and, at the same time, retaining important public companies, especially public services sector, in public ownership.

This points to the issue in which, to a certain degree, productivity increase can be achieved at the expense of employment decrease, but excessive employment decrease leads to quality reduction, which then leads to the need for deeper review of the idea of the necessity for public services commodification with the result of productivity increase.

With the aim of complete economic treatment of privatization topic through the aspect of technology transfer, it is necessary to mention that privatization processes carry within the possibility of the acceleration of technology transfer process. However, for ensuring positive effects at the national economy level, it is necessary to have a well established institutional environment, with the function of ensuring prerequisites for ensuring general business safety, as well as for specific protection of intellectual ownership rights.

Further to these conclusions, in the continuation of this paper, the issues of public services sector as a public good will be considered.

## 4. PUBLIC SERVICES SECTOR AS PUBLIC GOOD

The importance of the whole public sector, therefore the public services also, in modern economies is undoubtedly extremely big, and in the last two centuries it has recorded a significant degree of growth. Human needs, among them public needs also, are a complex social category. Scientifically looking, the degree of their fulfillment is never completed and finalized. Public (social) needs can also be observed as the needs fulfilled via services which

everyone can use in the same extent (Musgrave, 1973). In the public sector there is a category of public goods and services, unlike the private market, which incorporates a category of private goods and services. The difference between them is big and it comes from the basic distinction of the sense and function of public and private goods and services markets. Goods and services on private goods and services market, first of all, show personal preferences of consumers and their purchasing power. Public goods and services have significantly different characteristics. Purely public good is defined as a good which demands indivisibility of production and consumption, nonexistence of competitiveness and exclusivity (McLean, 1997). Taking into account the nonexistence of competitiveness, by definition, one can talk about certain categories of public services, which entails economic repercussions in achievement of allocative efficiency. For needs of this paper, it is especially important to determine how the service of public sea transport (shipping) can be included into the public goods category.

Public goods are nonexclusive, as well as indivisible in production and consumption. There is no competitiveness in public goods. Usage of public goods is conducted in a way that each individual consummates them in accordance with certain norms. However, before that, one needs to provide, i.e. ensure public goods, prepare, capacitate and organize them for public usage. That function is done by the state, i.e. public government. People who do not pay for public services cannot be excluded from the benefits which arise from them, and since they cannot be excluded from the benefits, they will not commit themselves to voluntary payment. There is a case where individuals refuse to give their support to financing public goods. In theory, this case is known as 'free rider problem'. Therefore, standard market cannot satisfy public needs (Musgrave, 1973).

Unlike the private market, on the public goods and services market all individuals – society members take same amount of public goods. However, those takings occur parallel to different tax burdens of the members of that same society. This means that here the prerequisite of all consumers taking goods according to same prices is not valid, because in that case each individual would pay equal tax, and that is not the case because the tax burdens differ in relatively numerous fiscal criteria which are effective in that society. In comparison with conventional private goods market, with public goods there is a significant difference in creating an offer. In the public goods and services allocation mechanisms, their offer is created by political processes, which makes fundamental and the most important difference in comparison with private goods. The answer to the question which public goods and services and in which amount should the public sector make available is connected to political decisions, i.e. relation of political forces in a country (Jelčić, 2001). This feature of public goods and services offer leads to the border of political sciences and economy.

Following chart (Chart 1) shows public and private goods demand. It is presupposed that there are two consumers (Consumer 1 and Consumer 2). $D_1D_1$ stands for the demand of the first consumer, $D_2D_2$ stands for the demand of the second consumer, and DD stands for aggregate demand. With private goods, total market demand for a private good is obtained by horizontal summation of individual demands of both consumers. Optimal amount of production on this market is obtained in equilibrium – a balanced point marked with $E_p$ in which the aggregate demand curve cuts (for this example presupposed) offer curve. Unlike the situation with a private good, aggregate demand for a public good is obtained by vertical summation of individual demand curves. Basic difference in comparison with public goods demand is mirrored in the fact that in public goods consumption all consumers, by definition, spend an equal amount of the public good, which basically means total amount of the public good.

In the models there are symbols: CH – marginal Consumer 1 usage; FG – marginal Consumer 2 usage; QpEp – marginal expense; 0Qj – amount of public good or size of product; 0Pj – marginal social usage; QjEj – limiting social expense.

**Chart 1:**

**Private and public goods demand**
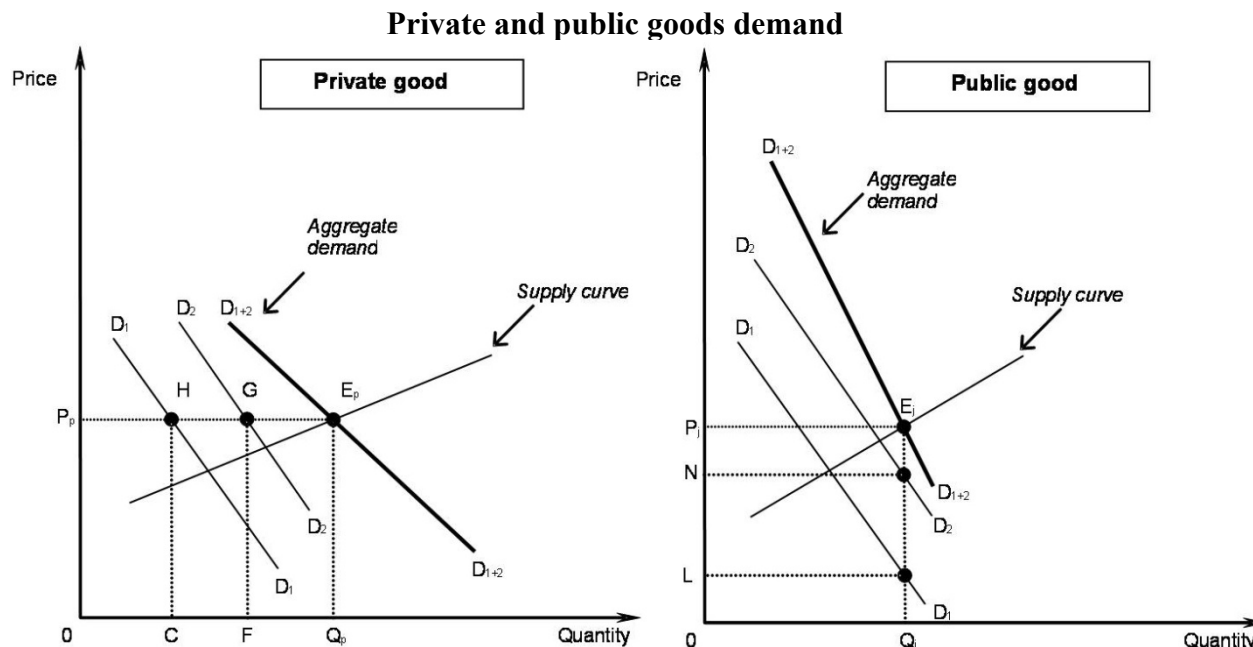


Source: Author analysis according to Petak, Z. (1999). Javna dobra u teoriji javnog izbora: doktorska disertacija, Zagreb: Z. Petak, 1999., p.193.

Goods can be more or less public. Most goods are somewhere in-between those two extremes. The more elements of publicity that they possess the more sensitive they are to the influence of non-payers, so they are provided in lesser quantities than people would want or they are not provided at all.

Further to the previously stated attribution of indivisibility and nonexistence of competitiveness in public goods, in theoretical sense it is necessary to consider the issue of monopoly structure emergence, by definition. Public services sector, such as sea transport services in the Republic of Croatia, has had for many years a dominant attribution of monopoly structure. Simultaneously, a question about the naturalness of that monopoly emerges, i.e. is it a created monopoly.

In a research it is important to concentrate on the issue of privatization of public companies in the specific market of public services. A model has been developed, which calculates gains or losses in welfare, which can occur in privatization of public company with a dominant monopoly position, when it becomes profitable managed private company and retains a monopoly position. Such examples have occurred in the Republic of Croatia in past twenty years. Model incorporates pre-privatization flexibility of demand with post-privatization efficiency changes. Obtained sizes of welfare change imply that improvement in allocative efficiency is not *per se* a dominant reason for post-privatization regulation, which is greatly needed; rather, it is a powerful regulation need with the aim of creation of institutional environment which would be a trigger for investments (Bradburd, 1995).

As an practical example, when analyzing the issue of privatization of public services sector, we can also observe the impacts on the example of maritime-passenger transport in the Republic of Croatia and Jadrolinija d.d. (JSC). It is also necessary to emphasize the indirect link with issuing of Jadrolinija 's bonds, and the attitude of lenders toward the risks and

business continuity maintenance. Jadrolinija is 100% in state ownership, and country's public ownership of Jadrolinija is an important factor of business orientation of a company, on which both infrastructural and suprastructural public functions of transport connection are founded, which is especially evident in the fact that developmental strategy of a company makes a part of state strategy. This also reveals the fact of giving importance to maintenance of transport business of connecting islands with the mainland, for which it is important to be under sufficient degree of control, with the goal of safety assurance and overall development continuation. In the context of mentioned issues, it is necessary in this paper to consider Jadrolinija d.d. privatization process, which is frequently talked about and debated upon. In 2005, a study titled 'Concept and proposition for Jadrolinija privatization' was made and it researched and suggested possible privatization modalities. Essentially, two phases were suggested, where the first phase of privatization would be allocation of 7% of stocks to island local residents and employees, and 4% of stocks to pension and veterans funds. Estimated period for the beginning of second phase is five years after the end of the first phase, and in the second phase what dominates is a public offer of stock packages of 50% plus one stock, where the state would simultaneously retain control package of 25 % plus one stock in its portfolio. The importance of systematical approach to privatization problems solution, taking into account the initial decision on whether to start privatization and which potential model to choose, is evident in the need to prepare Jadrolinija, which does around 90% of whole public maritime-passenger transport in the country, in the best possible way for market business activities in the scope of domestic and foreign competition. This will especially be emphasized as a necessity in the time of Croatia's possible integration into the European Union, and additionally in the context of medium-term strivings for market opening through implementation of public tendering systems in every area.

Regardless the chosen model and time of privatization implementation, if it happens, it is necessary to prioritize public good preservation by quality and sea transport service continuity preservation. Public interest is primarily evident in concern about island and island population, as well as developmental perspectives, and looking through prerequisites for its realization, one can see the need for Jadrolinija d.d. to maintain and improve itself in economic sense through modernization and preparation for competitive market battle. This intrudes the need for a systematic and thorough research, and model and time frames verification, as well as coverage of Jadrolinija privatization, taking into account the interests of all the main participants in this complex and strategically important process.

Strong influence of the state in the sector of maritime-passenger transport undoubtedly also has its negative effects, which are partly evident in the functioning of market competition. However, big strategic importance of line maritime-passenger transport, as well as always present imperfection of market in the process of optimal allocation of public goods, generates the need for public sector interference, with the aim of permanent assurance of transport schedule regularity independent to the price anomalies and possible other market instabilities. Enabled direct influence of public government and favorable relation of domestic and foreign capital, open possibilities of positive effect on economic performances, with the aim of optimization of public good allocation in economic and social aspects of public service of transport.

## 5. CONCLUSION

Economic effects and implications of every strategic decision at the level of national economy are an important aspect of overall economic policy and future economic progress realization. Specificities of sectors in which monopoly structure is dominant and fragility of those sectors caused by long-time specific position, are a strong determinant and a kind of limitation in making decisions about their privatization.

In this paper, subsequently to analysis of different economic approaches to the issues of public monopolies privatization and connection of privatization processes and models with economic effects, the results have shown that privatization *per se* does not have any influence on the final output level; rather, the key is in privatization methods in every case individually. At the same time, empirical results show that countries which had gradual privatization reach higher output levels than those countries which had privatization on the principle of mass and fast renunciation of state ownership. Also, countries which favored gradual privatization of public companies have higher output recovery rate than those countries which gave advantage to mass and fast privatization. The conclusion is that privatization *per se* is not a significant determinant of economic success; but privatization methods are, which lead to permanent changes in ownership structure of economy and have different influences on output level, but do not have influence on annual growth rates.

From this it can be concluded that the decision of privatization is very complex and before making a final decision, one needs to conduct a thorough analysis of all relevant economic parameters, in accordance with suggested models. If the decision of privatization proves to be desirable option, a new chain of question arises about optimal privatization model, as well as about coverage of privatization and time distribution as especially important elements. Privatization model, and not privatization *per se*, is the key for realization of optimal economic results, on microeconomic and mezoeconomic, but also on macroeconomic levels, and all with the aim of advancement of the quality level of maritime-passenger transport service as a public good and realization of higher level of efficiency, together with stability and business continuity assurance.

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# EKONOMSKI UČINCI PRIVATIZACIJE SEKTORA JAVNIH USLUGA REPUBLIKE HRVATSKE S OSVRTOM NA POMORSKO-PUTNIČKI PROMET

## SAŽETAK

*Ekonomski učinci svake strateške odluke na razini gospodarstva važan su aspekt ukupne ekonomske politike i snažna odrednica generiranja budućeg ekonomskog prosperiteta i ukupnog razvoja od mikroekonomske, preko mezoekonmske, do makroekonomske razine promatranja konkurentskih performansi. U ovom znanstvenom radu provedena je analiza ekonomskih učinaka privatizacije u ovisnosti o posebnostima sektora javnih usluga. Metodologija znanstvenog rada obuhvaća komparaciju specifičnih osjetljivosti tih sektora izazvanih dugogodišnjom specifičnom pozicijom, a koji su snažna determinanta i ograničenje u donošenje optimalnih odluka o privatizaciji istih. Svrha ovog znanstvenog rada je, u kontekstu kompleksne problematike odabira vremenskog okvira i modela privatizacije u slučaju da je opredjeljenje za privatizaciju konačna odluka, modelirati temeljne parametre za donošenje optimalne odluke. Rezultati istraživanja pokazuju da ekonomski outputi privatizacije sektora javnih usluga ovise prvenstveno o odabranom modelu privatizacije i vremenu provedbe, što upućuju na to kako privatizacija takvog sektora zahtjeva sui generis pristup odrednicama privatizacijskog procesa, budući da isti imaju značajna obilježja javnog dobra, a problematika se proteže od elemenata pretfaze privatizacije i učvršćivanja tržišne pozicije objekta privatizacije do brige za kreaciju preduvjeta za uspješno ostvarivanje mikro-konkurentnosti u samom sektoru te institucionalnog okruženja za unapređenje rasta i konkurentnosti.*

***Ključne riječi***: *ekonomski učinci, privatizacija, poduzetništvo, javno dobro, javne usluge, pomorsko-putnički promet*

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ORIGINAL SCIENTIFIC PAPER
IZVORNI ZNANSTVENI RAD

# CAPITAL REVERSALS AND EXCHANGE MARKET PRESSURE: EVIDENCE FROM THE AUTOREGRESSIVE DISTRIBUTED LAG (ARDL) BOUNDS TESTS

### ABSTRACT

*This article examines the relationship between capital reversals and exchange market pressure in Turkey within an autoregressive distributed lag (ARDL) bounds testing and Granger causality framework using monthly data from 1991:12 to 2006:08. The results suggest that capital reversals are in a long-run equilibrium relationship with exchange market pressure. Granger causality tests indicate that there exists short-run and long-run causality running from capital reversals to exchange market pressure, but not vice versa. These findings lend empirical support to the Sudden Stop theory.*

## I.  INTRODUCTION

It is widely acknowledged that the IMF-led financial liberalization policies have exposed emerging market economies to short-term speculative capital movements and to currency crises. The mechanisms through which a sudden stop or reversal in capital flows may lead to a currency crisis have been explained through the sudden stop theory suggested by Calvo (1998) and Calvo et *al*. (2003). Despite the developments on the theoretical front and substantial policy interest, there is surprisingly little empirical literature testing the validity of the sudden stop hypothesis in emerging markets. The related empirical literature has documented evidence of the role played by capital flows in the upsurge of currency crises (See, for example, Kaminsky and Reinhart, 1999; Gazioglu, 2003; Komulainen and Lukkarila, 2003). However, no study to date has focused on the direct causal effects of capital reversals on exchange market pressure.

The present article aims at filling this gap in the literature through investigating the validity of the sudden stop theory in Turkey. In addition, it offers a contribution to the existing literature on the methodological front by applying the autoregressive distributed lag (ARDL) bounds testing procedure (Pesaran, *et al*. 2001) to investigate the short-run and long-run causal effects of capital reversals on exchange market pressure (hereafter EMP), which has not been done to date. This is a novel approach as the ARDL methodology allows inclusion of a stationary, $I(0)$ EMP index in the analysis while the conventional cointegration techniques can only accommodate $I(1)$ series.

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It has been widely argued that Turkish economy became vulnerable to speculative pressure and currency crises after liberalizing capital flows in August, 1989 (See, for instance, Yeldan 1998, Alper 2001, Ekinci 2002). Indeed, thereafter, Turkish economy experienced currency crises in 1994 and 2001, as well as a number of unsuccessful speculative attacks which where fended off by the intervention of the Turkish Central Bank. The present article studies the Turkish experience with capital outflows for three reasons. First, it is a small open economy in which world prices and global monetary conditions can be taken as given. This is an assumption underlying most of the theoretical speculative attack models in the literature and makes Turkey a case study representing other emerging market economies. Second, the Turkish economy is unique case as the sample period includes various unique types of exchange rate regimes. In particular, the currency crisis of 1994 differed from the crises experienced in other emerging economies as it erupted in midst of a managed-float, rather than a pegged exchange rate regime. Third, over 60% of the capitalization of the Istanbul Stock Exchange (ISE) is owned by the foreigners.[2] Therefore, the economy is highly sensitive to capital reversals. From a policy perspective, an econometric analysis of such an economy could offer policy implications not only for Turkish policy-makers, but also for their peers in other emerging economies as the crises are known to have spillover effects in global financial markets.

The rest of the article is structured as follows. The next section will provide the theoretical framework of the study. Section III will introduce the data and explain the empirical methodology. Section IV will point out the conclusions and the policy implications that emerge from the analysis.

## II. THEORETICAL FRAMEWORK

The empirical application in the present article is based on the parsimonious sudden stop model introduced by Calvo (1998). The model lays out basic mechanisms, whereby a sudden stop and/or a reversal in capital flows may trigger speculative attacks which, in turn, may lead to currency crises. The model suggests the following accounting identity in a non-monetary economy:

$$KI = CAD \qquad (1)$$

where *KI* and *CAD* stand for capital inflows and current account deficit in tradable goods, respectively. The following identity holds for both a monetary and non-monetary economy:
$$CAD = AD - GNP = DT - GDPT - NFTA \qquad (2)$$

where *AD, DT, GNP, GDPT,* and *NFTA* are, respectively, aggregate demand, demand for tradables, gross national product, gross domestic product of tradables and net factor transfers abroad. During a capital inflows episode, *KI* increases sharply. By Equation 1, this leads to an increase in *CAD*. Therefore, a sudden stop in *KI* causes a sudden contraction in *CAD* which, by Equation 2, can be accommodated by lowering the demand for tradable goods with no output cost. However, given the real exchange rate, lower *DT* is likely to be accompanied by a lower demand for nontradable goods, *AD - DT*. If it is assumed that prices are flexible, then a decline in the relative price of non-tradables with respect to tradables leads to an increase in real exchange rate. Since a sudden stop is largely unexpected, loans to the non-tradable sector such as real estate extended under the assumption that previous relative prices would remain

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[2] See Berument et al (2007).

constant could become non-performing, leading to possible bankruptcies. The model also suggests an account of the monetary economy as:

$$KI = CAD + RA \qquad (3)$$

where *KI, CAD* and *RA* stand for capital inflows, current account deficit and for accumulation of international reserves per unit of time, respectively. A slowdown in capital inflows and the output/credit collapse associated with this are mitigated by the Central Bank through exhausting international reserves. However, Calvo (1998) argues that this may not be the case in practice. He points out the following central bank balance-sheet identity (in terms of tradable goods):

$$R = H - NDA \qquad (4)$$

where *R, H* and *NDA* denote, respectively, international reserves, high-powered money, and net domestic assets (the central bank's certificates of deposit and net worth, and government's deposits at the central bank). Calvo (1998) explains that, in practice, *R* is likely to increase as a result of the expansion in *H* and certificates of deposit, but also as a result of an increase in government deposits. In case of an endogenous fall in *KI*, the economy would go through the same type of adjustment as in the non-monetary case if the central bank sticks to its reserves. Calvo (1998) explains that a capital inflows slowdown causes an increase in domestic interest rates. Thus, the central bank has to increase *NDA* (through a discount window, for example) to cushion the interest rate rise. Keeping international reserves constant, a higher *NDA* results in an increase in *H*, and in a devaluation, i.e., a rise in the nominal exchange rate. In order for the mechanism to work, the central bank will have to intervene in the foreign exchange market and release international reserves. This mechanism makes the central bank vulnerable to a speculative attack if there is a commitment to a fixed or semi-fixed exchange rate. Reserve-loss policies induce a further flight from domestic assets. This is because, as soon as the public perceives the trouble, they will lower their demand for assets denominated in domestic currency. The rush out of domestic currency assets exacerbate the fall in *KI* and lead to further pressure in the exchange market.

### III. DATA AND METHODOLOGY
### III.I. DATA

The present study employs seasonally-unadjusted monthly data spanning the period 1991:12-2006:08. The series have been obtained from IMF International Financial Statistics Database of the IMF, and the Central Bank of the Republic of Turkey Electronic Data Delivery System and have been transformed into logarithms. Appendix I gives detailed information about the sources of the data.

### III.I.I EXCHANGE MARKET PRESSURE INDEX

In a floating exchange rate regime, EMP is measured easily because the exchange rate change fully reflects the pressure on the exchange rate. However, in the case of a pegged exchange rate, the exchange rate change alone does not sufficiently reflect the pressure. In this case, speculative attacks on the exchange rate will be reflected through the action taken by the

monetary authorities. For instance, in order to prevent depreciation of the currency, the central bank may either sell international reserves and/or increase the interest rates.

Eichengreen et *al*. (1995) suggests a model-independent EMP index which is applicable under all exchange rate regimes. The index consists of weighted average of normalized changes in the exchange rate, the ratio of international reserves to M1, and the nominal interest rates. The EMP in period *t* is calculated as follows:

$$EMP_t = \alpha\Delta e_t + \beta\Delta(i_t - i^*_t) - \gamma\Delta(r_t - r^*_t) \tag{5}$$

where $\alpha$, $\beta$ and $\gamma$ are the weights which, are the inverse of the standard deviation of $e_t$, $(i_t - i^*_t)$ and $(r_t - r^*_t)$, respectively. They are used to equalize the volatilities of the three components and to prevent the component with the highest volatility from dominating the index (Eichengreen et *al*. 1995). $\Delta$ denotes monthly percent change. $e_t$ denotes the equally weighted Turkish lira/Deutsche mark[3]-Turkish lira/US dollar nominal exchange rate basket, *i* denotes the domestic interest rate (3-month deposit rate)[4], $i^*_t$ corresponds to the same variable but for the US (3-month US T-Bill rate). $r_t$ denotes the ratio of international reserves (net of gold) to M1 for Turkey and, $r^*_t$ denotes the same ratio for the US. A positive value of the index indicates a increased pressure in the exchange market that can stem from any combination of a devaluation, an expansion of the interest rate spread, or a loss of international reserves.

### III.I.II. EXPLANATORY VARIABLES

Two series are calculated to proxy for short-term capital reversals. The first one (KO1) is a broad measure and involves the measure of capital inflows suggested by (Saxena, 2004). It is calculated as:

*KO1= -(FA + NEE)*

where FA and NEE denote, respectively, the financial account and net errors and omissions in the balance of payments accounts.

The second series (KO2) is a narrow measure of capital outflow suggested by (Alper and Saglam, 2001). It is calculated as:
*KO2= -(PI+OSTC)*

where *PI and OSTC* denote the portfolio investment and the other short-term capital in the balance of payments accounts.

Based on the theoretical framework presented in Section II, an increase in KO1 and KO2 are expected to cause an increase the EMP, higher values of which reveal a greater pressure on the domestic currency that can be signaled by a nominal depreciation or a successful defense where the exchange rate remains unchanged but the monetary authorities deter an attack by a combination of interest rate increases and foreign market interventions.

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[3] For the sake of consistency, we consider Deutsche mark for the whole period under study and use the official fixed parity (1 euro = 1.95583 Deutsche mark) to recalculate Turkish lira/Deutsche Mark exchange rate.
[4] 3-month deposit rate has been used as a proxy for short-term interest rates for Turkey as 3-month T-Bill rates are not available for Turkey.

### III.II. METHODOLOGY

In order to investigate the long-run equilibrium relationship between *EMP* and the capital reversal variables, *KO1* and *KO2*, the ARDL bounds test (Pesaran et *al*, 2001) is applied. One of the advantages of the ARDL bounds test is that it yields valid results regardless of the orders of integration of the underlying variables provided that they are not *I(2)* or higher (Pesaran et al, 2001). The ARDL model takes into account a one-period lagged error correction term, which does not have restricted error corrections. Hence, it involves estimating the following Unrestricted Error Correction Model (UECM):

$$\Delta EMP = \alpha_o + \alpha_1 t + \sum_{i=1}^{m} \alpha_2 \Delta EMP_{t-i} + \sum_{i=0}^{m} \alpha_3 \Delta KO1_{t-i} + \alpha_4 EMP_{t-1} + \alpha_5 KO1_{t-1} + \eta_i \qquad (6)$$

where *t* is time trend variable. On the other hand, η and μ are error terms in the models. The first part of both equations with $\alpha_2, \alpha_3$ and $\beta_2, \beta_3$ represents the short-run dynamics of the models whereas the second part with $\alpha_4, \alpha_5$ and $\beta_4, \beta_5$ represent the long-run phenomenon. The null hypothesis is $\alpha_4 = \alpha_5 = 0$, which means the non-existence of the long-run relationship and vice versa.

The ARDL model testing procedure starts with conducting the bounds test for the null hypothesis of no cointegration. The calculated statistics are compared with the critical value tabulated by Pesaran *et al*. (2001). If the test statistic exceeds the upper critical value, the null hypothesis of no long-run relationship can be rejected regardless of whether the underlying orders of integration of the variables are *I(0)* or *I(1)* . Similarly, if the test statistic falls below the lower critical value, the null hypothesis is not rejected. However, if the sample test statistic falls between these two bounds, the result is inconclusive. The model can be selected using the lag length criteria like Schwartz-Bayesian Criteria (SBC) and Hannan-Quinn (HQ) information criterion.

The third stage includes conducting standard Granger causality tests augmented with a lagged error-correction term. The Granger representation theorem suggests that there will be Granger causality in at least one direction if there exists co-integration relationship among the variables provided the variables are integrated order of one. Engle-Granger (1987) cautioned that if the Granger causality test is conducted at first difference through vector auto regression (VAR) method than it will be misleading in the presence of co-integration. Therefore, an inclusion of an additional variable to the VAR method such as the error-correction term would help us to capture the long-run relationship. To this end, an augmented form of Granger causality test is involved to the error-correction term and it is formulated in a bi-variate *p*th order vector error-correction model (VECM) which is as follows:

$$\begin{bmatrix} \Delta EMP_t \\ \Delta KO1_t \end{bmatrix} = \begin{bmatrix} k_1 \\ k_2 \end{bmatrix} + \sum_{i=1}^{p} \begin{bmatrix} d_{11}(L) & d_{12}(L) \\ d_{21}(L) & d_{22}(L) \end{bmatrix} \begin{bmatrix} \Delta EMP_{t-i} \\ \Delta KO1_{t-i} \end{bmatrix} + \begin{bmatrix} \gamma_1 ECT_{t-1} \\ \lambda_1 ECT_{t-1} \end{bmatrix} + \begin{bmatrix} C_1 \\ C_2 \end{bmatrix} + \begin{bmatrix} \eta_1 \\ \eta_2 \end{bmatrix}$$

$$(7)$$

where Δ is a difference operator, ECT representing the error-correction term derived from long-run co-integrating friendship via ARDL model, C (i = 1, 2) is constant and η(i = 1, 2) are serially uncorrelated random disturbance term with zero mean. The significance of the

differenced explanatory variables based on F-statistics indicates the existence of short-term causal effects, whereas, the significance of the estimated lagged error correction term ($ECT_{t-1}$) based on t-statistics indicates the existence of a long-term relationship (Narayan and Smyth, 2004). The rejection of the null hypothesis under investigation by both the F-value and the t-value would indicate that the explanatory variable Granger causes the explained variable both in the long-run and the short-run.

## IV. Empirical Results

In order to make sure that all series are either $I(0)$ or $I(1)$, Augmented Dickey–Fuller (ADF) and more powerful Phillips–Perron (PP) tests are used. In the tests, the lag length and the bandwith are selected with Akaike Information Criterion (AIC) and the Newey-West Bartlett kernel, respectively. Table 1 reports the results of the unit root tests. Two tests generally seem to yield conclusive evidence that the series are stationary, i.e. $I(0)$. The tests give conflicting results in the case of KO2, possibly due to the differences in the powers of the tests and to the arbitrary nature of lag length selection criteria (Bender et al, 2006). However, the ARDL bounds test is applicable as it yields consistent estimates of the long-run coefficients that are asymptotically normal regardless of whether the underlying variables are $I(1)$ or $I(0)$ (Pesaran et al, 2001).

**Table 1.**
**ADF and PP Tests for Unit Root**

| Statistics (Levels) | EMP | Lag | KO1 | Lag | KO2 | Lag |
|---|---|---|---|---|---|---|
| $\tau_T$ (ADF) | -8.83* | (1) | -3.58** | (2) | -2.11 | (11) |
| $\tau_\mu$ (ADF) | -8.44* | (0) | -3.21** | (2) | -1.57 | (11) |
| $\tau$ (ADF) | 7.10* | (0) | -2.78* | (2) | -0.12 | (11) |
| $\tau_T$ (PP) | -9.95* | (4) | -7.99* | (7) | -14.60* | (2) |
| $\tau_\mu$ (PP) | -9.98* | (4) | -7.21* | (7) | -13.14* | (7) |
| $\tau$ (PP) | -10.01* | (4) | -6.45* | (7) | -7.82 | (8) |
| Statistics (First Differences) | | | | | | |
| $\tau_T$ (ADF) | -8.69* | (8) | -16.86* | (1) | -9.52* | (10) |
| $\tau_\mu$ (ADF) | -8.32* | (3) | -16.91* | (1) | -9.55* | (10) |
| $\tau$ (ADF) | -6.97* | (3) | -16.96* | (1) | -9.57 | (10) |
| $\tau_T$ (PP) | -58.87* | (75) | -27.52* | (9) | -123.63* | (74) |
| $\tau_\mu$ (PP) | -55.13* | (74) | -27.65* | (9) | -122.89* | (174) |
| $\tau$ (PP) | -52.34* | (74) | -27.68* | (9) | -126.20* | (174) |
| Decision | I(0) | | I(0) | | I(0) | |

Notes: $\tau_T$ represents the most general model with a drift and trend; $\tau_\mu$ is the model with a drift and without trend; $\tau$ is the most restricted model without a drift and trend. Numbers in brackets are the lag lengths and the bandwidths. *, ** and *** denote rejection of the null hypothesis at the 10%, 5% and 1% levels respectively.

As Pesaran et al. (2001) suggests, the ARDL bounds tests have non-standard distributions. Therefore, the estimated ARDL test statistic is compared to two asymptotic critical values reported in Pesaran et al. (2001) rather than the conventional critical values. Pesaran et al. (2001) discuss five cases with different restrictions on the trends and intercepts and estimate

critical bounds. The present study considers three of these cases. Table 2 shows the asymptotic critical values reported in Pesaran et *al*. (2001).

**Table 2.**

### Critical Value Bounds for ARDL Test

|        | 0.10 | | 0.05 | | 0.01 | |
|--------|------|------|------|------|------|------|
| Case   | I(0) | I(1) | I(0) | I(1) | I(0) | I(1) |
| $F_\eta$ | 3.17 | 4.14 | 3.79 | 4.85 | 5.15 | 6.36 |
| $F_\theta$ | 3.38 | 4.02 | 3.88 | 4.61 | 4.99 | 5.85 |
| $F_\pi$ | 4.19 | 5.06 | 4.87 | 5.85 | 6.34 | 7.52 |
| $t_\eta$ | -2.57 | -3.21 | -2.86 | -3.53 | -3.43 | -4.10 |
| $t_\pi$ | -3.13 | -3.63 | -3.41 | -3.95 | -3.96 | -4.53 |

*Source: Pesaran et al. (2001): pp. 300-304.*

If the test statistic is above an upper critical value, the null hypothesis of no long-run relationship can be rejected regardless of the orders of integration of the underlying variables. The opposite is the case if the test statistic falls below a lower critical value. If the sample test statistic falls between these two bounds, the result is inconclusive. Table 3 reports the results of equations 6 and 7 for each of the hypothesized relationships. The representation of the tested hypotheses is such that $F_{EMP}$ (EMP|KO1) denotes the null hypothesis $H_0$: $\sigma_{1EMP} = \sigma_{2EMP} = 0$, where KO1 is a long-run forcing variable for EMP, whereas, $F_{KO1}$ (KO1|EMP) represents the opposite case where the null hypothesis is $H_0$: $\omega_{1KO1} = \omega_{2KO1} = 0$, i.e. EMP is a long-run forcing variable for KO1. In each case, the optimum lag length (*p*) selection is based on minimizing Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC).

**Table 3.**

### ARDL Bounds Test

| Hypothesis | *p* | With Deterministic Trends | | | Without Deterministic Trend | | Conclusion |
|---|---|---|---|---|---|---|---|
| | | $F_\theta$ | $F_\pi$ | $t_\pi$ | $F_\eta$ | $t_\eta$ | $H_o$ |
| EMP and RER | (1) | | | | | | |
| $F_{EMP}$ (EMP|KO1) | | 19.61 * | 16.91 * | -8.92 * | 18.54 * | -8.47 * | Reject |
| $F_{KO1}$ (KO1|EMP) | | 13.04 * | 10.84 * | -5.61 * | 12.36 * | -5.35 * | Reject |
| EMP and BSFI | (1) | | | | | | |
| $F_{EMP}$ (EMP|KO2) | | 24.56 * | 14.55 * | -8.71 * | 20.30 * | -8.36 * | Reject |
| $F_{KO2}$ (KO2|EMP) | | 16.89 * | 20.51 * | -9.43 * | 15.08 * | -8.03 * | Reject |

Notes: * indicates that the statistic lies above the 0.05 upper bound.

Results suggest the rejection of the null hypothesis of no long-run relationship in each case regardless of whether is the dependent variable or not. Therefore, it is concluded that EMP is in a long-run equilibrium level relationship with both KO1 and KO2 over the sample period. However, as far as a causal relationship is concerned, this is only a necessary but not a

sufficient condition (Morley, 2006). Groenewold and Tang (2007) suggest that Granger causality tests are applicable regardless of the orders of integration of the underlying variables if it has been established that there exists a long-run equilibrium relationship between the underlying series. Therefore, the existence of the causal relationship is tested using Granger causality tests. Table 4 summarizes the result of the short-run and long-run Granger causality tests within the VECM. Rather than following the mainstream lag length selection criteria, VECMs are estimated for up to 4 lags to make sure that the results are not sensitive to the choice of the lag length (See Katircioglu, 2009). VECMs satisfy the diagnostic tests for serial correlation, functional form misspecification, non-normality and heteroscedasticity[5].

**Table 4.**

**Results of Granger Causality Tests based on VECM**

| Direction of Causation | $p=1$ | | $p=2$ | | $p=3$ | | $p=4$ | |
|---|---|---|---|---|---|---|---|---|
| | α | $ECT_{t-1}$ | α | $ECT_{t-1}$ | α | $ECT_{t-1}$ | α | $ECT_{t-1}$ |
| (1) KO1 →EMP | -0.70* (-7.98) | 0.00* (-26.47) | -0.70* (-6.67 | 0.00* (16.11) | -0.66* (-5.53) | 0.00* (11.92 | -0.63* (-4.70) | 0.00* (9.29) |
| (2) EMP →KO1 | -0.05 (-1.44) | 15.49* (9.11) | -0.04 (-1.12) | 43.23* (13.54) | -0.07 (-1.63) | 68.58* (9.82) | -0.08 (-1.61) | 61.82* (7.63) |
| (3) KO2 →EMP | -0.28* (-4.54) | 0.00* (9.80) | -0.04 -1.90 | 0.00* 6.22 | -0.59* (-5.23) | 0.00* 10.60 | -0.48* (-4.24) | 0.00* 8.23 |
| (4) EMP →KO2 | -0.53* -6.45 | 65.82* 23.14 | -0.63* (-6.40) | - 78.77* (19.50) | -0.03 (-0.81) | 43.84* (9.90) | -0.17 (-2.14) | 49.06* (10.01) |

Note: [*] denotes statistical significance at the 1% level. Numbers in brackets are the estimated F-statistics and t-statistics for the coefficients δ and φ, respectively. *p* denotes the lag length.

From the coefficients of the differenced explanatory variables, the magnitude and the direction of the causal relationship between the explained and the explanatory variables can be identified (Groenewold and Tang, 2007). On the other hand, the magnitude of the error correction term ($ECT_{t-1}$) indicates the speed of adjustment from a short-run disequilibrium. The results obtained from the Granger causality tests based on VECM reported in Table 4 indicates that the tested hypotheses (1) and (3) are rejected at 1% level with the signs of the coefficients in line with what the Sudden Stop theory suggests. These findings are generally consistent in different lag levels. An examination of the magnitude of the coefficients suggests that the causal effects are similar on both cases. The coefficients of the lagged error correction terms are also significant at the 1% level with a negative sign, which confirms the findings from the ARDL bounds test that there exists a long-run equilibrium relationship between EMP and the two proxies of capital outflows. In all three cases, the coefficient of the lagged error correction term is quite high, which suggests that convergence to the long-run equilibrium path following a shock is fast. Results indicate evidence of reverse causality only in the case of hypothesis (4) at lag levels 1 and 2.

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[5] Results of the diagnostic tests are not reported to preserve space. However, they are available from the author upon request.

# V. CONCLUSIONS

There has been growing interest in the causal effects of capital reversals and EMP especially with the developments on the theoretical front. This article, for the first time, examined short-run and long-run causal effect of capital reversals on exchange market pressure in Turkey. The results suggested that capital reversals and EMP are in a long-run equilibrium relationship and that, capital reversals Granger-cause EMP both in short-run and long-run. Overall, the findings lend support to the sudden stop hypothesis based on the case of Turkey. These results are also consistent with the findings of several earlier studies on the root causes of currency crises in Turkey such as Kibritcioglu et al. (1998), Gazioglu (2003) and Ghoshal (2006) who suggest that the currency crises in Turkey were, among other factors, a consequence of short-term capital movements. The policy implication that emerge from the analysis is clear: Practitioners and policy makers should closely monitor the capital movements for any sign of reversals, whereas governments should not rely on hot money in their long-term plans, particularly for financing deficits as any unanticipated reversal in capital flows would cause an increase in the exchange market pressure, the excess of which would result in a currency crisis.

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## Appendix I. Sources of Data Used in Estimations

| Data | Source |
| --- | --- |
| M1 | IFS line 34 |
| M2 | IFS line 35LZF |
| Real effective exchange rate | CBRT |
| Turkish lira-Deutsche mark exchange rate | CBRT |
| Turkish lira-euro exchange rate | CBRT |
| Turkish lira-US dollar exchange rate | CBRT |
| 3-month deposit rate | IFS line 60LZF |
| 3-month US T-Bill rate | IFS line 60CS |
| US M1 | IFS line 34 (interpolated from quarterly series) |
| International reserves | IFS line 1LD |
| US international reserves | IFS line 1LD |
| Bank Deposits | IFS line 24+25 |
| Credits to Domestic Private Sector | IFS line 32DZF |
| Foreign Liabilities of Banks | IFS line 26C |

Data Sources Key:

CBRT EDDS: The Central Bank of the Republic of Turkey Electronic Data Delivery System

IFS: International Financial Statistics Database of the IMF

TT: The Undersecretariat of the Turkish Treasury Web Site (www.hazine.gov.tr)

## PAD VRIJEDNOSTI KAPITALA I PRITISAK TRŽIŠTA VALUTA: NALAZ GRANIČNOG TESTA AUTOREGRESIJSKOG MODELA S DISTRIBUIRANIM VREMENSKIM POMAKOM

### *SAŽETAK*

*Članak proučava vezu između pada vrijednosti kapitala i pritiska tržišta valuta u Turskoj u okviru graničnog testiranja autoregresijskog modela s distribuiranim vremenskim pomakom (ARDL) i Grangerove kauzalnosti uz pomoć mjesečnih podataka od 1991:12 do 2006:08. Rezultati pokazuju da se i kapitala nalaze u dugoročnoj ravnoteži s pritiskom valutnog tržišta. Granger testovi kauzalnosti ukazuju na to da postoji kratkoročna i dugoročna kauzalnost koja se kreće od pada vrijednosti kapitala u smjeru pritiska valutnog tržišta ali ne i obrnuto. Takav nalaz empirijski podupire teoriju naglog zastoja.*

***Ključne riječi:*** *pad vrijednosti kapitala, pritisak valutnog tržišta, Turska, ARDL (autoregresijski model s distribuiranim vremenskim pomakom)*

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# TRAINING IMPACT ON EMPLOYEE'S JOB PERFORMANCE: A SELF EVALUATION

### ABSTRACT

Nurturing a high-quality, knowledgeable and innovative human capital with strong moral and ethical values has become a new source of driving the nation's productivity growth and competitiveness. Therefore, Human Resource Development Council (HRDC) was established in 1992 to generate lifelong learning in workplace setting to improve labor productivity, technology transfer and innovation. In 2002 it was renamed as Human Resource Development Limited (HRDL). All registered employers with HRDL are eligible for the employees training grants. The total approved training places and disbursement of training grants had increased over the years. This paper investigates to what extent the training programs improve employee knowledge, skills, works behavior and job performance, and what are the significant training related factors influencing job performance. The paper is based on data collected through self-reported survey on 1200 employees (458 responded) at hotels, resorts and ICTs companies in four selected states. Out of the responses, 73 percent attended various training programs coordinated by HRDL. The result shows that, in general, the training programs improve knowledge, skills and positive work behavior of employees. Multiple linear regression analysis supports the hypothesis that training related variables have positive impact on employees' job performance except cognitive competence.

## 1.   INTRODUCTION

Malaysia is moving up the competitiveness rankings by seven spots to the 25th place in the Growth Competitiveness index in 2005, as compared to 2004. In terms of the Business Competitiveness Index, Malaysia's ranking moved upward to $20^{th}$ place. Malaysia also places 26th in the World Economic Forum's (WEF) Global Competitiveness Index (GCI) rankings for 2006 (Claros et. al 2007; Porter, Schwab and Martin 2006;  Claros, Porter and Schwab 2005). Currently Malaysia has moved up to the $19^{th}$ place in the World Competitiveness Yearbook 2008 published by the International Institute for Management Development (IMD) based in Switzerland (IMD, 2008).  The competitiveness of nation and companies in the knowledge-based economy today lies more on their knowledge and intellectual capital than on other resources as mentioned in the Ninth Malaysia Plan 2006-2010 (Malaysia 2006). Local researchers (such as Fong Chan Ong, 2006; Kanapathy, 1997; Tan and Gill, 2000) have recognized that knowledge workers are the most critical element in developing advance technologies, improving productivity and continuing to attract foreign direct investment

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(FDI). These circumstances point to the importance of human resources as factors of investment, economic development and as key element of competitiveness (Garelli, 2002). Therefore, the priority efforts must be given to develop high-quality, knowledgeable and innovative human capital with strong moral and ethical values to perform tasks efficiently and effectively (Prime Minister's Department, 2008). With regards to the above, the private sector employers are encouraged to retrain and upgrade the skill of their employees. Human Resource Development Limited (HRDL) was set up as a mechanism for stimulating and strengthening organizational learning culture among private companies in Malaysia. This article addressed two main questions. First, does training programs improve knowledge, skills and work behavior of the participant? Second, does training affect on job performance?

## 2. HUMAN RESOURCE DEVELOPMENT FUND (HRDF)

Human resource development (HRD) act was established in 1992 and enforced in January 1993. The enforcement of this act led to the formation of Human Resource Development Fund (HRDF) and Human Resource Development Council (HRDC) as a coordinator (HRDF, 2008). In 2002 HRDC was renamed as Human Resource Development Limited (HRDL). In the early implementation, HRD act only covered employers with 50 and above Malaysian citizen employees in the manufacturing sector. Every employer must register with HRDL and pay one percent of the monthly wages of the employee. The wages of employees are not permitted to be deducted for the payment of the levy (HRDF 2008). However with effect from January 1995, the coverage was extended to employers with 10 to 49 employee and paid-up capital of RM2.5 million and above (HRDF 2005). The establishment of the HRDL aims at upgrading the knowledge and skills of workers, equipping workers with the latest and specific skills, producing multi-skilled workers, facilitating the transfer technology, improving productivity and value-added operations, preventing worker's skills from becoming obsolete and enhancing the training culture amongst employers (HRDF, 2008).

In 2007, there was an additional sector covered under the Act, namely, the Commercial Land Transport Sector. The total number of registered employers was increased from 10,261 in year 2006 to 10,780 in year 2007 (HRDF, 2008). The total amount of levy collection also increases over the years with 23 percent of annual growth rate. In year 2008, total amount of levy collection was RM323.39 million as shown in Chart 1.



**Chart 1: Collection of the Human Resources Development Levy 2002-2008 (RM Million)**
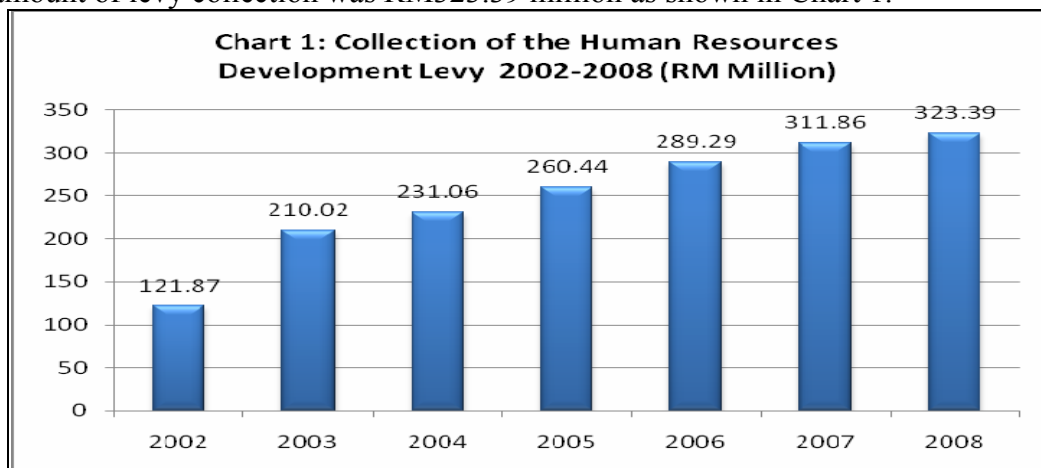
*Source:* HRDF/Human Resource Development Fund (2005, 2008).

Registered employers with HRDL and pay the levy are eligible to apply for training grants in the area of direct benefit to their employees and companies. Currently there are ten training schemes and employers are encouraged to utilize their levy payments. The training schemes consist of subsidize training scheme (SBL), Special-SBL scheme (SBL-Special),

approved training scheme (PROLUS), annual training plan scheme (PLT), training provider agreement scheme (PERLA), purchase of training aids and set up training rooms, computer based training scheme (CBT), set up computer training units, apprenticeships training scheme and joint training scheme (HRDF 2005). In term of disbursement of training grants, there was an increase of RM129.73 million (81.9 percent) from RM158.31 million in year 2002 to RM288.04 million in year 2008 (Chart 2).
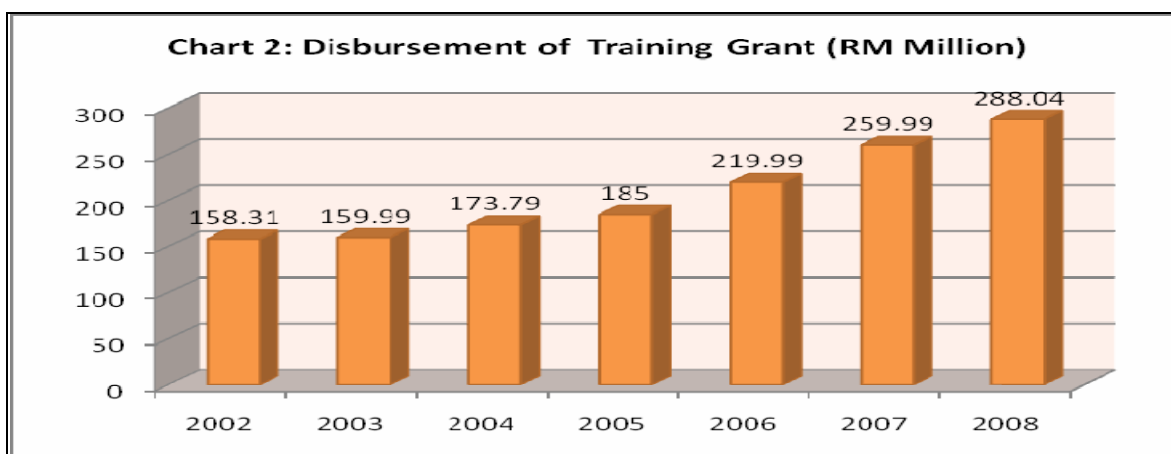


*Source:* HRDF/ Human Resource Development Fund (2005, 2008).

Chart 3 showed the total approved training places had increased 75.3 percent from 420,008 in 2002 to 736,410 in 2008. On average the annual growth rate was 10.8 percent. All registered employers are eligible to choose allowed modes of training as enterprises-based training, institution-based training, industry-managed training centers, co-operative type training and overseas training. The training programs are organized by public and private training agencies. All the training provides are monitored, coordinated and endorsed by HRDL. The numbers of registered employer, levy collection & training places in hotel and computer services sector have increase over the years as shown in Table 1.
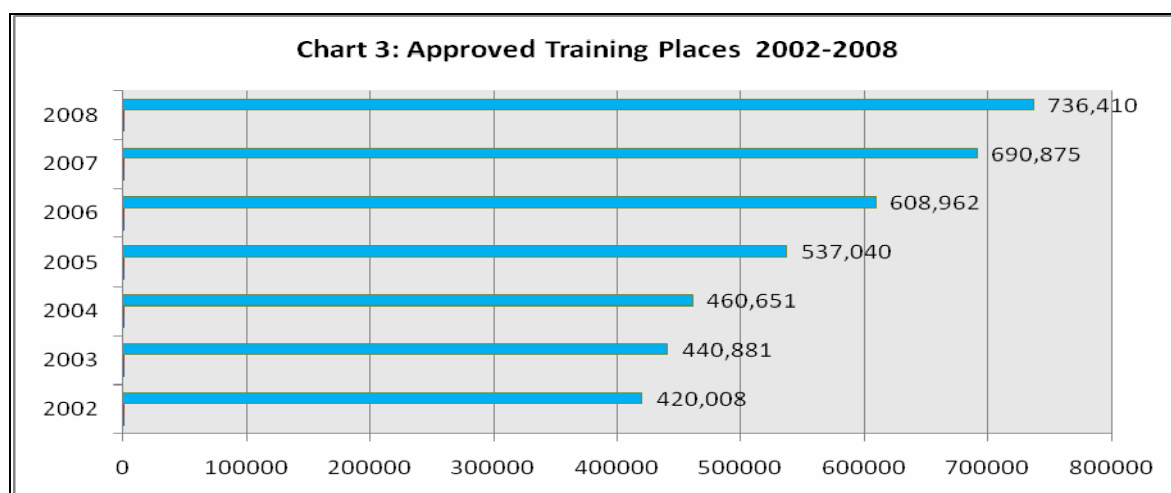


*Source:* HRDF/Human Resource Development Fund (2005, 2008).

**Table 1:**

**Numbers of Registered Employer & Training Places in
Selected Services Sector 2005 – 2007**

| Year | Levy Collection (RM) | Registered employer | Approved training places | Registeration of new employers |
|---|---|---|---|---|
| Hotel Industry | | | | |
| 2007 | 12,673,466.18 | 792 | 37,710 | 69 |
| 2006 | 11,885,679.74 | 758 | 40,870 | 27 |
| 2005 | 11,032,257.52 | 748 | 30,127 | 33 |
| Computer services industry | | | | |
| 2007 | 19,101,879.93 | 676 | 21,935 | 76 |
| 2006 | 17,997,706.94 | 641 | 17,556 | 140 |
| 2005 | 12,555,300.32 | 525 | 11,896 | 65 |

*Source:* HRDF/Human Resource Development Fund (2005, 2008).

## 3. DATA AND METHODS

A survey of hotels, resorts and ICT's employees was carried out using a structured questionnaire in four selected states (Selangor, Federal Territory, Johor and Pulau Pinang) in Malaysia. The main purpose of the survey was to collect information on the incidence and perceptions of training among multi-racial workers (Malays, Chinese, Indian & others). Data have been collected through self-reported survey on 1,200 employees (458 responded) who are attended approved training in year 2006-2008. Trained numerators distributed and collected the survey questionnaire. Out of the responses, 334 employees (72.9 percent) attended various training programs coordinated by HRDL. The survey questionnaire was adapted from the Kirkpatrik's training level (reactions, learning outcomes, behavioral changes and results) (1994) taking into account the extensive reviews of relevant research (Al-Khayyat and Elgamal, 1997; Cuthbert, 1996; Ka-shing Woo,1998; Kwan and Ng, 1999; Schmidt 1998; Smith and Wilson, 2002; Strickland, Simons, Harris, Robertson, Harford and Edwards, 2001; Tamkin, 2005; Velde and Cooper, 2000). The survey questionnaire measure the participant perceptions of the actual service and impact received after the training programs. Employees respond to item using a five point likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree).

A total of four components indicator were identified as the measurement parameters. These are training reactions, learning outcomes, behavioral changes and organizational impact in terms of employee's job performance. We have considered six subjective measures of job performance – work target, product/service quality, product/service defect, customer complaint, job hazard and equipments failure. A pilot test with a group of 20 employees was conducted in September 2008 to determine problem with the instruments. The overall Cronbach alpha ($\infty$) range of four components indicator in this study was 0.77 to 0.87. According to George and Mallery (2001) Cronbach alpha ($\infty$) 0.7 is considered acceptable, while 0.8 is good. While, the linear regression model was employed to explain employee's

job performance by personal endowments (gender, years of schooling and work experience), attributes of training reactions (training contents, financing of the training and trainers quality), learning outcomes (cognitive competencies and technical skills) and behavioral changes (work commitment and work respectfulness).

## 4. RESEARCH FRAMEWORK

A widely accepted Kirkpatrik (1994) classical model, indentified four level of training evaluation; Level One – Reaction, Level Two – Leaning, Level three – Behavior and Level Four – Result. The training system comprises of inputs, process and outcomes (Al-Khayyat and Elgamal, 1997; Barnard, Veldhuis and Van Rooij, 2001; Dumbrell, 2000; Gabbard, 1981; Gasskov, 2000; Grubb and Ryan, 1999; Hanushek, 1986, 1997, 2002; Kim and Harris, 1976; Lynton and Pareek, 2000; McCaslin, 1990; Nelson, 1993; Ziderman, 1997). Inputs of the training program consist of trainer, instructional content and training financing. The training process is the engine of the system. Here the inputs are transformed into actions and outcomes. This is where the teaching and learning occur and required knowledge, skills and behavior changes are introduced to the participants. The trainee's capabilities, personality, motivational factors, previous work experience will affect the learning process. At this stage reaction of service quality of the training program will affect the knowledge, skills and behavior changes of the participants. The main goal of training is to prepare participants for the tasks they are going to perform on their jobs (Barnard, Veldhuis and Van Rooij, 2001; Holton and Trott, 1996; Tamkin, 2005). These effects on the participant refer to the increments in knowledge, skills and attitudes that required in the workplace. The needed impact of training to the company operations is improvement in employee's job performance.

## 5. RESULT AND DISCUSSION

This section presents descriptive statistics and explains the background of respondents and HRDF training programs attended by employees in this study as shown in Table 2. More than half (56.6 percent) of the respondents are female. On average their age are 32 years (M=31.58, SD=6.970), with the eldest is 56 years and the youngest is 20 years old. The majority of the employees are Malays (52.4 percent), followed by Chinese (33.5 percent) and Indian (12.3 percent). In terms of marital status, 60.8 percent of them are married and 38.9 percent are still single.

**Table 2:**

**Employees' Demographics Profile**

|  | Frequency | Percent |
|---|---|---|
| Gender | | |
| • Male | 145 | 43.4 |
| • Female | 189 | 56.6 |
| Race | | |
| • Malay | 175 | 52.4 |
| • Chinese | 112 | 33.5 |
| • Indian | 41 | 12.3 |
| • Others | 6 | 1.8 |
| Marital status | | |
| • Bachelor | 130 | 38.9 |
| • Married | 203 | 60.8 |
| • Widow | 1 | 0.3 |
| Age | Min: 20 years<br>Max: 56 years | Avg: 32 years |

Table 3 revealed that most of the employees hold a bachelors degree, 21.0 percent of them are diploma holders and 33.5 percent have SPM or STPM. Majority of the employees have been trained at local educational and training institutions. Only 11.2 percent hold foreign academic qualifications.

**Table 3:**

**Employees' Academic Qualifications**

|  | | |
|---|---|---|
| Academic qualification | | |
| • MCE or HSC | 112 | 33.5 |
| • Diploma holder | 70 | 21.0 |
| • Bachelor degree | 140 | 41.9 |
| • Master degree | 6 | 1.8 |
| • PhD | - | |
| • Others | 6 | 1.8 |
| Type of educational institution | | |
| • Foreign educational institution | 26 | 7.8 |
| • Local educational institution | 274 | 81.2 |
| • Not mention | 37 | 11.0 |

As shown in Table 4, 13.5 percent of the employees earn less than MYR1,000 a month, 18.6 percent between MYR 1,001 and MYR 1,500, 17.4 percent between MYR 1,500 and MYR 2,000 and 24.0 percent between MYR 2,001 and MYR 2,500. Table 4 also indicates, on average their tenure in the current company is 6 years (M=5.82, SD=4.837), with the maximum 35 years service and minimum of one year. In terms of employment status 93.4 percent hold permanent posts, 3.0 percent hold a temporary posts and the rest are working on the contract basis.

**Table 4:**

**Current Salary and Employment Profile**

|  | Frequency | Percent |
|---|---|---|
| Monthly Earning | | |
| • Less than MYR1,000 | 45 | 13.5 |
| • MYR1,001 – MYR1,500 | 62 | 18.6 |
| • MYR1,501 - MYR2,000 | 58 | 17.4 |
| • MYR2,001 – MYR2,500 | 80 | 24.0 |
| • MYR2,501 – MYR3,000 | 44 | 13.2 |
| • More than MYR3,001 | 45 | 13.5 |
| Job's status | | |
| • Permanent | 312 | 93.4 |
| • Temporary | 10 | 3.0 |
| • Contract | 12 | 3.6 |
| Work experience | Min: 1 years<br>Max: 35 years | Avg: 6 years |

## Participation in HRDL Training Program

The most popular training courses are management and supervisory (36.9 percent), followed by technical skills (15.0 percent), occupational health, safety and environmental protection courses (14.0 percent) and teamwork and motivation (13.6 percent). However a few of them attended ccommunications and customer services and sales and marketing courses as shown in Table 5. Almost all employees participate in short courses (less than 3 months). However 23.8 percent of those attended management and supervisory courses for 3 – 6 months and 25 percent attended more than 6 months. The types of training schemes are presented in Table 6. Only 14.0 percent of the respondents participate in approved training scheme (PROLUS*)* and 11.0 percent annual training plan scheme (PLT). As shown in the Table 6, the subsidized training scheme (SBL) is considered as main choice of the training schemes.

**Table 5:**

**Type of Training Courses and Duration**

|  | Frequency | Percent | Duration (percent) | | |
|---|---|---|---|---|---|
|  |  |  | Less than 3 months | 3 – 6 Months | More than 6 months |
| Management and Supervisory | 111 | 36.9 | 38.8 | 23.8 | 25.0 |
| Technical skills | 45 | 15.0 | 73.3 | 6.7 | 20.0 |
| Occupational health, safety, and environmental protection | 42 | 14.0 | 95.2 | 2.4 | 2.4 |
| Teamwork & motivation | 41 | 13.6 | 92.7 | 7.3 | 0.0 |
| Communication & customer service | 26 | 8.6 | 80.8 | 15.4 | 3.8 |
| Sales and marketing | 17 | 5.6 | 70.6 | 23.5 | 5.9 |
| Others | 19 | 6.3 | 94.4 | 5.6 | 0.0 |

Notes: n=301 and missing cases = 33.

**Table 6:**

**Type of Training Scheme**

| Scheme | Frequency | Percent |
|---|---|---|
| Subsidized training scheme (SBL) | 201 | 66.8 |
| Approved training scheme (PROLUS) | 42 | 14.0 |
| Annual training plan  scheme  (PLT) | 35 | 11.6 |
| Training provider agreement scheme (PERLA) | 13 | 4.3 |
| Others | 10 | 3.3 |

Notes: n=301 and missing cases = 33.

**Effectiveness of the Training**

This section describes perception of employees towards the training programs organized by HRDL. Table 7 indicates the mean of the employees' reactions towards the training programs. The summations of the training content (M=3.662, SD=0.491) and overall financing (M=3.369, SD=0.621) of the training yielded as moderate level.  However, in terms of courses content relevancy and needed for the job were classified as high. The overall trainers quality level (M=3.757, SD=0.5334) is also high which is attributed by high score of each items under this variable.

**Table 7:**

**Level One - Training Reactions**

| | Mean | Std Deviation | Rank |
|---|---|---|---|
| Having what you need to do your job | 3.8323 | 0.6590 | High |
| A relevant of courses content | 3.8114 | 0.6130 | High |
| Suitable facilities for teaching and learning | 3.5719 | 0.7589 | Moderate |
| Does not duplicate what you learned previously | 3.4311 | 0.8663 | Moderate |
| *Overall training contents* | 3.6617 | 0.4906 | Moderate |
| | | | |
| Affordable training for employee and employers | 3.6287 | 0.7433 | Moderate |
| A costly form of training | 3.2814 | 0.8552 | Moderate |
| Received training allowances | 3.1976 | 1.0207 | Moderate |
| *Overall financing training* | 3.3693 | 0.6211 | Moderate |
| | | | |
| Effective presentation with audio visual | 3.7305 | 0.7509 | High |
| Received  good guidance from trainers | 3.7246 | 0.6903 | High |
| Well qualified trainers/ instructors | 3.8084 | 0.6750 | High |
| Industrial based  experience trainers/ instructors | 3.7665 | 0.6884 | High |
| *Overall  trainers quality* | 3.7575 | 0.5334 | High |

Notes: Mean classification: 1.00-2.32 = Low, 2.33-3.66 = Moderate, 3.67 – 5.00 = High

In terms of the learning outcomes perception, employees have high level improvement in overall cognitive competencies (M=3.8481, SD=0.5990) and overall technical competencies (M=3.704, SD=0.5850).  All items in cognitive competencies enhancement shown in Table 8

are high.  Meanwhile, only one item in overall technical competencies is classified high. However, the training program does not provide better improvement in employees capability in utilizing current technology (M=3.655, SD=0.713) adoption and application of new technologies (M=3.620, SD=0.737).

**Table 8:**

### Level 2 - Learning Outcomes

| | Mean | Std Deviation | Rank |
|---|---|---|---|
| Enhanced  understanding of job responsibilities | 3.9581 | 0.7542 | High |
| Enhanced  understanding of  task  with latest knowledge | 3.8174 | 0.7226 | High |
| Improved understanding of the subject matter | 3.8114 | 0.7536 | High |
| Received hands-on work experience | 3.8054 | 0.7640 | High |
| *Overall cognitive competencies* | 3.8481 | 0.5990 | High |
| | | | |
| Able to work independently | 3.8353 | 0.7671 | High |
| Improved ability to utilize current technology | 3.6557 | 0.7132 | Moderate |
| Facilitated adoption and application of new technologies | 3.6198 | 0.7367 | Moderate |
| *Overall technical competencies* | 3.7036 | 0.5854 | High |

Notes: Mean classification: 1.00-2.32 = Low, 2.33-3.66 = Moderate, 3.67 – 5.00 = High

There are seven items to measure behavioral changes. The mean of these items as shown in Table 9 reveals that the overall employees' level of work commitment (M=3.801, SD=0.568) and work respectfulness (M=3.745, SD=0.547) are high. Participants of the training show a high improvement in positive attitudes, work eagerness, teamwork within department and punctuality in work. Meanwhile, accuracy, thoroughness and reliability of products and services, compliance to the professional standards and respect to the top management decisions increased at same magnitude. Based on these items, it is indicated that employees have an improvement in the productive workplace behavior.

**Table 9:**

### Level 9 - Behavioral Changes

| | Mean | Std Deviation | Rank |
|---|---|---|---|
| Positive attitudes towards work | 3.8503 | 0.7071 | High |
| Enhance  work eagerness | 3.8383 | 0.6650 | High |
| Improved  teamwork collaboration | 3.8108 | 0.7859 | High |
| Improved punctuality in work | 3.7066 | 0.7213 | High |
| *Overall work commitment* | 3.8011 | 0.5681 | High |
| | | | |
| Improved in accuracy, thoroughness and reliability | 3.8473 | 0.7254 | High |
| Stronger compliance to professional standards | 3.8174 | 0.6481 | High |
| Better respect to the top management decisions | 3.7665 | 0.7266 | High |
| *Overall  work respectfulness* | 3.7448 | 0.5468 | High |

Notes: Mean classification: 1.00-2.32 = Low, 2.33-3.66 = Moderate, 3.67 – 5.00 = High

The total score for employee's job performance is obtained from the summation of responses based on all the 6 item statements shown in Table 10.  A higher score indicates a higher level improvement of employee job performance and inversely, a lower score indicates a lower level of employee job performance.  The items with highest score in job performance are

achievement in work target (M=3.754, SD=0.718) and improve product quality or service provided (M=3.716, SD=0.767) mainly within the company. However Table 10 shows reduce in product or service defects, customer complaints, job hazards and equipment failure rate exhibited a moderate level.  Although these items have slightly low mean score, the training impact for job performance (M=3.625, SD=.577) is considered moderate.

**Table 10:**
**Level 4 - Result on Employee Job Performance**

| Description | Mean | Std Deviation | Rank |
|---|---|---|---|
| Achieve work target | 3.7545 | 0.7184 | High |
| Improve product quality or service provided | 3.7156 | 0.7672 | High |
| Reduce product/service defects | 3.6228 | 0.7197 | Moderate |
| Reduce customers complaints | 3.6198 | 0.7992 | Moderate |
| Reduce job hazards | 3.6018 | 0.7980 | Moderate |
| Reduce equipments failure rate | 3.5240 | 0.7540 | Moderate |
| *Overall* | 3.6246 | 0.7745 | Moderate |

Notes: Mean classification: 1.00-2.32 = Low, 2.33-3.66 = Moderate, 3.67 – 5.00 = High

### Contribution of Training to Employee's Performance

Table 11 exhibits the result of the estimation of the regression model for training impact on job performance. The overall training impact in model 1 shows a strong statistical significance, with $\rho<0.001$ and the R-square of 0.590. The model explains 59.0 percent of the variance in job performance. Multicollinearity does not appear to be a serious concern in both models since the VIFs for these variables are below 3.0 (Hair et al., 1998). The hypothesis assumes that the training inputs, learning process and behavioral changes are significantly associated with job performance. Table 11 shows that the training inputs attributes; training content [$\beta=0.113$, $\rho<.05$], financing of the training programs [$\beta=0.122$, $\rho<.05$] and trainers quality [$\beta=0.214$, $\rho<.001$] are positively related to the dependent variable. In term of the learning process, a cognitive competence [$\rho>.05$] is insignificant. While technical skills [$\beta=0.228$, $\rho<.001$] is a significant predictor variable. Positive works related behavior mainly respect to the company management [$\beta=0.282$, $\rho<.001$] and works commitment [$\beta=0.147$, $\rho<.05$] are positive and significant predictors of employee's job performance in hotels, resort and ICT companies. In the second model, we add-in demographics factor, academic qualification and works experience.  The estimated coefficient of gender [$\beta=0.097$, $\rho<.05$] and current work experience [$\beta=0.011$, $\rho<.05$] are significant and positively related to the job performance. However, employee's age [$\beta= - 0.007$, $\rho<.01$] is significant and has an inverse related to the job performance. Meanwhile, years of schooling as proxy for academic qualification are not significant predictor of employee job performance.

**Table 11:**

**Multiple Regression Analysis of Training Impacts on Employee Job Performance**

| Independent variables | Model 1 | | | Model 2 | | |
|---|---|---|---|---|---|---|
| | β | Std. error | VIFs | β | Std. error | VIFs |
| (Constant) | -.192 | .193 | - | -.100 | .224 | - |
| Training content | .113** | .053 | 1.619 | .115** | .053 | 1.631 |
| Financing training | .122*** | .035 | 1.126 | .105** | .036 | 1.199 |
| Trainers quality | .214*** | .052 | 1.852 | .213*** | .052 | 1.860 |
| Cognitive competence | -.071 | .050 | 2.105 | -.079 | .049 | 2.113 |
| Technical skills | .228*** | .054 | 2.361 | .232*** | .053 | 2.366 |
| Respect | .282*** | .063 | 2.868 | .275*** | .063 | 2.894 |
| Work commitment | .147** | .060 | 2.722 | .160** | .059 | 2.766 |
| Gender | | | | .097** | .043 | 1.094 |
| Age | | | | -.007* | .004 | 1.095 |
| Years of Schooling | | | | .005 | .005 | 1.594 |
| Current work experience | | | | .011** | .005 | 1.611 |
| $R^2$ | .590 | | | .605 | | |
| Adjusted $R^2$ | .581 | | | .591 | | |
| F | 66.981*** | | | 44.831*** | | |
| N | 334 | | | 334 | | |

Notes: *** $\rho < .001$, ** $\rho < .05$, * $\rho < .01$; Dependent variable job performance.

## 6. CONCLUSION

Management and supervisory and technical skills are the most popular training courses. A subsidized training scheme (SBL) is considered as main choice of the training schemes. Based on participant positive reactions, the training programs were designed match with employee needs and expectation. We have found clear empirical evidence that HRDL training programs improved the knowledge, skills and work behavior of workers. However, the training has moderate impact on employee's job performance. Most of training related variables are positively and significantly associated with employees' job performance except cognitive competence.

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*UTJECAJ USAVRŠAVANJA NA UČINKOVITOST ZAPOSLENIKA: SAMOOCJENJIVANJE*

*SAŽETAK*

*Stvaranje visoko kvalitetnog, obrazovanog i inovativnog ljudskog kapitala sa snažnim moralnim i etičkim vrijednostima postaje nova smjernica rasta produktivnosti i konkurentnosti zemalja. Stoga je 1992 ustanovljeno Vijeće za razvoj ljudskih resursa (HRDC) kako bi se potaklo cjeloživotno učenje na radnom mjestu u svrhu poboljšanja produktivnosti rada, transfera tehnologije i inovacija. 2002 je preimenovano u HRDL (Human Resource Development Limited). Svi zaposlenici članovi HRDL-a mogu aplicirati za stipendiranje usavršavanja. Zadnjih godina je ukupan broj mjesta i iznosa odobrenih za financiranje usavršavanja u porastu. Ovaj rad istražuje u kojoj mjeri programi usavršavanja unapređuju znanja i sposobnosti zaposlenika te njihovo ponašanje na poslu i učinkovitost, kao i koji važni čimbenici vezani uz usavršavanje utječu na učinkovitost. Rad počiva na podacima prikupljenima anketiranjem 1200 zaposlenika (odgovorilo ih je 45.8 %) hotela, ljetovališta i ICT poduzeća u četiri odabrane države. Iz odgovora je vidljivo da je 73% zaposlenika prošlo razne programe usavršavanja koje je koordinirao HRDL. Rezultati pokazuju da, generalno gledano, programi usavršavanja poboljšavaju znanje, sposobnosti i pozitivno poslovno ponašanje zaposlenika. Višestruka regresijska linearna analiza podržava hipotezu da varijable vezane uz usavršavanje imaju pozitivan utjecaj na učinkovitost zaposlenika s izuzetkom kognitivne kompetencije.*

*Ključne riječi: usavršavanje, učinkovitost, kvaliteta zaposlenika*

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Review
Pregledni rad

# ECONOMIC IMPACT OF CRUISE TOURISM ALONG THE PAN-EUROPEAN CORRIDOR VII

***ABSTRACT***

*This paper provides some tentative estimates of the economic impact of cruise tourism in receptive countries and regions along the Pan-European Corridor VII. Examples are provided to illustrate the potential benefit to Vojvodina Region (Case study).*

*The results of the analysis have shown that the Corridor VII cruises have positive impact on Vojvodina Province, primarily the riparian area of the Danube (only Novi Sad - the "Port of Vojvodina for cruisers"). Although the benefits exclude accommodation and food expenditure, they are noticeable within the following segments: tourism promotion (broadening the scopes of Vojvodina Province as a receptive area for the foreign market through its cultural heritage and natural values); increase in foreign tourist turnover, visitor's expenditures; new job opportunities (adequate infrastructure and superstructure – rendering services to ships, crew and passengers) – harbors, carriers, souvenir shops, etc. / new products, business net, exchange money, invisible export, etc.*

*The results of the research may initiate further studies on the cause and effect connections between this type of travelling and resources of receptive countries, upon which the travels are based, both aiming at adequate design and launching of the tourist offer, i.e. the optimal development of receptive countries through sustainable tourism. Also, the discussion provides potentially useful information to the different stakeholders in the evolving cruise tourism industry, particularly regarding expected (private or social) returns on investment.*

*Key words: tourism, cruise, the Danube, Vojvodina Region, Serbia, transition, economic impact, demography.*

## 1. INTRODUCTION

Cruising is becoming a more and more popular segment of tourism (Gibson, 2006; Hobson, 1993; Peisley, 1992, 2006). According to the Cruise Lines International Association (CLIA) (CLIA, 2006a; CLIA, 2006b), the industry has experienced an average annual growth of 8.2% since 1980. This is double the long-term average growth figure of 4.1% for tourism in general (World Tourism Organisation, 2006). According to what other sources claim, cruisers are one of the leading areas of international tourism regarding the speed of development and the increase in demand – of the realised tourist flow (CLIA, 1992, 1995; Hobson, 1993). The demand for cruisers increased by 50% in the period between 1989 and 1996, and the same trend continued in the period between 1996 and 2000 (World Tourism Organization, 2003). In 1995 there were about 5.7 million tourists cruising the world. In 2000, there were about 9.6 million (Dowling, 2006), and in 2004 about 14.3 million tourists. In the first half of 2005, CLIA explained the phenomenon of global expansion of cruisers by using

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data referring to 2004, when about 30 million Americans showed interest in participating in cruising in the following three years, which could not have even remotely been predicted in 1975, when the Association was founded (CLIA, 2005a).

If we take a single bed as a parameter for the basic unit of accommodation capacity, cruisers include 0.6% of the total accommodation capacity in the world (World Tourism Organization, 2003, taken from Dowling, 2006). It is interesting to note that cruisers reached 104% of capacity utilisation, despite the fact that in 2000 the fleet of this kind of ships at global level increased by 62 new cruisers (CLIA, 2005b). It was predicted that in 2006 tourist flow will rise to 15 million tourists and in 2012, 20 million tourists on cruisers are expected (Cruise Information Service, 2005). These expectations were surpassed, at least if we take 2006 into account, with the total of 16 million registered tourists (Dowling, 2006). The same source notes that cruisers worldwide tend to reach the overall number of about 19 million tourists in 2010, which would represent the rise of 70% compared to the year 2000. This means that the number of passengers will be four times higher in the period of four years. The reasons for this are bigger ships (greater accommodation capacity / the concept of resort), as well as the increase in average age of population worldwide, apart from Asia (Dowling, 2006).

Besides the primary goal (travelling), there are many objects of nautical infrastructure included, as well as complementary products and services in the function of tourism (piers, jetties, accommodation, food, culture, entertainment, sports, recreation) (Dowling, 2006; Ivkov et al., 2007; Ward, 2005). The development of nautical tourism at a national level is by all means determined by the quality of the cruiser offer, and is further reflected onto the country's economic benefit from nautical tourism (Dragin, 2008; Dwyer, Forsyth, 1998; Dragin, Ivkov, Dragin, V; 2006).

Previously published works on cruise tourism mainly deal with the problems from the fields of sociology, i.e. anthropology and economy. The economic impact and benefits of the cruising tourism has been researched by a number of authors (Braun, Xander & White, 2002; Brida, Aguire, 2008; Chase, Alon, 2002; Dragin, 2010; Dwyer, Forsyth 1996; Foster, 1986; Hall, Braithwaite, 1990; Henthorne, 2000; Hobson, 1993; Mescon, Vosikis, 1985, Mancini, 2000). All studies concern cruising refer to trans-ocean cruises. It is rather difficult to find a research that covers the cruises along European receptive areas, especially on rivers which are becoming more and more popular way of spending free time. Moreover, almost all the published studies that deal with cruising treat tourists as their main object of interest (e.g. Armenski, Zakić & Dragin, 2009; Dowling, 2006; Hung, Petrick, 2010; Li, 2006; Petrick, 2003; Petrick, 2004; Petrick, Sirakaya, 2004).

## 2. RIVER CRUISERS

In 2003, river cruisers reached the overall number of tourists visiting of 1.3 million, which is about an 11%-rise compared to the previous year. In the development of global tourism, the Danube became a significant tourist route, which is evident in the data (Serbian Ministry of Commerce, Tourism and Services, Horwath Consulting Zagreb and the Faculty of Economics Belgrade (MHCEF), 2005) that in 2003 there were 392,766 tourists cruising the Danube (followed by the Nile with 266,978 and the Yangtze with 151,459 tourists). This tendency on the market of river cruisers is the result of high life standard of the population in certain countries (Northern, Western and central Europe and the USA), greater competition between the ships with lower prices of tourist services (e.g. ships from Russia, Ukraine, Bulgaria), segmentation of the tourist demand and supply aiming to discover new tourist activities, requirement for a safe journey (Dragin, Ivkov & Dragin, 2006). Tourist recreation

has become available to a greater number of people and it has found its role in their philosophy of life.

The greatest increase of the tourist flow of cruisers is expected in new European destinations – generating route of nautical tourism (Hungary, Romania, Slovakia, Croatia and Serbia), mostly in the Danube countries - Corridor VII. Corridor VII is defined by the European Agreement on Main Inland Waterways of International Importance. Corridor VII is the Danube river with the system of natural and artificial waterways: the Danube (E 80), canal Black Sea – Danube (between Chernovoda and Constantia) (E 80-14), arms Chilia (E 80-09) and Sulina, the Tisza in Serbia and Hungary, the Vah in Slovakia, canal Danube – Sava (E 80-10), canal Danube – Odra – Elba (in Austria, the Czech Republic, Germany and Poland) and relevant port infrastructure (www.tinavienna.at/service/upload/MoU.pdf).

## 3. THE IMPACT OF CRUISE SHIP TOURISM IN LOCAL ECONOMY

The cruises along the Corridor VII are characterised by complexity, i.e. multiplicity, which is the result of the fact that they are the object of interest and demand of tourists from a great number of countries in Central and Southeast Europe. Each one of them presupposes specific conditions of the offer and organisation as well as specific strategy of the cruise-tourism development (Dragin et al., 2007; Dragin, Đurđev & Armenski, 2008). The key generating markets of this kind of tourism are the USA, Germany, France, Great Britain and Austria (Dragin, 2010).

The aim of the paper is to explore the potential benefits for the receptive countries and regions (Case study: Vojvodina Province) by launching this tourist product to the world market. The results of the research may initiate further studies on the cause and effect connections between this type of travelling and resources of receptive countries, upon which the travels are based, both aiming at adequate design and launching of the tourist offer, i.e. the optimal development of receptive countries through sustainable tourism.

## 4. SAMPLING AND METHODOLOGY

Key countries in the itineraries are Austria, Slovakia, Hungary, Croatia, Serbia, Romania and Bulgaria. The programme as well includes border regions of Germany, Moldova and Ukraine. It is interesting that five European capitals are placed along the Corridor VII: Vienna, Bratislava, Budapest, Belgrade and Bucharest. The research consists of two segments:

*Analysis of the contribution of the Corridor VII cruises to receptive region*: The research used for this is a three-years field study (2007-2009). This was done by means of written data sources analysis, surveys, interviews with tour-operators, captains and crew, agencies, and forwarding agents. The analyses were done at following locations: ports and ships, travel agencies ("Putnik"), transportation companies ("Vojvodina" and "Putnik"), restaurants (MB "Rodic"), museums (the Museum of the City of Novi Sad), etc. (the research that is presented here is part of the project approved by the Ministry of Science of the Republic of Serbia (No. 146017d) and also a part of the doctoral dissertation defended by Aleksandra Dragin at the University of Novi Sad in 2008).

*Analysis of customers*: 151 tourists were interviewed in order to identify the motives underlying their selection of a tour along the Corridor VII (including the Vojvodina section) and to discuss their travelling experience and impressions (the attractiveness of the tour, their picture of Vojvodina before and after the trip, etc.). The research used for this is two-years field study (2007-2008) – methodology "paper, pencil and talk" (survey). The interviews with cruisers were done at "Port of Novi Sad 2". Survey on the quality of services during

cruises along the Corridor VII was done in order to comprehend the manners in which tourists experience Vojvodina. A special attention was given to questions about the travel motives, experience gained during the travel, the most attractive elements of the supply in Novi Sad within international cruises along the Corridor VII, the opinion tourists had about Vojvodina Region before and after the visit, etc.

Since the countries along the Corridor VII do not have analysis of the subject, some data has been collected from the manifests of the cruises which docked in Novi Sad, Vojvodina (2,218 of employees have been included – crew from 54 cruisers) in 2007 (nine-month field study - whole year season). The sample represents 10.4% of the total tourist flow in Novi Sad in 2007. The most widely represented cruisers are: "River Aria" (Grand Circle Travel Cruise Line, Worldwide RC Ruises), "Heinrich Heine" (Viking River Cruise), "Ms Johann Strauβ" (Austrian River Cruises), "Maxima" (Phoenix Reisen Gmbh Bonn), "Ms Victor Hugo" (L'Europe en Croisières), "River Adagio" (Grand Circle Travel Cruise Line, Worldwide RC Ruises), "Beethoven" (L'Europe en Croisières), "River Navigator" (Deluxe World Travel Vantage), "Odyssey" (Deluxe World Travel Vantage), "Erasmus" (B.V. Scheepvaart MIJ.), "Ms Artistry" (Avalon Waterways), "Amadeus" (Lüftner Reisin Austria), etc.

The basic methods used while obtaining and processing data and analysing the results are: field research (systematically observation and questioning, i.e. crew and passenger interviewing), historical method (written documents, statistical data, research of the results from similar researches etc.), statistical procession of literature and other material, quantitative and qualitative content analyses, comparative method.

## 5. DISCUSSION

The Corridor VII cruises highlight the attractiveness of Danube, Tisza and Sava basins and numerous complementary tourist values of natural and anthropogenic content. The tourist offer design emerges as one of the most important activities of tourist product designers (leading American and European tour operators). The proper design of a tourist package requires a detailed study of the market (target groups research, "innovative" destinations, redesigning of the "old" tourist offer, etc.). Therefore, the designers of the tourist products, based on the Danube river, tend to provide dynamic and stable balance of offer and demand, by fine tuning of marketing mix basic instruments to market demands; what is more, to direct the demand towards the offer through tourist communication by means of homological and analogical codes.

Tourist season is the period from March to November. The market offers different arrangements by numerous tour operators, lasting from approximately ten days up to four weeks. Tour operators are mainly from the USA (Massachusetts) – "Grand Circle Travel" and "Vantage Deluxe World Travel", California – "Viking River Cruises), from Germany ("Peter Deilmann", "Phoenix Reisen Gmbh" and "Nicko Tours") and from France ("Croisi Europe") (Dragin, Bubalo-Živkovic, Ivanović, 2009).

Tour packages offers of the Corridor VII cruises comprise various activities, among which stand the airline transport, railroad routes between the cities in the itinerary, accommodation facilities on vessels and in hotels, exclusive trips (sightseeing of the towns, vine tours, visits to castles and art colonies, etc.), cultural, educational and artistic programmes, dinner with the ship captain, additional services (e.g. information desk on the ship, sports and recreational activities, optional visits), etc. Usual capacity of ships ranges between 100 - 120 tourists (from 48 to 180 tourists).

Passenger expenditure includes that incurred as part of the cruise (port visit expenditure) and also the payment for it. Thus it includes air fares to/from the base country –

some of which will be paid to airlines owned by the country (Dwyer, Forsyth, 1996) (Figure 1). There are also travels within counties (by bus – in all counties along the Corridor VII and by train – in Romania).

**Figure 1.**

### Cruise Related Expenditures
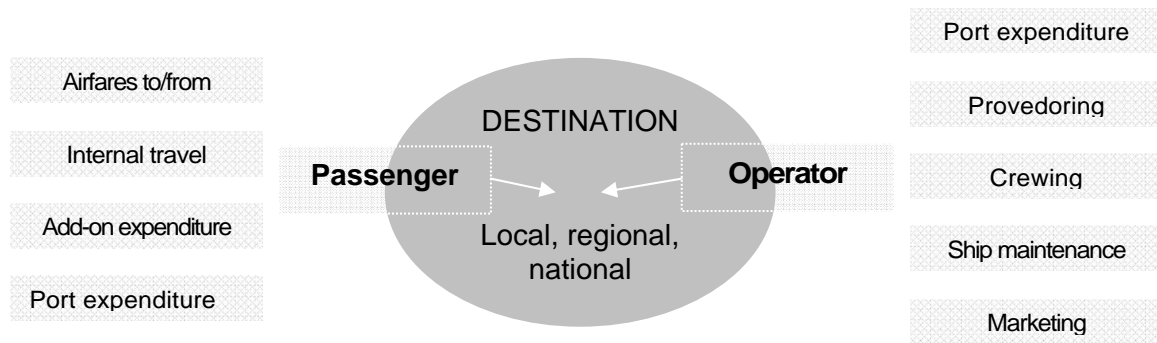


Sources: Dwyer, Forsyth, 1996; Dwyer, Forsyth, 1998

Some add-on expenditures (hotel accommodation, meals, tours & attractions in port before or after cruising) are essential for the locals. In some counties along the Corridor VII (for example in Hungary, Croatia and Romania) there are possibilities for tourists to spent some days on lend before and after cruise (in Budapest, Dubrovnik and Bucharest). Visitors also make direct expenditures on excursions, attractions and shopping, while on the cruise (Dwyer, Forsyth, 1996).

The operators (tour operators) charter the vessels; whereas tourist agencies render services to the cruise tourists on land and charter the vessels' capacities to be included in their programmes. As we mentioned, the tour operators are foreign companies. Even if a payment for a cruise is made in the base country, using its currency, this does not feature as "expenditure in the base country", since it is income payable abroad, and does not stimulate economic activity within this country. Passenger expenditures include the cost of the cruise, but this is an amount paid to a foreign company, and it is not included (Dwyer, Forsyth, 1996; Figure 1).

On the other side, tour operators make a range of payments. They pay charges associated with the use of a port (to cover the cost of navigational services of government as well as for the terminal used). The operator will purchase goods and services to provision the vassel, including stores and provedoring, fuel, waste disposal, electricity etc. There are some expenditure also for the crew - in additional, the operator will hire foreign crew (some of them are from stopover ports). Apart from these, the operator will make expenditures on ship main trance. It will also have business expenses in the base or some other country, including costs of operating an office and marketing expenditure, but excluding any marketing costs elsewhere in the world. Further, taxes may be levied on cruise operators. These include income or corporate taxes, but some operators will be exempt, due to the operations of tax agreements and nature of their cruises. There may be customs duties payable, and departure taxes may be levied. It should be noted that apart from direct taxes on cruises, there may be

indirect taxes, on such items as fuel, and it is possible that government charges for services would include a tax element (Dwyer, Forsyth, 1996; Dwyer, Forsyth, 1998; Figure 1).

Worldwide, employment within the tourism economy is estimated at 192.2 millions jobs. By 2010, this should grow to 251.6 millions jobs (World Travel and Tourism Council, 2000). "...Although tourism is a growth industry and a major creator of value added, the industry is vulnerable to a variety of economic, ecological, geopolitical and meteorological factors, and over-reliance on it can be dangerous for a country" or region. "Economic recession and the impact of natural disaster..." or military attacks can devastate the sector in a country (or in region) for several years. "One example is the war in the Balkans which has seriously reduced tourism income in the area. Events of this kind represent the extremes of a recurrent uncertainty in an industry which is characterized by the seasonal nature of many its activities and by important fluctuations even during normal periods. These factors shape the structure of the tourism labour force, making it difficult to maintain high permanent staffing levels. There is a generic tendency to operate on the basis of a core staff and to employ the labour needed for day-to-day operations under atypical contractual arrangements..." (www.ilo.org/public/english/dialogue/sector/techmeet/tmhct01/tmhct-r.pdf).

The question is: Who is being employed on the cruising along the Pan-European Corridor VII - where the crew come from? As for the country of origin, according to crew manifests from cruisers along the Corridor VII, 32 countries are present, which implies that globalization infiltrated into this segment of tourism. On the first eight positions and on the tenth are citizens of Danube countries, which we assumed even before the research. Moldova is the only Danube country that in our sample did not have a representative in the crews researched. What was not our assumption is the presence of so many nations among the crews. About 99.1% are citizens of some European country (2,199 crew members from 27 different courtiers), 0.1% come from the USA, while 0.7% are citizens of one of the three Asian countries (Table 1).

**Table 1.**

**Crew structure according to the country of origin**

| Country | in % | Country | in % |
|---|---|---|---|
| *Europe* | | *Europe* | |
| Romania | 24.5 | Norway | <0.1 |
| Ukraine | 21.9 | United Kingdom | <0.1 |
| Hungary | 14.1 | Belgian | <0.1 |
| Slovakia | 13.2 | Denmark | <0.1 |
| Bulgaria | 7.2 | Switzerland | <0.1 |
| Germany | 6.0 | Slovenia | <0.1 |
| Serbia | 4.0 | Italy | <0.1 |
| Austria | 2.0 | Portugal | <0.1 |
| the Netherlands | 1.2 | Greece | <0.1 |
| Croatia | 1.1 | *North America* | |
| France | 0.9 | USA | 0.1 |
| the Czech Republic | 0.7 | *Africa* | |
| Poland | 0.5 | Ghana | <0.1 |
| Bosnia and Herzegovina | 0.4 | *Asia* | |
| FYR Macedonia | 0.3 | Indonesia | 0.4 |
| Lithuania | 0.3 | Philippines | 0.2 |
| Russia | 0.2 | Sri Lanka | <0.1 |
| Latvia | 0.2 | | |

**Case study: Vojvodina Region**

The tourist turnover is quantitative and qualitative indicator of the supply attractiveness, that is, the recognizability of a particular tourist destination on the market. Tourist turnover is also the result of good promotional appearance of the supplier.

After the bridges on the Danube in Novi Sad were bombed in 1999, the clearance of the Danube basin in that area was commenced by the support of the European Union, the Danube Commission and Corridor VII-Management/TINA Vienna. Two new bridges were built and one pontoon bridge was constructed, with the opening schedule of three times a week to make passage for ships. Thus, the Danube was at least, even with some restrictions, made navigable again as far as to its delta in Romania. On the initiative of the Danube Tourist Commission, passenger ships did not have to pay any toll.

By the year 2004, there was only one harbour in Vojvodina (in Novi Sad) – the "Port of Novi Sad" (on the left bank of the Danube, downstream the pontoon bridge). Following the initiative of the Traffic Office in Novi Sad, the new harbour was opened for tourist vessels – "Port of Novi Sad 2" (on the right bank of the Danube, upstream the pontoon bridge). This resulted in direct access of tourist vessels that were cruising downstream from Budapest to Belgrade, and more convenient disembarking of tourists according to the itinerary, without any delays considering the opening schedule of the pontoon bridge.

In October 2005 the third bridge in Novi Sad was reconstructed – "Bridge of Freedom", and the pontoon bridge was finally removed. That meant that navigation on the Danube had been fully restored. Today, there are five piers in Vojvodina Region (four in Novi Sad, and from 2010. one pier in Apatin).

It can be noted that the number of tourists on the Corridor VII (in Vojvodina Region) is increasing every year, with the exception of 2006 and 2008 (Figure 2). The reasons can be found in the extremely high water level of the Danube in April and May 2006, due to which many cruises were, cancelled. For 2008 the reasons can be found in the world financial crisis.

**Figure 2.**
 **Total annual number of cruisers (tourists) along the Corridor VII in Vojvodina Region**
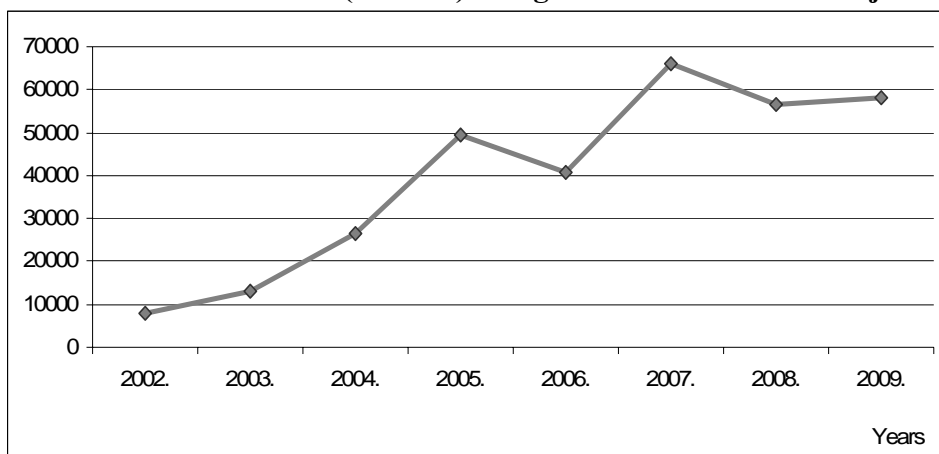


Source: Dragin, 2008; "Novi Sad" Port, 2010

Survey on the quality of services during cruises along the Corridor VII was done in order to comprehend the manners in which tourists experience Vojvodina. The survey has shown that tourists on cruises through Vojvodina are well-travelled persons. Of all the interviewees, 85.7% said that they decided to go on a cruise along the Corridor VII due to some already gained experience about this form of tourism. However, 90.5% visited Vojvodina (Serbia) for the first time, so personal experience during the tour was the only factor that helped them shape a picture about this country.

According to the initial motives, the structure of the tourists is as follows: 26.8% were attracted by the whole tour; 19.7% were motivated by the need to visit the countries specified in the itinerary; 18.8% wanted to get to know the natural treasures of the Danube region and 15.3% the cultural heritage of the region. In addition, 19.4% tourists classified their motive as "other" (cruising along the Danube, visits to local villages, home-hosted lunches, scenery of the Balkans, new experience, etc.)

About a third of all tourists thought that they would change/add something in the tour. For example, more information about the visited areas is needed before docking, more activities should be introduced inland, more excursions to rural areas should be offered, more opportunities to meet local communities are needed, etc.

The question of what it is that they liked best in Vojvodina gave rise to the following answers: architecture (24.1%), nature (17.2%), folklore (13.8%) and hospitality (13.8%). In the category "other" (20.7%) they put history, culture, friendly people, the banks of the Danube, etc. None of the interviewed tourists selected cuisine or souvenirs, which suggests that the Novi Sad (Vojvodina) supply for the Corridor VII was not adequately designed.

It should be noted that 71.4% of the interviewed did not have any objections to the Vojvodina (and Serbia) supply. The objections were primarily aimed at insufficient choice of souvenirs, inadequate quality of guidebooks, the pollution of the Danube (rubbish on the banks and floating on water), tiresome walks on the land, etc.

Around 62% of the interviewed said that the tour through Vojvodina (and Serbia) induced a positive opinion about this region (country), which can be illustrated by the following answers: "One can get the impression that Serbia is prospering and that people look content", "This is a beautiful region", "Novi Sad has an impressive architectural style and cordial people", "It would be nice to visit this region again", etc.

The negative answers (about 35%) are of the following sort: "The past of Serbia is filled too much with wars", "Novi Sad is on the long way towards the recovery from the wars", "It is difficult to communicate with the local population in English", etc. Nevertheless, all tourists who supplied negative answers would recommend this tour to their friends.

Of all interviewed tourists, 23.1% did not have a formed opinion about Vojvodina Region or Serbia before the trip. Approximately the same percentage of tourists said that the Corridor VII cruise had a positive effect on changing their view on Vojvodina and Serbia, especially the view upon Serbia's economic development.

*The benefits of cruises along the Corridor VII for the Vojvodina Region*

Cruises in Vojvodina proceed only along the Corridor VII, that are, along the Danube, and in part along the Tisza and Sava. Given what has been said so far, it follows that the Danube is the axis of international tourist cruises in this area.

**Figure 3.**
**Economic impact of cruise tourism along the Pan-European Corridor VII in Vojvodina (effects of tourist promotion and tourist turnover)**
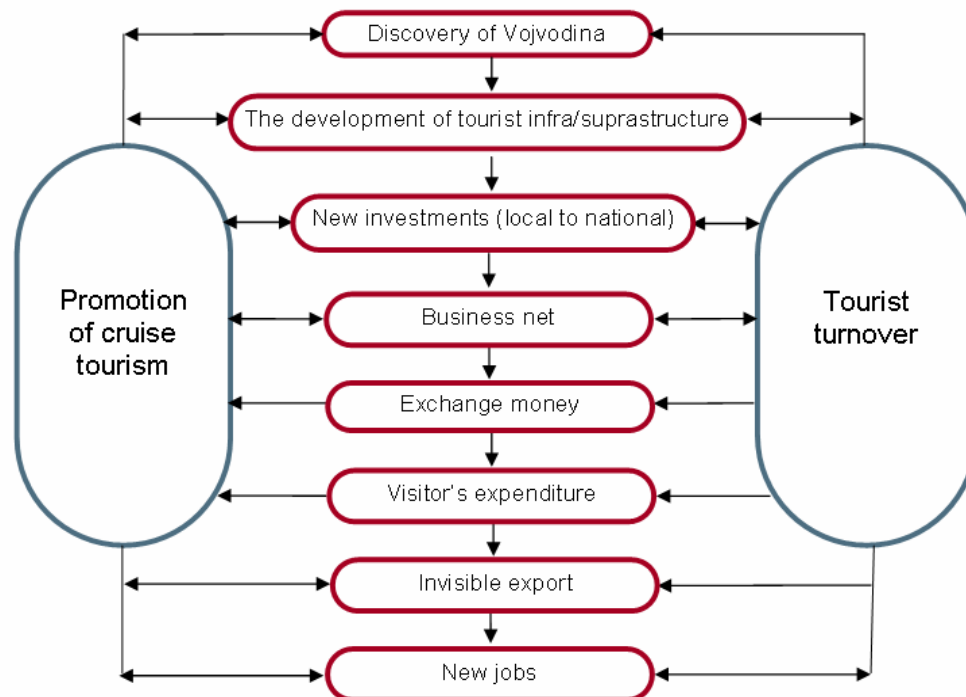


The benefits of river cruises concerning Vojvodina Province are numerous (Figure 3):

− Discovery of Vojvodina as a tourist destination for potential generating areas at the international tourist market - creation of the image of Vojvodina as an attractive receptive tourist area through the promotion and sale of tourist packages:

    o The area abundant in significant natural tourist resources (protected natural values in the Danube riparian area, national parks, etc.), attractive hydrography (canals and smaller rivers); Geo-heritage, etc.);

    o Multiethnic and multicultural features (over 24 nations);

    o Significant cultural heritage (archaeological sites, medieval fortifications, authentic urban and rural units, etc.).

− Increase in the total tourist turnover in Vojvodina Region. The share of the participants in this form of tourist activities compared to the total foreign tourist turnover in Vojvodina (Statistical Office of the Republic of Serbia, 2003-2009) in 2002 was 15.7%, in 2003 with 27.1%, in 2004 with 46.4%, in 2005 their share reached additional 70.4%, in 2006 they participated with 52.1 %, in 2007 with 67.6 % and in 2008 with 54.2 %.

− The development of tourist infrastructure and superstructure (the reconstruction of the quay in Novi Sad is in process, including the parking facilities for tourist buses, and more convenient access for tourists).

− Increase of the total expenditure through foreign tourist payments of various services:

    o Ship services – harbouring and tax;

    o Issuing passenger permits for stays in border region;

    o Shipping transport agencies;

    o Fresh drinking water services from the local water supplies in Novi Sad (Public Utility Company "Water Works and Sewerage") and sanitation services for ships

(Public Utility Company "City Sanitation"). For example daily fresh water demands of a river cruise are approximately 70-100 m$^3$ and daily waste disposal reaches several m$^3$.

o Tourist sojourn tax (the city of Novi Sad);

o Foreign currency exchange in exchange offices and banks;

o Coach transport services (mainly offered by transport companies: "Vojvodina", "Putnik" and "Lasta");

o Sightseeing tours of the city, the Petrovaradin Fortress, Sremski Karlovci, monasteries of Fruška gora, etc. (receptive travel agencies, i.e. "Putnik") and guiding services;

o Evening concerts of folk dance associations during the cruise stay in the harbour;

o Entrance tickets for various institutions and tourist localities during the sightseeing tour of Novi Sad and its surroundings (the Museum of Vojvodina, the Museum of the town of Novi Sad, etc.) – the growth of the income of tourist localities etc.

– In Vojvodina, links between cruise operators and travel agencies are less well established. With payments from operators, some government charges will be paid directly to the provincial/state/national governments. However, they could have a significant regional component.

– Opening of new job posts – employment possibilities (new harbour, souvenirs production, production of food and drinks of geographical origin, crew, etc.). Due to permanent increase in tourist ships frequency on the Danube, and subsequently the increase in the number of harboured ships in Novi Sad, the function of the Port of Novi Sad 2 did not stop with the removal of the pontoon bridge. The Port was relocated downstream, on the left bank of the Danube, near the centre of Novi Sad in August 2006. From 2008 there are four piers in Novi Sad. Another example of the direct influence of Cruise Ship Tourism on new job opportunities is the opening of the souvenir market near the port for tourist ships in Novi Sad in 2006.

Concerning the Vojvodina Province as a receptive tourism region of the river cruises, there are few shortcomings:

– Whole year season is nine-month. As the weather conditions are making it more difficult and even impossible to travel during winter (low temperatures of air and water, gusts of wind, fog, and particularly the ice on water), it is necessary to come up with an offer that would provide the ships, i.e. the crew, longer working season during the year. This could be achieved by organising Christmas or New Year's Eve programmes in ports.

– There is a need for more information about the visited areas before docking, more activities should be introduced inland, more excursions to rural areas should be offered, more opportunities to meet local communities are needed, etc. (results of the Questionnaire).

– As we already said, additional expenditure per passenger will result if pre or post cruise add-on holidays are taken. But, Vojvodina (Novi Sad) is still not on that list (Novi Sad has not been yet a port before or after cruising).

– Cruise operations are foreign owned, and profits accrue to the owners.

– There is no The National Cruise Shipping Strategy.

## 6. THE POLICY IMPLICATIONS

If we take facts and present situation into account, based on the field research of the Corridor VII cruises and from the perspective of tourist flow, we believe that the analyses introduced in this study are the basis for further material investment in the development characteristic of this matter.

In many respects, cruise tourism will have an impact on a regional or national economy similar to that of other foreign visitors. They may fly to the county, stay in some accommodation, and purchase goods and services. The difference is that a major component of their expenditure will be on a cruise, and in many cases this payment will be to foreign-owned operators who (in turn) will purchase some goods and services in the home region or country (there can be significant tax results, however). Therefore the foreign exchange earnings and the economic impact on the host economy will depend on the visitors direct and indirect expenditure relates to good and services sourced from within the region or sourced from elsewhere. The economic impacts and their distribution will differ also as between the regional and the national economy.

Passengers are foreign. Additional expenditure per passenger will result if pre or post cruise add-on holidays are taken.

Vojvodina region had plenty of positive effects thanks to the tourist flow. These effects were really needed after the 1990's and overall regional crisis (politic, economic, financial and social). Vojvodina Region which used to have a positive tourist image, now disappeared from the pages of tourist brochures.

With the democratic changes in 1999, Vojvodina (Serbia) started its transitional processes, trying to shape its tourist offer as well. Eventually, by creating documents which are concerned with the conception of tourism strategy of the Republic of Serbia (MHCEF, 2005; MHCEF, 2006a; MHCEF, 2006b), it distinguished nine key products, cruises being one of them, representing the path of further tourist interregional integration. In order for cruises along the Corridor VII to provide prosperity in the forthcoming period, it is necessary that this form of tourism be integrated into plans and programmes of tourism development of the entire Corridor VII. However, without adequate plans for nautical tourism, the reconstruction of the existing and new infrastructure and increase in service quality, it is reasonable to expect a decline in the competitiveness of the Vojvodina's supply at the international cruise tourism market. In this manner, positive effects of the entire tourism economy will be diminished.

Cruisers are definitely a good employment market, which is particularly useful for the majority of the Danube countries which changed from the socialist to capitalistic system in the last decade of the 20th century and which are still in the stage of transition. The employment market in the developed Danube countries is equally important bearing in mind the world financial crisis of the last couple of years. It must be pointed out that the crisis is the very reason why cruise companies have been reducing their budget, while the same companies expect at least equal results as in the previous seasons.

The advantages of cruises include: the content of the supply/tour, comfort, and safety. Given these advantages, further development of the competitiveness of cruising tours along the Corridor VII requires specific measures, such as a more intensive promotional appearance at international markets, enhanced investment in attractive localities, distribution of domestic products to foreign visitors (souvenirs, food products) on ships or to localities in itineraries, etc.

Disadvantages or delimiting factors for a more successful market competitive of cruises along the Vojvodina section of the Corridor VII include: underdeveloped infra and suprastructure (traffic signalization, exchange offices, parking lots, restaurants, bars), little time spent at itinerary destinations (the average duration of a stay on a tour of Novi Sad is 3-5 hours), etc. It is necessary to activate attractive localities which are not included in itineraries of Corridor VII cruises although they are situated on the navigation path.

At the social and economic level, important are the effects related to increased employment in various tourism-related sectors and a favourable climate for attracting domestic and foreign investors. A great significance is given to the effects that lead to the strengthening of regional tourism integrations via the Corridor VII, as well as to connecting

cultures of different ethnic communities, the representatives of which are both tourists on cruises and tour providers.

The realization of tours along the Corridor VII requires opening new job positions. However, sometimes new posts are opened indirectly, not only for the purpose of satisfying the needs of cruise companies. Such is the case with the opening of a souvenir market in Novi Sad where souvenirs created by local artists are exhibited to tourists docking from a ship.

In order for cruises along the Corridor VII to provide prosperity in the forthcoming period, it is necessary that this form of tourism be integrated into plans and programmes of tourism development of the entire Corridor VII and Serbia as a whole. However, without adequate plans for nautical tourism, the reconstruction of the existing and new infrastructure and increase in service quality, it is reasonable to expect a decline in the competitiveness of the Vojvodina's supply at the international cruise tourism market. In this manner, positive effects of the entire tourism economy will be diminished.

Of all the interviewees, 85.7% cruisers said that they decided to go on a cruise along the Corridor VII due to some already gained experience about this form of tourism. However, 90.5% visited Vojvodina (Serbia) for the first time, so personal experience during the tour was the only factor that helped them shape a picture about this country. Wirth a good service, tourists become more satisfied and the positive image is thus spread among potential future tourists and they become familiar with that sort of travel, specific cruise company and cruise destination.

It has been said that, bearing in mind the demographic profile of the tourist on cruisers (older, educated and well off), the employees must have skills that underpin customer service relationships or interpersonal communications (Gibson, 2008).

To sum up the affirmation of this topic was encouraged by numerous facts that refer to unquestionably multi-effective impact that international cruises have upon receptive countries / regions and consist of the following: activation of tourist offer in receptive areas and spreading of the positive image, development of different economic activities, employment possibilities in different sectors, creation of favourable atmosphere for domestic and foreign investors, effects of regional tourist integration along Corridor VII, cultural integration of nations etc.

We can therefore conclude that cruises along the Corridor VII can contribute to the promotion of the Danube region in Serbia, in particular, the promotion of specific centres and localities, to a greater extent than used to be the case up to now. This means that cruise tourism can function as a strong impetus for reviving those regions in Serbia that during the past two decades went through the process of transition – social, political and economic (most of the Danube countries).

# 7. ACKNOWLEDGEMENTS

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## KRSTARENJA PAN-EUROPSKIM KORIDOROM VII I NJIHOV EKONOMSKI ZNAČAJ NA RECEPTIVNE PROSTORE

### *SAŽETAK*

*Ovim radom su analizirana međunarodna turistička krstarenja Pan-europskim Koridorom VII, odnosno njihov utjecaj (potencijalne dobrobiti) na ekonomiju receptivnih prostora. Studijom slučaja (Vojvodina) dati su primjeri koji to ilustriraju.*

*Rezultati analize pokazuju da kruzevi Koridorom VII utječu pozitivno na Vojvodinu, prvenstveno na priobalnu, podunavsku regiju i to u Novom Sadu (gdje brodovi pristaju). Iako se beneficije ne odnose na korištenje usluga smještaja i hrane na kopnu, dobrobit se ogleda u sljedećim segmentima: turistička promocija (širenje pozitivnog plasmana Vojvodine kao receptivnog prostora na inozemnom tržištu – predstavljanje kulturne baštine i prirodnih vrijednosti); porast inozemnog turističkog prometa, a samim tim i potrošnje posjetilaca; otvaranje novih radnih mjesta (adekvatna infrastruktura i suprastruktura – serviseri različitih usluga brodovima, posadi i putnicima) – pristaništa, špediteri, suvenir tržnice i dr. / novi proizvodi, širenje poslovne mreže, promjena valute, nevidljivi izvoz itd.*

*Rezultati istraživanja mogu pomoći daljim proučavanjima uzročno-posljedičnih veza između ovakvog vida putovanja i resursa receptivnih zemalja na kojima se ova putovanja događaju, a sve u cilju adekvatnog osmišljavanja i plasmana turističke ponude, odnosno optimalnog razvoja receptivnih zemalja kroz održivi turizam. Rad pruža i informacije različitim partnerima („stakeholders") uključenim u turističko privređivanje kruzeva, koji očekuju privatnu i društvenu dobit od svojih ulaganja.*

***Ključne riječi:*** *turizam, kruzevi, Dunav, Vojvodina, Srbija, tranzicija, ekonomski značaj, demografija*

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# COST OPTIMIZATION OF TIME SCHEDULES FOR PROJECT MANAGEMENT[3]

## ABSTRACT

*The paper presents the cost optimization of the time schedules for project management. The nonlinear programming (NLP) model for the cost optimization of the time schedules under the generalized precedence relations between the project activities was developed and applied. The existing NLP optimization models have focused on the cost optimal solution of the project scheduling problems which include simplifying assumptions regarding the precedence relationships among the project activities. In this way, this research work aims to propose the NLP optimization model for making optimal time-cost decisions applicable to actual projects in project management. The generalized reduced-gradient method was used for the NLP optimization. The obtained results include the minimum total cost project schedules and the optimal project time-cost curves. The proposed optimization approach enables the insight into the interdependence between the project duration and the total project cost. The decision-maker can more effectively estimate the effect of the project deadline on a total project cost before the submission of a tender. An application example and an example of the time-cost trade-off analysis are presented in the paper to demonstrate the advantages of the proposed approach.*

**JEL:** *M11, O21, O22, C61*

**Keywords:** *project management, planning models, project analysis, optimization techniques*

## 1. INTRODUCTION

Since the development of the critical path method (CPM) in the late 1950s, the cost effective scheduling has received substantial attention from numerous researchers because of its practical relevance in project management. Namely, execution of each project activity, in normal duration, requires employment of certain resources and direct cost. Completing the activity in its reduced duration (i.e. activity crashing) requires additional resources at extra cost. On the other hand, the activity crashing leads to decreasing project duration and indirect cost. Keeping the project costs within the budget and not to exceed the project duration may be identified as project critical success factors, see e.g. Indihar-Štemberger et al. (2009).

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In this way, the cost effective time schedules in project management are traditionally achieved in a time-consuming cost-duration analysis of various alternatives for start times and durations of the project activities. However, doubt always exists as to whether or not the obtained project schedule is optimal. In order to surmount the mentioned disadvantages of the traditional approach, various different optimization methods have been proposed for the cost optimization of the project schedules. A number of authors have conducted the research works that are focused on optimal project scheduling using classical approximate heuristic methods. For instance, Feng et al. (1997), Li et al. (1999), Hegazy (1999), Leu and Yang (1999) and Senouci and Eldin (2004) proposed the models for optimization of the project schedules using the genetic algorithms (GA). Shtub et al. (1996) and Azaron et al. (2007) developed the simulated annealing (SA) optimization model formulations. Gagnon et al. (2002) proposed the tabu search (TS) optimization model to minimize the cost of the project. Adeli and Karim (1997) presented the neural network (NN) model formulation for the cost optimal project scheduling. Xiong and Kuang (2008) introduced an optimization model for the cost optimization of the project schedules using the ant colony optimization (ACO). Yang (2007) proposed the particle swarm optimization (PSO) model formulation for the cost optimal scheduling in project management.

Considering the exact mathematical programming methods, the cost optimization of the project schedules has been handled mainly by different linear programming (LP) methods, see e.g. Demeulemeester et al. (1998); Achuthan and Hardjawidjaja (2001); Möhring et al. (2001); Vanhoucke et al. (2002), Sakellaropoulos and Chassiakos (2004). Since the LP optimization methods can handle only linear relations between the variables, the nonlinear terms of the optimization models have been formulated as the discrete relationships between the variables or they have been approximated with (piece-wise) linear functions.

However, even the earliest studies in this field have recognized the nonlinear nature of the project cost-duration relationships. Furthermore, the production costs oftentimes appear in practice as nonlinear functions of different parameters, see e.g. Klanšek and Kravanja (2006) and Rep et al. (2008). Therefore, the nonlinear programming (NLP) optimization techniques have been proposed to solve the project scheduling optimization problems with continuous nonlinear cost functions, see e.g. Kapur (1973); Deckro et al. (1995), Deckro and Hebert (2002), and Turnquist and Nozick (2004). Nevertheless, in most of the published research works the cost optimization of the project time schedules was performed considering only the finish-to-start precedence relationships between the project activities.

On the other hand, the aim of this paper is to develop the model for the cost optimization of the time schedules considering realistic project characteristics such as nonlinear nature of the cost-duration relationships and generalized activity precedence relations. The NLP model for the cost optimization of the time schedules under the generalized precedence relations between the project activities was developed and applied. In this way, this research work aims to propose the NLP optimization model for making optimal time-cost decisions applicable to actual projects in project management. The generalized reduced-gradient method by Drud (1994) was used for the NLP optimization. The obtained results include the minimum total cost project schedules and the optimal project time-cost curves. An application example and an example of the time-cost trade-off analysis are presented in the paper to demonstrate the advantages of the proposed approach.

## 2. NLP OPTIMIZATION PROBLEM FORMULATION

The general NLP optimization problem may be formulated in the following form:

$$\text{Minimize } z = f(\mathbf{x}),$$
$$\text{subject to:}$$
$$\mathbf{h}(\mathbf{x}) = \mathbf{0}, \tag{NLP}$$
$$\mathbf{g}(\mathbf{x}) \leq \mathbf{0},$$
$$\mathbf{x} \in \mathbf{X} = \{\mathbf{x} \mid \mathbf{x} \in \mathbf{R}^n, \mathbf{x}^{LO} \leq \mathbf{x} \leq \mathbf{x}^{UP}\},$$

where $\mathbf{x}$ is a vector of the continuous variables, defined within the compact set $\mathbf{X}$. Functions $f(\mathbf{x})$, $\mathbf{h}(\mathbf{x})$ and $\mathbf{g}(\mathbf{x})$ are the (non)linear functions involved in the objective function $z$, the equality and inequality constraints, respectively. All the functions $f(\mathbf{x})$, $\mathbf{h}(\mathbf{x})$ and $\mathbf{g}(\mathbf{x})$ must be continuous and differentiable. In the context of the project scheduling optimization problem, the continuous variables define schedule parameters such as activity durations, start times, direct costs, etc. The objective function determines the total project cost. Equality and inequality constraints and the bounds of the continuous variables represent a rigorous system of the generalized precedence relationship constraints, the activity duration constraints and the project duration constraints of the project scheduling optimization problem.

## 3. NLP OPTIMIZATION MODEL FORMULATION

The cost optimization of the time schedules was performed by the NLP approach. In this way, the proposed NLP optimization model formulation consists of the total cost objective function, the generalized precedence relationship constraints, the activity duration constraints and the project duration constraints. The following total project cost objective function is defined for the cost optimization of the project time schedules:

$$C_T = \sum_{i \in I} C_i(D_i) + C_I(D_P) + P(D_L) - B(D_E), \tag{1}$$

where objective variable $C_T$ represents the total project cost, set $I$ comprises the project activities $i$, $i \in I$, $C_i(D_i)$ denotes the direct cost-duration functions of the project activities $i$, $i \in I$, $C_I(D_P)$ is the project indirect cost-duration function, $P(D_L)$ is the penalty-duration function and $B(D_E)$ is the bonus-duration function. The variables $D_i$, $D_P$, $D_L$ and $D_E$ denote the durations of the project activities $i$, $i \in I$, the actual project duration, the amount of time - the project is late, and the amount of time - the project is early, respectively.

The project activity direct cost-duration functions can be defined from the resources allocated to it, e.g. see Klanšek and Kravanja (2006). The project indirect cost depends upon the actual project duration and it usually includes the initial project costs, the business operating and overhead costs, and the machinery/equipment operating costs. The project penalty cost depends upon the amount of time - the project is late, while the project award bonus depends upon the amount of the time - the project is early. Both the penalty cost for late project completion and the award bonus for early project completion are usually determined from the project contract. The total project cost objective function is subjected to the rigorous system of the generalized precedence relationship constraints, the activity duration constraints and the project duration constraints. The project activities are mutually linked by the generalized precedence relationships, see Figure 1.

**Figure 1**

**Precedence relationships between the project activities**
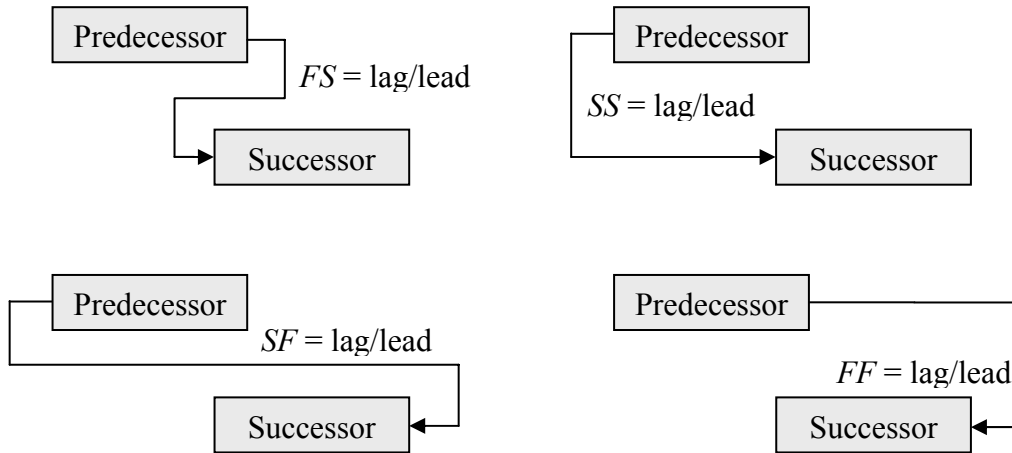


In this way, each project activity $i$, $i \in I$, is connected to its succeeding activities $j$, $j \in J(i)$ by fulfilling at least one of the following generalized precedence relationship constraints:

Finish-to-Start (*FS*):  $\quad\quad S_i + D_i + L_{i,j} \leq S_j,$  (2)

Start-to-Start (*SS*):  $\quad\quad S_i + L_{i,j} \leq S_j,$  (3)

Start-to-Finish (*SF*):  $\quad\quad S_i + L_{i,j} \leq S_j + D_j,$  (4)

Finish-to-Finish (*FF*):$S_i + D_i + L_{i,j} \leq S_j + D_j,$  (5)

where $S_i$ is the start time of activity $i$, $i \in I$, $D_i$ is the activity duration, $L_{i,j}$ is the lag/lead time between the activity $i$, $i \in I$, and the succeeding activity $j$, $j \in J(i)$, and $S_j$ is the start time of the succeeding activity $j$, $j \in J(i)$. The actual project duration $D_P$ is determined within the optimization model in the following form:

$$D_P = S_{i\omega} + D_{i\omega} - S_{i\alpha},$$  (6)

where $S_{i\omega}$ and $D_{i\omega}$ represent the start time and the duration of the last project activity $i\omega$, $i\omega \in I$, and $S_{i\alpha}$ denotes the start time of the first project activity $i\alpha$, $i\alpha \in I$. Since the project activities must be executed between the project start and the finishing times, the following constraint is set to limit the completion times of the project activities:

$$S_i + D_i - S_{i\alpha} \leq D_P.$$  (7)

The relationship between the actual project duration $D_P$, the amount of time - the project is late $D_L$, the amount of time - the project is early $D_E$ and the target project duration $D_T$, is formulated as follows:

$$D_P - D_L + D_E = D_T.$$  (8)

Only one of the variables $D_L$ and $D_E$ can, at the most, take a nonzero value in any project scheduling solution. Accordingly, these two variables are additionally constrained by the following equation:

$$D_L D_E = 0. \tag{9}$$

The nomenclature of the proposed NLP optimization model formulation is given in Appendix.

## 4. AN APPLICATION EXAMPLE

The example from construction project management practice is considered to demonstrate the applicability of the proposed NLP optimization model. The considered project scheduling optimization problem was originally presented and solved by Sakellaropoulos and Chassiakos (2004) using the mixed-integer linear programming (MILP) approach. The example project refers to the upgrading of an existing two-lane undivided highway to a four-lane divided motorway with controlled traffic access. The example project consists of 29 activities. The precedence relationships and the lag/lead times between the succeeding project activities are presented in Table 1. While the lag times are defined with positive numbers, the lead times are determined with negative numbers.

**Table 1**

**Precedence relationships and lag/lead times between the example project activities**

| Activity | | Succeeding activity | Precedence relationship | Lag/lead time |
|---|---|---|---|---|
| ID | Description | ID | | [day] |
| Service road A: | | | | |
| 1. | Rock excavation | 2. | Finish-to-Start | −3 |
| | | 3. | Finish-to-Start | 0 |
| | | 6. | Finish-to-Start | 0 |
| 2. | Embankment construction | 3. | Finish-to-Start | 0 |
| | | 7. | Finish-to-Start | 0 |
| 3. | Sub-base and base layers | 4. | Finish-to-Start | 0 |
| | | 8. | Finish-to-Start | 0 |
| 4. | Asphalt layer | 5. | Start-to-Start | 1 |
| | | 9. | Finish-to-Start | 0 |
| 5. | Temporary marking and signing | 10. | Finish-to-Start | 0 |
| | | 11. | Finish-to-Start | 0 |
| Service road B: | | | | |
| 6. | Earth and semi-rock excavation | 7. | Finish-to-Start | −1 |
| 7. | Embankment construction | 8. | Finish-to-Start | 0 |
| 8. | Sub-base and base layers | 9. | Finish-to-Start | 0 |
| 9. | Asphalt layer | 10. | Finish-to-Finish | 1 |
| 10. | Temporary marking and signing | 11. | Finish-to-Start | 0 |
| Main road: | | | | |
| 11. | Traffic diversion | 12. | Finish-to-Start | 0 |
| 12. | Rock excavation | 13. | Start-to-Start | 2 |
| | | 15. | Finish-to-Start | −4 |
| 13. | Earth and semi-rock excavation, existing pavement removal | 14. | Start-to-Start | 2 |
| 14. | Sub-grade stabilisation, retaining wall/culvert construction | 15. | Finish-to-Start | −2 |
| 15. | Embankment construction | 16. | Finish-to-Start | −6 |

| | | | |
|---|---|---|---|
| | 17. | Start-to-Start | 4 |
| | 18. | Finish-to-Start | 4 |
| | 19. | Finish-to-Start | 0 |
| 16. Drainage pipe construction | – | – | – |
| 17. Drainage layer | 20. | Start-to-Start | 3 |
| 18. Planting at roadway verges | – | – | – |
| 19. Electrical installations at roadway verges | – | – | – |
| 20. Ditches | 21. | Start-to-Start | 2 |
| 21. Sub-base layer | 22. | Start-to-Start | 2 |
| 22. Base layer | 23. | Finish-to-Start | –9 |
| 23. Median island (New Jersey) | 24. | Start-to-Start | 6 |
| | 25. | Finish-to-Start | –4 |
| 24. Electrical installations in median island | – | – | – |
| 25. Asphalt layer #1 | 26. | Start-to-Start | 4 |
| 26. Asphalt layer #2 | 27. | Finish-to-Start | 0 |
| 27. Friction course overlay | 28. | Finish-to-Start | –3 |
| 28. Final marking and signing | 29. | Finish-to-Start | 0 |
| 29. Traffic restoration | – | – | – |

The alternative cost-duration options and the direct cost-duration functions for the project activities are presented in Table 2. The continuous direct cost-duration functions are developed for each project activity on the basis of the alternative cost-duration options by using the curve-fitting calculations. While the first option refers to the normal activity duration and cost, the last option represents the crashed activity duration and cost. Moreover, the first option for duration of each activity defines the upper bound on the activity duration, while the last option denotes the lower bound on the activity duration.

**Table 2**

**Alternative cost-duration options and direct cost-duration functions of the activities**

| Activity ID | Option 1 | | Option 2 | | Option 3 | | Direct cost-duration function |
|---|---|---|---|---|---|---|---|
| | Duration | Cost | Duration | Cost | Duration | Cost | |
| 1. | 5 | 2,030 | 4 | 2,300 | – | – | $-270.00\,D_1+3,380.00$ |
| 2. | 8 | 1,020 | 7 | 1,280 | 6 | 1,510 | $-15.00\,D_2^2-35.00\,D_2+2,260.00$ |
| 3. | 8 | 1,700 | 7 | 1,850 | 6 | 2,090 | $45.00\,D_3^2-825.00\,D_3+5,420.00$ |
| 4. | 4 | 590 | 3 | 730 | – | – | $-140.00\,D_4+1,150.00$ |
| 5. | 2 | 90 | – | – | – | – | $90.00$ |
| 6. | 4 | 910 | 3 | 1,100 | – | – | $-190.00\,D_6+1,670.00$ |
| 7. | 2 | 250 | – | – | – | – | $250.00$ |
| 8. | 7 | 1,490 | 6 | 1,650 | 5 | 1,830 | $10.00\,D_8^2-290.00\,D_8+3,030.00$ |
| 9. | 4 | 520 | 3 | 750 | – | – | $-230.00\,D_9+1,440.00$ |
| 10. | 2 | 90 | – | – | – | – | $90.00$ |
| 11. | 1 | 50 | – | – | – | – | $50.00$ |
| 12. | 8 | 3,260 | 7 | 3,580 | 6 | 3,710 | $-95.00\,D_{12}^2+1105.00\,D_{12}+500.00$ |
| 13. | 5 | 1,140 | 4 | 1,400 | 3 | 1,720 | $30.00\,D_{13}^2-530.00\,D_{13}+3,040.00$ |
| 14. | 4 | 300 | 3 | 450 | – | – | $-150.00\,D_{14}+900.00$ |
| 15. | 8 | 1,020 | 6 | 1,300 | 5 | 1,430 | $-3.\overline{33}\,D_{15}^2-93.\overline{33}\,D_{15}+1,980.00$ |
| 16. | 9 | 790 | 8 | 900 | 6 | 1,180 | $10.00\,D_{16}^2-280.00\,D_{16}+2,500.00$ |
| 17. | 13 | 3,340 | 12 | 3,750 | 11 | 4,060 | $-50.00\,D_{17}^2+840.00\,D_{17}+870.00$ |
| 18. | 9 | 470 | 8 | 650 | 7 | 830 | $-180.00\,D_{18}+2,090.00$ |
| 19. | 6 | 460 | 5 | 600 | 4 | 810 | $35.00\,D_{19}^2-525.00\,D_{19}+2,350.00$ |

| 20. | 6 | 1,280 | 5 | 1,430 | – | – | $-150.00\,D_{20}+2{,}180.00$ |
|---|---|---|---|---|---|---|---|
| 21. | 14 | 1,090 | 12 | 1,320 | 10 | 1,560 | $1.25\,D_{21}^{2}-147.50\,D_{21}+2{,}910.00$ |
| 22. | 14 | 900 | 11 | 1,140 | 9 | 1,400 | $10.00\,D_{22}^{2}-330.00\,D_{22}+3{,}560.00$ |
| 23. | 14 | 2,220 | 12 | 2,510 | 11 | 2,690 | $11.66\,D_{23}^{2}-448.33\,D_{23}+6{,}210.00$ |
| 24. | 3 | 230 | – | – | – | – | $230.00$ |
| 25. | 6 | 1,590 | 5 | 1,790 | 4 | 1,990 | $-200.00\,D_{25}+2{,}790.00$ |
| 26. | 10 | 2,630 | 9 | 2,930 | 8 | 3,240 | $5.00\,D_{26}^{2}-395.00\,D_{26}+6{,}080.00$ |
| 27. | 8 | 2,060 | 7 | 2,450 | 6 | 2,660 | $-90.00\,D_{27}^{2}+960.00\,D_{27}+140.00$ |
| 28. | 10 | 320 | 9 | 440 | 8 | 610 | $25.00\,D_{28}^{2}-595.00\,D_{28}+3{,}770.00$ |
| 29. | 1 | 50 | – | – | – | – | $50.00$ |

Notes:  $D_1$ to $D_{29}$ denote the durations of the project activities (labelled 1 to 29) in days. The activity direct costs are given in cost units.

The indirect project cost is 150 cost units per day. The per-period penalty for late project completion is 200 cost units per day, while the per-period bonus for early project completion is 100 cost units per day. The target project duration is fixed at 80 days as suggested by Sakellaropoulos and Chassiakos (2004). The objective of the optimization was to find the project time schedule with the optimal start times and the optimal durations of the activities with respect to the minimum total project cost. The proposed NLP optimization model formulation was applied. A high-level language GAMS (General Algebraic Modelling System) by Brooke *et al*. (1988) was used for modelling and for the data inputs/outputs. CONOPT (Generalized reduced-gradient method) by Drud (1994) was used for the optimization. The considered project scheduling optimization problem was solved using the personal computer, Intel Core2 Duo T8100, 2.10 GHz, 4 GB RAM DDR2 and 250 GB SATA hard disc. The convergence of the optimal NLP solution was achieved in much less than a second.

Since the NLP denotes the continuous optimization technique, the cost optimization of the project time schedule was performed in two successive steps. In the first step, the ordinary NLP optimization was performed to calculate the optimal continuous variables (e.g. activity start times, activity durations, etc.) inside their upper and lower bounds. In the second step, the calculation was repeated/checked for fixed and rounded variables (from in the first stage obtained continuous values to their nearest discrete values).

The optimization of the example project time schedule gained the minimum total project cost of 45,500 cost units and the optimal actual project duration of 75 days. The minimum total project cost of 45,500 cost units was obtained at optimum combination between the 75-day actual project duration and the 80-day target project duration. In this way, the minimum total project cost consists of 46,000 cost units of the project direct + indirect costs, which is reduced for the award bonus of 500 units gained on account of the 5-day early-completion period. Both the minimum total project cost and the optimum actual project duration were identical to those reported by Sakellaropoulos and Chassiakos (2004). Since the considered project scheduling problem represents the convex optimization problem (i.e. all the functions within the model are convex), for which both the MILP methods and the gradient-based algorithms usually easily find the global optimum, the obtained minimum cost solution of 45,500 cost units was expected. The obtained optimum time schedule of the example project is presented in Figure 2.

**Figure 2**

**Optimal time schedule of the example project**

| Project activity | Working days | Activity direct cost |
|---|---|---|
| Service road A: 1. Rock excavation | | 2,030 |
| 2. Embankment construction | | 1,510 |
| 3. Subbase and base layers | | 2,090 |
| 4. Asphalt layer | | 590 |
| 5. Temporary marking and signing | | 90 |
| Service road B: 6. Earth and semi-rock excavation | | 910 |
| 7. Embankment construction | | 250 |
| 8. Subbase and base layers | | 1,830 |
| 9. Asphalt layer | | 750 |
| 10. Temporary marking and signing | | 90 |
| Main road: 11. Traffic diversion | | 50 |
| 12. Rock excavation | | 3,260 |
| 13. Earth and semi-rock excavation, existing pavement removal | | 1,140 |
| 14. Subgrade stabilisation, retaining wall/culvert construction | | 450 |
| 15. Embankment construction | | 1,020 |
| 16. Drainage pipe construction | | 790 |
| 17. Drainage layer | | 3,340 |
| 18. Planting at roadway verges | | 470 |
| 19. Electrical installations at roadway verges | | 460 |
| 20. Ditches | | 1,280 |
| 21. Subbase layer | | 1,090 |
| 22. Base layer | | 1,400 |
| 23. Median island (New Jersey) | | 2,690 |
| 24. Electrical installations in median island | | 230 |
| 25. Asphalt layer #1 | | 1,590 |
| 26. Asphalt layer #2 | | 2,630 |
| 27. Friction course overlay | | 2,060 |
| 28. Final marking and signing | | 610 |
| 29. Traffic restoration | | 50 |
| | Project indirect cost: | 11,250 |
| | Penalty: | 0 |
| | Bonus: | -500 |
| | Total project cost: | 45,500 |

The comparison between the MILP optimization model presented by Sakellaropoulos and Chassiakos (2004) and the NLP model proposed in this paper shows differences in the model sizes. While the MILP optimization model, with respect to the above-demonstrated example, comprised 218 (in)equality constraints and 132 variables, the NLP model included 97 (in)equality constraints and 91 variables. Although a precise comparison between the sizes of both models cannot be performed in details, one can notice that the proposed NLP model required smaller model size formulation for the same project scheduling optimization problem than the MILP model.

The main reason for such differences lies in the fact, that the reformulation of the original nonlinear optimization problem into the linear optimization problem often requires large size problem formulation. The MILP optimization model handles the discrete variables explicitly, but the non-linearities, within the MILP model, must be formulated as the discrete relationships between the variables or they must be approximated with (piece-wise) linear functions. On the other hand, the NLP model enables the optimization of the continuous variables, while the non-linearities are handled explicitly. The NLP optimization model is simpler and requires lower computational effort than the MILP model. The result accuracy of both optimization models is the same. In this way, the obtained results demonstrate the applicability of the proposed NLP model for solving practical nonlinear project scheduling optimization problems.

## 5.    AN EXAMPLE OF THE TIME-COST TRADE-OFF ANALYSIS

In order to better demonstrate the advantages of the proposed approach, the paper also presents the example of the complete time-cost trade-off analysis of the project obtained, using the NLP optimization. The considered project scheduling optimization problem is a modified time-cost trade-off problem for a small building project presented by Yang (2005). The example project consists of 7 activities. The precedence relationships and the lag times

between the succeeding project activities are presented in Table 3. The crash/normal points and the direct cost-duration functions of the project activities are presented in Table 4.

**Table 3**

**Precedence relationships and lag times between the project activities**

| Activity | | Succeeding activity | Precedence relationship | Lag time |
|---|---|---|---|---|
| ID | Description | ID | | [day] |
| 1. | Underground service | 2. | Start-to-Start | 2 |
| 2. | Concrete works | 3. | Finish-to-Start | 3 |
| 3. | Exterior walls | 4. | Finish-to-Start | 0 |
| 4. | Roof construction | 5. | Finish-to-Start | 0 |
| | | 6. | Finish-to-Start | 0 |
| 5. | Floor finish | 7. | Finish-to-Start | 0 |
| 6. | Ceiling | 7. | Finish-to-Finish | 6 |
| 7. | Finish work | – | – | – |

**Table 4**

**Crash/normal points and direct cost-duration functions of the project activities**

| Activity | | Duration [days] | | Direct cost [$] | | Direct cost-duration function |
|---|---|---|---|---|---|---|
| ID | Description | Crash | Normal | Crash | Normal | |
| 1. | Underground service | 3 | 6 | 4,500.00 | 1,500.00 | $250\,D_1^2 - 3{,}250\,D_1 + 12{,}000$ |
| 2. | Concrete works | 10 | 12 | 7,000.00 | 5,000.00 | $-10{,}969.6299\,\ln(D_2) + 32{,}258.5063$ |
| 3. | Exterior walls | 8 | 12 | 3,600.00 | 2,000.00 | $11{,}664\,\exp(-0.1469\,D_3)$ |
| 4. | Roof construction | 6 | 8 | 3,100.00 | 2,000.00 | $-550\,D_4 + 6{,}400$ |
| 5. | Floor finish | 3 | 4 | 3,000.00 | 2,000.00 | $-1{,}000\,D_5 + 6{,}000$ |
| 6. | Ceiling | 4 | 6 | 4,000.00 | 2,500.00 | $-750\,D_6 + 7{,}000$ |
| 7. | Finish work | 10 | 14 | 2,800.00 | 1,000.00 | $75\,D_7^2 - 2{,}250\,D_7 + 17{,}800$ |
| | Project | 42 | 55 | 28,000.00 | 16,000.00 | |

Notes: $D_1$ to $D_7$ denote the durations of the project activities (labelled 1 to 7) in days.
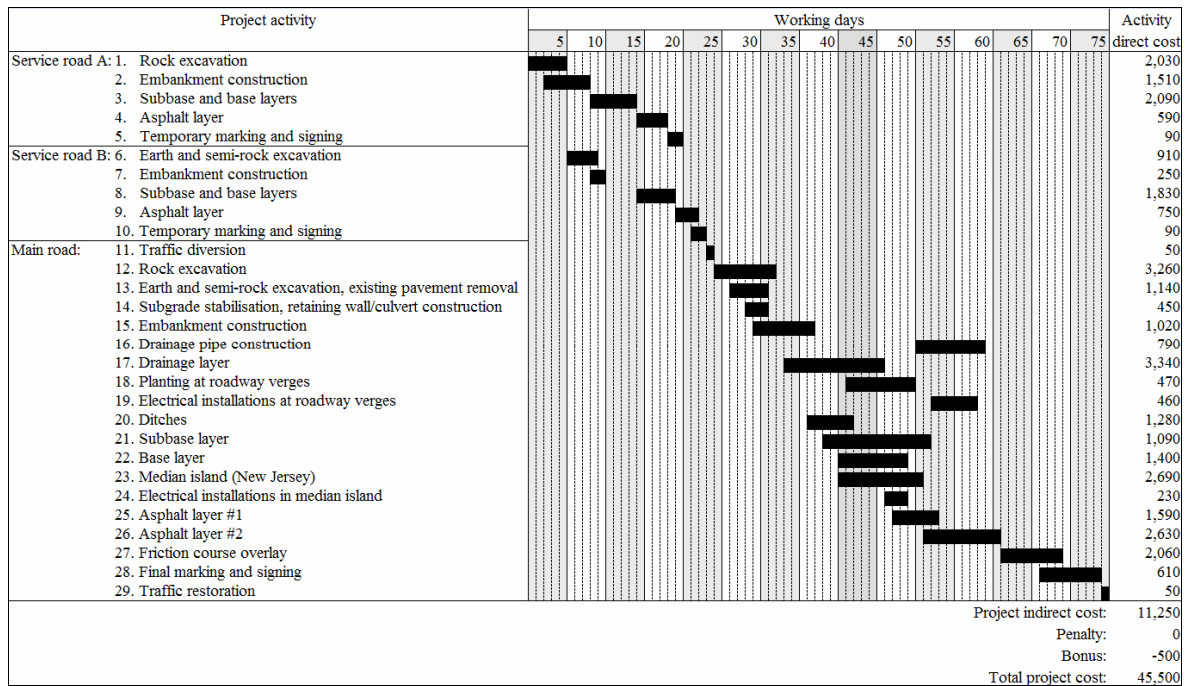
The daily indirect project cost is $200.00. While the per-period penalty for late project completion is set to be $400.00/day, the per-period bonus for early project completion is determined to be $300.00/day. The resulting NLP optimization model formulation for the adopted project scheduling optimization problem included 25 (in)equality constraints and 25 variables.

The main task of the project time-cost trade-off analysis was to find the optimal project duration and its corresponding minimum total project cost time schedule. The second task was to find the optimal time-cost curves of the project which are drawn by the minimum total project cost value at each feasible combination between the actual project duration and the target project duration.

The proposed NLP optimization model was run repetitively (one time for each combination) for various values of actual and target project durations. This repetitive procedure of the NLP optimization achieved the optimal solutions for 196 combinations between the actual project duration and the target project duration. The total solver time required for each obtained optimal NLP solution of the project scheduling problem was much less than a second.

The optimal time-cost curves of the project were developed from the minimum total project costs obtained for all 196 feasible combinations between the actual project duration and the target project duration. Since the amount of time - the project is late/early is calculated

as a difference between the actual and the target project duration (which are both fixed in each run), the NLP optimization gained 14 different optimal project time schedules for actual project durations defined from the 55-day normal project duration to the 42-day crashing project duration. While the obtained optimal solutions for the project time schedules are presented in Table 5, the gained optimal time-cost curves of the project are given in Figure 3.

**Table 5**

**Optimal solutions for the project time schedules**

| Activity | | | Project duration [days] | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ID Description | | | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 |
| 1. Underground service | Start | [day] | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Duration [days] | | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| 2. Concrete works | Start | [day] | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| | Duration [days] | | 10 | 11 | 11 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| 3. Exterior walls | Start | [day] | 16 | 17 | 17 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 |
| | Duration [days] | | 8 | 8 | 8 | 8 | 8 | 8 | 9 | 9 | 10 | 11 | 9 | 10 | 12 | 12 |
| 4. Roof construction | Start | [day] | 24 | 25 | 25 | 26 | 26 | 26 | 27 | 27 | 28 | 29 | 27 | 28 | 30 | 30 |
| | Duration [days] | | 6 | 6 | 6 | 6 | 7 | 8 | 6 | 7 | 7 | 7 | 8 | 8 | 7 | 8 |
| 5. Floor finish | Start | [day] | 30 | 31 | 31 | 32 | 33 | 34 | 33 | 34 | 35 | 36 | 35 | 36 | 37 | 38 |
| | Duration [days] | | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 6. Ceiling | Start | [day] | 31 | 31 | 33 | 34 | 33 | 34 | 36 | 34 | 38 | 38 | 36 | 38 | 38 | 38 |
| | Duration [days] | | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| 7. Finish work | Start | [day] | 33 | 34 | 35 | 36 | 37 | 38 | 37 | 38 | 39 | 40 | 39 | 40 | 41 | 42 |
| | Duration [days] | | 10 | 10 | 10 | 10 | 10 | 10 | 12 | 12 | 12 | 12 | 14 | 14 | 14 | 14 |

**Figure 3**

**Optimal time-cost curves of the project**
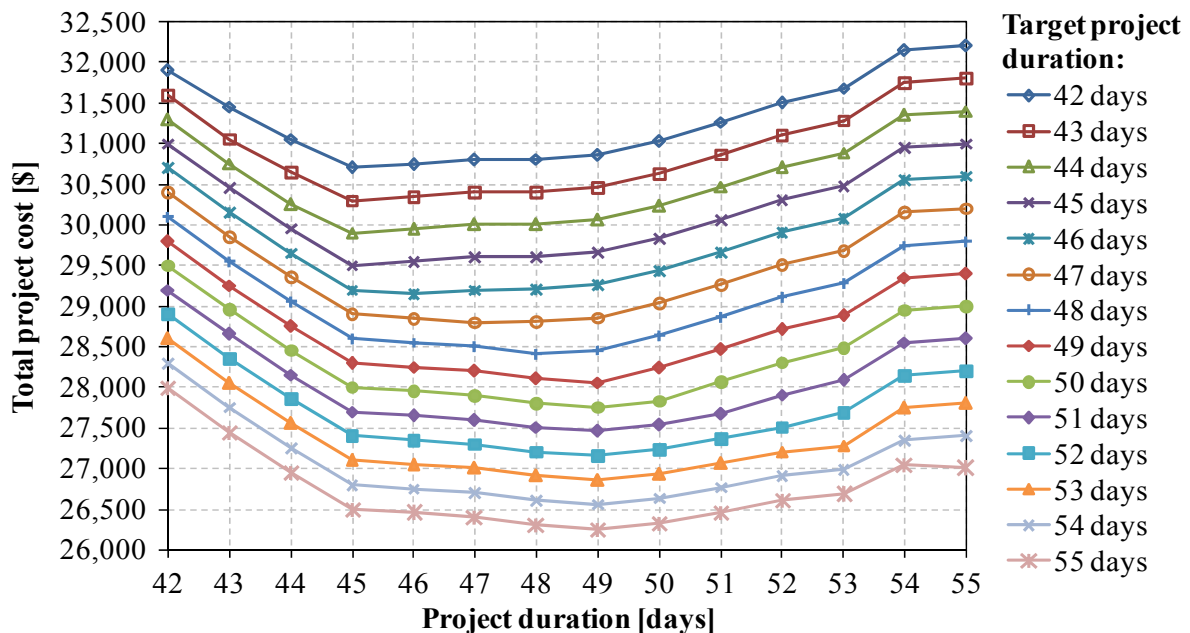
The analysis of the optimal project time schedule presented in Table 5 indicates that the NLP optimization extended the actual project duration rather than the amount of time - the project was early. This is because the optimal scheduling of the activities for such actual project duration resulted in bigger cost savings than the alternative (i.e. earlier project completion with an extra award bonus). Further analysis of the optimal time-cost curves of the project demonstrates that the 55-day target project duration is an optimal one for the contractor, while the 42-day target project duration represents the optimal solution for the investor.

Namely, the 55-day target project duration enables the contractor to complete the project 6 days before deadline while keeping the total project cost on the minimum value of $26,258.02. On the contrary, the 42-day target project duration represents the optimal solution for the investor since it encourages the contractor to complete the project earlier than in 49 days (which is optimal project duration for the contractor). If the 42-day target project duration is specified in the contract, the contractor will naturally seek the minimum total cost of $30,700.00 and will want to complete the project within 45 days, see Figure 3. In this way, Table 5 and Figure 3 present the complete project time-cost trade-off analysis of the considered small building project obtained, using the NLP optimization approach. The optimal time-cost curves of the project may be used for evaluation of the optimal project duration that will lead to the minimum total project cost.

## 6. DISCUSSION

The discussion in this section is addressed to the advantages and the limitations of the proposed NLP optimization model. In particular, the limitations of the proposed optimization model may be found in deterministic time and cost estimates. Contrary to stochastic approach, the deterministic approach does not consider uncertainty within the project execution. In cases when a considerable amount of risk is associated with the realization of the project activities, e.g. such as complex logistic projects (Kamnik et al., 2010), the stochastic consideration of the project parameters may estimate the execution of the project more realistically than the deterministic approach.

However, the deterministic approach to project management problems is widely used in practice on the account of the serviceability nature of its results. The application of modern activity-based costing systems (see e.g. Knežević and Mizdarković, 2010) into the deterministic project scheduling can significantly improve the performance of project management. Since the managers' perception and activities within the information management area are mainly cost oriented (Žabjek et al., 2008), the deterministic cost optimization of project time schedule using the proposed model provides the decision-maker valuable and easily explainable results when the estimation of the project input parameters is performed by experienced practitioner.

The proposed NLP optimization model enables the project time scheduling to be performed simultaneously with the total project cost minimization. Contrary to the heuristic optimization models, which calculate the approximate solutions, the proposed NLP optimization model yields the exact solution for the project scheduling problem. Since the NLP denotes the continuous optimization technique, the rounding of the continuous solution into an integer solution may be exposed as the limitation of the proposed model. On the other hand, the main advantages of the presented optimization technique are the model and application simplicity. Moreover, solving the project scheduling optimization problem, using the presented NLP optimization model, avoids the need for (piece-wise) linear or discrete approximation of the nonlinear expressions, which has been the traditional approach proposed for solving this optimization problem, using the LP optimization techniques. Since the state-

of-the-art NLP optimization methods can efficiently solve comprehensive and highly nonlinear optimization problems, the applicability of the proposed NLP optimization model is not limited to weakly nonlinear project scheduling optimization problems.

## CONCLUSION

This paper presents the cost optimization of time schedules for project management. The NLP optimization model for the cost optimization of the project time schedules under the generalized precedence relations between the project activities was developed and applied. The input data of the NLP optimization model include: the project network with defined preceding and succeeding activities, the precedence relationships and the lag/lead times between the activities, the normal/crash points and the direct cost-duration functions of the activities, the project indirect cost-duration function, the penalty-duration function and the bonus-duration function.

The nonlinear continuous total project cost objective function was subjected to the rigorous system of the generalized precedence relationship constraints, the activity duration constraints and the project duration constraints. For specified input data, the NLP optimization model yields the minimum total project cost and the project time schedule with the optimal start times and the optimal durations of the project activities.

The optimization was carried out in a calculating process, where the start times and the durations of the project activities were considered simultaneously in order to obtain the minimum of the nonlinear total project cost. The obtained results of the optimization include the minimum total cost project schedules and the optimal project time-cost curves. The optimal time-cost curves of the project may be used for evaluation of the optimal project duration that will lead to the minimum total project cost.

Solving the project scheduling optimization problem, using the proposed NLP optimization model, avoids the need for (piece-wise) linear approximation of the nonlinear expressions, which has been the traditional approach proposed for solving this optimization problem, using the LP optimization models. The proposed NLP optimization model yields the exact solution of the project scheduling optimization problem.

The existing NLP optimization models have focused on the cost optimal solution of the project scheduling problems which include simplifying assumptions regarding the precedence relationships among the project activities. On the other hand, the present work aims to incorporate generalized precedence relationships between project activities and to propose the NLP optimization model for making optimal project time-cost decisions applicable to actual projects.

Since the proposed optimization approach enables the insight into the interdependence between the project duration and the total project cost, the decision-maker can more effectively estimate the effect of the project deadline on a total project cost before the submission of a tender. In this way, the proposed NLP optimization model is intended to be of considerable value to practitioners in project management. The application example and the example of the time-cost trade-off analysis were presented in the paper to demonstrate the advantages of the proposed approach.

The present study will serve as the basis for further research on the cost optimization of the schedules for project management. Further research effort will be focused on explicit nonlinear-discrete optimization of the project schedules, the multi-project scheduling and the resource-constrained scheduling.

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## APPENDIX

NLP optimization model formulation nomenclature

**A.1. Indices**
$i$      project activity, $i \in I$
$j$      succeeding project activity, $j \in J(i)$

**A.2. Constants**
$D_T$    target project duration
$L_{i,j}$    lag/lead time between the activities

**A.3. Variables**
$B$      project award bonus
$C_i$    activity direct cost
$C_I$    indirect project cost
$C_T$    total project cost
$D_i$    activity duration
$D_E$    amount of time - the project is early

$D_L$       amount of time - the project is late
$D_P$       actual project duration
$P$         project penalty cost
$S_i$       activity start time

**A.4.    Symbols**
$\alpha$     first project activity
$\omega$     last project activity

# TROŠKOVNA OPTIMIZACIJA TERMINSKIH PLANOVA ZA VODENJE PROJEKATA

## SAŽETAK

*U radu je prikazana troškovna optimizacija terminskih planova za vodenje projekata. Za troškovnu optimizaciju terminskih planova s generaliziranim vremenskim vezama između projektnih aktivnosti je razvijen i upotrebljen model nelinearnog programiranja (NLP). Postojeći optimizacijski modeli NLP su usredotočeni na rješavanje problema troškovne optimizacije projektnih planova koji uključuju pojednostavljene pretpostavke glede vremenskih veza između projektnih aktivnosti. Na taj način je cilj predstavljenog istraživačkog rada predložiti aplikativni optimizacijski model NLP za učinkovito donošenje odluka pri vodenju realnih projekata. Za optimizaciju je upotrebljena generalizirana metoda reduciranoga gradienta. Postignuti rezultati sadrže projektne planove s minimalnim ukupnim troškovima i optimalne krivulje ovisnosti ukupnih troškova projekta od dužine trajanja projekta. Budući da predloženi optimizacijski pristup omogućuje uvid u odnos između dužine trajanja projekta i ukupnih troškova projekta, donositelj odluka može bolje procijeniti učinak roka za dovršetak projekta na ukupne troškove projekta prije dostavljanja same ponude. Za prikaz prednosti predloženog pristupa su u radu pokazani primjer upotrebe predstavljenoga modela i primjer analize ovisnosti ukupnih troškova projekta od dužine trajanja projekta.*

**JEL:** *M11, O21, O22, C61*

**Ključne riječi:** *vođenje projekta, modeli za planiranje, analiza projekta, optimizacijske tehnike*

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# MANAGERS' COMPETENCIES  FRAMEWORK:
# A STUDY OF CONATIVE COMPONENT

***ABSTRACT***

*This paper aims to study the conative component of competencies of managers in the post-transition economy of Slovenia. A conceptual framework of the tripartite components of competencies is developed and a sample of 183 managers in 11 small and medium enterprises from different sectors of industry is analyzed. The eventual disparity with the managers` conative component of competency and their job-related self-expectations and level of adaptation is analyzed. The results of the study suggest that Slovene managers are not aggressive initiative-takers but do not resist opportunities when they arise. However, the conative component of managers reveals that they might have problems coping with market and economic challenges because they will most likely shy away from taking the initiative in finding new opportunities.*

***Key words****: Conation, Tripartite components of competencies framework, SME, Middle managers, Slovenia.*

*JEL: J 24, M 13*

## 1.  INTRODUCTION

In human resources management (HRM) the concept of individual competence is widely used, however, determining a precise definition is still a matter of much discussion. Some scholars (Boyatzis, 1982; Schroder, 1989; Burgoyne, 1993) refer to the set of skills that an individual must possess in order to be capable of satisfactorily performing a specified job. Competence is, according to Mansfield (1999), Ruth (2006) and Yang et al. (2006), the underlying characteristic of a person that results in an effective or superior performance. There is not a single factor, but a range of factors that differentiate successful from less successful performance, including personal qualities, motives, experience and behavioral characteristics (Boyatzis, 1982).

According to Winterton et al. (2005), competence-based HRM has become widespread phenomenon and competence has gained a much broader conception, including knowledge and skills, alongside the behavioral or psycho-social characteristics. For the purposes of this article we use "competence" as a general ability and "competencies" as components of competence (Hoffman, 1999; Garavan and McGuire, 2001). We concur with Mulder and Collins (2007) who claim that competence can be viewed in a holistic or professional development orientation and competencies as components of competence. If the term competency is used, it means a more specific, behavioral or behaviorism-oriented perspective (McClelland, 1973 and 1998).

The interest of this paper is competencies as individual characteristics in management. Many scholars have studied competencies as individual characteristics (Baker et al, 1997; Ellström, 1997; Cheetham and Chivers, 1998; Selby et al., 2000; Sandberg, 2000; Mulder,

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2001; Boon and Van der Klink, 2001; Armstrong, 2003; Liu et al., 2006; Draganidis and Mentzas, 2006; Biloslavo and Lynn, 2007; Mlinar et al., 2009; Videmšek et al., 2010).

However, despite numerous papers written about competencies, the managerial challenges in transition economies of Central and Eastern Europe are given little attention. Therefore, our research question is whether managers in Slovenia have competencies such as opportunity perception, creativity, innovation, risk taking ability and initiative that would allow them to cope efficiently with changing business environment, which is characterized by increasing complexity, uncertainty and discontinuity (Chung et al., 2006; Patel, 2007; Dolenc, 2010). For the investigation of the question, a model of tripartite components of competencies is set: cognitive, affective, and conative ones, with focus on the conative component of competencies as the most stable and unchangeable one.

The paper is organized as follows. The next section addresses components of competencies and their assessment. It is followed by an explanation of the research methodology, sample and findings. The final section discusses the limitations of our study, future research opportunities and conclusions.

## 2. THE TRIPARTITE COMPONENTS OF COMPETENCIES FRAMEWORK

An individual's value system is composed of cognitive, affective and conative components, which all result in certain behavior and acquisition of these components is an on-going process (see Figure 1). The cognitive component of competences can be learned and the affective component of competences can be acquired through the process of professional socialization; the conative component of competences is inborn and can only be fostered (Kovač and Bertoncelj, 2008).

Cognitive part is commonly connected with intellectual abilities and intelligence. Intelligence has been studied as a predictor of performance and different taxonomies about types of intelligence have been developed (Grigorenko et al., 2000; Rogoff, 1990; Earley and Ang, 2003).

**Figure 1**

**Tripartite individual competency components construct**
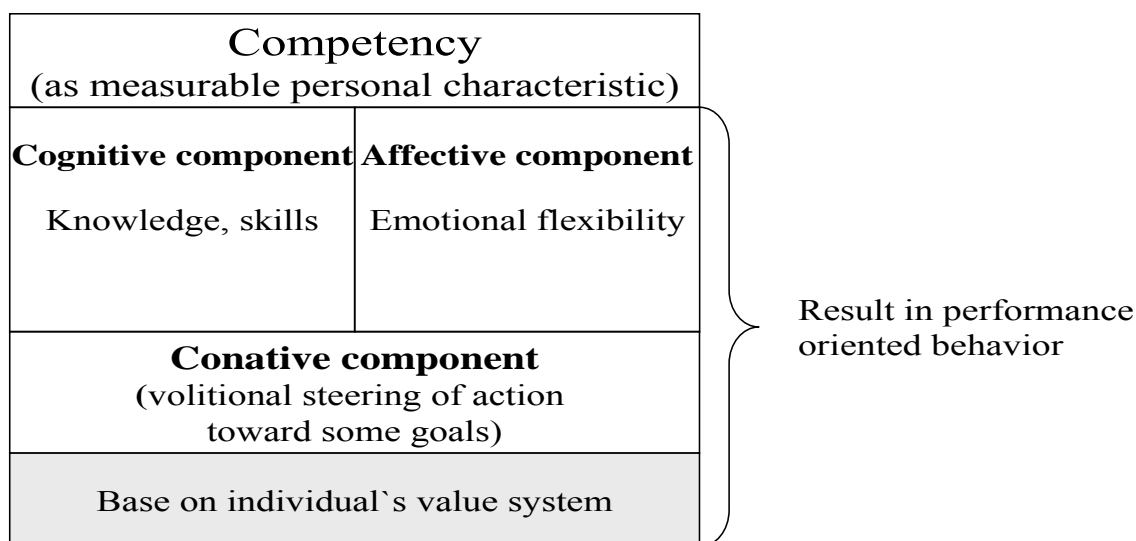


Source: Author

Winterton et al (2005) claim that specialized cognitive competencies are prerequisites for superior performance in a particular activity, whether defined narrowly (e.g. solving second order differential equations) or broadly (e.g. analytical competence). Another antecedent of presented tripartite competency model is affection, which can not avoid the question of personal traits. Personal traits include biological determinants (such as temperament), motives (such as achievement motive) and generalized attitudes and beliefs (such as generalized self-efficacy). Cognitive and affective parts of personality are most commonly cited in competency discussions.

However, from the point of view of practitioners, what counts is action: how someone will act, will not act, or is preparing to act. Or to put in other words: the cognitive and affective parts of a person's mind have to be realized in certain action. Though both the cognitive and affective sides are clues to performance, they do not necessarily have an effect in action. Therefore, we are interested in researching how a person will act. We argue that, besides the soft component of competencies (the affection side of the mind), and the hard component of competencies (the cognitive side of the mind), the conative component of competencies (the conative side of the mind) should be included in the concept.

Conation is an emerging concept defined as the use of will or the freedom to make choices about what to do (Kane, 1985; Mischel, 1996) as a proactive aspect of behavior (as opposed to reactive or habitual), which is the personal, intentional, deliberate, goal-oriented, or striving component of motivation (Baumeister et al., 1998; Emmons, 1986), as the tendency to take and maintain purposive action or direction toward goals (Snow et al., 1996) and as the achievement aspect of ability, the process through which we fulfill our goals (Kolbe 1997). To summarize several definitions, conation is described as volitional steering of action toward some goal. As such, conative competency is an important part of the tripartite competency dichotomy which is not teachable.

There is increasing concern about what motivates people in a job. Every individual has some expectations about the organization he/she work for and vice versa. An individual has job-related self-expectations, which have an influence on his performance. Kolbe (1997) claims that strain occurs when an individual tries to live up to false self-expectations. Expectancy theory (Vroom, 1964) suggests that motivation is based on values and beliefs of individuals, or on how a person feels about effort, performance, and outcomes.

To achieve the main research objective, the study attempts to seek answers to the following hypothesis:

*H1: Managers in Slovenia are not aggressive risk takers and can have troubles to cope efficiently with a recession.*

*H2: A disparity between managers' conative component of competency and managers' job-related self-expectations and level of adaptation exists.*

# 3. RESEARCH METHODOLOGY

We present here the assessment tools, sample structure, data analyses and findings followed by the final discussion.

### *Assessment of conative component of competency*

Kolbe (1997) developed the Kolbe™ Index, which identifies four conative modes (Kolbe Action Modes®) through which we act, albeit with different intensity. The four conative Kolbe Action Modes® can be determined with the Kolbe A™ Index:

- FF – Fact Finder (instincts to probe, refine and simplify),
- FT – Follow Thru (instincts to organize, reform and adapt),

- QS – Quick Start (instincts to improvise, revise and stabilize),
- IM – Implementer (instincts to construct, renovate, and envision).

The degree of intensity each individual has in an Kolbe Action Mode® is defined on a scale from 1 to 10 and each mode has three Zones of Operation on a scale from 1 to 10: the Preventive Zone (1-3 on the scale), in which one prevents problems through its use; the Responsive Zone (4-6 on the scale), in which one acts in an accommodating way; and the Initiative Zone (7-10 on the scale), in which one initiates solutions. The Kolbe A™ Index is a forced-choice instrument that requires subjects to choose two answers from four response choices reflecting how they would most and least likely respond to 36 single-sentence problem-solving or behavioral scenarios (for more details see Kolbe 1997, 1999, 2003).

The decision to use the Kolbe™ instrument as a tool for measuring the conative component of competencies was made on the basis of reliability and validity, for which Kolbe (2003) provides a strong argument, claiming that this instrument is considered valid and reliable in predicting performance. The decision to use the Kolbe™ instrument was also made because it measures the above-mentioned and most cited conative side of managerial antecedents, i.e. the conative component of competencies.

Kolbe (1999) defines in the QS Kolbe Action Mode® the following natural advantages: promoting appropriateness, improvising presentations, converting data, challenging the status quo, revising standards and changing priorities. An individual who scores highly (7 to 10) in the Quick Start Kolbe Action Mode® will most likely succeed at tasks which require an individual to invent, brainstorm, originate, devise, challenge, contrive, risk, play, reform, improvise, promote and intuit. An individual who scores highly (7 to 10) in the Fact Finder Kolbe Action Mode® will most likely succeed at tasks which require an individual to probe, research, formalize, allocate, deliberate, priorities, define, prove, specify, calculate, inquire, and evaluate. On the other hand, an individual who scores highly (7 to 10) in the Follow Thru Kolbe Action Mode® will most likely succeed at tasks which require an individual to structure, consolidate, translate, prepare, discipline, coordinate, arrange, integrate, schedule, plan, budget, and chart; and an individual who scores highly (7 to 10) in the Implementer Kolbe Action Mode® will most likely succeed at tasks which require an individual to form, mould, demonstrate, craft, shape, put together, build, render, construct, fix, repair and practice (for more details see Kolbe 2003, 4).

The Kolbe B™ Index, meanwhile, measures an individual's job-related self-expectations and level of adaptation (Kolbe 1997). When an individual tries to live up to false self-expectations, strain occurs. Strain is one of the measures of conative stress. Strain on the job is identified by comparing Kolbe A™ Index results to Kolbe B™ Index results. Conative strain occurs when there is a difference of four or more between Kolbe A™ Index and Kolbe B™ Index results in any mode.

Conative stress can be measured through conflict, strain, and tension (Kolbe, 2004). Conflict occurs when two people with contradictory instincts interrupt each other's progress by insisting on their own paths to problem solving. Potential conflict is identified by comparing their Kolbe A™ Index results (the individual's conative reality). Kolbe claims that there will be stress between people working directly with one another if they have a difference of four or more in any mode (Kolbe, 1997). Strain on the job is identified by comparing Kolbe A™ Index results to Kolbe B™ Index results (an individual's job-related self-expectations). For the purposes of this study, strain was measured if there was a difference of four or more between Kolbe A™ Index and Kolbe B™ Index results in any mode. Tension occurs when external obstacles posed by people or circumstances force an individual to work against his instincts. Tension is identified by comparing the Kolbe A™ Index results to the Kolbe C™ Index results (job requirements as determined by someone else, usually a boss or

supervisor). According to the Kolbe Corporation, there is no bias in gender, age, race, or national origin in Kolbe instrument results (Kolbe Corporation, 1999).

### *Sample*

The studied sample was chosen in a random manner in different sectors of Slovene industry (cutting, shaping and finishing of ornamental and building stone; forging, pressing, stamping and roll forming of metal; powder metallurgy; manufacturing of glass and glass products; low electricity diodes technology production; manufacturing of other fabricated metal products; cargo handling and storage; hardware consultancy; business consultancy; and hospitality and tourism). Out of that, ten companies were mid-sized enterprises and one company was a small enterprise. Six of the companies were founded after 1990 and the other five were restructured and privatized after 1990. One hundred and eighty-three managers participated in the Kolbe testing. Out of that, one hundred and seventy-five managers were middle-managers and eight managers were top-managers. The sampling was purposive in that only managers were involved. Eighteen managers were excluded because their result was "In Transition", meaning that, due to reasons on the individual level, their natural talents could not be revealed. Not all of them concluded the Kolbe B™ test, which has to be taken into consideration when interpreting the results.

### *Data Analyses*

Descriptive statistics is presented in Table 1.

**Table 1**

**Descriptive statistics**

|  | FF | | FT | | QS | | IM | |
|---|---|---|---|---|---|---|---|---|
| Kolbe ™ Indexes | A | B | A | B | A | B | A | B |
| Company 1 | 6.2 | 4.9 | 5.0 | 6.8 | 5.3 | 4.8 | 3.7 | 3.9 |
| Company 2 | 4.8 | 5.5 | 5.4 | 7.0 | 5.6 | 6.3 | 4.0 | 2.8 |
| Company 3 | 5.8 | 4.6 | 4.0 | 6.6 | 5.2 | 5.0 | 5.0 | 4.2 |
| Company 4 | 5.9 | 3.7 | 4.7 | 5.4 | 4.1 | 4.6 | 5.3 | 6.3 |
| Company 5 | 5.4 | 4.8 | 5.3 | 6.4 | 4.7 | 4.3 | 4.8 | 4.6 |
| Company 6 | 6.0 | 5.5 | 4.8 | 6.5 | 4.9 | 5.2 | 4.2 | 3.4 |
| Company 7 | 5.8 | 5.5 | 5.1 | 6.6 | 4.9 | 4.3 | 4.4 | 4.2 |
| Company 8 | 4.4 | 4.6 | 4.2 | 5.2 | 5.4 | 6.0 | 6.4 | 5.2 |
| Company 9 | 5.0 | 5.0 | 4.4 | 6.5 | 5.4 | 6.0 | 5.2 | 2.8 |
| Company 10 | 6.1 | 5.0 | 5.1 | 6.6 | 5.6 | 5.7 | 3.9 | 3.3 |
| Company 11 | 6.4 | 4.9 | 5.1 | 7.2 | 4.6 | 4.1 | 4.4 | 4.1 |
| *Mean* | *5.6* | *4.9* | *4.8* | *6.4* | *5.1* | *5.1* | *4.7* | *4.1* |
| *Std. Dev.* | *0.63* | *0.52* | *0.46* | *0.60* | *0.46* | *0.78* | *0.79* | *1.05* |

Source: Author

The correlation among the conative component of competencies was calculated with the Pearson Correlation Coefficient (see Table 2).

**Table 2**

**Inter correlation of Kolbe A™ Index values**

|  |  | Ffa | Fta | Qsa | Ima |
|---|---|---|---|---|---|
| Ffa | Pearson Corr. | 1.000 | 0.116 | -0.367 ** | -0.416** |
|  | Sig. (2-tailed) | . | 0.152 | 0 | 0 |
| Fta | Pearson Corr. | 0.116 | 1.000 | -0.474** | -0.173* |
|  | Sig. (2-tailed) | 0.152 | . | 0 | 0.032 |
| Qsa | Pearson Corr. | -0.367 ** | -0.474** | 1.000 | -0.454** |
|  | Sig. (2-tailed) | 0 | 0 | . | 0 |
| Ima | Pearson Corr. | -0.416 ** | -0.173* | -0.454** | 1.000 |
|  | Sig. (2-tailed) | 0 | 0.032 | 0 | . |

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Source: Author

Among the majority of conative components of competencies there is a negative correlation: the more distinctive the conative component is the less expressed the others are. Between Fta and Ffa is a weak positive correlation, but it is not statistically significant. The strongest correlation is between Fta and Qsa ($r = -0.474$, $p<0.01$), and between Ima and Qsa ($r = -0.454$, $p<0.01$). The correlation between Ffa and Qsa ($r = -0.367$) and Ffa and Ima ($r = -0.416$) can also be confirmed. There is a weak negative correlation between Fta and Ima ($r = 0.173$; $p<0.5$).

The Kolbe B™ Index results (see Table 3) are similar to the Kolbe A™ results. FFb and FTb are in a very weak positive correlation but not statistically significant (almost no correlation due to $r=0.006$). The strongest negative correlation is QSb and Imb ($r=-0.569$; $p<0.01$), and FTb and QSb ($r=-0.415$; $p<0.01$). A weaker negative correlation can be observed between FFb and QSb ($r=-0.294$; $p<0.01$) and FFb and Imb ($r=-0.279$; $p<0.01$), and even weaker between FTb and Imb ($r=-0.199$; $p<0.05$).

**Table 3**

**Inter-correlation of Kolbe B™ Index values**

|  |  | FFb | FTb | QSb | Imb |
|---|---|---|---|---|---|
| FFb | Pearson Corr. | 1.000 | 0.006 | -0.294 ** | -0.279 ** |
|  | Sig. (2-tailed) | . | 0.939 | 0 | 0.001 |
| FTb | Pearson Corr. | 0.006 | 1.000 | -0.415 ** | -0.199 * |
|  | Sig. (2-tailed) | 0.939 | . | 0 | 0.014 |
| QSb | Pearson Corr. | -0.294 ** | -0.415** | 1.000 | -0.569 ** |
|  | Sig. (2-tailed) | 0 | 0 | . | 0 |
| Imb | Pearson Corr. | -0.279 ** | -0.199 * | -0.569 ** | 1.000 |
|  | Sig. (2-tailed) | 0.001 | 0.014 | 0 | . |

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Source: Author

FTb has the highest average value and Ima has the lowest. Only the mean FTb Kolbe B™ Index is higher than the mean Kolbe A™ Index; all others are lower. The IM and QS results match most, while the correlation is weak in the case of FF and FT (0.2 or less).

As shown in Table 4, the differences in mean values are statistically important only in the case of the pairs FF and FT (the mean value Ffa is higher than FFb and the mean value FTb is higher than Fta).

**Table 4**

**Paired-Samples t test**

| | | Paired Differences | | | | | t | df | Sig. |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Std. Dev. | Std. Error Mean | 95% Confidence Interval of the Difference | | | | |
| | | | | | Lower | Upper | | | |
| Pair 1 | Ffa – FFb | 0.91 | 1.76 | 0.14 | 0.62 | 1.19 | 6.33 | 150 | 0 |
| Pair 2 | Fta – FTb | -1.58 | 1.63 | 0.13 | -1.84 | -1.31 | -11.88 | 150 | 0 |
| Pair 3 | Qsa – QSb | 0.25 | 2.12 | 0.17 | -0.10 | 0.59 | 1.42 | 150 | 0.158 |
| Pair 4 | Ima – Imb | 0.23 | 1.87 | 0.15 | -0.07 | 0.53 | 1.52 | 150 | 0.131 |

Source: Author

### *Findings and discussion*

The mean values at the company level were, according to normal distribution, expected. A comparison of the Kolbe A™ and Kolbe B™ Index values suggests that managers are inclined to analyze, quantify and compare results from the past, but their focus on details is not as great as their natural ability (the mean value for the FF Kolbe A™ Index is 5.6 and for the Kolbe B™ Index it is 4.9). On the other hand, they like to follow existing procedures, plan and perform routine work (the mean value for the FT Kolbe A™ Index is 4.8 and for the Kolbe B™ Index it is 6.4). Their conative component of competencies and their view of how they should actually use it are at the same level (the mean value for the QS Kolbe A™ Index is 5.1 and for the Kolbe B™ Index it is 5.1), meaning that the result is in the accommodating zone.

When comparing the conative component of competencies on the individual level we found a negative correlation: the more distinctive the conative component is, the less expressed are the others. The highest negative correlation is detected in the Kolbe A™ Index FT and QS values, meaning the more planning and routine work, the less opportunity spotting, innovating and risk taking. Similarly high is the negative correlation between the Kolbe A™ Index FF and QS values, meaning the more analyzing, quantifying and focusing on details there is, the worse the ability is to spot and use opportunities, innovate, risk and find new solutions. Thus, Hypothesis 1 is confirmed.

It was observed that each of the Kolbe A™ Index values on the individual level is higher than the Kolbe B™ Index value, except for the FT value. It could be claimed that middle managers have a natural knack for analyzing, quantifying, comparing past results, and

focusing on details, but are less prone to more aggressive risk-taking than they believe themselves to be. Measurement of their conative component of competency in the QS mode suggests that they have a greater natural knack for invention, brainstorming, origination, challenge, risk-taking, reform, improvisation, and promotion than perceived and exercised in practice. Hence, Hypothesis 2 is confirmed as well.

The correlations of pair samples reveal that managers have the most difficulties in accommodating the QS and IM modes. It could be concluded that they would adapt in the case of opportunities and take advantage of them, but they would most likely not take the initiative.

## 4. FUTURE RESEARCH AND CONCLUSION

The results of the study should be interpreted with caution due to the size of the sample and the measurement of the constructs. The sample of managers of SMEs in the post-transitional economy of Slovenia might be different from samples of their peers in developed market economies, which may impact the results. Interpretation of our analyses should take into account that only representatives of some sectors were analyzed and thus should be interpreted with care. The results from SMEs from different sectors may be different. The evolving market economy of Slovenia requires different conative competencies from those valued and required in Slovenia's previous socio-economic system with less accommodation and more initiative taking. However, Slovenia can provide a small-scale role model for other transition economies in the region which aspire to enter the EU, moreover, it can be a valuable case to other developing economies worldwide on their way to market economies. Further studies are required in order to corroborate the results, which might be affected by the cultural context and not be extrapolated to other contexts. Despite these limitations, the authors believe that the study helps to better understand competency in general and provides insightful directions for advanced studies in this area.

Moreover, the presented method, being quantitative, provides a framework for a promising investigation of inborn, un-teachable managerial antecedents. However, emphasis should be placed on further longitudinal and international studies. It would be particularly interesting for future research to make comparisons between peers in countries that are more developed than Slovenia.

The study suggests that Slovene managers are not aggressive initiative-takers, but do not resist opportunities when they arise. On the other hand, it seems that historical and other socio-economic circumstances in Slovenia influenced managers in the way that they have become more obedient and adaptable. Due to that reason, a longitudinal study is suggested for future research to analyze changes which have been made among Slovene managers and to justify the presented results.

## IN MEMORIAM

I would like to dedicate this paper to Darko Kovač (1957-2009) for his contribution to the study of managerial competencies in Slovenia.

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# OKVIR MENADŽERSKIH NADLEŽNOSTI:
## STUDIJA KONATIVNE KOMPONENTE

## SAŽETAK

*Cilj ovog rada jest proučavanje konativne nadležnosti menadžera u tranzicijskoj ekonomiji Slovenije. Konceptualni okvir trojnih komponenata nadležnosti temelji se na uzorku od 183 menadžera u 11 malih i srednjih poduzeća različitih industrijskih sektora. Proučena su eventualna nepodudaranja između menadžerske konativne komponente, njihovih osobnih očekivanja i razine prilagođavanja. Studija dokazuje da slovenski menadžeri nisu dovoljno agresivni u preuzimanju inicijativa, ali ne mogu odoljeti novim prilikama. Međutim, konativna komponenta ukazuje na njihove poteškoće u suočavanju s tržišnim i ekonomskim izazovima, s obzirom na pomalo stidljivi pristup u pronalaženju novih mogućnosti.*

*Ključne riječi: Motivacija, okvir trojnih komponenata nadležnosti, MSP, srednji menadžeri, Slovenija.*

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# AN INTEGRATED MODEL OF PRICE, SERVICE QUALITY, SATISFACTION AND LOYALTY: AN EMPIRICAL RESEARCH IN THE BANKING SECTOR OF BOSNIA AND HERZEGOVINA

## ABSTRACT

*The relationship between service quality, price, customer satisfaction and customer loyalty is the subject of interests of researchers for several decades. Despite many publications on perceived quality, the position of the construct relative to the other key constructs in marketing remains vague. This research tries to bring conceptual clarity with regard to the relationship between perceived service quality, perceived price, customer satisfaction and customer loyalty. The proposed model is defined in line with the existing theoretical findings. Besides, this research is conducted to examine the sustainability of service quality dimensions and service price dimensions in Bosnia and Herzegovina's retail banking. In order to test the defined model and research hypotheses empirical research was conducted on the sample of 300 retail bank customers of three leading banks in Bosnia and Herzegovina. Research results indicate that the defined model has an acceptable level of fit to the empirical data. This paper contributes to the existing literature by identifying the effects of different service quality and price quality dimensions on customer satisfaction and loyalty. A dimension-specific approach used in this study can help bank managers to gain useful insight regarding the relative contribution of each dimension to the management of customer satisfaction and loyalty. This research has several limitations that need to highlight. The sample size was relatively small (n= 300) and the survey was conducted in a single service setting with a few banks under investigation. Thus, future research with a larger sample and tested in other service setting is needed to enhance the generalizability of the findings.*

**Keywords:** *Service quality, Price, Customer satisfaction, Customer loyalty, Retail banking*

**JEL Classification: M31, L80**

## 1. INTRODUCTION

Service quality, as well as customer satisfaction and loyalty, are terms increasingly used in recent years. This relates to both, business and academic community. Bosnia and Herzegovina has also been enveloped by this trend, especially when it comes to the service sector. An intensive competition in the service market has surely contributed to emergence of a service quality to the forefront of everybody's interest. Irrespective of which business strategy a company opts for – either by resorting to standardization and centralization to cut

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back on costs and thus offer lower prices or by attempting to oppose the competition by providing exclusive services, the focus of both must be placed upon quality of services they provide. Provision of high quality service aids in meeting several requirements such as customer satisfaction and its consequent loyalty and market share, soliciting new customers and improved productivity, financial performance and profitability (Cui *et al.*, 2003).

A review of literature indicates that studies related to service quality have been mainly conducted in US and developed European banking industries. Research on service quality in banking sector of South Eastern European countries is rather limited. This appears to be particularly the case within the Western Balkan countries. Therefore, it is desirable to conduct the study on service quality in the context of banking sector in Bosnia and Herzegovina. Also, review of literature revealed that only a limited number of studies were involved into the research of customer perception of price in service context and its relationship with customer satisfaction and customer loyalty. This study seeks to feel these gaps in the literature by proposing an integrated model including four widely used constructs in marketing literature - service quality, service price, customer satisfaction and customer loyalty - and test the hypothetical links.

Retail banking was chosen as the context for a study due to several reasons. First of all, retail banking is a typical service industry, in which customers frequently become loyal only after some years of doing business with the same bank. Secondly, banking services are contract-based and usually entail a long term relationship between a customer and a bank. Thirdly, there is a reason to believe that the banking industry faces new challenges when the traditionally stable relationships are challenged by deregulation and increased competition. Finally, these constructs have been studied previously, albeit not in the same way as in the current study. The fact that knowledge about those constructs in retail banking does exists makes it possible to build and compare findings of this study to previously findings.

The banking sector of Bosnia and Herzegovina, contrary to the banking sectors in the most transition countries, is specific for many reasons. It falls under transition countries where initial transitional reforms were stopped because of war. After war damage and highly influences through policies set forth by international organizations (e.g. IMF. EBRD, The etc.) reform of banking sector in Bosnia Herzegovina was pursued in order to create a more competitive environment in accordance with the market conditions. Reform in the banking sector has so far produced best results. Commercial banks (almost totally privatized, with predominantly foreign capital) has been seen as one of the pillars for successful development of other sectors in economy. Also, past study (Brkić and Šahinagić, 2003) reported that banking sector is the most market-oriented sector in Bosnia and Herzegovina. Therefore, it is desirable to conduct the study on service quality, service price, customer satisfaction and loyalty in the context of banking sector in Bosnia and Herzegovina.

Even though there are a small number of studies related to service quality, customer satisfaction and customer loyalty in the banking sector of Western Balkan countries (Pepur, 2006, Pisnik Korda and Snoj, 2010) no study has not investigate the effects of individual dimensions of service price on customer satisfaction and loyalty. Moreover, no study questioning dimensional structure of service quality and service price in the context of Bosnia and Herzegovina's retail banking has been encountered. Therefore, this study aims to contribute to the existing literature in this field by testing the dimensional structure of service quality and service price in the context of Bosnia and Herzegovina's retail banking.

The remainder of this paper is organised in five sections. In section two, the proposed model of effects of service quality and service price dimensions on customer satisfaction and loyalty is presented. In section three, the data collection procedure along with measures applied in the current study are described. Results for exploratory factor analysis, regression

analysis and descriptive analysis are presented in section four. Conclusion and managerial implications are noted, and limitations and future direction are discussed in section five.

## 2. CONCEPTUAL MODEL AND  HYPOTHESIS DEVELOPMENT

Based on the literature review and results of preliminary exploratory factor analysis of data collected from the present study, we proposed the conceptual model of effects of service quality and service price dimensions to customer satisfaction and loyalty.  The proposed model is shown in Figure 1.  Research model includes a group of exogenous variables (those excluded from the model) and a group of endogenous variables (those included in the model). Initially, the endogenous variables were: (1) tangibles (2) reliability; (3) responsiveness; (4) assurance; (5) empathy; (6) price transparency; (7) price reliability; (8) price-quality ratio; (9) relative price; and (10) price fairness. It is pertinent to note here that a preliminary statistical analysis of data collected through an exploratory factor analysis method found no proof of original five dimensions of the service quality or five dimensions of the service price. More specifically, three service quality dimensions were identified: customer orientation (original dimensions therein being: assurance, empathy and responsiveness), reliability and tangibles, as well as three service price dimensions: price transparency, reference price (original dimensions therein being: relative price, price-quality ratio and price fairness) and price reliability. In this model, customer satisfaction and loyalty are observed as exogenous variables, although customer satisfaction is observed as an indirect variable.

**Figure 1**

**Path diagram of research model**
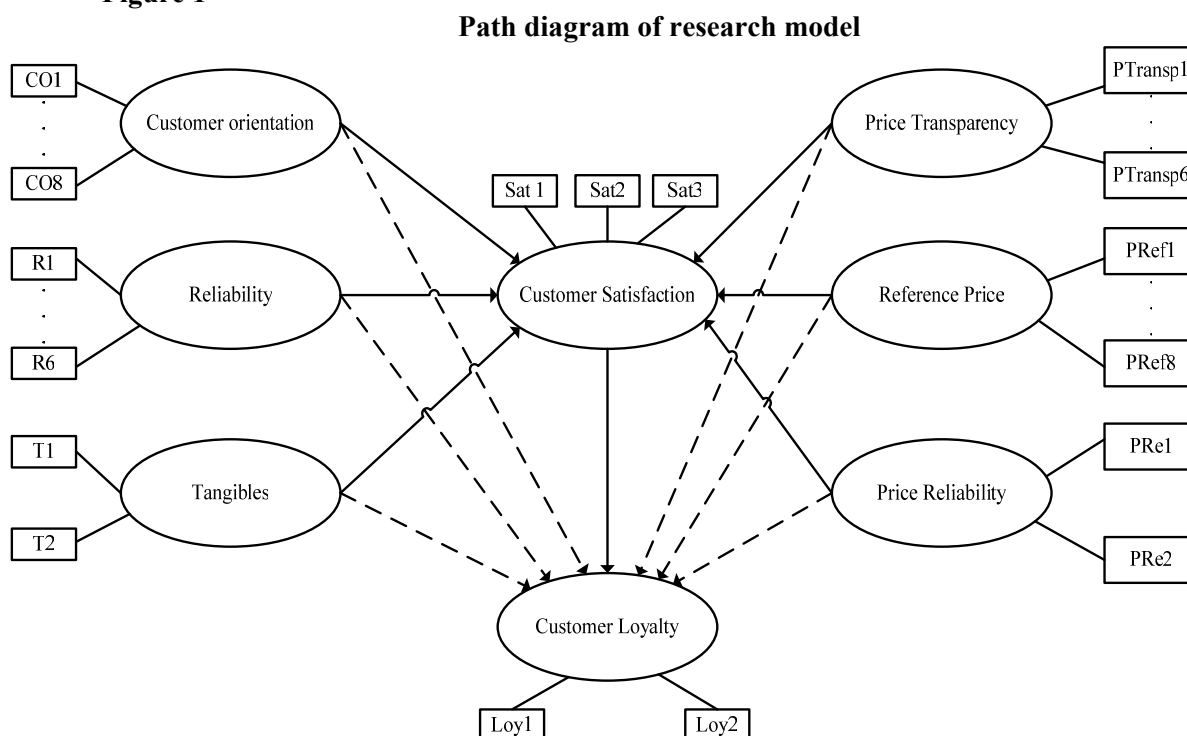


The model (Figure 1) shows relations between individual variables presumed/expected to be of statistical relevance. In order to confirm actual existence of presumed relations between the variables, we have defined the model, examined its statistical reliability and mutual relations and effects.

In the following section we discuss the theoretical underpinnings for our conceptual framework and outline the hypotheses for our study.

### 2.1.  Service quality and service price dimensions

Recognizing the importance of service quality as a source of competitive advantage, researchers advanced the development of models form measuring service quality. It is generally accepted that the concept of quality is abstract and difficult to understand. Thus, it is considered difficult to make this concept concrete and difficult to measure it. However, the most widely used model for measuring service quality is SERVQUAL, a model that was developed by Parasuraman *et al*. (1985; 1988). It relies on the difference between expectation and perception regarding the ''consumption'' of the service. SERVQUAL model consists of five dimensions: (1) tangibles – physical facilities, equipment and appearance of personnel; (2) reliability – ability to perform the promised service dependably and accurately; (3) responsiveness – willingness to help customers and provide prompt service; (4) assurance – knowledge and courtesy of employees and their ability to inspire trust and confidence; and (5) empathy – caring, the individualized attention the firm provides its customers. Although there have been many studies using the SERVQUAL model as a framework in measuring service quality, there have also been theoretical and operational criticisms directed towards this model.  One particular area of criticism has been the scale's dimensionality across different service settings and cultural contexts. Although Parasuraman *et al.* (1998) proposed five ''universal'' dimensions that were supposed to measure service quality in any industry, the majority of studies that have used the instrument have reported a variety of dimensions (Raajpoot, 2004; Zhou, 2004; Cronin and Taylor, 1992; Babakus and Boller, 1992; Carman, 1990).

Carman (1990), for instance, tested SERVQUAL scale in four service setting and found six to nine dimensions, depending on the industry.  It is argued that the variability in the nature of SERVQUAL dimensions is the result of cultural differences across countries or ethnicities. Customer values and beliefs, which change from one culture to another, largely determine the importance and perception of service quality. In this respect, Raajpoot (2004) developed and tested PAKSERV model of service quality to measure service quality in non-Western (i.e. Pakistan) cultural settings. The PAKSERV findings confirmed SERVQUAL dimensions of tangibles, reliability and assurance, but replaced the responsiveness and empathy with three new dimensions: sincerity, formality and personalization. In a replication study, Cronin and Taylor (1992) reported that the five-dimension structure of SERVQUAL could not be confirmed in any of their samples.  They performed empirical test with four alternative service quality models and concluded that the unweighted SERVPERF measure (performance only) performs better than other measure of service quality. In order to define dimensions of service quality in the banking sector of Bosnia and Herzegovina we hypothesize the following:

H1: Service quality can be conceptualized as multidimensional construct.

The central role of price as a purchasing determinant as well as in post-purchasing process is well recognized.  In a qualitative study focusing on switching behavior, Keaveney (1995) reported that more than half customers switched because of poor price perception (compared to competitors). Varki and Colgate (2001) arrived at similar results in their study of banking industry. They concluded that price perception directly influences customer satisfaction, the likelihood of switching, and the likelihood of recommendation to others. Most of such studies that examine the price effect to the customer's perception of a product or

a service have actually looked into single dimension of the price. These authors have usually focused on single dimension of the price, e.g. an effect of price fairness to the price perception (Campbell, 1999; Xia et al., 2004), the price – quality ratio (Fornell et al.1996), or an effect of perceived price to customer satisfaction and behavior (Varki and Colgate, 2001).

The second downside to current literature on the price effect to a purchase decision is a fact that only their lesser part discusses the service sector or banking services in particular. Prompted by the aforesaid, Matzler *et al.* (2006) have gone through an empirical research of the price effect to the customer satisfaction in the banking sector. Therein, they have found that the price is in fact a multidimensional construct consisting of five dimensions: (1) price transparency - clear, comprehensive, current and effortless overview about a company's quoted prices; (2) price/quality ratio - ratio or trade-off between quality of the service and monetary costs; (3) relative price - price of the offer compared to that of competitors; (4) price reliability - fulfillment of raised price expectations and prevention of negative "price surprises"; and (5) price fairness - customers' perception of whether the difference between the socially accepted price or another comparative party is reasonable, acceptable, or justifiable. In order to assess the dimensional structure of service price in the context of Bosnia and Herzegovina's retail banking, we hypothesize the following:

H2: Service price can be conceptualized as multidimensional construct.

## 2.2. Effects of service quality dimensions on customer satisfaction and loyalty

Customer satisfaction is generally defined as the full meeting of one's expectations (Oliver, 1980) and can be described as the feeling or attitude of a customer towards a product or service after it has been used. Numerous studies from different service sectors have investigated the relationship between service quality and customer satisfaction. Although researchers have agreed that there is a relationship between the two constructs, there has been no consensus regarding the direction of this relationship. Some researchers have proposed a causal link from customer satisfaction to service quality (Bitner *et al.*, 1990), whereas others researchers have proposed a causal link in the opposite direction (Bolton and Drew, 1991). While a substantial amount of research has reported a causal link between service quality and customer satisfaction (e.g. Anderson and Sullivan, 1993; Bolton and Drew, 1991; Cronin and Taylor, 1992), few have investigated the link between each of the service quality dimensions and satisfaction and have reported some mixed results (Johnston, 1995, 1997; Lassar *et al.*, 2000; Zhou, 2004; Arasli *et al.*, 2005). For example, Arasli *et al.* (2005) reported that assurance, reliability, empathy and tangibles dimensions of service quality were predictors of customer satisfaction in the Cyprus banking sector. Additional support comes from Zhou (2004), who reported that reliability and assurance were important predictors of satisfaction for bank customers in China. Based on this, we hypothesize the following:

H3a: Customer orientation is positively related to customer satisfaction.
H3b: Reliability is positively related to customer satisfaction.
H3c: Tangibles is positively related to customer satisfaction.
H4: Customer orientation, reliability and tangibles have significantly different effect on customer satisfaction.

Past studies have reported that perceived service quality has an impact on customer loyalty. In their study on retail trade, Wong and Sohal (2003) found a positive relationship between service quality and customer loyalty. Other researchers had discovered a positive

relationship between service quality and loyalty in the banking sector (Bloemer, 1998, Ehigie, 2006). All the researchers have unilaterally agreed that service quality is related to behavioral outcomes, especially in the form of word-of-mouth, recommendation and switching behavior. Based on findings of past studies we hypothesize the following:

H5a: Customer orientation is positively related to customer loyalty.
H5b: Reliability is positively related to customer loyalty
H5c: Tangibles is positively related to customer loyalty
H6: Customer orientation, reliability and tangibles have significantly different effect on customer loyalty.

Customer satisfaction is a main determinant of customer loyalty. Numerous studies show the positive relationship between satisfied customers and repurchase intentions (Mittal and Kamakura, 2001; Reichheld and Sasser, 1990; Zeithaml et al., 1996). Positive effects of satisfaction on loyalty are reflected in the customer's intentions to repurchase a product or service and his/her willingness to recommend it other people. As a consequence firms can be assured of a stable customer base, thereby reducing the acquisition and transaction costs, and attenuating the volatility of revenues (Srivastava *et al.*, 1999). From many studies we know however that customer satisfaction does not translate directly into customer loyalty, and that the relationship between satisfaction and loyalty is not a linear one (Oliver, 1999). Despite these contradictory results there is no doubt that customer satisfaction is a precondition for loyalty. Based on this, the following hypothesize is formulated:

H7: Overall customer satisfaction has positive influence on customer loyalty.

## 2.3.  Effects of service price  dimensions on customer satisfaction and loyalty

Matzler et al. (2006) stated that the customer satisfaction with a certain price should be observed as the multidimensional construct. Also, they found that five dimensions strongly influence overall price satisfaction, word–of mouth and switching intentions. With this respect, customer needs that are linked to a price are quite complex and vary in different stages of the purchase decision process. Still, we should point out that customers do not have formed price expectations toward all these dimensions in every purchase situation. A matter of which price dimensions and to which extent customers have indeed formed their expectations depends primarily on their interest in the price of a product or service they intend to purchase. The customer's price interest is determined by several factors, e.g. factors that influence price sensitivity (Nagle and Holden, 1995) and product or brand involvement. Involvement is indicative of a cognitive effort the consumer invests when ordering a service. As far as customer satisfaction is concerned, low involvement will result in limited information processing with little formal search and evaluation of alternatives (Bennett *et.al*, 2005; Oliver, 1997). In this case, only few price dimensions will be relevant. However, once customers ascertain high purchase risk, they tend to make complex purchase decisions. Should this happen, their relevance span will encompass more price dimensions.

Matzler *et a*l. (2007) have confirmed in their empirical study that different price dimensions have an asymmetrical effect on the customer satisfaction and that price / quality ratio, price fairness and relative price can be taken for basic factors, while price transparency is a performance factor and price reliability is an excitement factor. They concluded that overall price satisfaction can be increased when satisfaction with performance and excitement factors is enhanced.

In the line with the findings of previous research, we hypothesize the following:

H8a: Price transparency is positively related to customer satisfaction.
H8b: Reference price is positively related to customer satisfaction.
H8c: Price reliability is positively related to customer satisfaction.
H9: Price transparency, reference price and price reliability have significantly different effect on customer satisfaction.

As far as we know, there is no empirical research regarding the direct relationship between individual dimensions of service price and customer loyalty. On the other hand, many studies (Keaveny, 1995, Varki and Colgate, 2001) have showed that price perception has a direct effect on the likelihood of switching and the likelihood of recommendation to others. Therefore, we hypothesize the following:

H10a: Price transparency is positively related to customer loyalty.
H10b: Reference price is positively related to customer loyalty.
H10c: Price reliability is positively related to customer loyalty.
H11: Price transparency, reference price and price reliability have significantly different effect on customer loyalty.

## 3. RESEARCH METHODOLOGY

### 3.1. Data collection and sample profile

The citizens with permanent residence in the area of city Sarajevo, who are over 18 years of age and use financial services of at least one bank, were taken as population for this study. Data was collecting using a random sampling method. The questionnaire was carried out through personal interview in respondent's home. The respondents were asked to focus on the bank they use most often. The survey period was three weeks. The whole procedure of data gathering is performed by specialized agency for market research, PrismResearch BIH.

During the research, 519 households have been contacted. In 176 cases we found no member of a household to have an account open with any of the three target banks, while in 17 cases we managed to locate the account holder, but he denied participation in the survey. It was found that 14 questionnaire were not completed correctly. A total of 300 valid questionnaires were completed. The response rate was therefore 57.80 per cent. The sample size met with the requirements suggested by Hair *et al*. (1999) that a sample size of 200 may be required to ensure appropriate use of maximum likelihood estimation, to generate valid fit measures and to avoid drawing inaccurate inferences.

The basic findings related to demographic profile of the respondents are presented in Table 1. The sample consisted of a slightly high proportion of female customers (53.3 percent), and a fairly wide spread between age segments. In terms of their level of education, a majority of respondents had a secondary school degree (59.7 percent).

**Table 1**

**Demographic profile of respondents**

| Factor | Category | Frequency | Percentage |
|---|---|---|---|
| Gender | Male | 140 | 46.7 |
| | Female | 160 | 53.3 |
| Customer's age | 18-25 | 56 | 18.7 |
| | 26-35 | 69 | 23.0 |
| | 36- 45 | 60 | 20.0 |
| | 46-55 | 68 | 22.7 |
| | Over 56 | 47 | 15.6 |
| Customer's education | Primary school | 7 | 2.3 |
| | Secondary school | 179 | 59.7 |
| | Faculty | 102 | 37.3 |
| | Master's Degree | 2 | 0.7 |
| Customer's current work status | Employed | 181 | 60.3 |
| | Unemployed | 22 | 7.3 |
| | Retired | 55 | 18.3 |
| | Student | 38 | 12.7 |
| | Housewife | 4 | 1.3 |
| Customer's income (monthly) | Under €300 | 120 | 40.0 |
| | € 301 - € 500 | 106 | 35.3 |
| | € 501 - €1000 | 74 | 24.7 |
| | Over € 1001 | 0 | 0.00 |
| Duration of relationship with main bank | Less than 1 year | 63 | 21.0 |
| | 2- 5 years | 171 | 57.0 |
| | More than 5 years | 66 | 22.0 |
| Beside my main bank, I bank with… | 1 bank | 68 | 22.6 |
| | 2 banks | 56 | 18.7 |
| | 3 banks | 60 | 20.0 |
| | 4 banks | 17 | 5.7 |
| | I bank only with my main bank | 99 | 33.0 |

*Source: Author's research*

### 3.2. Measurement instrument

In order to access the measurement of exogenous and endogenous variables of the defined model, a questionnaire was developed which focused on four measures: (1) service quality; (2) service price; (3) customer satisfaction and (4) customer loyalty. Each item was measured using five-point Liker scale ranging from ''strongly disagree'' (1) to ''strongly agree'' (5). Therefore, the questionnaire contained four parts (sections).

The first part (Section A) of questionnaire contained 22 perception-only items to measure five dimensions of service quality based on the original SERVQUAL instrument developed by Parasuraman *et al.* (1988). Items are grouped in five original dimensions: tangibles, reliability, responsiveness, assurance and empathy. In the present study, perception-only items (SERVPERF model) were used, although we are aware of all limitations in case we do not measure a level of previous expectations. Actual method and capabilities for conducting this research, as well as the fact this involves a specific service type, have mitigated possible remarks and problems certain critics might have seen regarding this model.

This is due to the fact that respondents in the research have had prior expectations "considered" when deciding for a particular bank.

The Section B of the questionnaire was consisted of 18 items based on the original questionnaire developed by Matzler *et al*. (2007). These items were grouped according to the five original dimensions of the service price: price transparency, price reliability, price - quality ratio, relative price and price fairness.

The overall customer satisfaction was measured using a three items that identified how satisfied a customer felt with regard to the participating banking service provider. The following items have been used:  (1) "I am very satisfied with the Bank X", (2) "Bank X comes up to my expectations of a good bank", and (3) "I consider that Bank X is an ideal choice for my banking". In order to measure loyalty, we used a three - items scale based on the work of Beatty and Kahle (1988), Oliver (1997) and Yoo et al. (2000). The following three items regarding the customer loyalty have been used: (1) "I consider myself to be loyal to Bank X″, (2) "Bank X would be my first choice for my banking'' and (3) "I think I am committed to Bank X". These six items related to customer satisfaction and customer loyalty were presented in the third part of the questionnaire (Section C).

The fourth part (Section D) of the questionnaire includes demographic questions (gender, age, qualifications, current work status, average monthly income) and two items – one regarding the duration of the customer's relationship with a bank and the other regarding the number of banks the customer banked besides its first (main) bank of choice.


### 3.3.   Method of data analysis

The observed data were analyzed using numerous statistical methods and techniques.   In general terms, the entire procedure of data analysis took place in three stages: assessment of metric characteristics of applied measure scales, preparation and verification of data for performing the regression analysis and performing the regression analysis.  During the first stage of data analysis, the Cronbach alpha model and the exploratory factor analysis were applied.  The second stage of the data analysis included a series of analytical procedures to ensure that gathered empirical data meet conditions and prerequisites for performing the regression analysis. More specifically, the following factors could adversely affect validity of the results: (1) distribution of individual variables that deviates from the normal distribution; (2) variables display a bivariate or multivariate multicollinearity; (3) existence of heteroscedasticity among variables (Kline. 1998). The whole procedure of data analysis was performed using statistical package for social sciences (SPSS 12.0). It is important to mention that instead of regression analysis we could have employed a more rigorous method of analysis, such as structural equation modeling (SEM), for testing both, direct and indirect effects between the variables of defined model. Since the purpose of this study is to test only direct effects, regression analysis is employed.

## 4. ANALYSIS AND RESULTS

This section provides results of analysis on the described variables. This will be followed by Cronbach's alpha model in testing the reliability of the measurement scales, factor analysis and regression analysis.

### 4.1. Reliability and factor analysis

Among the numbers models suitable for determining the reliability of measurement scales, Cronbach's alpha model was selected. It is based upon determining the internal consistency among characteristics (items) which make construction of the selected instrument for service quality measurement. Measurement of internal consistency of characteristics (items), i.e. average correlation coefficients among characteristics (items) was estimated for each dimension of the service quality as well as for the whole measurement instrument. Also, the effect of individual characteristics (items) on the internal consistency of each dimension of service quality was estimated. The characteristics (items) that can lower internal consistency of appertaining dimension were eliminated from further analysis.

Having determined reliability of measurement scales for individual service quality dimensions, we have approached an assessment of convergent and discriminant validity of applied measurement scales. Regarding the pre-analysis testing for suitability of entire sample for factor analysis, Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) was 0.930 and the Bartlett's test of sphericity ( 3930.380) was significant at $p<0.01$, thus, indicating that the sample was suitable for factor analytic procedures. The exploratory factor analysis using principal component analysis with varimax rotation was employed to assess construct validity.

**Table 2**

**Results of factor analysis (service quality)**

| Component | Initial variables | Loading |
|---|---|---|
| **Customer orientation [a], α = 0.938** | 21. Customer's best interest are at hart | 0.840 |
| | 22. Employees understand the specific needs of customers | 0.809 |
| | 15. Customers feel safe in their transactions | 0.780 |
| | 14. Employee behavior instills customer confidence | 0.757 |
| | 20. Employees give customers personal attention | 0.731 |
| | 12. Employees are always willing to help | 0.699 |
| | 18. Employees give customers individual attentions | 0.667 |
| | 17. Employees have knowledge to answer questions | 0.636 |
| **Reliability [b], α = 0.905** | 8. Employees provide their services as promised | 0.817 |
| | 9. Employees insist on error-free records | 0.789 |
| | 7. Employees perform the service right the first time | 0.786 |
| | 6. Employees show sincere interest in solving customer problems | 0.644 |
| | 5. Employees keep promises | 0.574 |
| | 10. Employees inform exactly when services will be performed | 0.525 |
| **Tangibles [c], α = 0.835** | 2. Visually appealing physical facilities | 0.885 |
| | 1. Modern - looking equipment | 0.828 |

**Note:** [a] variance explained = 33.821 percent; [b] variance explained = 26.366 percent; [c] variance explained = 12.656 percent

*Author's calculations*

Using the Kaiser-Guttman rule, we were able to single out three factors (dimensions), i.e. to retain those factors with eigenvalues greater than 1.0 and factor loadings equal to or greater than 0.50. The exploratory factor analysis pointed out to the fact that certain items are indicative of high factor loadings across several factors (dimensions). The items with the loadings factor greater than 0.50 related to several factors (dimensions), i.e. that had overlaps among two factors, have been eliminated from further research. The items we eliminated belonged to the original dimension of tangibles: *"Bank's reception desk employees are neat appearing"* (T3) and dimension of responsiveness: *"Employees in bank give you prompt service"* (Re2) and *"Employees in bank are never too busy to respond to your request"*(Re4). Table 2 herein displays the resulting factor structure of the Varimax rotations. Sixteen items, loading under three dimensions, were extracted from the analysis and these items explained 72.643 percent of the overall variance. Also, we have tested reliability of sub-scales of measure for every identified factor (dimension) by applying the Cronbach alpha coefficient. The overall Cronbach alpha coefficient for the modified SERVQUAL instrument (16 items) is 0.950, while for factors 1, factor 2 and factor 3 this coefficient equals 0.938, 0.905 and 0.835 respectively.

While the three original dimensions of the service quality – responsiveness, assurance and empathy, do not appear in this research, the model was complemented with another, new dimension – *customer orientation.* The dimension's name is a result of the author's personal view, pursuant to the idea that the sets of interrelated variables included in the factor can be used to measure ''customer orientation'' of the bank. More specifically, all items within the dimension "customer orientation" describe the way in which the employees treat the customer at the time of service delivery. Therein, the focus is on paying individual attention to the customer, meeting specific needs of the customer, expressing interest in providing assistance to the customer and solving any potential problem the customer may be having. Out of five statements of the "reliability" dimension, one belongs to the original dimension of "responsiveness". Eight statements of the "customer orientation" dimension have originally belonged to the dimensions "responsiveness", "assurance" and "empathy". All items of the dimension of ''tangibles'' are the same as the original items. Therefore, hypothesis *H1: Service quality can be conceptualized as* multidimensional construct, is confirmed.

Results of the factor analysis used to test the multidimensional construct of the service price are presents in the Table 3.

**Table 3**

**Results of factor analysis (service price)**

| Component | Initial variables | Loading |
|---|---|---|
| **Price Transparency [a], α = 0.910** | 7. Price information is understandable and comprehensible | 0.880 |
| | 6. Price information is complete, correct, and frank | 0.817 |
| | 5. All price components are clear, comprehensible and understandable | 0.863 |
| | 8. I am properly informed about the prices of services | 0.795 |
| | 3. There is no ''hidden'' costs | 0.615 |
| | 4. Prices and conditions do not change unexpectedly | 0.571 |
| **Price Reference [b], α = 0.920** | 11. Terms and conditions of my bank are better than those of other banks | 0.848 |
| | 13. Price and quality meet my needs | 0.817 |
| | 10. I do not believe that another bank would have the same or better offer | 0.788 |
| | 12. I am convinced that my bank is the best choice | 0.775 |
| | 14. I get a good price-quality ratio | 0.742 |
| | 16. The prices I pay are fair | 0.677 |
| | 17. My bank does not take advantage of me | 0.596 |
| | 18. Overdrafts do not cause abnormally high interest rates | 0.595 |
| **Price Reliability [c], α = 0. 932** | 1. Price changes are communicated properly | 0.916 |
| | 2. Price changes are communicated timely | 0,915 |

**Note:** [a] variance explained = 29.941 percent; [b] variance explained = 29.835 percent; [c] variance explained = 12.780 percent

*Authors' calculations*

The pre-analysis testing for suitability of entire sample for factor analysis, Kaiser-Meyer- Olkin measure of sampling adequacy was 0.915 and the Bartlett's test of sphericity (3967.537) was significant at $p<0.01$, thus, indicating that the sample was suitable for factor analytic procedures An initial solution to the Varimax rotation resulted in three factors (dimensions), whereas we have remained the factors with eigenvalues greater than 1.0 and factor loadings equal to or greater than 0.50. There were sixteen statements included in the three factors (dimensions) that explain the 72.555% of total variance. In order to ascertain reliability of the internal consistency of applied scales of measure, we have calculated the Cronbach alpha coefficient for every factor (dimension). The overall Cronbach alpha coefficient is 0.940, while their respective values for individual factors are 0.910, 0.920 and 0.932.

The three original dimensions of the service price – relative price, price / quality ratio and price fairness, do not appear in the research. Items belonging to these service price dimensions have displayed high factor loadings related to the second factor (dimension) marked as "price reference". There are eight items in the "price reference" dimension and they originally belong to dimensions "relative price", "price-quality ratio" and "price fairness". These dimensions relate to a comparison with prices charged by other service companies (banks) for the same service or with a price the customer finds acceptable. In both cases, there was certain point of reference that the customer applied to assess a price of service being offered by a service provider (bank). Since any price used by the customer in this comparison is called the "reference price", we find the dimension's title "reference price" the most suitable for manifest variables (items) included in this dimension. Out of six statements of the "price transparency" dimension, two belong to the original dimension of

"price reliability". There are two statements, originally belonging to the "price reliability" dimension, that have displayed high factor loadings related to the third factor, i.e. dimension that we marked as "price reliability". These results supported the hypothesis *H2: Service price can be conceptualized as multidimensional construct.*

## 4.2.  Regression analysis

In order to examine the univarite normal distribution of individual variables, we have calculated a skewness index and a kurtosis index for every single variable. Results have shown that both indices are within acceptable limits (absolute values are below 3 for the skewness index and below 10 for the kurtosis index), i.e. there is a normal distribution for all variables in the model. Given that it is possible for the high correlation between two variables to imply the bivariate multicollinearity, we have used a correlation matrix for all variables as to determine the multicollinearity among them. Results of the correlation analysis have led to a conclusion that there is no unacceptable level of the bivariate collinearity among the variables as values of all correlation coefficients are below 0.83.  Also, we have looked into a variance inflation factor (VIF) in order to examine the multicollinearity for more than two variables, i.e. in case when three or more variables have high correlation coefficient. The findings of the VIF test (Table 4) show that all observed variables are within the acceptable limits. The VIF test has helped us determine that the collinearity level among analyzed variables is acceptable (the VIF test benchmarks at 10, so values above this figure are indicative of significant multicollinearity). The homoscedasticity of individual variable pairs, wherein the defined model presumed to be in a direct causal relationship, were subject to the Levene's test of homogenity of variances. This test has proven to be insignificant (p>0.05) related to all examined variable pairs, hence this makes us conclude that the hypothesis of homoscedasticity of certain relations cannot be dismissed, meaning that the relation between tested variables is homoscedastic.

**Table 4**

**Results of VIF test**

| Model | Variables | Collinearity Statistics | |
|---|---|---|---|
| | | Tolerance | VIF |
| Satisfaction | Customer orientation | 0.272 | 3.674 |
| | Reliability | 0.286 | 3.502 |
| | Tangibles | 0,498 | 2.008 |
| | Price Transparency | 0.272 | 3.679 |
| | Reference Price | 0.285 | 3.507 |
| | Price Reliability | 0.384 | 2.607 |
| Loyalty | Customer orientation | 0.263 | 3.798 |
| | Reliability | 0.268 | 3.810 |
| | Tangibles | 0.489 | 2.044 |
| | Price Transparency | 0.258 | 3.882 |
| | Reference Price | 0.262 | 3.810 |
| | Price Reliability | 0.367 | 2.724 |
| | Satisfaction | 0.188 | 5.323 |

*Author's calculations*

As we have ascertained that the collected empirical data meets the primary presumptions for performing regression analysis, we were able to approach the next stage in the process. The summarized results of regression analysis are presented in Table 5. The results of the first model (SAT model) indicate that  81.2 percent $(R^2 = 0.812)$  of the variance

in customer satisfaction can be explained by the dimensions of service quality (customer orientation, reliability, tangibles) and service price (price transparency, reference price, price reliability) . Findings from the second model (LOY model) indicate that 79.6 percent ($R^2$=0.796) of the variance in customer loyalty can be explained by the dimensions of service quality (customer orientation, reliability, tangibles), service price (price transparency, reference price, price reliability) and customer satisfaction.

**Table 5**

**Results of regression analysis**

| Model | Standardized coefficients | Standardized error | t-value | p-value |
|---|---|---|---|---|
| **Satisfaction- SAT ($R^2$)** | (0.812) | | | |
| Customer orientation | 0.153 | 0.050 | 3.142 | 0.002 |
| Reliability | 0.205 | 0.048 | 4.324 | 0.000 |
| Tangibles | 0.082 | 0.038 | 2.297 | 0.001 |
| Price Transparency | 0.195 | 0.049 | 4.022 | 0.000 |
| Reference Price | 0.238 | 0.050 | 5.028 | 0.000 |
| Price Reliability | 0.149 | 0.038 | 3.637 | 0.000 |
| **Loyalty – LOY  ($R^2$)** | (0.796) | | | |
| Customer orientation | 0.136 | 0.051 | 2.638 | 0.009 |
| Reliability | 0.148 | 0.050 | 2.910 | 0.004 |
| Tangibles | 0.100 | 0.039 | 2.641 | 0.009 |
| Price Transparency | 0.140 | 0.050 | 2.694 | 0.007 |
| Reference Price | 0.170 | 0.052 | 3.398 | 0.001 |
| Price Reliability | 0.113 | 0.039 | 2.910 | 0.004 |
| Satisfaction | 0.201 | 0.058 | 3.289 | 0.001 |
| **F test (Satisfaction)** | 211.124 | df =6 | | 0.000 |
| **F test (Loyalty)** | 162.806 | df=7 | | 0.000 |

*Author's calculations*

The positive value of the standardized coefficient made us conclude there is a positive relation between independent and dependant variable, while the negative value is indicative of a negative relation between the independent and dependant variable. The standardized coefficient's value also points out to an extent to which every independent variable affects the dependant variable. This is rooted on a presumption that all other independent variables remain unchanged (constant). Every standardized coefficient has an associated and standardized error pointing out to the degree to which values of standardized coefficients would vary across different samples. The statistical relevance of regression coefficients is established on basis of t-statistics and accompanying p-values.

Standardized coefficients used to assess direct causal relations between latent variables were specified in the defined model and presented in the Table 6. Results of the regression analysis revealed the statistically significant positive relation between customer satisfaction and customer loyalty ($\beta$ =0.201). This has also confirmed the hypothesis *H7: Overall customer satisfaction has positive influence on customer loyalty*

**Table 6**

**Standardized coefficients estimates (n=300)**

| | Hypothesis | Standardized coefficients | t-value | p-value |
|---|---|---|---|---|
| **H3a** | Customer orientation → Satisfaction (+) | 0.153 | 3.142 | 0.002 |
| **H3b** | Reliability → Satisfaction (+) | 0.205 | 4.324 | 0.000 |
| **H3c** | Tangibles→ Satisfaction (+) | 0.082 | 2.297 | 0.001 |
| **H8a** | Price Transparency → Satisfaction (+) | 0.195 | 4.022 | 0.000 |
| **H8b** | Reference Price → Satisfaction (+) | 0.238 | 5.028 | 0.000 |
| **H8c** | Price Reliability → Satisfaction (+) | 0.149 | 3.637 | 0.000 |
| **H7** | Satisfaction → Loyalty (+) | 0.201 | 3.289 | 0.001 |
| **H5a** | Customer orientation → Loyalty (+) | 0.136 | 2.638 | 0.009 |
| **H5b** | Reliability → Loyalty (+) | 0.148 | 2.910 | 0.004 |
| **H5c** | Tangibles → Loyalty (+) | 0.100 | 2.641 | 0.009 |
| **H10a** | Price Transparency → Loyalty (+) | 0.140 | 2.694 | 0.007 |
| **H10b** | Reference Price → Loyalty (+) | 0.170 | 3.298 | 0.001 |
| **H10c** | Price Reliability → Loyalty (+) | 0.113 | 2.910 | 0.001 |

*Author's calculations*

We have established the direct positive links between: reliability and satisfaction ($\beta$ = 0.205), customer orientation and satisfaction ($\beta$ = 0.153) and tangibles and satisfaction ($\beta$ =0.082). This leads to a conclusion that all dimensions of the service quality, as determined by the factor analysis, possess statistical relevance in determining the customer satisfaction. Therefore, the set of hypotheses H3a, H3b, H3c is supported. Results of the regression analysis (LOY model) confirmed positive statistically significant relations among: reliability and loyalty ($\beta$ = 0.148), customer orientation and loyalty ($\beta$ =0.136), as well as tangibles and loyalty ($\beta$ =0.100). Based on these findings, the set of hypotheses H5a, H5b, H5c is supported. Also, results indicate direct links between price reference and customer satisfaction ($\beta$ = 0.238), price transparency and satisfaction ($\beta$ = 0.195) and price reliability and satisfaction ($\beta$ =0.149). These results confirm the hypotheses H8a, H8b and H8c. The positive statistically significant relations among price reference and loyalty ($\beta$ =0.170), price transparency and loyalty ($\beta$ =0.140) and price reliability and loyalty ($\beta$ =0.113) are also reported in this study. These results affirmed the set of hypotheses H10a, H10b and H10c.

T-statistics and accompanying p-values have been used to test hypotheses H4 and H6, i.e. to estimate the effects of the individual dimensions of service quality on customer satisfaction and loyalty. Findings indicate that the strongest predictor of customer satisfaction is reliability, followed by customer satisfaction and tangibles. Also, we have found that the customer loyalty is largely determined by the reliability, followed by customer orientation and tangibles. However, the effect of these dimensions to the customer loyalty is lesser than to the customer satisfaction. These results lead to the conclusion stated under the hypothesis H4: *Individual dimensions of service quality have significantly different effect on the customer satisfaction,* and hypothesis *H6: Individual dimensions of service quality have significantly different effect on the customer loyalty.*

The same method has been applied to test hypotheses H9 and H11, i.e. to estimate the effects of individual service price dimensions on customer satisfaction and loyalty. Our conclusion therein was that the price reference is the strongest predictor of customer satisfaction, followed by price transparency and price reliability. Also, we concluded that the price reference contributes the most to the customer loyalty. These results enabled us to confirm hypotheses *H9: Individual dimensions of service price have significantly different*

*effect on the customer satisfaction* and *H11: Individual dimensions of service price have significantly different effect on the customer loyalty.*

### 4.3. Discussion and implications

Although SERVQUAL is accepted as the universal instrument in measuring service quality, some critics have risen regarding its dimensionality. In the present study SERVQUAL has been reduced to three dimensions: customer orientation, reliability, and tangibles. This finding is in the line with previous studies suggesting that SERVQUAL model needs some adaptation when it has to be implemented in a particular country or industry. As regard the service price, compared to the findings of original study conducted in Austria (Matzler *et al.,* 2006, 2007), the results of the present study reported different dimensional structure of service price. This finding indicates that price satisfaction scale developed by Matzler *et al*. (2006, 2007) need to be adopted to reflect the particular settings of research. In the case of Bosnia and Herzegovina these particularities can be imposed by the specific cultural values of the society, but also by the stage of banking sector's development.

As hypothesized, we find that customer orientation, reliability and tangibles are positively related to customer satisfaction and loyalty. Therefore, it seems reasonable to conclude that customer satisfaction and loyalty can be enhanced by focusing on these dimensions of service quality within the Bosnia and Herzegovina's retail banking. We found that reliability of service is the most important predictor of customer satisfaction and loyalty, which is in the line with prior research (Arasli *et al*., 2005; Zhou, 2004). Moreover, we found that tangible dimension is positively related to customer satisfaction and loyalty, although the standardized coefficient was smallest in comparison with reliability and customer orientation. This finding is consistent with previous research, by suggesting that physical environment is the important part of the service offering. However, it is not in the line with the extant banking literature, which has been reported that tangible dimension is the most significant predictor of customer loyalty (Wong and Sohal, 2003). Moreover, our findings confirm the mediating role of satisfaction on the relationship among service quality dimensions and customer loyalty and therefore reconfirm the significance of customer satisfaction in the service setting.

Furthermore, it is interesting to note that relative importance of price dimensions in creating customer satisfaction differs between the present study and study conducted in Austria. Whereas the price reliability is the most important price dimension in the sample of retail bank customers in Austria (Matzler et al., 2007), the present study showed that reference price is a major predictor of customer satisfaction and loyalty for bank customers in Bosnia and Herzegovina.

Our findings suggest that bank managers in Bosnia and Herzegovina should focus on customer orientation, reliability and tangible dimensions of service quality with a purpose of measuring, monitoring, and improving the satisfaction and loyalty levels of their customers. Given the significance of reliability of service, bank managers in Bosnia and Herzegovina should provide customers with accurate and prompt service deliveries in order to enhance their satisfaction and loyalty. Regarding the service price, results of present study showed that reference price is the most important predictor of customer satisfaction and loyalty. From a managerial point of view the results suggest that banks should used a more efficiently way of informing customers when they lower interest rates or automatically increase interest rates when interest rates in the market increase , as well as informing them of charging so called "hidden" costs. Also, this means that a bank should focus more on delivering the right quality at the right price (price-quality ratio) and on treating the customers fairly.

## 5. CONCLUSION AND FINDINGS

The defined model of service price, service quality, customer satisfaction and customer loyalty has proven to be statistically reliable and enabled us to determine the positive and statistically significant relation between the defined variables of the model. Also, the results indicate that individual dimensions of the service quality and service price have different effect on customer satisfaction and customer loyalty. The results of factor analysis confirm that the service quality can be viewed as the multidimensional construct and that the dimensional structure of the service quality in the banking sector of Bosnia and Herzegovina varies from the originally thought. To put it more precisely, a three-factor solution was identified: tangibles, reliability and customer orientation. Also, the dimensionality of the service price construct was confirmed. The empirical data analysis singled out three dimensions of the service price: price transparency, price reliability and reference price. The last dimension – reference price encompasses items already belonging to dimensions of price-quality ratio, relative price and price fairness. The research findings deny universal nature of original SERVQUAL dimensions of the service quality and the service price. An explanation to this can be found in cultural differences and values and beliefs of customers that can vary among countries. This is to say that different cultural values shape the perception of customers that may even result in different dimensions of the service quality and the service price. The research findings show that banks still persist in not paying enough attention to service quality they offer to individual customers.

This study is a first attempt to test the dimensions of the service quality and service price in the context of Bosnia and Herzegovina's retail banking. Besides, it aims to provide an integrated framework for analyzing service quality, service price and customer satisfaction and loyalty. Although it has some limitations, it also opens new research opportunities in service marketing literature, particularly in the area of bank service marketing in the context of the countries in transition.

.However, the present study has several limitations that need to highlight. The sample size was relatively small (n =300) and the measurement instrument was validated by collecting data from bank customers. Thus, further research should be conducted to confirm the relevance of the findings of this study in different service industries. The applied research methodology can also influence the research results and can hence be considered as the limiting factor. More specifically, the research was based on personal interviews at respondents' homes, thus a limitation here is that no alternative method was employed. A choice of the service quality measuring model can too impose limitations.

Based on described limitations and deficiencies of the research, we have also drawn up certain recommendations for future research studies regarding the concerned topic. Guidelines for any future research of the service quality, service price, customer satisfaction and customer loyalty include: (1) research needs to be conducted over different service sectors (telecommunications, hospitality, education) as to ensure comparison and generalization results of present study; (2) if possible, research needs to cover the entire area of Bosnia and Herzegovina; (3) research needs to examine perceived service quality and service price as observed from a perspective of service company managers; (4) investigate the relations between customer satisfaction and loyalty, on one hand, and service staff satisfaction and loyalty, on the other .

Any future research of the service quality and price, as well as their effect on the customer satisfaction and loyalty, will be largely determined by trends present in the general environment, like: increasing competition among service companies, further advancement of information technologies, level of acceptance of these technologies among general population and changes in behavior of such population (new life styles, new values, etc.).

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# INTEGRIRANI MODEL CIJENE, KVALITETA USLUGA, ZADOVOLJSTVA I LOJALNOSTI: EMPIRIJSKO ISTRAŽIVANJE U BANKARSKOM SEKTORU BOSNE I HERCEGOVINE

*Relacija između kvalitete, zadovoljstva i lojalnosti korisnika usluga je predmet interesa istraživača već niz desetljeća. I pored velikog broja publiciranih radova o kvaliteti usluge, uloga ove koncepcije te njezine povezanosti sa drugim ključnim marketing koncepcijama je i dalje nejasna. Ovaj rad pokušava objasniti povezanost između percepcije kvaliteta usluge, percepcije cijene usluge, zadovoljstva i lojalnosti. Predloženi model je definiran na osnovu postojećih teorijskih spoznaja. Pored toga, istraživanje je provedeno s ciljem ispitivanja održivosti dimenzija kvalitete usluge i dimenzija cijene usluge u maloprodajnom bankarstvu Bosne i Hercegovine. Kako bi se testirao definirani model i hipoteze istraživanja, provedeno je empirijsko istraživanje na uzorka 300 korisnika bankarskih usluga. Rezultati istraživanja upućuju na zaključak da model pokazuje prihvatljiv nivo odgovaranja empirijskim podacima. Doprinos ovog rada ogleda se u identificiranju utjecaja pojedinih dimenzija kvaliteta i cijene usluge na zadovoljstvo i lojalnost korisnika. Pristup zasnovan na dimenzijama koji je korišten u ovom radu omogućava menadžerima banaka da identificiraju one dimenzije koje najviše doprinose kreiranju zadovoljstva i lojalnosti klijenata. Provedeno istraživanje ima nekoliko ograničenja koja je potrebno istaknuti. Obzirom da je istraživanje provedeno samo na uzorku korisnika usluga u bankarskom sektoru, te da je uključivalo nekoliko banaka i uzorak od 300 ispitanika smatramo da nije moguće generalizirati dobivene rezultate istraživanja. U cilju generalizacije rezultata neophodno je ponoviti istraživanje u drugim uslužnim sektorima i na većem uzorku ispitanika.*

***Ključne riječi:*** *kvaliteta usluge, cijena, zadovoljstvo klijenta, lojalnost klijenta, maloprodajno bankarstvo*

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# FISCAL SUSTAINABILITY OF EU MEMBER STATES IN THE CONTEXT OF CURRENT FINANCIAL CRISIS

***ABSTRACT***

*This paper tackles the question of fiscal sustainability in current times of financial/economic crisis. Our literature review leads us to conclusion that when fiscal sustainability is being considered, putting fixed limit to public debt-to-GDP and budget balance-to-GDP ratio is a too simplified solution and that sustainable fiscal policy might be defined with public debt-to-GDP and budget balance-to-GDP ceilings, but taking into account some underlying country specific parameters. Our empirical analysis shows that most EU Member States entered year 2008 with healthy public finances. However, most EU Member States now face fiscal difficulties. Even more: almost all EU Member States would have to decrease budget deficit in 2009 and 2010, in order to achieve sustainable budget position. The extensive jumps in fiscal deficits in 2009 and 2010, compared to 2007 (before crisis), are mainly due to lower fiscal incomes as a consequence of lower economic growth and policy measures for tackling financial/economic crisis. We argue that these changes in fiscal deficits are not sustainable. Our analysis shows that in 2009 about 2/3 of the economies in question should have budget surplus, taking into consideration other relevant macroeconomic variables, such as economic growth, etc. In 2010, however, a more loosened fiscal policy would be possible, but still significantly lower fiscal deficit than forecasted would be sustainable.*

***Key Words***
*public finance, sustainability, budget balance, budget deficit, public debt*

***JEL Classification Codes***
*E62, H72, H74*

## 1   INTRODUCTION

In the last financial/economic crisis the governments were forced to undertake necessary policy actions to overcome economic slowdown. In 2008 and 2009 most of EU policy makers (similar also in the USA and other economies) introduced some policy measures that usually involved massive amounts of public funds, used directly or indirectly, aiming to boost economic growth, tackle liquidity problems of banking sector, etc. The use of public funds resulted in many academic and professional debates (see e.g. Balassone et al. 2009, Spilimbergo et al. 2008, Daniel and Shiamptains 2008, Baldacci, Gupta and Mulas-Granados 2009, Leigh and Stehn 2009, Afonso and Rault 2008); especially regarding the fiscal sustainability of such actions. Data shows that fiscal situation significantly worsened in most EU Member States in 2009 and (forecasted) in 2010, compared to 2010.

For EU Member States (or at least for EMU Member States) there are two limits (Maastricht fiscal criteria), under which fiscal policy is considered to be sustainable: 3% of GDP for budget deficit and 60% of GDP for public debt are politically accepted as long-term sustainable. When Maastricht criteria were first introduced they implicitly implied that an economy, fulfilling these criteria, cannot suffer from fiscal difficulties; it tends to have

healthy public finances. Later on, many academic debates and empirical studies[1] show that the two Maastricht fiscal criteria were politically motivated and really do not have a strong theoretical and/or empirical background (as regards to fiscal sustainability as such).

Many authors argued that it is unreasonable or economically irrational to limit a member state of Euro-area (EMU) with its fiscal policy, because with the adoption of single European currency a country already loses its monetary policy. These debates started mostly soon after the acceptance of the criteria and stopped immediately after most of EU member states successfully adopted euro in 1999. And further, it is the fact that most of (also *academic*) critics of Maastricht criteria originated from countries, where public debt and budget deficit were significantly higher than a defined limit (that is mostly from Italy and Belgium). However, these debates all stand on common critics of administratively defined 3% and 60% which cannot guarantee *per se* a fiscal sustainability[2].

However, current Stability and Growth Pact require countries not only to fulfill these two conditions, but to have their cyclically adjusted balances close to zero. EMU Member States and countries aiming to join are urged to comply with the budgetary requirements of EMU by avoiding excessive deficits, keeping debt levels below the 60% of GDP reference value, and respecting the "close to balance or in surplus" requirement of the Stability and Growth Pact (see e.g. Afonso and Rault (2008) for more details). But also this interpretation raises several practical questions, one being long-run horizon and how to measure it technically. Models have been developed for long-run sustainability assessment, but they are rather unpopular in their practical use; at least because there is no clear cut such as – for example – 3% and 60% of GDP for budget balance and public debt, respectively.

Slovenia is a good example of the above mentioned dilemmas about real term fiscal sustainability. Even though fiscal criteria were in accordance with the Maastricht criteria well before Slovenia actually entered EMU in 2007, empirical study clearly showed a doubtful sustainability of public finances in the period before 2004 (see Dolenc 2006). However, in 2005 and 2006 the situation changed and with higher economic growth (see Žižmond and Novak 2006), lower cost of public debt financing, and even budget surplus in recent years, Slovenia was not only in accordance with the Maastricht Criteria, but also and most importantly in accordance with the objective criteria for fiscal sustainability (see Dolenc 2007).

This paper tackles the mentioned dilemmas and focuses on one possible solution in determining the objective limitations for policy makers in EU economies. The aim of the article is to clarify if sustainability criteria could really be simplified to fixed public debt-to-GDP and budget balance-to-GDP ratio as in Maastricht criteria. We would like to find a pragmatic definition of fiscal sustainability, i.e. an operative definition that would be simple to understand and calculate. Further, we would like to assess realistic estimates of fiscal sustainability of EU Member States and determine if EU Member States in fact have any space to tackle financial crisis.

Our analysis of theoretical literature confirms that putting fixed limit to public debt-to-GDP and budget balance-to-GDP ratio is a too simplified solution if one aims at estimating/determining, what the sustainable fiscal position of an economy really is. Further,

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[1]    For example Pasinetti (1998), Papadopoulos and Sidiropoulos (1999), Fatás and Mihov (2003), Eichengreen and Wyplosz (1998) and others.

[2]    For the pro and contra of the suitability of EU fiscal surveillance rules see Dabrowski et al. (2005).

the review of theoretical and empirical solutions leads us to conclusion that sustainable fiscal policy might be defined with public debt-to-GDP and budget balance-to-GDP ceilings, but taking into account some underlying country specific parameters, but taking into account some underlying parameters that are country specific.

In the empirical part we find that most EU Member States entered year 2008 with healthy public finances, measured with selected sustainability criteria. However, in recent times of financial/economic crisis most EU Member States face fiscal difficulties and most of them are currently not fiscally sustainable due to increased fiscal expenditures, applying selected sustainability measures. Even more: our analysis shows that almost all EU Member States would have to decrease budget deficit in 2009 and 2010 in order to achieve sustainable budget balance.

And finally, we estimate that massive fiscal deficits which can be noticed in 2009 and are forecasted for 2010, or more precisely, the extensive jumps in fiscal deficits compared to 2007 (before crisis), mainly originate from lower fiscal incomes as a consequence of lower economic growth and policy measures for tackling financial/economic crisis. In this context, however, we can argue that these changes in fiscal deficits are not sustainable and thus too high. Our estimates predict that in 2009 about two thirds of the economies in question should have budget surplus, taking into consideration other relevant macroeconomic variables such as economic growth, etc. In 2010, however, a more loosened fiscal policy would be possible, but still significantly lower fiscal deficit than forecasted would be sustainable.

The rest of the paper is organized as follows. Section 2 reviews some theories and empirical studies on fiscal sustainability and introduces the underlying theory of our empirical analysis. In section 3 data and methodology are described. Section 4 with its three subsections concentrates on the results of the analysis and offers a discussion on these results. We sum up with concluding remarks and some policy implications.

## 2    ON FISCAL SUSTAINABILITY

Academic studies on fiscal sustainability are of two types: 1) studies that focus on cointegration between public revenues and consumption; and 2) studies that analyze the sustainability of fiscal position through the perspective of (if we simplify) sustainable (growth of) public debt on condition of some macroeconomic parameters. In the next two subsections we present the main assumptions and arguments of these studies, and in subsection 2.3 we present some relevant empirical studies about fiscal policy in economic downturns in the context of fiscal sustainability.

### 2.1    Cointegration of public revenues vs. consumption as a concept of sustainability

According to these studies a fiscal policy is sustainable if budget consumption follows budget revenues; i.e. given positive public debt, fiscal position tends to be sustainable if budget consumption follows budget revenues and public debt is being serviced normally. Such analyses are usually based on partial equilibrium model and assume no future changes in structural form of the economy and apply to data some kind of autocorrelation and cointergation tests and in fact analyze if public revenues follow adequately public consumption (and vice versa) on long-run.

Hamilton and Flavin (1986) and Wilcox (1989) argue that fiscal policy is sustainable on long-run if public debt is integrated in the first level and if the change of public debt and primary public balance are stationary. There are two drawbacks of this test: 1) fixed interest rate on public debt is assumed; and 2) the analysis gives only alternative answers: public finances are sustainable or not.

Trehan Bharat and Walsh (1988) argue that in order to be fiscally sustainable primary public balance must be cointegrated with public debt, where the cointegration factor should be the interest rate on public debt. Despite alternative formulation this analysis suffers from the same two problems and prior analyses. In 1991 they presented a new version of empirical testing where they overcame the problematic assumption of fixed interest rate (see Trehan Bharat and Walsh 1991).

Hakkio and Rush (1991), Ahmed and Rogers (1995) and Quintos (1995) made a step forward, allowing also weak sustainability and not only two alternative answers (sustainable or non-sustainable fiscal policy). According to the authors, public finances are weakly sustainable if: a) both public revenues and public consumption expenses are integrated in the first level; b) public revenues and public consumption expenses are cointegrated with coefficient between zero and one; and c) residuals are stationary.

Bohn (1998) offers another solution, i.e. testing the cointegration of primary public balance with public debt, where cointegration coefficient should be greater than 0 for the public finances to be sustainable.

Cointegration analyses of public revenues and consumption as a concept of sustainability have some advantages and disadvantages. The advantage of such an analysis is that it is a firm indicator of the sustainability of fiscal policy in a selected economy. However, such an analysis can also suffer from major drawback: it could be difficult to understand, especially for non-academic society and those who are not familiar with econometric analysis.

The other group of analyses gives such answer, especially Pasinetti's approach adopted also in our empirical study[3].

## 2.2 The sustainable growth of public debt

These studies usually seek for the optimal level or growth of public debt. Fiscal policy tends to be sustainable if budget deficit does not change (significantly) public debt-budget incomes ratio (Easterly et al., 1995).

Many authors[4] have focused on the problem of sustainable (growth of) public debt, most of them trying to define the optimal level of public debt with one of the basic macroeconomic identities – the so called (dynamic) budget constraint. Blanchard et al. (1990), for example, methodologically solved the question of optimal level of public debt and implicitly set the framework for the analysis of public finances sustainability. The authors argue that the

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[3]  Pasinetti (1998) argues that public debt-to-GDP ratio and budget balance-to-GDP ratio are connected with well defined relation and that 3% and 60% of Maastricht limits have no serious underlying argumentation.

[4]  For example Blanchard et al. (1990), McCallum (1984), Papadopolous and Sidiropoulos (1999), Herring (1995), De Haan and Sierman (1993), Heinemann (1993), Mac Donald and Speight (1990), Uctum and Wickens (1997), Collignon and Mundschenk (1999) and others.

question of fiscal sustainability is mostly the question whether a country's long-term trend of public debt accumulation goes over the limit; the best indicator is therefore public debt-to-GDP ratio. According to authors, fiscal policy is considered sustainable if it enables the public debt-to-GDP ratio to converge into its initial level. From this perspective, not only the level of public debt- and budget deficit-to-GDP ratio matter, but also interest rate on public debt and economic growth. However authors did not fully solve the question of optimal level of public debt (and thus the question of sustainable fiscal policy) or clearly offer a numerical solution that could be used in practical analysis and concrete policy maker's dilemmas.

The later problem has been solved by Pasinetti in his "… Myth (or Folly) of the Maastricht criteria" (Pasinetti 1998), offering a solution that can be easily applied to specified economy. His critic of the Maastricht treaty is in that it does not even mention the concept of public finances sustainability nor it defines the relation between public debt-to-GDP ratio (as one limit or criteria) and budget deficit-to-GDP ratio (as the other limit or criteria)[5]. Pasinetti shows that public debt-to-GDP ratio and budget balance-to-GDP ratio are connected with well defined relation which enables also the analysis of fiscal sustainability leading to two simple conditions for sustainable fiscal position[6]:

$$\frac{D}{Y} \geq -\theta_n \cdot \frac{B}{Y} \text{ and} \tag{1}$$

$$\frac{D_p}{Y} \geq (i - \theta_n) \cdot \frac{B}{Y}, \tag{2}$$

where:

- $D = -dB$ – total (yearly) budget balance (this defines the change of public debt in one year),
- $D_p$ – (yearly) primary budget balance,
- $B > 0$ – public debt,
- $Y$ – nominal GDP,
- $\theta_n$ – yearly nominal growth of GDP.
- $i$ – (yearly) nominal interest rate on public debt.

In this way Passinetti's solution offers a good (and in fact simple) analytical tool for the determination of the flexibility of fiscal policy. These two rules could also be used in recent times of expansive fiscal policy used to ease the effects of financial and economic crises.

According to this theoretical model we can conclude that one cannot simplify fiscal sustainability criteria to fixed public debt/GDP and budget balance/GDP ratio (such as it is done in Maastricht fiscal criteria). Further, putting fixed limit to public debt/GDP and budget balance/GDP ratio is a too simplified solution if one is aiming to estimate, what the sustainable fiscal position of an economy really is. However, the sustainable fiscal policy might be defined with public debt-to-GDP and budget balance-to-GDP ceilings, but taking into account some underlying country specific parameters. These limits – suggested by Pasinetti (1998) – are expressed in equation [1] and [2] above.

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[5]   We have already mentioned that current rules require from countries to have their cyclically adjusted balances close to zero.

[6]   Note that besides budget balance and public debt two additional factors in determining fiscal sustainability are interest rate on public debt and economic growth.

### 2.3 Relevant recent empirical literature on fiscal sustainability (with the emphasis also on financial crisis)

Besides theoretical issues fiscal sustainability is a huge empirical challenge. There are several studies that focused on this matter, few of them for EU-15 Member States and to our knowledge none on the fiscal sustainability for EU-27 under current economic distress, therefore this paper adds a new value on this topic.

Past studies usually combine the question of fiscal sustainability with fiscal effects on fiscal policy under economic distress. Alfonso and Rault (2008) have studied fiscal sustainability in EU-15 countries for the period from 1970-2006. Authors find that most of EU-15 member states (not all!) had sound fiscal position until 2006. Authors note that the results of the analysis may question fiscal sustainability in some cases when taken individually, but the overall solvency of government public finances when considering EU-15 area as a whole is indubitably proven. These findings hold also for the immediate sub-period before the actual crisis (1992-2006).

Spilimbergo et al. (2008) surveyed the countries that have experienced severe systemic financial crisis. They show that fiscal stimulus is highly useful (almost necessary) when the financial crisis spills over to the corporate and household sectors which results in worsening of the balance sheets. Although the fiscal response is usually vast (sometimes causing questionable fiscal sustainability) the effect of the public funds "invested" highly depends on its composition (rather solely on its value). The authors argue that the room for discretionary fiscal action over prolonged periods of time is limited even in countries where the initial fiscal position appeared to be strong.

On the other hand, Leigh and Stehn (2009) analyzed fiscal responses during crises in G7 and advocate that during economic downturns fiscal policy provides too little stimulus too late, while monetary policy is a timely and powerful countercyclical instrument. Also some other authors (i.e. Gali and Perotti 2003, Lane 2003, Auerbach 2003) argue that discretionary fiscal easing, proxied by the cyclically-adjusted primary balance, generally arrived after the end of recessions, and provided a weak degree of stimulus. Authors argue that all that matters are automatic fiscal stabilizers and not discretional fiscal responses.

Balducci, Gupta and Mulas-Granados (2009) found that in times of financial crises governments usually implement fiscal and monetary stimulus packages to sustain aggregate demand and prevent a downward spiral of output. Further, Christiano, Wichenbaum and Rebelo (2009) argue that as the room for monetary easing rapidly shrinks, reflecting limited space for additional interest rate cuts and impaired monetary policy transmission channels, fiscal policy becomes the principal tool for stimulating economic recovery. It is subject of much debate whether these fiscal responses are sustainable and to what extent fiscal policy will be effective in supporting growth recovery, both in the short term and over time.(Jansen et al. 2008).

Analyzing the literature on fiscal responses to economic crisis IMF (2009a) finds, that fiscal responses lead to economic recoveries after the crisis only when financial sector's vulnerabilities are addressed without endangering fiscal sustainability. Namely, countercyclical fiscal policies – comprising discretionary budget measures and the operation of automatic stabilizers – have generally helped to shorten recession spells in advanced economies during previous crisis episodes (IMF 2009b). The evidence is more mixed, though,

in emerging market economies where procyclical spending bias, narrow automatic stabilizers and limited credit access have constrained governments' ability to provide fiscal stimulus during adverse economic periods (Kaminsky, Reinhart and Vegh 2004). Initial fiscal conditions generally play a key role in crisis responses, in both advanced and emerging economies (Alesina et al. 2002).

To sum up some of the relevant literature in this respect we can say that fiscal policies might play an important role in boosting the economy and driving it from decline. The structure of fiscal stimulus matters here and – above all – the sustainability of such actions.

## 3   DATA AND METHODOLOGY

The analysis is based on yearly data for the period from 2000 to 2010[7], where the data is obtained for all EU-27 member states. Underlying variables are those from equations [1] and [2], i.e. total and primary budget balance, gross public debt and yearly economic (i.e. GDP) growth. Definitions of total and primary budget balance and gross public debt are in accordance with ESA95 standards. These data was obtained from European Commission online database (2009).

Cost of debt was estimated as:

$$i = \frac{\left(\frac{D_p}{Y}\right) - \left(\frac{D}{Y}\right)}{\left(\frac{B}{Y}\right)_{-1}} \cdot \left(1 + \theta_n\right) \qquad [3]$$

where: subscript *-1* denotes lagged variable for 1 period (i.e. 1 year).

There are several reasons why we estimated the cost of debt rather than simply taking into account market yield on sovereign securities (say 10-year bond):
1.  not all countries have a liquid market for government securities and not all countries regularly issue such bonds,
2.  a selected 10-year bond yield might not be the best estimate for the actual cost of debt servicing because of differences in public debt structure,
3.  current market yields might not reflect appropriately the actual cost of debt servicing, because public debt portfolio usually incorporates current and past issues of debt, whereas market yield reflects required market yield for (say) new issues of public debt.

We found that countries are quite heterogeneous in selected variables. Thus cluster analysis was performed to find more homogenous groups of countries, where clustering variables were 2000-2007 averages of total and primary balance-to-GDP ratio, debt-to-GDP ratio, economic growth and the cost of debt. Average values of selected variables were calculated for obtained homogenous groups and analysis of variance was performed to confirm statistical differences between groups.
The following procedure was used to estimate sustainability and flexibility of fiscal policy in selected group of countries[8]:

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[7]   Data for years 2009 and 2010 are European Commission's projections.

[8]   Note that the presented methodology omits the effects of population ageing on sound public finances.

1. Nominal interest rate on public debt for 2009 and 2010 was estimated according to equation [3], using actual estimated values for relevant variables in 2009 and 2010.
2. Sustainable total budget balance-to-GDP ratio for 2009 and 2010 was simulated under condition from equation [1], or more precisely, under condition

$$\frac{D}{Y} + \theta_n \cdot \frac{B}{Y} \geq 0 . \qquad [4]$$

3. Simultaneously public debt-to-GDP for 2009 and 2010 ratio was estimated as[9]:

$$\left(\frac{B}{Y}\right) = \left(\frac{B}{Y}\right)_{-1} \cdot \frac{1}{1 + \theta_n} - \left(\frac{D}{Y}\right) . \qquad [5]$$

For estimates in 2009 actual data on public debt-to-GDP ratio and economic growth in 2008 was used, and in addition estimated sustainable total budget balance for 2009, whereas for 2010 simulations for 2009 were applied.
4. Also simultaneously sustainable primary budget balance-to-GDP ratio for 2009 was simulated as the sum of primary budget balance-to-GDP ratio in 2008 and simulated sustainable total budget balance-to-GDP ratio in 2009, minus total budget balance-to-GDP ratio in 2008. Similarly, the sustainable primary budget balance-to-GDP ratio for 2010 was calculated, where (sustainability) simulations for 2009 were used.
5. Second sustainability condition was calculated from equation [2]. If this condition was not satisfied, parameters from steps 2 to 4 would be recalculated until both conditions [1] and [2] hold.

Historical data, estimates of selected variables and relevant forecasts are presented in Appendix 1, while relevant data for discussion is presented directly in the main text.


## 4    RESULTS AND DISCUSSION

### 4.1    Summary statistics and cluster analysis

Table 1 shows some basic statistical data for selected countries: country medians for the period 2000-2008 and group medians, standard deviations, minimums and maximums for selected variables. We can see (Table 1) that the selected group of countries is quite diversified with extensive differences mostly in fiscal policy parameters.

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[9]    The difference between primary and total budget balance is under ESA95 standards in fact interests on public debt including flows on swaps and forward rate agreements used for debt management and represent the actual nominal cost of debt servicing.

**Table 1:**

**Averages on selected parameters for countries and some statistical parameters for selected variables**

| Country | D/Y | B/Y | $D_p$/Y | $\theta_n$ | i |
|---------|-----|-----|---------|------------|---|
| Austria | -1,4 | 64,8 | 1,8 | 4,2 | 4,6 |
| Belgium | -0,1 | 94,3 | 4,4 | 4,3 | 4,8 |
| Bulgaria | 0,6 | 37,9 | 3,4 | 12,1 | 5,0 |
| Czech republik | -3,6 | 29,6 | -2,4 | 6,0 | 4,3 |
| Cyprus | -2,3 | 64,6 | 1,1 | 7,5 | 5,3 |
| Denmark | 2,4 | 44,5 | 5,0 | 3,6 | 5,3 |
| Estonia | 1,5 | 4,8 | 1,7 | 13,3 | 4,6 |
| Finland | 4,1 | 41,4 | 5,6 | 4,4 | 4,1 |
| France | -2,9 | 63,7 | -0,2 | 4,0 | 4,5 |
| Germany | -2,8 | 65,1 | 0,2 | 2,5 | 4,4 |
| Greece | -4,8 | 98,6 | 0,5 | 7,4 | 5,1 |
| Hungary | -6,4 | 59,4 | -2,0 | 9,4 | 7,7 |
| Ireland | 0,9 | 31,1 | 2,4 | 8,9 | 3,9 |
| Italy | -3,1 | 105,8 | 2,4 | 3,9 | 4,9 |
| Latvia | -1,6 | 13,5 | -0,9 | 11,4 | 6,0 |
| Lithuania | -1,5 | 19,4 | -0,6 | 10,1 | 4,7 |
| Luxemburg | 2,1 | 6,5 | 2,4 | 7,3 | 3,9 |
| Malta | -4,7 | 63,7 | -1,4 | 5,9 | 5,5 |
| Netherlands | -0,2 | 51,8 | 2,6 | 4,9 | 5,1 |
| Poland | -4,3 | 45,7 | -1,7 | 7,8 | 6,5 |
| Portugal | -2,9 | 58,3 | -0,2 | 4,2 | 4,8 |
| Romania | -2,2 | 18,7 | -0,1 | 25,3 | 7,5 |
| Slovenia | -2,2 | 27,0 | -0,3 | 8,8 | 6,3 |
| Slovakia | -2,8 | 41,4 | -1,1 | 10,3 | 5,5 |
| Spain | -0,3 | 46,2 | 2,2 | 7,4 | 4,4 |
| Sweden | 2,3 | 51,2 | 4,2 | 4,2 | 4,0 |
| United Kingdom | -2,7 | 41,0 | -0,7 | 5,3 | 5,4 |
| **Median** | **-2,2** | **45,7** | **0,5** | **7,3** | **4,9** |
| **Standard deviation** | **2,5** | **25,9** | **2,2** | **4,6** | **1,0** |
| **Minimum** | **-6,4** | **4,8** | **-2,4** | **2,5** | **3,9** |
| **Maximum** | **4,1** | **105,8** | **5,6** | **25,3** | **7,7** |

*Source: European Commission online database (2009), own calculations.*

Aiming to find more homogenous groups of countries, we employ hierarchical cluster analysis. The analysis confirms that selected countries are quite heterogeneous, taking into account selected variables, but there are three more homogeneous groups (see dendrogram, Figure 1). Group membership is presented in Table 2 and Table 3 presents detailed statistical information about these groups, including analysis of variance for testing statistical differences between groups for all selected variables.

**Figure 1:**

**Dendrogram using Ward method of hierarchical clustering**

```
                              Rescaled Distance Cluster Combine

        C A S E           0         5        10        15        20        25
   Label            Num   +---------+---------+---------+---------+---------+

   France             9   -+
   Portugal          21   -+-+
   Germany           10   -+ +---+
   Austria            1   -+ |   |
   Netherlands       19   -+-+   +-----------------------+
   Cyprus             5   -+      |                       |
   Greece            11   -+-+    |                       |
   Italy             14   -+ +---+                        |
   Belgium            2   ---+                             +--------------+
   Finland            8   -+                              |              |
   Sweden            26   -+-------+                       |              |
   Denmark            6   -+       |                       |              |
   Ireland           13   -+       +---------------------+ |              |
   Spain             25   -+-+     |                     | |              |
   Bulgaria           3   -+ +-----+                     | |              |
   Estonia            7   -+-+                           | |              |
   Luxemburg         17   -+                             | |              |
   Czech republik     4   -+---+                         | |              |
   Lithuania         16   -+   +---+                     | |              |
   Latvia            15   -+-+ |   |                     | |              |
   Slovenia          23   -+ +-+   |                     | |              |
   Slovakia          24   -+ |     +---------+           | |              |
   United Kingdom    27   -+-+     |         |           +-+              |
   Malta             18   -+       |         +-----------------------------+
   Poland            20   -+       |         |
   Hungary           12   --------+          |
   Romania           22   ------------------+
```
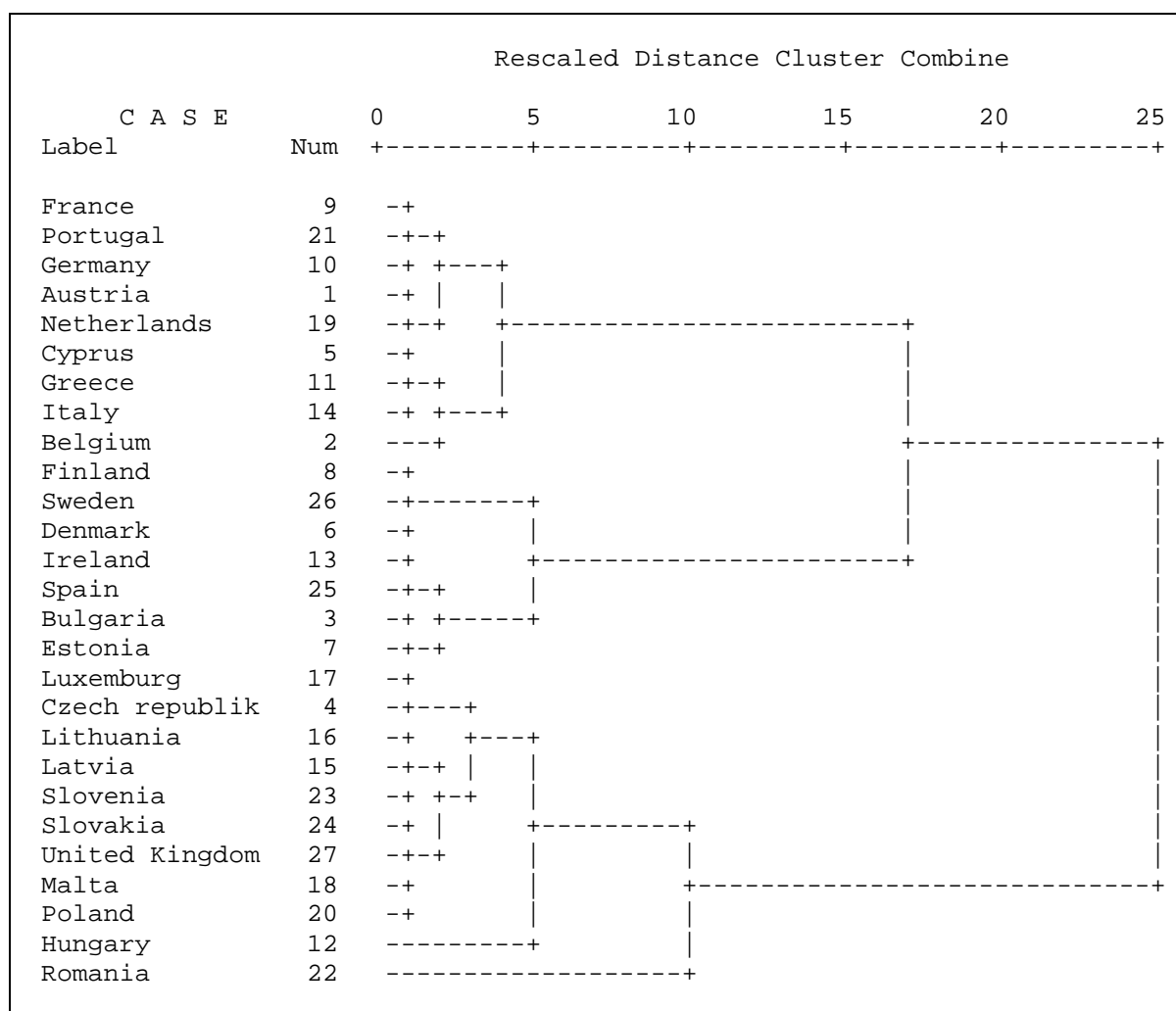
*Source: Based on Figure 1.*

**Table 2:**

**Group membership according to cluster analysis**

| Group 1 | Group 2 | Group 3 |
|---------|---------|---------|
| Austria | Bulgaria | Czech republic |
| Belgium | Denmark | Hungary |
| Cyprus | Estonia | Latvia |
| France | Finland | Lithuania |
| Germany | Ireland | Malta |
| Greece | Luxemburg | Poland |
| Italy | Spain | Romania |
| Netherlands | Sweden | Slovakia |
| Portugal | | Slovenia |
| | | United Kingdom |

*Source: Based on Figure 1.*

**Table 3:**

**Basic statistics about selected groups and total, and ANOVA test**

| Group | Parameter | *D/Y* | *B/Y* | *D$_p$/Y* | *θ$_n$* | *i* |
|---|---|---|---|---|---|---|
| Group 1 | Mean | -2,8 | 64,8 | 1,1 | 4,2 | 4,8 |
| | N | 9 | 9 | 9 | 9 | 9 |
| | Standard deviation | 1,5 | 19,8 | 1,5 | 1,6 | 0,3 |
| | Minimum | -4,8 | 51,8 | -0,2 | 2,5 | 4,4 |
| | Maximum | -0,1 | 105,8 | 4,4 | 7,5 | 5,3 |
| Group 2 | Mean | 1,8 | 39,7 | 2,9 | 7,4 | 4,3 |
| | N | 8 | 8 | 8 | 8 | 8 |
| | Standard deviation | 1,3 | 17,9 | 1,4 | 3,6 | 0,5 |
| | Minimum | -0,3 | 4,8 | 1,7 | 3,6 | 3,9 |
| | Maximum | 4,1 | 51,2 | 5,6 | 13,3 | 5,3 |
| Group 3 | Mean | -2,8 | 35,3 | -1,0 | 9,1 | 5,8 |
| | N | 10 | 10 | 10 | 10 | 10 |
| | Standard deviation | 1,6 | 17,2 | 0,7 | 5,8 | 1,1 |
| | Minimum | -6,4 | 13,5 | -2,4 | 5,3 | 4,3 |
| | Maximum | -1,5 | 63,7 | -0,1 | 25,3 | 7,7 |
| Total | Mean | -2,2 | 45,7 | 0,5 | 7,3 | 4,9 |
| | N | 27 | 27 | 27 | 27 | 27 |
| | Standard deviation | 2,5 | 25,9 | 2,2 | 4,6 | 1,0 |
| | Minimum | -6,4 | 4,8 | -2,4 | 2,5 | 3,9 |
| | Maximum | 4,1 | 105,8 | 5,6 | 25,3 | 7,7 |
| Anova | F | 26,7 | 14,1 | 28,4 | 3,8 | 10,3 |
| | Significance | 0,00 | 0,00 | 0,00 | 0,04 | 0,00 |

*Source: European Commission online database (2009), own calculations.*

The above analyses (see Table 3) show that countries of the first group have the highest average debt-to-GDP ratio (approx. 65%), (on average) positive primary balance (primary surplus of 1% of GDP), but due to high interest payments on public debt have a relatively high average total budget deficit (2,8% of GDP). Except Cyprus these countries are all »old« EU Member States with developed economies. They have the lowest average economic growth and intermediate cost of public debt servicing.

The second group of countries is again the group of »old« EU member states with developed economies[10] with significantly lower public debt-to-GDP ratio, lower cost of public debt servicing, primary and total budget surplus and higher economic growth.

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[10] The exceptions in this group are Bulgaria and Estonia as new member states with low public debt, cost of debt etc.

And in the last group there are countries that joined EU in 2004, i.e. transition economies, and United Kingdom. These have on average the lowest public debt-to-GDP ratio, high economic growth and high relative cost of public debt servicing. They also have both primary and total budget negative balance (i.e. deficit).

Note that for all selected variables between group differences are statistically significant at negligible significance level.

## 4.2 Historical data on fiscal sustainability

Past data shows that many EU member states, also those already in EMU, exceeded Maastricht criteria (see Appendix 1). For out-of-EMU countries this is not a violation of Stability and Growth Pact, but for EMU member states, this is in fact a violation. One example may be Germany and France in years 2002-2005 with more than 3% total budget deficit, or Greece in nearly all recent years, or Austria in 2004, etc. As we can see, the forecasts for 2009 and 2010 show that most EU Member States are in fact above these limits – there are only few exceptions.

However, as argued above, we do not focus our analysis on Maastricht criteria. Our attempt is to focus on fiscal sustainability, based on selected sustainability set of criteria. Table 4 shows computed parameters (the sum of total budget balance-to-GDP ratio and economic growth, multiplied with public debt-to-GDP ratio from equation [1]) for selected countries in the period from 2001 to 2008. Most of the economies were under the limit in the past, at least in some periods. In fact, 20 of 27 EU Member States exceeded this sustainability criterion for at least once[11], and 9 of 27 have violated the criterion for at least 3 subsequent years.

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[11] For relevant background of some countries see Jerman, Kavčič and Kavčič (2010).

**Table 4:**

**First sustainability measure: sum of total budget balance-to-GDP ratio and economic growth times public debt-to-GDP ratio**

| Country | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|---|
| Austria | 1,61 | 1,29 | -0,09 | -1,68 | 1,59 | 1,69 | 2,65 | 2,23 |
| Belgium | 3,48 | 3,52 | 2,46 | 4,79 | 1,26 | 4,96 | 4,17 | 1,40 |
| Bulgaria | 8,07 | 4,08 | 2,87 | 6,19 | 4,88 | 6,47 | 2,74 | 4,05 |
| Czech republic | -3,84 | -5,43 | -5,22 | -0,20 | -1,81 | -0,29 | 2,23 | -0,01 |
| Cyprus | 2,35 | -2,27 | -1,61 | 1,24 | 2,02 | 3,45 | 8,15 | 5,17 |
| Denmark | 3,02 | 1,61 | 1,02 | 4,09 | 7,20 | 6,89 | 5,46 | 4,63 |
| Estonia | 0,54 | 0,98 | 2,37 | 2,25 | 2,17 | 3,68 | 3,28 | -2,81 |
| Finland | 7,41 | 5,30 | 3,22 | 4,34 | 4,12 | 6,47 | 7,87 | 5,40 |
| France | 0,72 | -1,10 | -2,21 | -0,94 | -0,24 | 0,69 | 0,43 | -1,36 |
| Germany | -1,36 | -2,84 | -3,39 | -2,37 | -2,31 | 0,86 | 2,64 | 1,81 |
| Greece | 3,11 | 2,31 | 3,49 | 0,78 | 1,12 | 4,78 | 3,04 | 1,34 |
| Hungary | 2,72 | -2,14 | -1,22 | -0,82 | -3,91 | -3,89 | -0,36 | -0,41 |
| Ireland | 5,02 | 3,24 | 2,61 | 3,40 | 4,15 | 5,32 | 2,08 | -8,22 |
| Italy | 2,12 | 1,01 | -0,26 | 0,86 | -1,44 | 0,85 | 2,64 | -0,80 |
| Latvia | -0,71 | -0,91 | 0,01 | 1,43 | 2,32 | 1,99 | 2,51 | -2,07 |
| Lithuania | -2,14 | -0,32 | 0,68 | 0,46 | 2,24 | 2,28 | 2,15 | -1,08 |
| Luxemburg | 6,27 | 2,51 | 0,98 | -0,69 | 0,60 | 2,22 | 4,10 | 2,70 |
| Malta | -5,41 | -1,95 | -8,00 | -2,82 | 1,78 | 1,41 | 1,90 | -2,14 |
| Netherlands | 3,40 | -0,13 | -1,80 | -0,13 | 2,03 | 3,06 | 2,58 | 3,85 |
| Poland | -3,33 | -3,44 | -4,27 | -1,27 | -1,29 | -0,18 | 2,99 | -0,04 |
| Portugal | -1,23 | -0,19 | -1,59 | -1,07 | -3,87 | -1,18 | 0,58 | -1,40 |
| Romania | 8,22 | 5,20 | 4,93 | 3,53 | 1,45 | 0,19 | 0,01 | -2,39 |
| Slovenia | -0,87 | 0,87 | -0,34 | -0,08 | 0,22 | 0,84 | 3,12 | 1,11 |
| Slovakia | -2,29 | -4,38 | 1,57 | 2,28 | 0,31 | 0,06 | 1,54 | 0,42 |
| Spain | 3,84 | 3,23 | 3,40 | 3,12 | 4,48 | 5,21 | 4,73 | - |

|                | | | | | | | | 2,14 |
|----------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Sweden         | 3,45  | 0,96  | 1,14  | 3,05  | 4,44  | 5,30  | 6,07  | 3,68  |
|                |       | -     | -     | -     | -     | -     | -     | -     |
| United Kingdom | 2,23  | 0,01  | 0,98  | 1,25  | 1,58  | 0,31  | 0,05  | 3,94  |

Note: Negative (i.e. unsustainable) values are in red.
*Source: Own calculations based on data from European Commission online database (2009).*

Similar are results for the second sustainability criterion (equation [2]): the difference between primary budget balance-to-GDP ratio and interest rate spread over economic growth, multiplied by public debt-to-GDP ratio – see Table 5. These calculations show that high(er) public debt-to-GDP ratio might not be problematic if a country sustains a sound economic growth at given interest rates and budget balances. And vice versa: low public debt-to-GDP ratio does not guarantee fiscal sustainability if economic growth and interest rates are not properly balanced, ceteris paribus budget balances (see e.g. Germany and the United Kingdom).

**Table 5:**

**Second sustainability measure: the difference between primary budget balance-to-GDP ratio and interest rate spread over economic growth times public debt-to-GDP ratio**

| Country | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|---|
| Austria | 1,49 | 1,23 | -0,11 | -1,77 | 1,49 | 1,62 | 2,62 | 1,98 |
| Belgium | 3,38 | 3,49 | 2,58 | 4,75 | 1,18 | 4,94 | 4,15 | 1,04 |
| Bulgaria | 8,05 | 4,38 | 3,04 | 6,32 | 5,14 | 6,62 | 2,82 | 4,13 |
| Czech republic | -4,30 | -5,68 | -5,33 | -0,33 | -1,86 | -0,37 | 2,15 | -0,11 |
| Cyprus | 1,99 | -2,59 | -2,09 | 0,92 | 1,86 | 3,44 | 8,17 | 5,47 |
| Denmark | 3,19 | 1,57 | 1,02 | 4,05 | 7,42 | 7,07 | 5,65 | 4,24 |
| Estonia | 0,53 | 0,92 | 2,35 | 2,25 | 2,16 | 3,66 | 3,29 | -2,94 |
| Finland | 7,36 | 5,29 | 3,07 | 4,28 | 4,17 | 6,46 | 7,92 | 5,42 |
| France | 0,62 | -1,30 | -2,50 | -1,14 | -0,41 | 0,68 | 0,29 | -1,63 |
| Germany | -1,38 | -2,96 | -3,58 | -2,51 | -2,45 | 0,77 | 2,63 | 1,70 |
| Greece | 2,56 | 2,00 | 3,22 | 0,33 | 0,84 | 4,58 | 2,80 | 0,93 |
| Hungary | 2,33 | -2,97 | -1,82 | -1,34 | -4,34 | -4,47 | -0,65 | -1,06 |
| Ireland | 4,94 | 3,23 | 2,56 | 3,39 | 4,13 | 5,33 | 2,00 | -8,91 |
| Italy | 1,84 | 0,97 | -0,36 | 0,69 | -1,66 | 0,64 | 2,59 | -1,00 |
| Latvia | -0,94 | -0,96 | -0,13 | 1,30 | 2,31 | 1,96 | 2,45 | -3,31 |
| Lithuania | -2,20 | -0,36 | 0,64 | 0,45 | 2,17 | 2,20 | 2,06 | -1,10 |
| Luxemburg | 6,26 | 2,49 | 0,97 | -0,71 | 0,59 | 2,19 | 4,07 | 2,36 |
| Malta | -5,83 | -2,04 | -8,62 | -3,07 | 1,66 | 1,52 | 1,77 | -2,38 |
| Netherlands | 3,37 | -0,23 | -1,94 | -0,22 | 1,95 | 3,15 | 2,56 | 3,11 |
| Poland | -3,55 | -3,91 | -4,77 | -1,45 | -1,56 | -0,43 | 2,89 | -0,33 |
| Portugal | -1,56 | -0,47 | -1,72 | -1,25 | -4,21 | -1,34 | 0,49 | -1,59 |
| Romania | 6,45 | 4,57 | 4,73 | 3,41 | 1,47 | 0,25 | -0,14 | -2,61 |
| Slovenia | -1,21 | 0,55 | -0,46 | -0,19 | 0,14 | 0,74 | 3,15 | 1,04 |
| Slovakia | -2,52 | -4,26 | 1,37 | 2,09 | 0,48 | 0,07 | 1,43 | 0,39 |

| | | | | | | | | - |
|---|---|---|---|---|---|---|---|---|
| Spain | 3,80 | 3,19 | 3,41 | 3,08 | 4,47 | 5,22 | 4,77 | 2,35 |
| Sweden | 3,31 | 0,94 | 1,07 | 3,02 | 4,38 | 5,38 | 6,19 | 3,73 |
| | | - | - | - | - | - | - | - |
| United Kingdom | 2,33 | 0,11 | 1,16 | 1,45 | 1,76 | 0,48 | 0,22 | 4,45 |

Note: Negative (i.e. unsustainable) values are in red.
*Source: Own calculations based on data from European Commission online database (2009).*

20 (out of 27) economies had a negative value for our second sustainability criteria – the same as above, and 10 of them have had negative values for at least three subsequent years. The most vulnerable economies in this respect are (again) Czech Republic, France, Germany, Hungary, Poland, Portugal and the United Kingdom. In 2008 13 (out of 27) EU Member States – similar as above – exceeded the criterion with the highest deviation again in Ireland and the United Kingdom. This means that approximately half of the selected countries exhibited sustainability problems already in 2008[12] – the first year that countries really witnessed the crisis.

To sum up, we might say that selected economies entered year 2008 (and onwards) fiscally sound. Even though countries are quite diversified in fiscal balances, public debt and other parameters, the selected sustainability set of criteria shows that all countries (except two or three countries with negligible negative values) were fiscally sustainable, taking into account both sustainability measures. But in 2008 the problems with the global crisis occurred and half of the selected economies crossed the cut-off point below which the fiscal position tends not to be sustainable (according to selected two sets of criteria).

One of our aims was to identify what might the realistic estimates for fiscal sustainability of EU Member States be. We saw above that there is no simple answer to this question and that there are many "cross-section" and "time series" particularities. Estimates of parameters for fiscal sustainability vary between countries and time. However, we saw above that most EU Member States entered year 2008 with healthy public finances, measured by selected sustainability criteria. But how much free space did they have for tackling financial and economic crisis in 2009 and 2010? How much of GDP can they afford to spend for policy measures under the condition, that they remain fiscally sustainable? We try to find some answers in the next subsection.

## 4.3 The question of sustainable fiscal policies in 2009 and 2010

Policy makers (and academics) have been largely debating on policy measures that have to be undertaken in order to battle global financial and economic crisis. Usually fiscal stimuli are used, involving mass of fiscal budget funds for direct and indirect support of the economy, nationalization of banks, etc. In our analysis we would like to estimate if such stimuli are fiscally sustainable or even more, we would like to offer a plain technical solution, answering the question, how much space a country has for funding these policy measures and still sustains fiscal sustainability.

To do so, we first estimate "the sustainable primary and total budget balance" for 2009 and 2010 (individually for each country), and then calculate the difference in budget balance in

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[12]  In 2007 there were only 3 such countries with almost negligible negative values according to this criterion.

2009 and 2010, respectively, against 2008. This difference shows how many % of GDP these countries can really spend on *crisis policy measures,* keeping other structures of fiscal policy constant (at the level of 2008).

Data shows (Figure 2) that in all countries the Maastricht 3% limit for total budget deficit-to-GDP ratio is critically unsustainable in 2009 and 2010. In fact, 20 EU Member States would need to have budget surplus, aiming to achieve fiscal sustainability in 2009 – figures are less strict in 2010, though.

**Figure 2:**

**Estimated sustainable total budget balance (as % of GDP) in 2009 and 2010**
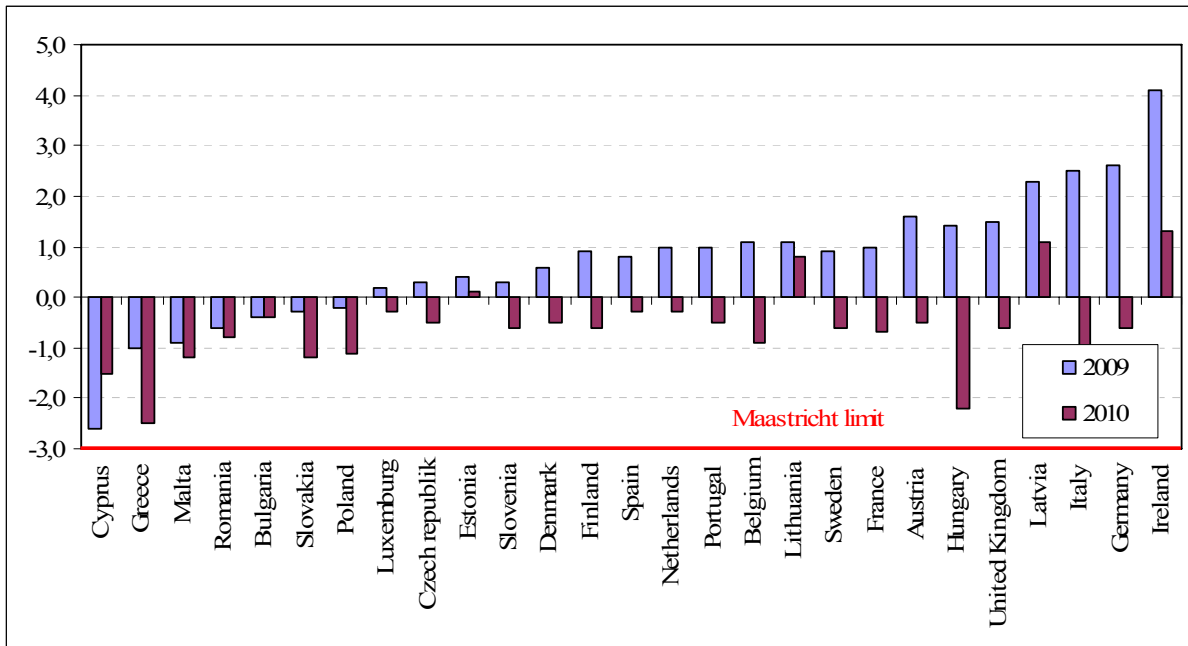


*Source: Own calculations based on data from European Commission online database (2009).*

However, in our opinion the differences between estimated sustainability figures and forecasted balances in 2009 and 2010, respectively, are much more relevant. These differences actually show which direction fiscal policy should follow in order to stay sustainable according to actual economic performance of selected countries. These estimates are reported in Figure 3.

**Figure 3:**

**Estimated sustainable change in actual total budget balance
(as % of GDP) in 2009 and 2010**
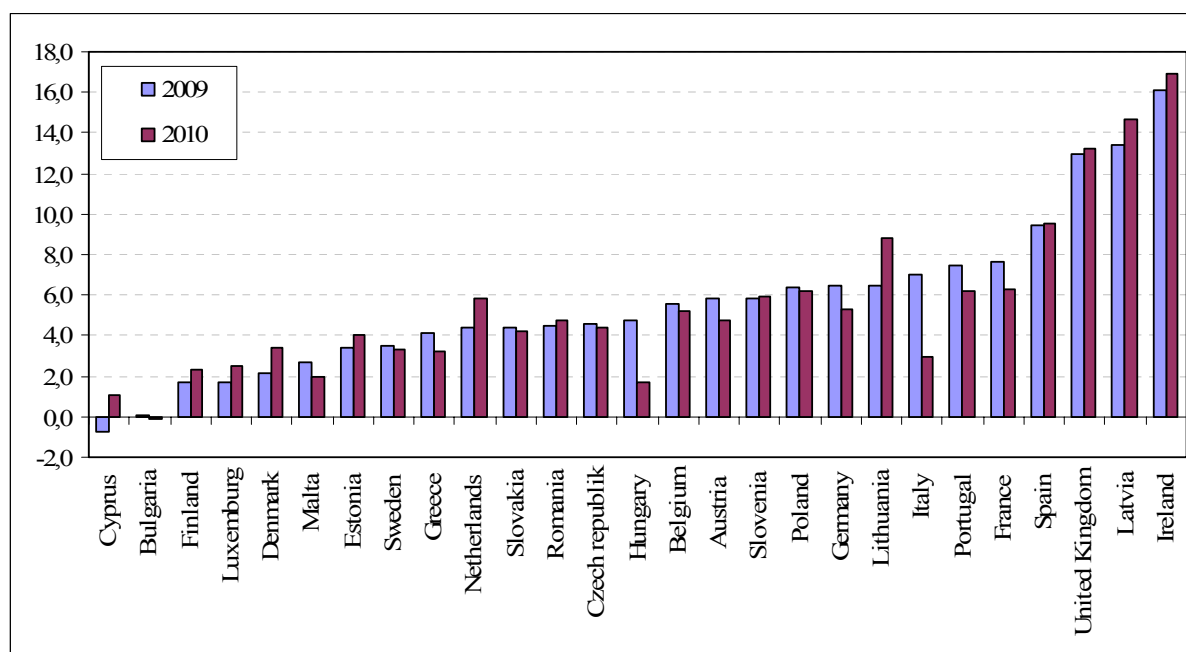


*Source: Own calculations based on data from European Commission online database (2009).*

Note that in order to achieve fiscal sustainability measures all of the selected countries (with two exceptions) would need a severe revision of their budgets. On average (in fact expressed by median) EU Member States would need to improve their budget balances for 5% points compared to forecasts. High diversity of these "necessary" changes is noticed here, though. Three countries would need the most severe actions – the United Kingdom, Latvia and Ireland – with expected correction in 2010 at the level from 13 to 17% points (!).

We find that in recent times of financial/economic crisis most EU Member States face with fiscal difficulties, some member states (but not all) are not fiscally sustainable due to increased fiscal expenditures, applying selected sustainability measures. Indeed, our analysis shows that all EU Member States (with only two exceptions) would have to decrease budget deficit in 2009 and 2010 in order to achieve sustainable budget balance, taking into account relevant macroeconomic variables in the past (i.e. 2008), and in 2009 and 2010, respectively.

So, did EU Member States really have some space to tackle financial crisis? Taking into account period before actual financial/economic crisis, we saw that fiscal position was sustainable in most of EU Member States. Following this finding, we assume that massive fiscal deficits which can be noticed in 2009 and in 2010, or more precisely, the extensive jumps in fiscal deficits compared to 2008, are mainly due to lower fiscal incomes as a consequence of lower economic growth and policy measures for tackling financial/economic crisis. In this context, however, we can argue that these changes in fiscal deficits are not sustainable and thus too high. Our estimates predict that in 2009 about two thirds of the economies in question should have budget surplus, taking into consideration other relevant macroeconomic variables, such as economic growth, etc. In 2010, however, a more loosened

fiscal policy would be possible, but still significantly lower fiscal deficit than forecasted would be sustainable.

## 5    SUMMARY AND POLICY RECOMMENDATIONS

The main idea of the presented paper was to look deeply into fiscal sustainability questions of EU member states. In recent times of financial and economic crisis all EU member states (and most other economies) tackle with necessary policy measures that have to be taken in order to preserve the economy from negative effects of the crisis. However, these steps usually cost money, and this money is usually public money. Therefore obvious question arises: will these policy measures be fiscally sustainable.

On the basis of theoretical literature we conclude that putting fixed limit to public debt-to-GDP and budget balance-to-GDP ratio is a too simplified solution if one is aiming to estimate/determine, what the sustainable fiscal position of an economy is. Further, the review of theoretical and empirical solutions leads us to conclusion that sustainable fiscal policy might be defined with public debt-to-GDP and budget balance-to-GDP ceilings, but taking into account some underlying country specific parameters.

On the basis of our calculations we argue that most EU Member States entered year 2008 with healthy public finances, measured by selected sustainability criteria. However, in recent times of financial/economic crisis most EU Member States face with fiscal difficulties and most of these states are currently not fiscally sustainable due to increased fiscal expenditures, applying selected sustainability measures. Even more: our analysis shows that almost all EU Member States would have to decrease budget deficit in 2009 and 2010, in order to achieve sustainable budget position.

We find that massive fiscal deficits which can be noticed in 2009 and in 2010, or more precisely, the extensive jumps in fiscal deficits compared to 2008, are mainly due to lower fiscal incomes as a consequence of lower economic growth and policy measures for tackling financial/economic crisis. In this context, however, we can argue that these changes in fiscal deficits are not sustainable and thus too high. Our estimates predict that in 2009 about two thirds of the economies in question should have budget surplus, taking into consideration other relevant macroeconomic variables, such as economic growth, etc. In 2010, however, a more loosened fiscal policy would be possible, but still significantly lower fiscal deficit than forecasted would be sustainable.

We conclude that EU Member States should really carefully select policy measures for tackling financial crisis, because fiscal policies in the period from 2008 to 2010 are predominantly not sustainable.

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**Appendix I:** Historical, estimated and forcasted country data for the analysis

**Austria**

| Variable | Unit | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | Sim. 2009 | Sim. 2010 | Diff. 2009 | Diff. 2010 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total budget balance | % of GDP | -1,7 | 0,0 | -0,7 | -1,4 | -4,4 | -1,6 | -1,6 | -0,5 | -0,4 | -4,2 | -5,3 | 1,6 | -0,5 | 5,8 | 4,8 |
| Public debt | % of GDP | 66,4 | 67,0 | 66,4 | 65,4 | 64,8 | 63,7 | 62,0 | 59,4 | 62,5 | 70,4 | 75,2 | 58,4 | 60,5 | -12,0 | -14,7 |
| Primary budget balance | % of GDP | 1,8 | 3,4 | 2,5 | 1,5 | -1,5 | 1,3 | 1,1 | 2,2 | 2,1 | -1,1 | -2,1 | 4,7 | 2,6 | 5,8 | 4,7 |
| Growth of GDP | % | 4,8 | 2,4 | 3,0 | 2,0 | 4,2 | 5,0 | 5,3 | 5,3 | 4,2 | -2,7 | 0,9 | -2,7 | 0,9 | | |
| Cost of public debt | % | | 5,2 | 4,9 | 4,5 | 4,6 | 4,7 | 4,5 | 4,6 | 4,4 | 4,8 | 4,6 | 4,8 | 4,6 | | |
| **1st sustainability criteria** | | 1,5 | 1,6 | 1,3 | -0,1 | -1,7 | 1,6 | 1,7 | 2,6 | 2,2 | -6,1 | -4,6 | 0,0 | 0,0 | | |
| **2nd sustainability criteria** | | 5,0 | 1,5 | 1,2 | -0,1 | -1,8 | 1,5 | 1,6 | 2,6 | 2,0 | -6,4 | -4,9 | 0,3 | 0,4 | | |

**Belgium**

| Variable | Unit | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | Sim. 2009 | Sim. 2010 | Diff. 2009 | Diff. 2010 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total budget balance | % of GDP | 0,0 | 0,5 | 0,0 | -0,1 | -0,3 | -2,7 | 0,3 | -0,2 | -1,2 | -4,5 | -6,1 | 1,1 | -0,9 | 5,6 | 5,2 |
| Public debt | % of GDP | 107,8 | 106,5 | 103,4 | 98,6 | 94,3 | 92,2 | 87,9 | 84,0 | 89,6 | 95,7 | 100,9 | 86,0 | 88,0 | -9,7 | -12,9 |
| Primary budget balance | % of GDP | 6,6 | 6,9 | 5,7 | 5,2 | 4,4 | 1,5 | 4,2 | 3,6 | 2,5 | -0,6 | -2,1 | 5,0 | 3,0 | 5,6 | 5,1 |
| Growth of GDP | % | 5,7 | 2,8 | 3,4 | 2,6 | 5,4 | 4,3 | 5,3 | 5,2 | 2,9 | -1,3 | 1,0 | -1,3 | 1,0 | | |
| Cost of public debt | % | | 6,1 | 5,5 | 5,3 | 5,0 | 4,6 | 4,5 | 4,5 | 4,5 | 4,3 | 4,2 | 4,3 | 4,2 | | |
| **1st sustainability criteria** | | 6,1 | 3,5 | 3,5 | 2,5 | 4,8 | 1,3 | 5,0 | 4,2 | 1,4 | -5,7 | -5,1 | 0,0 | 0,0 | | |
| **2nd sustainability criteria** | | 12,7 | 3,4 | 3,5 | 2,6 | 4,8 | 1,2 | 4,9 | 4,1 | 1,0 | -6,0 | -5,4 | 0,2 | 0,2 | | |

**Bulgaria**

| Variable | Unit | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | Sim. 2009 | Sim. 2010 | Diff. 2009 | Diff. 2010 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total budget balance | % of GDP | -0,3 | 0,6 | -0,8 | -0,3 | 1,6 | 1,9 | 3,0 | 0,1 | 1,5 | -0,5 | -0,3 | -0,4 | -0,4 | 0,1 | -0,1 |
| Public debt | % of GDP | 74,3 | 67,3 | 53,6 | 45,9 | 37,9 | 29,2 | 22,7 | 18,2 | 14,1 | 16,0 | 17,3 | 12,3 | 12,4 | -3,7 | -4,9 |
| Primary budget balance | % of GDP | 3,7 | 4,0 | 1,5 | 1,7 | 3,4 | 3,6 | 4,4 | 1,1 | 2,4 | 0,3 | 0,4 | 0,4 | 0,4 | 0,1 | 0,0 |
| Growth of GDP | % | 12,5 | 11,1 | 9,1 | 6,9 | 12,1 | 10,2 | 15,3 | 14,5 | 18,1 | 3,2 | 3,0 | 3,2 | 3,0 | | |
| Cost of public debt | % | | 5,1 | 3,7 | 4,0 | 4,4 | 4,9 | 5,5 | 5,0 | 5,8 | 5,9 | 4,5 | 5,9 | 4,5 | | |
| **1st sustainability criteria** | | 9,0 | 8,1 | 4,1 | 2,9 | 6,2 | 4,9 | 6,5 | 2,7 | 4,1 | 0,0 | 0,2 | 0,0 | 0,0 | | |
| **2nd sustainability criteria** | | 13,0 | 8,0 | 4,4 | 3,0 | 6,3 | 5,1 | 6,6 | 2,8 | 4,1 | -0,1 | 0,1 | 0,1 | 0,2 | | |

**Czech republik**

| Variable | Unit | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | Sim. 2009 | Sim. 2010 | Diff. 2009 | Diff. 2010 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total budget balance | % of GDP | -3,7 | -5,7 | -6,8 | -6,6 | -3,0 | -3,6 | -2,6 | -0,6 | -1,5 | -4,3 | -4,9 | 0,3 | -0,5 | 4,6 | 4,4 |
| Public debt | % of GDP | 18,5 | 25,1 | 28,5 | 30,1 | 30,4 | 29,8 | 29,6 | 28,9 | 29,8 | 33,7 | 37,9 | 28,1 | 28,9 | -5,6 | -9,0 |
| Primary budget balance | % of GDP | -2,9 | -4,7 | -5,5 | -5,5 | -1,8 | -2,4 | -1,5 | 0,5 | -0,3 | -3,2 | -3,7 | 1,4 | 0,6 | 4,6 | 4,3 |
| Growth of GDP | % | 5,2 | 7,4 | 4,8 | 4,6 | 9,2 | 6,0 | 7,8 | 9,8 | 5,0 | -1,2 | 1,7 | -1,2 | 1,7 | | |
| Cost of public debt | % | | 5,8 | 5,4 | 4,0 | 4,4 | 4,2 | 4,0 | 4,1 | 4,4 | 3,6 | 3,6 | 3,6 | 3,6 | | |
| **1st sustainability criteria** | | -2,7 | -3,8 | -5,4 | -5,2 | -0,2 | -1,8 | -0,3 | 2,2 | 0,0 | -4,7 | -4,3 | 0,0 | 0,0 | | |
| **2nd sustainability criteria** | | -1,9 | -4,3 | -5,7 | -5,3 | -0,3 | -1,9 | -0,4 | 2,2 | -0,1 | -4,8 | -4,4 | 0,0 | 0,0 | | |

**Cyprus**

| Variable | Unit | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | Sim. 2009 | Sim. 2010 | Diff. 2009 | Diff. 2010 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total budget balance | % of GDP | -2,3 | -2,2 | -4,4 | -6,5 | -4,1 | -2,4 | -1,2 | 3,4 | 0,9 | -1,9 | -2,6 | -2,6 | -1,5 | -0,7 | 1,1 |
| Public debt | % of GDP | 58,8 | 60,7 | 64,6 | 68,9 | 70,2 | 69,1 | 64,6 | 59,4 | 49,1 | 47,5 | 47,9 | 47,8 | 46,7 | 0,3 | -1,2 |
| Primary budget balance | % of GDP | 1,0 | 1,1 | -1,2 | -3,1 | -0,8 | 1,1 | 2,1 | 6,5 | 3,8 | 0,4 | -0,4 | -0,3 | 0,8 | -0,7 | 1,2 |
| Growth of GDP | % | 9,1 | 7,5 | 3,3 | 7,1 | 7,6 | 6,4 | 7,2 | 8,0 | 8,7 | 5,6 | 3,2 | 5,6 | 3,2 | | |
| Cost of public debt | % | | 6,0 | 5,4 | 5,6 | 5,2 | 5,3 | 5,1 | 5,2 | 5,3 | 4,9 | 4,8 | 4,9 | 4,8 | | |
| **1st sustainability criteria** | | 3,1 | 2,4 | -2,3 | -1,6 | 1,2 | 2,0 | 3,5 | 8,2 | 5,2 | 0,8 | -1,1 | 0,1 | 0,0 | | |
| **2nd sustainability criteria** | | 6,4 | 2,0 | -2,6 | -2,1 | 0,9 | 1,9 | 3,4 | 8,2 | 5,5 | 0,7 | -1,2 | 0,0 | 0,1 | | |

**Denmark**

| Variable | Unit | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | Sim. 2009 | Sim. 2010 | Diff. 2009 | Diff. 2010 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total budget balance | % of GDP | 2,4 | 1,5 | 0,3 | 0,1 | 2,0 | 5,2 | 5,2 | 4,5 | 3,6 | -1,5 | -3,9 | 0,6 | -0,5 | 2,1 | 3,4 |
| Public debt | % of GDP | 51,7 | 47,4 | 46,8 | 45,8 | 44,5 | 37,1 | 31,3 | 26,8 | 33,3 | 32,5 | 33,7 | 31,7 | 32,8 | -0,8 | -0,9 |
| Primary budget balance | % of GDP | 5,9 | 4,8 | 3,3 | 2,7 | 4,3 | 7,0 | 6,8 | 6,1 | 5,0 | 0,1 | -2,3 | 2,2 | 1,1 | 2,1 | 3,4 |
| Growth of GDP | % | 6,6 | 3,2 | 2,8 | 2,0 | 4,7 | 5,4 | 5,4 | 3,6 | 3,1 | -1,8 | 1,7 | -1,8 | 1,7 | | |
| Cost of public debt | % | | 6,6 | 6,5 | 5,7 | 5,3 | 4,3 | 4,5 | 5,3 | 5,4 | 4,7 | 5,0 | 4,7 | 5,0 | | |
| **1st sustainability criteria** | | 5,8 | 3,0 | 1,6 | 1,0 | 4,1 | 7,2 | 6,9 | 5,5 | 4,6 | -2,1 | -3,3 | 0,0 | 0,1 | | |
| **2nd sustainability criteria** | | 9,3 | 3,2 | 1,6 | 1,0 | 4,1 | 7,4 | 7,1 | 5,6 | 4,2 | -2,0 | -3,4 | 0,1 | 0,0 | | |

**Estonia**

| Variable | Unit | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | Sim 2009 | Sim 2010 | Diff 2009 | Diff 2010 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total budget balance | % of GDP | -0,2 | -0,1 | 0,3 | 1,7 | 1,7 | 1,5 | 2,9 | 2,7 | -3,0 | -3,0 | -3,9 | 0,4 | 0,1 | 3,4 | 4,0 |
| Public debt | % of GDP | 5,2 | 4,8 | 5,6 | 5,5 | 5,0 | 4,5 | 4,3 | 3,5 | 4,8 | 6,8 | 7,8 | 4,2 | 4,6 | -2,6 | -3,2 |
| Primary budget balance | % of GDP | 0,0 | 0,1 | 0,5 | 1,9 | 1,9 | 1,7 | 3,1 | 2,9 | -2,7 | -2,7 | -3,4 | 0,7 | 0,4 | 3,4 | 3,8 |
| Growth of GDP | % | 14,4 | 13,3 | 12,2 | 12,1 | 11,0 | 14,9 | 18,2 | 16,5 | 3,9 | -10,3 | -1,6 | -10,3 | -1,6 | | |
| Cost of public debt | % | | 4,4 | 4,7 | 4,0 | 4,0 | 4,6 | 5,3 | 5,4 | 8,9 | 5,6 | 7,2 | 5,6 | 7,2 | | |
| **1st sustainability criteria** | | 0,5 | 0,5 | 1,0 | 2,4 | 2,3 | 2,2 | 3,7 | 3,3 | -2,8 | -3,7 | -4,0 | 0,0 | 0,0 | | |
| **2nd sustainability criteria** | | 0,7 | 0,5 | 0,9 | 2,3 | 2,2 | 2,2 | 3,7 | 3,3 | -2,9 | -3,8 | -4,1 | 0,0 | 0,0 | | |

**Finland**

| Variable | Unit | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | Sim 2009 | Sim 2010 | Diff 2009 | Diff 2010 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total budget balance | % of GDP | 6,9 | 5,0 | 4,1 | 2,6 | 2,4 | 2,8 | 4,0 | 5,2 | 4,2 | -0,8 | -2,9 | 0,9 | -0,6 | 1,7 | 2,3 |
| Public debt | % of GDP | 43,8 | 42,3 | 41,3 | 44,4 | 44,2 | 41,4 | 39,2 | 35,1 | 33,4 | 39,7 | 45,7 | 31,3 | 32,9 | -8,4 | -12,8 |
| Primary budget balance | % of GDP | 9,7 | 7,6 | 6,2 | 4,3 | 4,0 | 4,3 | 5,4 | 6,7 | 5,6 | 0,5 | -1,5 | 2,2 | 0,7 | 1,7 | 2,2 |
| Growth of GDP | % | 7,8 | 5,7 | 2,9 | 1,4 | 4,4 | 3,2 | 6,3 | 7,6 | 3,6 | -3,0 | 1,8 | -3,0 | 1,8 | | |
| Cost of public debt | % | | 6,3 | 5,1 | 4,2 | 3,8 | 3,5 | 3,6 | 4,1 | 4,1 | 3,8 | 3,6 | 3,8 | 3,6 | | |
| **1st sustainability criteria** | | 10,3 | 7,4 | 5,3 | 3,2 | 4,3 | 4,1 | 6,5 | 7,9 | 5,4 | -2,0 | -2,1 | 0,0 | 0,0 | | |
| **2nd sustainability criteria** | | 13,1 | 7,4 | 5,3 | 3,1 | 4,3 | 4,2 | 6,5 | 7,9 | 5,4 | -2,2 | -2,3 | 0,1 | 0,1 | | |

**France**

| Variable | Unit | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | Sim 2009 | Sim 2010 | Diff 2009 | Diff 2010 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total budget balance | % of GDP | -1,5 | -1,5 | -3,1 | -4,1 | -3,6 | -2,9 | -2,3 | -2,7 | -3,4 | -6,6 | -7,0 | 1,3 | -0,7 | 7,9 | 6,3 |
| Public debt | % of GDP | 57,3 | 56,9 | 58,8 | 62,9 | 64,9 | 66,4 | 63,7 | 63,8 | 68,0 | 79,7 | 86,0 | 64,7 | 66,5 | -15,0 | -19,5 |
| Primary budget balance | % of GDP | 1,4 | 1,5 | -0,2 | -1,3 | -0,9 | -0,3 | 0,3 | 0,0 | -0,6 | -3,8 | -4,0 | 4,1 | 2,1 | 7,9 | 6,1 |
| Growth of GDP | % | 5,4 | 3,9 | 3,4 | 3,0 | 4,1 | 4,0 | 4,7 | 4,9 | 3,0 | -1,6 | 1,0 | -1,6 | 1,0 | | |
| Cost of public debt | % | | 5,4 | 5,3 | 4,9 | 4,5 | 4,2 | 4,1 | 4,4 | 4,5 | 4,1 | 3,8 | 4,1 | 3,8 | | |
| **1st sustainability criteria** | | 1,6 | 0,7 | -1,1 | -2,2 | -0,9 | -0,2 | 0,7 | 0,4 | -1,4 | -7,9 | -6,1 | 0,3 | 0,0 | | |
| **2nd sustainability criteria** | | 4,5 | 0,6 | -1,3 | -2,5 | -1,1 | -0,4 | 0,7 | 0,3 | -1,6 | -8,3 | -6,4 | 0,4 | 0,2 | | |

**Germany**

| Variable | Unit | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | Sim 2009 | Sim 2010 | Diff 2009 | Diff 2010 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total budget balance | % of GDP | 1,3 | -2,8 | -3,7 | -4,0 | -3,8 | -3,3 | -1,5 | -0,2 | -0,1 | -3,9 | -5,9 | 2,8 | -0,6 | 6,7 | 5,3 |
| Public debt | % of GDP | 59,7 | 58,8 | 60,3 | 63,8 | 65,6 | 67,8 | 67,6 | 65,1 | 65,9 | 73,4 | 78,7 | 61,2 | 64,5 | -12,2 | -14,2 |
| Primary budget balance | % of GDP | 4,5 | 0,2 | -0,7 | -1,1 | -1,0 | -0,5 | 1,3 | 2,6 | 2,6 | -1,0 | -2,9 | 5,7 | 2,3 | 6,7 | 5,2 |
| Growth of GDP | % | 2,5 | 2,5 | 1,4 | 1,0 | 2,2 | 1,5 | 3,5 | 4,4 | 2,9 | -4,2 | 1,0 | -4,2 | 1,0 | | |
| Cost of public debt | % | | 5,1 | 5,2 | 4,9 | 4,5 | 4,3 | 4,3 | 4,3 | 4,3 | 4,2 | 4,1 | 4,2 | 4,1 | | |
| **1st sustainability criteria** | | 2,8 | -1,4 | -2,8 | -3,4 | -2,4 | -2,3 | 0,9 | 2,6 | 1,8 | -7,0 | -5,1 | 0,2 | 0,0 | | |
| **2nd sustainability criteria** | | 6,0 | -1,4 | -3,0 | -3,6 | -2,5 | -2,4 | 0,8 | 2,6 | 1,7 | -7,2 | -5,4 | 0,5 | 0,3 | | |

**Greece**

| Variable | Unit | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | Sim 2009 | Sim 2010 | Diff 2009 | Diff 2010 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total budget balance | % of GDP | -3,7 | -4,5 | -4,8 | -5,7 | -7,5 | -5,1 | -2,8 | -3,6 | -5,0 | -5,1 | -5,7 | -1,0 | -2,5 | 4,1 | 3,2 |
| Public debt | % of GDP | 101,8 | 102,9 | 101,5 | 97,8 | 98,6 | 98,8 | 95,9 | 94,8 | 97,6 | 103,4 | 108,0 | 92,6 | 94,1 | -10,8 | -13,9 |
| Primary budget balance | % of GDP | 3,6 | 2,0 | 0,7 | -0,7 | -2,6 | -0,7 | 1,3 | 0,5 | -0,7 | -0,5 | -0,9 | 3,6 | 2,1 | 4,1 | 3,0 |
| Growth of GDP | % | 10,4 | 7,4 | 7,0 | 9,4 | 8,4 | 6,3 | 7,9 | 7,0 | 6,5 | 1,1 | 2,7 | 1,1 | 2,7 | | |
| Cost of public debt | % | | 6,9 | 5,7 | 5,4 | 5,4 | 4,7 | 4,5 | 4,6 | 4,8 | 4,8 | 4,8 | 4,8 | 4,8 | | |
| **1st sustainability criteria** | | 6,9 | 3,1 | 2,3 | 3,5 | 0,8 | 1,1 | 4,8 | 3,0 | 1,3 | -4,0 | -2,8 | 0,0 | 0,0 | | |
| **2nd sustainability criteria** | | 14,2 | 2,6 | 2,0 | 3,2 | 0,3 | 0,8 | 4,6 | 2,8 | 0,9 | -4,3 | -3,1 | 0,2 | 0,2 | | |

**Hungary**

| Variable | Unit | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | Sim 2009 | Sim 2010 | Diff 2009 | Diff 2010 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total budget balance | % of GDP | -2,9 | -4,0 | -9,0 | -7,2 | -6,4 | -7,8 | -9,2 | -4,9 | -3,4 | -3,4 | -3,9 | 1,6 | -2,2 | 5,0 | 1,7 |
| Public debt | % of GDP | 54,2 | 52,1 | 55,8 | 58,1 | 59,4 | 61,7 | 65,6 | 65,8 | 73,0 | 80,8 | 82,3 | 68,5 | 72,1 | -12,3 | -10,2 |
| Primary budget balance | % of GDP | 2,4 | 0,6 | -4,9 | -3,1 | -2,0 | -3,7 | -5,3 | -0,9 | 0,8 | 1,4 | 1,0 | 6,4 | 2,6 | 5,0 | 1,6 |
| Growth of GDP | % | 15,6 | 12,9 | 12,3 | 10,3 | 9,4 | 6,3 | 8,1 | 6,9 | 4,1 | -2,0 | 3,0 | -2,0 | 3,0 | | |
| Cost of public debt | % | | 9,6 | 8,8 | 8,1 | 8,3 | 7,3 | 6,8 | 6,5 | 6,6 | 6,4 | 6,2 | 6,4 | 6,2 | | |
| **1st sustainability criteria** | | 5,6 | 2,7 | -2,1 | -1,2 | -0,8 | -3,9 | -3,9 | -0,4 | -0,4 | -5,0 | -1,4 | 0,2 | 0,0 | | |
| **2nd sustainability criteria** | | 10,9 | 2,3 | -3,0 | -1,8 | -1,3 | -4,3 | -4,5 | -0,6 | -1,1 | -5,4 | -1,7 | 0,6 | 0,3 | | |

**Ireland**

| Variable | Unit | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | Simulation under the two conditions 2009 | 2010 | Difference 2009 | 2010 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total budget balance | % of GDP | 4,8 | 0,9 | -0,4 | 0,4 | 1,4 | 1,7 | 3,0 | 0,2 | -7,1 | -12,0 | -15,6 | 4,1 | 1,3 | 16,1 | 16,9 |
| Public debt | % of GDP | 37,7 | 35,5 | 32,2 | 31,1 | 29,4 | 27,5 | 24,9 | 25,0 | 43,2 | 61,2 | 79,7 | 40,3 | 43,5 | -20,9 | -36,2 |
| Primary budget balance | % of GDP | 6,8 | 2,4 | 1,0 | 1,7 | 2,5 | 2,7 | 3,9 | 1,1 | -6,1 | -9,8 | -12,5 | 6,3 | 3,5 | 16,1 | 16,0 |
| Growth of GDP | % | 15,8 | 11,6 | 11,3 | 7,1 | 6,8 | 8,9 | 9,3 | 7,5 | -2,6 | -10,1 | -2,9 | -10,1 | -2,9 | | |
| Cost of public debt | % | | 4,4 | 4,4 | 4,3 | 3,8 | 3,7 | 3,6 | 3,9 | 3,9 | 4,6 | 4,9 | 4,6 | 4,9 | | |
| **1st sustainability criteria** | | 10,8 | 5,0 | 3,2 | 2,6 | 3,4 | 4,1 | 5,3 | 2,1 | -8,2 | -18,2 | -17,9 | 0,0 | 0,0 | | |
| **2nd sustainability criteria** | | 12,8 | 4,9 | 3,2 | 2,6 | 3,4 | 4,1 | 5,3 | 2,0 | -8,9 | -18,8 | -18,7 | 0,4 | 0,1 | | |

**Italy**

| Variable | Unit | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | Simulation under the two conditions 2009 | 2010 | Difference 2009 | 2010 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total budget balance | % of GDP | -0,8 | -3,1 | -2,9 | -3,5 | -3,5 | -4,3 | -3,3 | -1,5 | -2,7 | -4,5 | -4,8 | 2,5 | -1,8 | 7,0 | 3,0 |
| Public debt | % of GDP | 109,2 | 108,8 | 105,7 | 104,4 | 103,8 | 105,8 | 106,5 | 103,5 | 105,8 | 113,0 | 116,1 | 101,4 | 105,8 | -11,6 | -10,3 |
| Primary budget balance | % of GDP | 5,5 | 3,2 | 2,7 | 1,6 | 1,2 | 0,3 | 1,3 | 3,5 | 2,4 | 0,2 | 0,1 | 7,2 | 2,9 | 7,0 | 2,8 |
| Growth of GDP | % | 5,7 | 4,8 | 3,7 | 3,1 | 4,2 | 2,7 | 3,9 | 4,0 | 1,8 | -2,5 | 1,7 | -2,5 | 1,7 | | |
| Cost of public debt | % | | 6,0 | 5,3 | 5,0 | 4,7 | 4,6 | 4,5 | 4,9 | 5,0 | 4,3 | 4,4 | 4,3 | 4,4 | | |
| **1st sustainability criteria** | | 5,4 | 2,1 | 1,0 | -0,3 | 0,9 | -1,4 | 0,9 | 2,6 | -0,8 | -7,3 | -2,8 | 0,0 | 0,0 | | |
| **2nd sustainability criteria** | | 11,7 | 1,8 | 1,0 | -0,4 | 0,7 | -1,7 | 0,6 | 2,6 | -1,0 | -7,5 | -3,0 | 0,3 | 0,0 | | |

**Latvia**

| Variable | Unit | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | Simulation under the two conditions 2009 | 2010 | Difference 2009 | 2010 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total budget balance | % of GDP | -2,8 | -2,1 | -2,3 | -1,6 | -1,0 | -0,4 | -0,5 | -0,4 | -4,0 | -11,1 | -13,6 | 2,3 | 1,1 | 13,4 | 14,7 |
| Public debt | % of GDP | 12,3 | 14,0 | 13,5 | 14,6 | 14,9 | 12,4 | 10,7 | 9,0 | 19,5 | 34,1 | 50,1 | 15,4 | 17,1 | -18,7 | -33,0 |
| Primary budget balance | % of GDP | -1,8 | -1,2 | -1,5 | -0,9 | -0,3 | 0,2 | 0,0 | 0,1 | -3,1 | -9,7 | -11,3 | 3,7 | 2,5 | 13,4 | 13,8 |
| Growth of GDP | % | 11,4 | 9,9 | 10,3 | 11,0 | 16,3 | 21,9 | 23,3 | 32,3 | 9,9 | -15,0 | -6,7 | -15,0 | -6,7 | | |
| Cost of public debt | % | | 8,0 | 6,3 | 5,8 | 5,6 | 4,9 | 5,0 | 6,2 | 11,0 | 6,1 | 6,3 | 6,1 | 6,3 | | |
| **1st sustainability criteria** | | -1,4 | -0,7 | -0,9 | 0,0 | 1,4 | 2,3 | 2,0 | 2,5 | -2,1 | -16,2 | -17,0 | 0,0 | 0,0 | | |
| **2nd sustainability criteria** | | -0,4 | -0,9 | -1,0 | -0,1 | 1,3 | 2,3 | 2,0 | 2,5 | -3,3 | -16,9 | -17,8 | 0,4 | 0,3 | | |

**Lithuania**

| Variable | Unit | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | Simulation under the two conditions 2009 | 2010 | Difference 2009 | 2010 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total budget balance | % of GDP | -3,2 | -3,6 | -1,9 | -1,3 | -1,5 | -0,5 | -0,4 | -1,0 | -3,2 | -5,4 | -8,0 | 1,1 | 0,8 | 6,5 | 8,8 |
| Public debt | % of GDP | 23,7 | 23,1 | 22,3 | 21,1 | 19,4 | 18,4 | 18,0 | 17,0 | 15,6 | 22,6 | 31,9 | 12,6 | 13,1 | -10,0 | -18,8 |
| Primary budget balance | % of GDP | -1,5 | -2,0 | -0,6 | 0,0 | -0,6 | 0,3 | 0,3 | -0,3 | -2,6 | -4,3 | -6,5 | 2,2 | 1,9 | 6,5 | 8,4 |
| Growth of GDP | % | 4,7 | 6,3 | 7,1 | 9,4 | 10,1 | 14,9 | 14,9 | 18,5 | 13,6 | -8,9 | -5,9 | -8,9 | -5,9 | | |
| Cost of public debt | % | | 7,2 | 6,0 | 6,4 | 4,7 | 4,7 | 4,4 | 4,6 | 4,0 | 6,4 | 6,2 | 6,4 | 6,2 | | |
| **1st sustainability criteria** | | -2,1 | -2,1 | -0,3 | 0,7 | 0,5 | 2,2 | 2,3 | 2,1 | -1,1 | -7,4 | -9,9 | 0,0 | 0,0 | | |
| **2nd sustainability criteria** | | -0,4 | -2,2 | -0,4 | 0,6 | 0,4 | 2,2 | 2,2 | 2,1 | -1,1 | -7,8 | -10,4 | 0,3 | 0,3 | | |

**Luxemburg**

| Variable | Unit | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | Simulation under the two conditions 2009 | 2010 | Difference 2009 | 2010 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total budget balance | % of GDP | 6,0 | 6,1 | 2,1 | 0,5 | -1,1 | 0,0 | 1,4 | 3,6 | 2,6 | -1,5 | -2,8 | 0,2 | -0,3 | 1,7 | 2,5 |
| Public debt | % of GDP | 6,4 | 6,5 | 6,5 | 6,2 | 6,3 | 6,1 | 6,7 | 6,9 | 14,7 | 16,0 | 16,4 | 14,4 | 14,9 | -1,6 | -1,5 |
| Primary budget balance | % of GDP | 6,3 | 6,4 | 2,4 | 0,7 | -0,9 | 0,2 | 1,5 | 3,9 | 2,9 | -0,9 | -2,2 | 0,8 | 0,3 | 1,7 | 2,5 |
| Growth of GDP | % | 10,6 | 2,6 | 6,3 | 7,7 | 6,5 | 9,9 | 12,2 | 7,3 | 0,7 | -1,1 | 1,8 | -1,1 | 1,8 | | |
| Cost of public debt | % | | 4,8 | 4,9 | 3,3 | 3,4 | 3,5 | 1,8 | 4,8 | 4,4 | 4,0 | 3,8 | 4,0 | 3,8 | | |
| **1st sustainability criteria** | | 6,7 | 6,3 | 2,5 | 1,0 | -0,7 | 0,6 | 2,2 | 4,1 | 2,7 | -1,7 | -2,5 | 0,0 | 0,0 | | |
| **2nd sustainability criteria** | | 7,0 | 6,3 | 2,5 | 1,0 | -0,7 | 0,6 | 2,2 | 4,1 | 2,4 | -1,7 | -2,5 | 0,1 | 0,0 | | |

**Malta**

| Variable | Unit | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | Simulation under the two conditions 2009 | 2010 | Difference 2009 | 2010 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total budget balance | % of GDP | -6,2 | -6,4 | -5,5 | -9,8 | -4,7 | -2,9 | -2,6 | -2,2 | -4,7 | -3,6 | -3,2 | -0,8 | -1,2 | 2,8 | 2,0 |
| Public debt | % of GDP | 55,9 | 62,1 | 60,1 | 69,3 | 72,2 | 69,8 | 63,7 | 62,1 | 64,1 | 67,0 | 68,9 | 62,4 | 62,8 | -4,6 | -6,1 |
| Primary budget balance | % of GDP | -2,5 | -3,1 | -1,9 | -6,4 | -1,1 | 0,8 | 1,0 | 1,1 | -1,4 | -0,2 | 0,4 | 2,6 | 2,2 | 2,8 | 1,8 |
| Growth of GDP | % | 9,4 | 1,6 | 5,9 | 2,6 | 2,6 | 6,7 | 6,3 | 6,6 | 4,0 | 1,4 | 2,0 | 1,4 | 2,0 | | |
| Cost of public debt | % | | 6,0 | 6,1 | 5,8 | 5,3 | 5,5 | 5,5 | 5,5 | 5,5 | 5,4 | 5,5 | 5,4 | 5,5 | | |
| **1st sustainability criteria** | | -0,9 | -5,4 | -2,0 | -8,0 | -2,8 | 1,8 | 1,4 | 1,9 | -2,1 | -2,7 | -1,8 | 0,1 | 0,1 | | |
| **2nd sustainability criteria** | | 2,8 | -5,8 | -2,0 | -8,6 | -3,1 | 1,7 | 1,5 | 1,8 | -2,4 | -2,9 | -2,0 | 0,1 | 0,0 | | |

**Netherlands**

| Variable | Unit | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | Simulation under the two conditions 2009 | 2010 | Difference 2009 | 2010 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total budget balance | % of GDP | 2,0 | -0,2 | -2,1 | -3,1 | -1,7 | -0,3 | 0,6 | 0,3 | 1,0 | -3,4 | -6,1 | 1,0 | -0,3 | 4,4 | 5,8 |
| Public debt | % of GDP | 53,8 | 50,7 | 50,5 | 52,0 | 52,4 | 51,8 | 47,4 | 45,6 | 58,2 | 57,0 | 63,1 | 54,5 | 55,8 | -2,5 | -7,3 |
| Primary budget balance | % of GDP | 5,6 | 2,9 | 0,7 | -0,6 | 0,7 | 2,1 | 2,8 | 2,6 | 3,2 | -0,8 | -3,4 | 3,6 | 2,3 | 4,4 | 5,7 |
| Growth of GDP | % | 8,2 | 7,1 | 3,9 | 2,5 | 3,0 | 4,5 | 5,2 | 5,0 | 4,9 | -1,9 | 0,7 | -1,9 | 0,7 | | |
| Cost of public debt | % | | 6,2 | 5,7 | 5,1 | 4,8 | 4,8 | 4,5 | 5,1 | 5,1 | 4,4 | 4,8 | 4,4 | 4,8 | | |
| **1st sustainability criteria** | | 6,4 | 3,4 | -0,1 | -1,8 | -0,1 | 2,0 | 3,1 | 2,6 | 3,9 | -4,5 | -5,7 | 0,0 | 0,1 | | |
| **2nd sustainability criteria** | | 10,0 | 3,4 | -0,2 | -1,9 | -0,2 | 2,0 | 3,1 | 2,6 | 3,1 | -4,4 | -6,0 | 0,2 | 0,0 | | |

**Poland**

| Variable | Unit | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | Simulation under the two conditions 2009 | 2010 | Difference 2009 | 2010 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total budget balance | % of GDP | -3,0 | -5,1 | -5,0 | -6,3 | -5,7 | -4,3 | -3,9 | -1,9 | -3,9 | -6,6 | -7,3 | -0,2 | -1,1 | 6,4 | 6,2 |
| Public debt | % of GDP | 36,8 | 37,6 | 42,2 | 47,1 | 45,7 | 47,1 | 47,7 | 44,9 | 47,1 | 53,6 | 59,7 | 43,7 | 44,6 | -9,9 | -15,1 |
| Primary budget balance | % of GDP | 0,0 | -2,0 | -2,1 | -3,3 | -2,9 | -1,5 | -1,2 | 0,4 | -1,7 | -3,7 | -4,3 | 2,7 | 1,8 | 6,4 | 6,1 |
| Growth of GDP | % | 11,8 | 4,7 | 3,7 | 4,3 | 9,7 | 6,4 | 7,8 | 10,9 | 8,2 | 0,5 | 2,4 | 0,5 | 2,4 | | |
| Cost of public debt | % | | 8,8 | 8,0 | 7,4 | 6,5 | 6,5 | 6,2 | 5,3 | 5,3 | 6,2 | 5,7 | 6,2 | 5,7 | | |
| **1st sustainability criteria** | | 1,3 | -3,3 | -3,4 | -4,3 | -1,3 | -1,3 | -0,2 | 3,0 | 0,0 | -6,3 | -5,9 | 0,0 | 0,0 | | |
| **2nd sustainability criteria** | | 4,3 | -3,5 | -3,9 | -4,8 | -1,4 | -1,6 | -0,4 | 2,9 | -0,3 | -6,7 | -6,3 | 0,2 | 0,3 | | |

**Portugal**

| Variable | Unit | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | Simulation under the two conditions 2009 | 2010 | Difference 2009 | 2010 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total budget balance | % of GDP | -2,9 | -4,3 | -2,8 | -2,9 | -3,4 | -6,1 | -3,9 | -2,6 | -2,6 | -6,5 | -6,7 | 1,0 | -0,5 | 7,5 | 6,2 |
| Public debt | % of GDP | 50,4 | 52,9 | 55,5 | 56,9 | 58,3 | 63,6 | 64,7 | 63,5 | 66,4 | 75,4 | 81,5 | 64,2 | 65,7 | -11,2 | -15,8 |
| Primary budget balance | % of GDP | 0,1 | -1,3 | 0,0 | -0,2 | -0,7 | -3,5 | -1,2 | 0,2 | 0,3 | -3,6 | -3,4 | 3,9 | 2,4 | 7,5 | 5,8 |
| Growth of GDP | % | 7,1 | 5,8 | 4,7 | 2,3 | 4,0 | 3,5 | 4,2 | 5,0 | 1,8 | -1,5 | 0,8 | -1,5 | 0,8 | | |
| Cost of public debt | % | | 6,3 | 5,5 | 5,0 | 4,9 | 4,6 | 4,4 | 4,5 | 4,6 | 4,3 | 4,4 | 4,3 | 4,4 | | |
| **1st sustainability criteria** | | 0,7 | -1,2 | -0,2 | -1,6 | -1,1 | -3,9 | -1,2 | 0,6 | -1,4 | -7,6 | -6,0 | 0,0 | 0,0 | | |
| **2nd sustainability criteria** | | 3,7 | -1,6 | -0,5 | -1,7 | -1,2 | -4,2 | -1,3 | 0,5 | -1,6 | -8,0 | -6,3 | 0,2 | 0,0 | | |

**Romania**

| Variable | Unit | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | Simulation under the two conditions 2009 | 2010 | Difference 2009 | 2010 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total budget balance | % of GDP | -4,7 | -3,5 | -2,0 | -1,5 | -1,2 | -1,2 | -2,2 | -2,5 | -5,4 | -5,1 | -5,6 | -0,6 | -0,8 | 4,5 | 4,8 |
| Public debt | % of GDP | 24,6 | 25,7 | 24,9 | 21,5 | 18,7 | 15,8 | 12,4 | 12,7 | 13,6 | 18,2 | 22,7 | 11,7 | 11,9 | -6,5 | -10,8 |
| Primary budget balance | % of GDP | -0,7 | -0,1 | 0,5 | 0,1 | 0,2 | -0,1 | -1,3 | -1,8 | -4,7 | -3,6 | -4,0 | 0,9 | 0,7 | 4,5 | 4,7 |
| Growth of GDP | % | 48,4 | 45,6 | 28,9 | 29,9 | 25,3 | 16,8 | 19,3 | 19,8 | 22,1 | 5,3 | 6,6 | 5,3 | 6,6 | | |
| Cost of public debt | % | | 20,1 | 12,5 | 8,3 | 8,2 | 6,9 | 6,8 | 6,8 | 6,7 | 11,6 | 9,4 | 11,6 | 9,4 | | |
| **1st sustainability criteria** | | 7,2 | 8,2 | 5,2 | 4,9 | 3,5 | 1,5 | 0,2 | 0,0 | -2,4 | -4,1 | -4,1 | 0,0 | 0,0 | | |
| **2nd sustainability criteria** | | 11,2 | 6,4 | 4,6 | 4,7 | 3,4 | 1,5 | 0,3 | -0,1 | -2,6 | -4,7 | -4,6 | 0,2 | 0,4 | | |

**Slovenia**

| Variable | Unit | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | Simulation under the two conditions 2009 | 2010 | Difference 2009 | 2010 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total budget balance | % of GDP | -3,8 | -4,1 | -2,5 | -2,7 | -2,2 | -1,4 | -1,3 | 0,5 | -0,9 | -5,5 | -6,5 | 0,4 | -0,6 | 5,9 | 5,9 |
| Public debt | % of GDP | 26,8 | 27,4 | 28,1 | 27,5 | 27,2 | 27,0 | 26,7 | 23,4 | 22,8 | 29,3 | 34,9 | 20,6 | 21,5 | -8,7 | -13,4 |
| Primary budget balance | % of GDP | -1,4 | -1,7 | -0,3 | -0,7 | -0,5 | 0,1 | 0,1 | 1,8 | 0,2 | -3,9 | -4,7 | 2,0 | 1,0 | 5,9 | 5,7 |
| Growth of GDP | % | 10,0 | 11,8 | 12,0 | 8,6 | 7,8 | 6,0 | 8,0 | 11,2 | 8,8 | -1,6 | 2,8 | -1,6 | 2,8 | | |
| Cost of public debt | % | | 10,0 | 9,0 | 7,7 | 6,7 | 5,8 | 5,6 | 5,4 | 5,1 | 6,9 | 6,3 | 6,9 | 6,3 | | |
| **1st sustainability criteria** | | -1,1 | -0,9 | 0,9 | -0,3 | -0,1 | 0,2 | 0,8 | 3,1 | 1,1 | -6,0 | -5,5 | 0,1 | 0,0 | | |
| **2nd sustainability criteria** | | 1,3 | -1,2 | 0,5 | -0,5 | -0,2 | 0,1 | 0,7 | 3,2 | 1,0 | -6,4 | -5,9 | 0,3 | 0,2 | | |

**Slovakia**

| Variable | Unit | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | Simulation under the two conditions 2009 | 2010 | Difference 2009 | 2010 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total budget balance | % of GDP | -12,3 | -6,5 | -8,2 | -2,8 | -2,4 | -2,8 | -3,5 | -1,9 | -2,2 | -4,7 | -5,4 | -0,3 | -1,2 | 4,4 | 4,2 |
| Public debt | % of GDP | 50,3 | 48,9 | 43,4 | 42,4 | 41,4 | 34,2 | 30,4 | 29,4 | 27,6 | 32,2 | 36,3 | 25,5 | 26,5 | -6,7 | -9,8 |
| Primary budget balance | % of GDP | -8,2 | -2,5 | -4,7 | -0,3 | -0,2 | -1,1 | -2,0 | -0,5 | -0,9 | -3,3 | -4,0 | 1,1 | 0,2 | 4,4 | 4,2 |
| Growth of GDP | % | 10,9 | 8,6 | 8,8 | 10,3 | 11,3 | 9,1 | 11,7 | 11,7 | 9,5 | 1,0 | 4,4 | 1,0 | 4,4 | | |
| Cost of public debt | % | | 8,6 | 7,8 | 6,4 | 5,8 | 4,5 | 4,9 | 5,1 | 4,8 | 5,1 | 4,5 | 5,1 | 4,5 | | |
| **1st sustainability criteria** | | -6,8 | -2,3 | -4,4 | 1,6 | 2,3 | 0,3 | 0,1 | 1,5 | 0,4 | -4,4 | -3,8 | 0,0 | 0,0 | | |
| **2nd sustainability criteria** | | -2,7 | -2,5 | -4,3 | 1,4 | 2,1 | 0,5 | 0,1 | 1,4 | 0,4 | -4,6 | -4,1 | 0,0 | 0,2 | | |

| Spain | | | | | | | Data | | | | | | | Simulation under the two conditions | | | Difference | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Unit | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | | 2009 | 2010 | | 2009 | 2010 |
| Total budget balance | % of GDP | -1,0 | -0,6 | -0,5 | -0,2 | -0,3 | 1,0 | 2,0 | 2,2 | -3,8 | -8,6 | -9,8 | | 0,9 | -0,3 | | 9,5 | 9,5 |
| Public debt | % of GDP | 59,2 | 55,5 | 52,5 | 48,7 | 46,2 | 43,0 | 39,6 | 36,2 | 39,5 | 50,8 | 62,3 | | 37,0 | 38,1 | | -13,8 | -24,2 |
| Primary budget balance | % of GDP | 2,2 | 2,4 | 2,2 | 2,1 | 1,7 | 2,8 | 3,7 | 3,8 | -2,3 | -6,9 | -7,8 | | 2,6 | 1,4 | | 9,5 | 9,2 |
| Growth of GDP | % | 8,7 | 8,0 | 7,1 | 7,4 | 7,4 | 8,1 | 8,1 | 7,0 | 4,2 | -2,1 | 0,9 | | -2,1 | 0,9 | | | |
| Cost of public debt | % | | 5,5 | 5,2 | 4,7 | 4,4 | 4,2 | 4,3 | 4,3 | 4,3 | 4,2 | 4,0 | | 4,2 | 4,0 | | | |
| **1st sustainability criteria** | | 4,2 | 3,8 | 3,2 | 3,4 | 3,1 | 4,5 | 5,2 | 4,7 | -2,1 | -9,7 | -9,2 | | 0,1 | 0,0 | | | |
| **2nd sustainability criteria** | | 7,4 | 3,8 | 3,2 | 3,4 | 3,1 | 4,5 | 5,2 | 4,8 | -2,3 | -10,1 | -9,7 | | 0,3 | 0,2 | | | |

| Sweden | | | | | | | Data | | | | | | | Simulation under the two conditions | | | Difference | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Unit | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | | 2009 | 2010 | | 2009 | 2010 |
| Total budget balance | % of GDP | 3,7 | 1,6 | -1,2 | -0,9 | 0,8 | 2,3 | 2,5 | 3,8 | 2,5 | -2,6 | -3,9 | | 1,1 | -0,6 | | 3,7 | 3,3 |
| Public debt | % of GDP | 53,6 | 54,4 | 52,6 | 52,3 | 51,2 | 51,0 | 45,9 | 40,5 | 38,0 | 44,0 | 47,2 | | 35,8 | 37,3 | | -8,2 | -9,9 |
| Primary budget balance | % of GDP | 7,2 | 4,4 | 1,7 | 1,1 | 2,4 | 3,9 | 4,2 | 5,6 | 4,2 | -1,2 | -2,5 | | 2,5 | 0,8 | | 3,7 | 3,3 |
| Growth of GDP | % | 5,9 | 3,4 | 4,1 | 3,9 | 4,4 | 4,2 | 6,1 | 5,6 | 3,1 | -2,5 | 1,7 | | -2,5 | 1,7 | | | |
| Cost of public debt | % | | 5,4 | 5,5 | 4,0 | 3,2 | 3,3 | 3,5 | 4,1 | 4,3 | 3,6 | 3,2 | | 3,6 | 3,2 | | | |
| **1st sustainability criteria** | | 6,9 | 3,4 | 1,0 | 1,1 | 3,1 | 4,4 | 5,3 | 6,1 | 3,7 | -3,7 | -3,1 | | 0,2 | 0,0 | | | |
| **2nd sustainability criteria** | | 10,4 | 3,3 | 0,9 | 1,1 | 3,0 | 4,4 | 5,4 | 6,2 | 3,7 | -3,9 | -3,2 | | 0,3 | 0,2 | | | |

| United Kingdom | | | | | | | Data | | | | | | | Simulation under the two conditions | | | Difference | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Unit | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | | 2009 | 2010 | | 2009 | 2010 |
| Total budget balance | % of GDP | 3,6 | 0,5 | -2,0 | -3,3 | -3,4 | -3,4 | -2,7 | -2,7 | -5,5 | -11,5 | -13,8 | | 1,7 | -0,6 | | 13,2 | 13,2 |
| Public debt | % of GDP | 41,0 | 37,7 | 37,5 | 38,7 | 40,6 | 42,3 | 43,4 | 44,2 | 52,0 | 68,4 | 81,7 | | 48,8 | 50,9 | | -19,6 | -30,8 |
| Primary budget balance | % of GDP | 6,3 | 2,9 | 0,0 | -1,4 | -1,5 | -1,3 | -0,7 | -0,5 | -3,1 | -9,4 | -10,8 | | 3,8 | 1,5 | | 13,2 | 12,3 |
| Growth of GDP | % | 5,1 | 4,6 | 5,3 | 6,0 | 5,3 | 4,3 | 5,5 | 6,0 | 3,0 | -3,0 | 1,6 | | -3,0 | 1,6 | | | |
| Cost of public debt | % | | 6,1 | 5,6 | 5,4 | 5,2 | 5,4 | 5,0 | 5,4 | 5,6 | 3,9 | 4,5 | | 3,9 | 4,5 | | | |
| **1st sustainability criteria** | | 5,7 | 2,2 | 0,0 | -1,0 | -1,2 | -1,6 | -0,3 | 0,0 | -3,9 | -13,6 | -12,5 | | 0,2 | 0,2 | | | |
| **2nd sustainability criteria** | | 8,4 | 2,3 | -0,1 | -1,2 | -1,4 | -1,8 | -0,5 | -0,2 | -4,4 | -14,1 | -13,1 | | 0,4 | 0,0 | | | |

Notes:

1. Estimates are in Bold.
2. Forecasts are in Italics.

*Source: Own calculations based on data from European Commission online database (2009).*

# FISKALNA ODRŽIVOST ZEMALJA ČLANICA EU U KONTEKSTU TRENUTNE FINANCIJSKE KRIZE

## SAŽETAK

Rad se bavi pitanjem fiskalne održivosti u trenutnoj financijskoj i ekonomskoj krizi. Iz literature se može zaključiti da je, u pogledu fiskalne stabilnosti, postavljanje fiksnog ograničenja u omjer odnosa javnog duga prema BDP-u i budžetne bilance prema BDP-u previše pojednostavljeno rješenje i kako bi održiva fiskalna politika mogla biti definirana gornjim granicama odnosa javnog duga prema BDP-u i budžetne bilance prema BDP-u, uzimajući u obzir neke parametre specifične za pojedinu zemlju. Naša empirijska analiza pokazuje da je većina zemalja članica EU ušla u 2008. godinu sa zdravim javnim financijama. Ipak, većina zemalja članica EU se sada nalazi u financijskim problemima. Čak štoviše, gotovo sve zemlje članice EU moraju u 2009. i 2010. smanjiti budžetni deficit kako bi dostigle održivu budžetnu poziciju. Veliki skokovi u budžetnom deficitu u 2009. i 2010., u usporedbi s 2007. (prije krize) uglavnom su uzrokovani manjim fiskalnim primanjima koja su posljedica smanjenog ekonomskog rasta i mjera za suzbijanje financijske i ekonomske krize. Mi tvrdimo da te promjene u fiskalnim deficitima nisu održive. Naša analiza pokazuje da bi u 2009. oko 2/3 gospodarstava o kojima govorimo trebalo imati proračunski višak uzimajući u obzir ostale relevantne makroekonomske varijable kao što su gospodarski rast, itd. U 2010. bi ipak bilo moguće provoditi opušteniju fiskalnu politiku ali bi još uvijek bio održiv znatno niži fiskalni deficit od prognoziranog.

Ključne riječi: Javne financije, održivost, budžetna bilanca, budžetni deficit, javni dug

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Preliminary paper

Prethodno priopćenje

# DECISION-MAKING STYLES OF YOUNG-ADULT CONSUMERS IN THE REPUBLIC OF MACEDONIA

## ABSTRACT

*The purpose of this research is to examine decision making styles and to test the Sproles and Kendall's (1986) CSI instrument (Consumer Style Inventory) among young-adult consumers in the Republic of Macedonia. It segments young-adult consumers by their decision-making styles and determines the differences among segments relative to their decision-making styles. The empirical analysis is based on data obtained from consumer survey. The data were analyzed using Cronbach alpha coefficients, exploratory factor analysis and k-means cluster analysis. Research results confirmed eight-factor model. Two homogeneous segments of consumers were identified: Economic consumers and Recreational consumers. Significant gender differences were found on four factors of consumer-decision making styles (brand consciousness, novelty-fashion consciousness, recreational-hedonistic consumer and habitual, brand-loyal consumer). Marketing strategies should be tailored to the specific characteristics of consumers in the Republic of Macedonia.*

*JEL Classification: M30, M31*
**Key words:** *Consumer decision-making styles, Consumer Style Inventory, Consumer segmentation, Gender differences, The Republic of Macedonia*

## 1. INTRODUCTION

Researchers and marketers show a growing interest in the research of consumers' decision-making styles to understand how and why people shop. Sproles and Kendall (1986) define a consumer decision making style as a mental orientation characterizing a consumer's approach to making choices. This concept is important to marketing because it determines consumer behavior and is relevant for market segmentation (Sproles and Kendall, 1986; Walsh, Hennig-Thurau, Wayne-Mitchell and Wiedmann, 2001). Although decision-making styles have been examined in various cultural environments, the generalizability of Consumer Style Inventory (CSI) instrument has not been established yet (Lysonski, Durvasula and Zotos, 1996; Hanzaee and Aghasibeig, 2008; Yasin, 2009; Anić, Piri Rajh and Rajh, 2009; Walsh, Hennig-Thurau, Wayne-Mitchell and Wiedmann, 2001). Consumer Style Inventory (CSI) is a comprehensive instrument developed by Sproles and Kendall (1986) used for measuring consumer decision making styles. More research is needed to examine consumer decision making styles and to test CSI instrument in different countries. Having a reliable and valid instrument is a prerequisite for creating shopping orientation profile of consumers that can be used to guide marketing strategy.

The purpose of this research is to examine decision making styles and the applicability of Sproles and Kendall's CSI instrument among young-adult consumers in the Republic of Macedonia. The objectives of the paper are: (1) to assess the reliability and construct validity of CSI instrument in the Republic of Macedonia, (2) to segment young-adult consumers by

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their decision-making styles, (3) to determine differences among segments relative to their decision-making styles, and (4) to determine gender differences in decision-making styles among young-adult consumers in the Republic of Macedonia. Data collected by consumer survey were analyzed using Cronbach alpha coefficients, exploratory factor analysis and k-means cluster analysis.

To address the issues described above, we conduct an empirical study which builds on the stream of research that attempts to test the generalizability of the consumer styles inventory (Sproles and Kendall CSI research, 1986; Lysonski, Durvasula and Zotos, 1996; Mitchell and Walsh, 2004; Anić, Piri Rajh and Rajh, 2009). There is no study on consumers' decision making styles in the Republic of Macedonia. Since the Republic of Macedonia belongs to the less developed transition countries with lower levels of income where the traditional way of life coexists with ongoing modernization, it is questionable whether the CSI instrument that was established for developed countries are also applicable in developing country. As we test the CSI instrument, we may refine the theory by findings from the environment of the Republic of Macedonia with respect to consumers' decision-making style segments and gender differences.

Several managerial implications might be derived from this study. Marketers might use the findings to segment consumers according to their decision-making styles, to target and position their products more effectively. International companies might use the findings of this study to tailor their marketing strategies to specific characteristics of consumers when entering the market of the Republic of Macedonia.

The paper starts with the theory of consumers' decision making styles. The methodology used is presented in section three, which is followed by research results in section four. Section five includes conclusions, limitations of the research, and future research directions.

## 2. THEORY OF CONSUMERS' DECISION MAKING STYLES

Sproles (1985) and Sproles and Kendall (1986) conceptualized the Consumer Styles Inventory (CSI), which is an early attempt to systematically measure shopping orientations using decision-making orientations. One of the most important assumptions of this approach is that each individual consumer has a specific decision-making style resulting from a combination of their individual decision making dimensions. Originally, the instrument contained 50 items to measure general orientations towards shopping, and in 1986 Sproles and Kendall developed 40 items instrument, calling it the consumer style inventory (CSI). They validated eight different decision-making dimensions from a sample of U.S. high school students. The CSI dimensions are: (1) Perfectionism or high-quality consciousness – characteristic that describes a perfectionist, high-quality conscious consumer who searches for the very best quality in products, and is not satisfied with the "good enough" product; (2) Brand consciousness - a characteristic identifying those consumers who buy more expensive, well-known national brands. They believe that a higher price means better quality, and prefer best selling advertised brands; (3) Novelty-fashion consciousness - characteristic indicating consumers who are fashion and novelty conscious, and seek out new things. For them it is important to be up-to-date with styles; (4) Recreational, hedonistic shopping consciousness - a characteristic identifying those consumers who find shopping pleasant and shops for the fun; (5) Price consciousness - a characteristic identifying those consumers who look for sale prices and are conscious of lower prices. They are concerned with getting the best value for their money, and are likely to be comparison shoppers; (6) Impulsiveness - a characteristic identifying those consumers who do not plan their shopping, and are unconcerned about how

much they spend; (7) Confusion from over choice - a characteristic identifying those consumers who have difficulty making choices, and experience information overload; (8) Brand-loyal orientation towards consumption - a characteristic identifying those consumers who have favorite brands and stores. They stick with their brands and go shopping each time they shop.

Past research on CSI test the applicability of CSI instrument in various countries. Although, consumer decision-making style represents a relatively consistent pattern of cognitive and affective responses, national culture has been proven to impact significantly on individual values and attitudes (Hofstede, 1980), thus, culture is expected to have a significant influence on consumer decision-making style (Cheryl, Bennett and Hartel, 2005). There have been differences in applicability of CSI instrument across various environments, since some dimensions showed a poor reliability and need some modifications (Siu, Wang, Chang and Hui, 2001; Walsh, Hennig-Thurau, Wayne-Mitchell and Wiedmann, 2001; Mitchell and Walsh, 2004). However, there are studies that established elements for validity for eight characteristics of consumer style in several countries (Sproles and Kendall, 1986; Wesley, LeHew and Woodside, 2006; Anić, Piri Rajh and Rajh, 2009). Therefore, it might be expected that young-adult consumers in the Republic of Macedonia express eight decision making styles.

Other studies examine the potential of CSI for market segmentation purposes (Walsh, Hennig-Thurau, Wayne-Mitchell and Wiedmann, 2001; Akturan and Tezcan, 2007; Anić, Piri Rajh and Rajh, 2009). The study of Walsh, Hennig-Thurau, Wayne-Mitchell and Wiedmann (2001) identified the following meaningful and distinct decision-making groups: value oriented consumers, the demanding comparison shoppers, impulsive consumers, emotionally dominated consumers, brand-oriented and shopping enthusiastic consumers, fashion conscious consumers. Therefore, it might be expected that young-adult consumers in the Republic of Macedonia might be classified in different consumer segments according to decision-making styles.

There are also studies that seek to understand how gender affects consumers' approaches to decision making. Past research indicates males and females differ with respect to decision-making process and emotional expression in purchasing behavior. While men tend to be less involved in shopping than women, women like shopping and often have the primary responsibility for the supply of grocery goods (Underhill, 1999). Women tend to spend more time shopping, make more purchases and purchase a higher percentage of products on an unplanned basis, although the women's roles in households change so does their shopping behavior. One study on gender differences found only four common factors to both males and females, and five additional separate male and female factors (Mitchell and Walsh, 2004), so that it can be expected that male and female consumer decision-making styles vary in the sample of the Republic of Macedonia.

## 2. METHODOLOGY

Data on CSI dimensions were collected using survey administered to 304 undergraduate students at the Faculty of Economics in Skopje in 2010. As in most replications of the CSI (Mitchell and Walsh, 2004), student sample was used to demonstrate whether the CSI inventory can be applied to the Republic of Macedonia. Since young people are eager to consume, are conscious of their experience, they are valid consumers for this study (Sproles and Kendall, 1986). Sample profile is presented in Table 1.

**Table 1.**
**Summary statistics on sampled consumers, N = 304**

| Respondent profile | |
|---|---|
| Gender (%) | |
| Male | 32.9 |
| Female | 67.1 |
| Age (average years) | 20.4 |

Items used in the questionnaire were taken from Sproles and Kendall (1986). The instrument contained 40 Likert-scaled items, ranging from one to five, where one equals „strongly disagree" and five equals „strongly agree". The items used in this research are listed in Appendix 1. Cronbach alpha coefficients were calculated to quantify the scale reliabilities. For the second step the construct validity of the consumer styles was examined using exploratory factor analysis. Then, K-means cluster analysis was employed to develop consumer typology based on CSI, while the differences in CSI's between consumers' segments were analyzed using the analysis of variance (ANOVA). Consumer segments were identified and named based on mean scores on each CSI factor. ANOVA was used to test the gender differences in CSI dimensions.

# 3. RESEARCH RESULTS
## 3.1. Assessment of reliability and construct validity

Reliability of scales was assessed using Cronbach alpha coefficients. Values of Cronbach alpha if deleted were calculated for each item. Items that decrease Cronbach alpha coefficients of respective scales were deleted from further analysis (i14, i18, i27, i31). Table 2 shows the results of reliability analysis.

**Table 2.**
**Reliability assessment**

| Items | Cronbach alphas if deleted |
|---|---|
| Perfectionist, high-quality conscious consumer/Cronbach Alpha for subscale: 0.784 | |
| i1 | 0.762 |
| i2 | 0.772 |
| i3 | 0.757 |
| i4 | 0.733 |
| i5 (r) | 0.741 |
| i6 | 0.769 |
| i7 (r) | 0.764 |
| i8 (r) | 0.783 |
| Brand conscious consumer/ Cronbach Alpha for subscale: 0.770 | |
| i9 | 0.698 |
| i10 | 0.709 |
| i11 | 0.748 |
| i12 | 0.721 |
| i13 | 0.751 |
| i14 | 0.774 |
| Novelty fashion conscious consumer/ Cronbach Alpha for subscale: 0.741 | |
| i15 | 0.674 |
| i16 | 0.617 |

| | |
|---|---|
| i17 | 0.657 |
| i18 | 0.771 |
| i19 | 0.733 |
| Recreational, hedonistic consumer/ Cronbach Alpha for subscale: 0.873 | |
| i20 (r) | 0.846 |
| i21 | 0.813 |
| i22 (r) | 0.838 |
| i23 | 0.861 |
| i24 (r) | 0.870 |
| Price conscious consumer/ Cronbach Alpha for subscale: 0.605 | |
| i25 | 0.276 |
| i26 | 0.318 |
| i27 | 0.773 |
| Impulsive consumer/ Cronbach Alpha for subscale: 0.545 | |
| i28 | 0.465 |
| i29 | 0.403 |
| i30 | 0.423 |
| i31 (r) | 0.626 |
| i32 (r) | 0.491 |
| Confused by over choice consumer/ Cronbach Alpha for subscale: 0.753 | |
| i33 | 0.698 |
| i34 | 0.690 |
| i35 | 0.685 |
| i36 | 0.710 |
| Habitual, brand-loyal consumer/ Cronbach Alpha for subscale: 0.788 | |
| i37 | 0.710 |
| i38 | 0.714 |
| i39 | 0.788 |
| i40 (r) | 0.728 |

Note: "r" denotes negative items that were recoded before the analysis.

Construct validity was assessed using exploratory factor analysis. First run of exploratory factor analysis indicated that there are five items that have low factor loading on respective factor and high factor loading on some other factor (i4, i5, i7, i8, i19). These five items were deleted from further analysis. Table 3 shows second run factor structure after varimax factor rotation. There were eight factors as conceptualized in the literature, with 63.0% of explained variance. The results of exploratory factor analysis indicate acceptable level of convergent and discriminant validity.

**Table 3.**

**Factor analysis results, factor loadings**

| Items | Factor 1 | Factor 2 | Factor 3 | Factor 4 | Factor 5 | Factor 6 | Factor 7 | Factor 8 |
|-------|----------|----------|----------|----------|----------|----------|----------|----------|
| i1 | 0.145 | 0.095 | 0.041 | -0.066 | 0.156 | **0.724** | 0.234 | -0.056 |
| i2 | -0.037 | 0.387 | -0.104 | -0.167 | 0.073 | **0.482** | -0.201 | 0.199 |
| i3 | 0.103 | 0.117 | -0.044 | -0.023 | 0.100 | **0.740** | 0.131 | 0.139 |
| i6 | -0.016 | 0.080 | -0.055 | -0.001 | 0.111 | **0.649** | 0.137 | 0.173 |
| i9 | **0.600** | -0.004 | 0.051 | 0.100 | 0.226 | 0.332 | 0.198 | 0.249 |
| i10 | **0.512** | 0.078 | 0.069 | 0.023 | 0.192 | 0.363 | 0.442 | 0.256 |
| i11 | **0.786** | 0.165 | 0.004 | 0.045 | 0.128 | -0.024 | 0.041 | -0.055 |
| i12 | **0.767** | 0.084 | -0.069 | -0.029 | 0.098 | 0.018 | 0.098 | 0.157 |
| i13 | **0.476** | -0.109 | 0.102 | 0.054 | 0.093 | 0.198 | -0.028 | 0.328 |
| i15 | 0.066 | 0.259 | 0.041 | 0.004 | 0.131 | 0.015 | 0.291 | **0.675** |
| i16 | 0.119 | 0.384 | 0.060 | 0.058 | 0.009 | 0.081 | 0.157 | **0.755** |
| i17 | 0.147 | 0.310 | 0.035 | 0.088 | 0.049 | 0.167 | 0.029 | **0.733** |
| i20 | 0.065 | **0.789** | 0.018 | -0.071 | 0.089 | 0.019 | -0.001 | 0.192 |
| i21 | 0.076 | **0.883** | 0.021 | 0.045 | 0.009 | 0.068 | -0.005 | 0.153 |
| i22 | -0.001 | **0.844** | -0.024 | 0.063 | 0.058 | 0.063 | 0.110 | 0.070 |
| i23 | 0.026 | **0.732** | -0.057 | 0.102 | -0.008 | 0.009 | -0.010 | 0.165 |
| i24 | 0.126 | **0.671** | 0.031 | -0.129 | -0.036 | 0.203 | 0.207 | 0.168 |
| i25 | -0.049 | -0.064 | 0.055 | 0.035 | -0.084 | -0.083 | **-0.866** | -0.052 |
| i26 | -0.162 | -0.074 | 0.053 | 0.018 | -0.135 | -0.190 | **-0.775** | -0.225 |
| i28 | -0.028 | 0.137 | 0.308 | **0.568** | 0.043 | 0.042 | -0.183 | -0.253 |
| i29 | -0.004 | -0.049 | -0.106 | **0.783** | -0.038 | 0.017 | -0.025 | 0.145 |
| i30 | 0.128 | 0.038 | 0.061 | **0.733** | -0.085 | -0.153 | -0.055 | 0.053 |
| i32 | -0.029 | 0.059 | 0.150 | **0.588** | 0.163 | -0.013 | 0.192 | 0.052 |
| i33 | -0.010 | 0.047 | **0.739** | 0.073 | -0.056 | 0.028 | -0.011 | 0.022 |
| i34 | 0.034 | 0.022 | **0.765** | 0.039 | -0.175 | 0.068 | -0.015 | 0.011 |
| i35 | 0.088 | -0.031 | **0.761** | -0.006 | 0.019 | -0.069 | -0.086 | 0.014 |
| i36 | -0.129 | -0.069 | **0.715** | 0.012 | 0.042 | -0.099 | -0.002 | 0.105 |
| i37 | 0.162 | 0.116 | 0.025 | 0.001 | **0.765** | 0.218 | 0.185 | -0.020 |
| i38 | 0.027 | 0.042 | 0.054 | 0.049 | **0.784** | 0.149 | 0.146 | 0.069 |
| i39 | 0.126 | -0.087 | -0.180 | -0.004 | **0.690** | -0.045 | -0.086 | 0.217 |
| i40 | 0.138 | 0.044 | -0.120 | -0.075 | **0.782** | 0.021 | 0.052 | -0.029 |

As expected, the results of this study indicate that young adult consumers in the Republic of Macedonia express eight decision making styles. Those decision making styles are: (1) perfectionism or high-quality consciousness, (2) brand consciousness, (3) novelty-fashion consciousness, (4) recreational, hedonistic shopping consciousness, (5) price consciousness, (6) impulsiveness, (7) confusion with over choice, (8) brand-loyal consumption. This result is in line with other similar empirical research (Sproles and Kendall, 1986; Wesley, Le Hew and Woodside, 2006; Anić, Piri Rajh and Rajh, 2009).

### 3.2. CSI Segments

K-means cluster analysis was employed to classify consumers according to their decision making styles. Items mean values were calculated for each factor using only items that remained after the reliability and construct validity assessment. These mean values were taken as an input in k-means cluster analysis. K-means cluster analysis produced two

homogeneous segments of consumers. Significant differences between consumers' segments were found for all consumers' decision making styles, except for confused by over choice style. As expected the young-adult consumers in the Republic of Macedonia might be classified in different consumer segments according to decision-making styles. This result is in line with other research, indicating that CSI instrument might be used for segmentation purposes (Anić, Piri Rajh and Rajh, 2009). The results of k-means cluster analysis are presented in Table 4.

**Table 4.**

**K-means cluster results, N = 304**

| Decision making styles | Sample average (N=304) | Segment 1: Economic consumers (N=169) | Segment 2: Recreational consumers (N=135) | ANOVA p value |
|---|---|---|---|---|
| 1. Perfectionist, high-quality conscious consumer | 3.88 | 3.65 | 4.16 | 0.00 |
| 2. Brand conscious consumer | 2.88 | 2.46 | 3.40 | 0.00 |
| 3. Novelty, fashion conscious consumer | 3.54 | 2.98 | 4.23 | 0.00 |
| 4. Recreational, hedonistic consumer | 3.82 | 3.40 | 4.35 | 0.00 |
| 5. Price conscious consumer | 2.89 | 3.35 | 2.32 | 0.00 |
| 6. Impulsive consumer | 2.79 | 2.76 | 2.84 | 0.42 |
| 7. Confused by over choice consumer | 2.81 | 2.84 | 2.78 | 0.50 |
| 8. Habitual, brand-loyal consumer | 3.42 | 3.09 | 3.83 | 0.00 |

On average, young-adult consumers in the Republic of Macedonia express high tendency towards perfectionism and recreational and hedonistic shopping. At the same time they express lower tendency towards impulsive shopping. They seem to plan their shopping trips in advance. On average, young-adult consumers in the Republic of Macedonia are still not confused by over choice. This is maybe because there are still not a large numbers of different brands in the market from which consumers could choose while doing shopping. The average values of brand consciousness and brand loyalty for both segments can be explained by the fact that most of the brands and stores that are present in the market are not so much involved in building long-term relationships with customers i.e. they do not develop customer loyalty programs, and do not give rewards cards, club cards nor loyalty cards). Recreational shopper is more loyal to brand and store than the economic shopper.

The characteristics of identified two clusters were examined based on the cluster means. The following labels were developed: Segment 1: Economic consumers and Segment 2: Recreational consumers. Economic consumers are very price conscious and tend to shop around for the lowest price (Bellenger and Korgaonkar, 1980). At the same time, those consumers are more interested in functional benefits of the products, oriented towards solving externally generated consumption needs (Park, Jaworski and MacInnis, 1986). Economic consumers are the most interested in quality of the product. They enjoy less shopping than recreational consumers and express below average loyalty to store or a brand. In total, 56% of consumers in the survey were categorized as economic consumers.

Recreational consumers enjoy shopping as a use of their time. In the total, 44% of consumers in the sample were categorized as recreational consumers. When choosing store, this consumer consider the quality of merchandise and variety of merchandise and prefer high quality products. This finding is in line with the study of Bellenger and Korgaonkar (1980). Their standards and expectations for products that buy are very high. This consumer tends to buy something new and is very fashion conscious. Recreational consumers are interested in newest fashion trends, while the economic segment is almost indifferent to fashion changes.

### 3.3. Gender differences in CSI

ANOVA was used to determine gender differences among young-adult consumers in their decisions-making styles. Results are presented in table 5.

**Table 5.**

**Gender differences in CSI, N = 304**

| Decision making styles | Male (N=100) | Female (N=204) | ANOVA p value |
|---|---|---|---|
| 1. Perfectionist, high-quality conscious consumer | 3.92 | 3.86 | 0.40 |
| 2. Brand conscious consumer | 3.03 | 2.81 | 0.03 |
| 3. Novelty, fashion conscious consumer | 3.22 | 3.69 | 0.00 |
| 4. Recreational, hedonistic consumer | 3.22 | 4.12 | 0.00 |
| 5. Price conscious consumer | 2.82 | 2.93 | 0.35 |
| 6. Impulsive consumer | 2.76 | 2.81 | 0.57 |
| 7. Confused by over choice consumer | 2.88 | 2.78 | 0.38 |
| 8. Habitual, brand-loyal consumer | 3.58 | 3.34 | 0.02 |

Our findings indicate that there were significant gender differences ($p<0.05$) on four factors of consumer-decision making styles (brand consciouness, novelty-fashion consciousness, recreational-hedonistic consumer and habitual, brand-loyal consumer). As compared to male consumers, females appeared to be less brand conscious and less brand loyal, but more novelty and fashion conscious and more interested in hedonistic shopping behaviour. However, on the other four factors no significant differences ($p>0.05$) in consumer decision styles between men and women were found. Those factors are: perfectionist consumer, price consciousness, impulsive consumer, and confused by overchoice consumer. Both male and female customers equally pay attention to quality, price, and variety of offered goods and behave in the same way regarding impulsivness in decision-making process. As expected, our study found statistically significant gender differences on four factors, which is in line with other research (Mitchell and Walsh, 2004). Female consumer behavior tends to be similar as indicated in Underhill's study (1999). Our study further indicates that male consumers became similar like female consumers among the young-adult consumers with respect to perfectionism, price consciousness, impulsiveness, and confused by over choice.

### 4. CONCLUSIONS

These papers assessed CSI instrument reliability and construct validity, and examined the potential of the CSI instrument for segmenting the markets in the Republic of Macedonia. Research results indicate that CSI instrument applied in the Republic of Macedonia show acceptable level of reliability, convergent and discriminant validity. Eight-factor model was confirmed, indicating that young adult consumers in the Republic of Macedonia express eight

decision making styles. K-means cluster analysis produced two homogeneous segments of consumers: Economic consumers and Recreational consumers. The analysis of gender differences among young-adult consumers shows that significant gender differences ($p<0.05$) exist on four factors of consumer-decision making styles (brand consciouness, novelty-fashion consciousness, recreational-hedonistic consumer and habitual, brand-loyal consumer). It might be concluded that CSI instrument is applicable, and might be used as a tool for segmenting and profiling the consumers in the Republic of Macedonia.

Several managerial implications follow from the findings of this study. This study shows that in the Republic of Macedonia managers might use CSI instrument for market segmentation purposes. Marketing strategies should be carefully designed and be tailored to the specific needs of identified consumer decision-making styles segments.

This study is limited by several factors that should be addressed in future research. The analysis "took a snapshot" of a sample in the Republic of Macedonia. This research was done on university students who have limited marketplace experience and are still learning their consumer styles. Thus, it may not be possible to generalize the results in this study to whole population in the Republic of Macedonia. To gain a better and more general overview of this research area, future studies may expand the sample to include adult populations in the Republic of Macedonia. As this research included a relatively small sample size, future researchers may also focus their efforts on obtaining a larger number of respondents. Research might further investigate the relationship between CSI and other demographic variables (such as age and income) in the Republic of Macedonia. Despite these limitations, the results of this paper offer useful findings and pose some valuable managerial implications and direction for further research.

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Appendix 1: Items used in research

| | |
|---|---|
| I1 | Getting very good quality is very important to me. |
| I2 | When it comes to purchasing products, I try to get the very best or perfect choice. |
| I3 | In general, i usually try to buy the best overall quality. |
| I4 | I make special effort to choose the very best quality products. |
| I5 | I really don't give my purchases much thought or care. |
| I6 | My standards and expectations for products I buy are very high. |
| I7 | I shop quickly, buying the first product or brand I find that seems good enough. |
| I8 | A product doesn't have to be perfect, or the best, to satisfy me. |
| I9 | The well-known national brands are best for me. |
| I10 | The more expensive brands are usually my choices. |
| I11 | The higher the price of a product, the better its quality. |
| I12 | Nice department and specialty stores offer me the best products. |
| I13 | I prefer buying the best-selling brands. |
| I14 | The most advertised brands are usually very good choices. |
| I15. | I usually have one or more outfits of the very newest style. |
| I16 | I keep my wardrobe up-to-date with the changing fashions. |
| I17 | Fashionable, attractive styling is very important to me. |
| I18 | To get variety, I shop different stores and choose different brands. |
| I19 | It's fun to buy something new and exciting. |
| I20 | Shopping is not a pleasant activity to me. |
| I21 | Going shopping is one of the enjoyable activities of my life. |
| I22 | Shopping the stores wastes my time. |
| I23 | I enjoy shopping just for the fun of it. |
| I24 | I make my shopping trips fast. |
| I25 | I buy as much as possible at sale prices. |
| I26 | The lower price products are usually my choice. |
| I27 | I look carefully to find the best value for the money. |
| I28 | I should plan my shopping more carefully than I do. |
| I29 | I am impulsive when purchasing. |
| I30 | Often I make careless purchases i later wish I had not. |
| I31. | I take the time to shop carefully for best buys. |
| I32. | I carefully watch how much I spend. |
| I33. | There are so many brands to choose from that often I feel confused. |
| I34. | Sometimes it's hard to choose which stores to shop. |
| I35 | The more I learn about products, the harder it seems to choose the best. |
| I36 | All the information I get on different products confuses me. |
| I37 | I have favorite brands I buy over and over. |
| I38 | Once I find a product or brand I like, I stick with it. |
| I39 | I go to the same stores each time I shop. |
| I40 | I change brands I buy regularly. |

## STILOVI ODLUČIVANJA MLADIH POTROŠAČA U REPUBLICI MAKEDONIJI

### SAŽETAK

*Svrha ovog rada je istražiti stilove odlučivanja i testirali CSI ljestvicu koju su razvili Sproles i Kendall (1986) na uzorku mladih potrošača u Republici Makedoniji. Također je izvršena segmentacija ispitanika i utvrđene su razlike među potrošačima s obzirom na njihov stil odlučivanja. Empirijska analiza temelji se na podacima koji su prikupljeni anketnim istraživanjem. Podaci su analizirani izračunom Cronbach alfa koeficijenata, primjenom eksplorativne faktorske analize, k-means klaster analize. Rezultati istraživanja pokazuju da postoji osam različitih, homogenih faktora stilova odlučivanja. Klaster analizom ispitanici su segmentirani u dva homogena segmenta s obzirom na iskazane stilove odlučivanja: ekonomični potrošači i rekreacijski potrošači. Također su potvrđene razlike između spolova na četiri faktora: sklonost marki, sklonost novitetima i modi, sklonost hedonizmu i sklonost kupnji iz navike. Vodeći računa o rezultatima istraživanje menadžeri bi trebali prilagoditi svoje marketinške strategije specifičnostima makedonskog tržišta.*

***Ključne riječi:*** *Stilovi odlučivanja potrošača, CSI instrument, segmentacija tržišta, razlike u spolu, Republika Makedonija*

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# CONSOLIDATED FINANCIAL STATEMENTS – MEANS AND PURPOSE OF PREPARATION: REASONS OF NOT ANNOUNCING OF CONSOLIDATED FINANCIAL STATEMENTS IN BOSNIA AND HERZEGOVINA

## ABSTRACT

*Consolidated financial statements represent systematic preview of financial position and business performance of more legally independent entities that act either as a unique business entity, or as a group. Preparation and presentation of consolidated financial statements is a key factor for forming and expression of opinion about financial condition and business performance of a group of firms. Regardless of value and importance of their announcement, consolidated financial statements in Bosnia and Herzegovina (hereinafter BH) are not presented publicly. The work goal is to review reasons of (no) preparation and (no) announcement of consolidated financial statements from side of entities that act on BH territory. This work analyzed financial reporting problems in BH, and reviewed possible solutions for overrunning of problems in creation, presentation and interpretation of consolidated financial statements in BH.*

**Key words:** consolidated financial statements, group, parent, entity.

## 1. INTRODUCTION

For sake of overrunning of borders of own firm, and with intention of creation of higher value for their owners, firms infrequently enter into different forms of business combination. Firms can invest their assets, for a short-term or a long-term period in other firms, with or without decision-making rights in firms where assets are invested. Long-term investments in other firms, which provide control to the acquirer over acquired, imply obligations of preparation and presentation of consolidated financial statements.

Purpose of preparation and presentation of financial statements is providing information about financial position and performance of the firm, its cash flows and capital changes, as well as other information that are useful to wider scope of users during making business decisions. In purpose of narrowing of differences in financial reporting of legal entities around the World, International Accounting Standards Committee (IASC) conducts a program of accounting regulative harmonization which is related to preparation and presentation of financial statements. In that purpose, IASC from 1975 publishes International Accounting Standard (IAS) and from 2001 International Financial Reporting Standard (IFRS), which have global use from side of business entities, therewith every country independently decides at which level will its law framework support IAS and IFRS.

By Accounting and Auditing Law of BH, published in Official Gazette of BH, No. 42/04, in Article 2 is listed compulsory application of International Financial Reporting Standards, International Accounting Standards, International Auditing Standards, following directions, explanations and guidelines brought by International Accounting Standards Board

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(IASB) and Council of the International Federation of Accountants (IFAC) including codex of professional ethics for professional accountants and auditors on the whole BH territory.

## 2. CONSOLIDATED FINANCIAL STATEMENTS: MEANING AND PURPOSE OF PREPARATION

In accounting theory and praxis we can perceive different divisions of financial statements, certainly the most important among them is division of financial statements on: single, cumulative and consolidated financial statements, performed according to the degree of aggregation of financial positions presented in financial statements. In conditions where more legally independent entities act as a unique business system, or as a group, financial statements of single members of the group are insufficient source of information, required for making business decisions. In conditions "when parent reports only about own business, without taking in consideration potential created by chosen connections established through own active investments, it couldn't provide enough information to shareholders or potential investors… (because) firm's business nature and its potential and also risks connected to it, couldn't be seen from, financial statements prepared in that way" (Stolowy, Lebas, 2002, 524). Therefore, it's justified IAS 27 request regarding to obligations of reporting of acquirer about the value creation potential of the group of entities, or a parent together with its own subsidiaries.

IAS 27 defines consolidated financial statements as "financial statements of a group presented as those of a single economic entity" (IAS 27.4), and at the same time emphasizes that "a group is consisted of a parent and all its subsidiaries" (IAS 27.4)[1]. Hence, for consolidated financial statements we can say that they are financial statements of a parent which has under control one or more subsidiaries.

According to IAS 27 „control exists when parent posses, directly or indirectly over subsidiaries, more than a half of voting power of an entity, except if, in certain conditions, it can be clearly demonstrated that such property doesn't represent control" (IAS 27.13)[2]. IAS 27 prescribes that for evaluation and determination of an entity control degree over another entity should be taken into consideration:

a) Real voting power, and
b) Potential voting power.

Since real and potential voting rights are criterions for determining of parent control degree over subsidiary, they are also criterions for determining of obligation of preparation and presentation of consolidated financial statements for a parent. Namely, if an entity posses 45% of actual voting rights in another entity, and has option to buy additional 10% of voting power of the same entity, it means that observed entity has 55% of voting power (45% of actual voting power + 10% of potential voting power), and according to IAS 27 obligation of consolidation of financial statements. On the other hand, in order to avoid confusion, potential share capital shouldn't be taken in considerations during determining a portion of profit of subsidiary which should be allocated to the parent. "It means that potential

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[1] Unlike understanding of a group in narrow sense of words as it does IAS 27 in accounting theory and praxis can be noted group understanding in wider sense of words including associated entities and entities that are under common board of the parent and (an)other entity(s).

[2] Control also exists when a parent posses a half or less of voting power of an entity, but has: (a) Power over more than a half of voting rights in accordance with agreement with other investors; (b) Power of managing of financial and business policies of an entity according to the statute or agreement; (c) Power of naming or deposing of majority of the supervisory board members or relevant controlling body; or (d) Power of directing of majority of votes on supervisory board meetings or relevant controlling body. (IAS 27.13)

ownership may force on consolidated financial reporting, but allocating of profit or losses should be based on actual, not on potential percentage of property" (Epstein, Jermakovicz, 2008., 430).

In consolidated financial statement a parent which, directly or indirectly gains control over one or more related entities, recognizable assets and liabilities, realized revenues and expenditures, legally independent, but economically bonded entities, presents as single reporting information. Information prepared and presented in this way in a consolidated financial statement are key factors for forming and expressing of opinion about financial position and performance of group business, because only consolidated financial statement provides to its users:

a) Comparative review (for two consecutive periods) of information about:

    i) by means and sources of resources that are available to the group management for achieving satisfying business performance;

    ii) achieved financial result of the group;

    iii) competency of the group to create money, and

b) Review of used accounting policies during preparation and presentation of a consolidated financial statement with explanation of business activities that led to presented financial conditions and results of group business.

Prepared in a proper way and consecutively presented, consolidated financial statements represent instrumental foundation for successful management over a group, or successful procurement and use of financial assets, implementation of optimal assets structure and source of assets, providing of optimal business liquidity, maintaining permanent solvency, adequate risk protection as well as satisfaction other requirements that are set in front of the group management. However, it is important to mention that consolidated financial statements of a group as an economic unity, doesn't exclude but supplements single financial statements of members. "So those two sources provide information which is reliable foundation for decision" (June 2008, www.ekof.bg.ac.yu).

Thus, for example, for creation a plan of group needs, for additional financing sources are used information about financial structure taken from consolidated financial statements with an annex with information from single financial statements. Reason for using of information from single financial statements is that single entities are shown as funds questers in the market and by that their single financial statements are the base of evaluation of their financial stability, and evaluation of liquidity and solvency. Information about business performance taken from consolidate financial statements are the base for evaluation of efficacy of using of available resources, and for creation of a plan for engagement of additional resources from observed group. But, the subject of taxation is a financial result expressed in a single income statement, for what state bodies show interests primarily for insight in single financial statements of entities members of the group, although in BH[3] tax regulations provide possibility of group taxation[4], when state bodies are provided with tax balance sheet together with a single income statement, and also provided with a consolidated income statement and consolidated tax balance sheet.

In conditions of growing technological progress, better communications and more intensive international cooperation, using of financial statements and consolidated financial statements among them, as a main source of information for business decision requirements become more frequent. Investors and creditors in the World market believe only to financial

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[3] Law on profit tax in Federation of BH (hereinafter: FBH), Official Gazette No.97/07, and Law on profit tax in Republic of Srpska (hereinafter: RS), Official Gazette No.91/06.

[4] Parent and its subsidiaries create a group of entities in sense of this Law, unless if there is direct or indirect control over at least 90% of share(Law on profit tax in FBH, Article 42, paragraph 1), or 80% of share (Law on profit tax in RS, Article 41, paragraph 2)

statements which are established on objective and internationally harmonized accounting regulations. Criterions that provide reliability, comparability and expediency of financial statements at the international level are actually IFRS.

## 3. EXPERIENCES IN PREPARATION AND PRESENTATION OF FINANCIAL STATEMENTS IN BH

Inadequate theoretical studying of IFRS in BH, and not complying with its provisions in praxis represents primary and initial problem of financial reporting quality in BiH. If we join to this problem inadequate and incomplete legal solution for area of financial reporting, i.e. poor forms for reporting which are unadapted to requirements of IFRS, then a conclusion is clear and unambiguous: condition like this implicate negative consequences on overall BH economy, since brought business decisions are based on incomplete, inadequately prepared and on inconsistent way announced financial statements. On the other hand, inadequate education of users of financial statements, in connections of purpose and usage of financial statements for business decision requirements, is reflected negatively on quality of conclusions obtained by their interpretation. Besides of that, inadequate understanding and studying of business combination accounting area as one of the most demanding areas of accounting from accountants significantly complicate, even prevents preparation and presentation of consolidated financial statements in accordance with IAS 27 provisions.

An entity which has one or more subsidiaries, in accordance with IAS 27 provisions, is obliged to prepare consolidated financial statements, except in a case when conditions from Article 10 of IAS 27[5] are cumulatively fulfilled. Nevertheless, either Law on accounting and auditing of FBH from 2005[6] or Decision about the procedure of submission and processing of accounting statements about business performance of entities in BH (Official Gazette FBH, No.74/04)[7] didn't regulate obligation of presenting of consolidated financial statements to an official institution.

Therefore, investigation in praxis shows that numerous parents prepare consolidated financial statements, fulfilling their obligation in accordance with IAS 27, but they keep them in drawers or shelves of their desks and cupboards, because they don't have specified either obligations or term of their presenting to an official institution. These parents present prepared consolidated financial statements for insight to interested persons, by own assessment and from case to case. Some parents prepare consolidated financial statements, and present them to Agency for Financial, Informatics and Intermediary Businesses by inertia together with semiannual financial statements by July, 31st of the current year, as well as to interested persons, according to their policy of annunciation of financial information. However, parents which don't prepare consolidated financial statements at all are not so rare, because they don't have obligation of their presentation to an official institution, so they can not present them for insight to other potentially interested persons. Numerous economic

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[5] Parent doesn't have to prepare consolidated financial statements if provided: (a)parent itself is a subsidiary which is completely or partially owned by another entity, and its other owners including those who usually don't have voting rights were informed and they don't have objections for non preparation of consolidated financial statements; (b)not to trade in public market with debtors and owners instruments of the parent (local or foreign stock exchange or buying and selling of shares in the market outside of stock exchange, including local and regional markets); (c)that either parent didn't submit, or isn't in a process of submitting its financial statements to the commission for securities or other regulatory body in order to issue new types of instruments in a public market; and (d)that final or any intermediate parent in a chain prepares consolidated financial statements that will be available for public use and they are in accordance with International standards of financial stating.(IAS27.10)

[6] Mentioned law regulates process of financial reporting for a period from January, 01st 2006 to December, 31st 2009.

[7] The same situation about financial reporting is noted also in the second BH entity – Republic of Srpska.

entities consider obligation of preparation and presentation of financial statements as ballast, not as necessity from which significant benefits have different users of financial statements, so they use unregulated terms for presenting of consolidated financial statements as an argument for avoiding of their preparation and presentation in public.

The World Bank investigations also showed problems in preparation, presentation and interpretation of statements generally, and at the same time in consolidated financial statements. "During ROSC A&A project[8], The World Bank has reviewed financial statements of company samples and identified areas where financial statements were not prepared in accordance with IFRS – missing of notes, non existence of cash flows and auditing statements, non existence consolidated or segmented reporting, as well as non announced transactions with connected parties…In order to fulfill tax authorities requests in connection with incomes and expenditures, those who prepare financial statements of general purpose and consolidated financial statements for small and intermediate private firms and firms that have public responsibility, usually deviate from financial reporting standards and follow tax rules… Financial statements are not announced in public. In praxis, it is very hard to get financial statements, which is not in accordance with requests of the First EU directive in area of Law on companies" (May 2009, www. siteresources.worldbank.org).

For the purpose of conduction of empirical investigation of this work, some financial statements of FBH entities are taken from Agency for Financial, Informatics and Intermediary Businesses in FBH (hereinafter: Agency) in April 2009 for a period which ends on December, 31st 2008. After reviewing of taken financial statements, it is observed that 20.560 entities from FBH territory presented financial statements for 2008 to authorized office. From that number, in 370 financial statements (1.80%) is observed financial value on account 051 – shares in subsidiaries and other connected entities. Analyzing legal form of organizing of these entities, it is observed that 52 entities organized in a form of joint stock company, while 318 entities are registered in a form of a limited company. Since, generally, in front of joint stock companies are set bigger demands concerning transparent financial reporting related to other legal forms of society, financial statements of 52 joint stock companies were subject of further analysis and their layout in cantons in F BiH and total value of investment on account 051 is shown in table 1.

**Table 1.**
**Financial statements of joint stock companies with 051 position in cantons**

| *Canton* | *Entities* | | *Account 051 value in BAM* | |
|---|---|---|---|---|
| | *Number* | *Percent* | *Value* | *Percent* |
| Canton Srednjo-bosanski 030 | 3 | 5.77 | 2.300.469 | 1.0385 |
| Canton Zeničko dobojski 032 | 4 | 7.69 | 10.547.095 | 4.7614 |
| Canton Sarajevo 033 | 28 | 53.85 | 151.085.789 | 68.2070 |
| Canton Hercegovačko-bosanski 034 | 1 | 1.92 | 742.423 | 0.3352 |
| Canton Tuzlanski 035 | 4 | 7.69 | 51.048.940 | 23.0458 |
| Canton Hercegovačko-neretvanski 036 | 5 | 9.62 | 5.425.763 | 2.4494 |
| Canton Unsko-sanski 037 | 4 | 7.69 | 316.752 | 0.1430 |
| Canton Zapadno-hercegovački 039 | 3 | 5.77 | 43.533 | 0.0197 |
| *Total* | *52* | *100.00* | *221.510.764* | *100.0000* |

Analyzing representation of financial position 051 in financial statements of joint stock companies in cantons reveal us that the majority of joint stock companies, which presented position 051 in their financial statements, are registered in Canton Sarajevo

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[8] Report on the Observance of Standards and Codes Accounting and Auditing

(53.85%) and related to value mentioned companies include even 68.21% of total financial value presented on account 051. Schedule review of these 28 entities according to values that they have presented on account 051 is shown in Table 2.

**Table 2.**

**Review of joint stock companies from Sarajevo Canton
according to values of account 051**

| *Range of values in BAM shown on account 051* | *Entities* | |
|---|---|---|
| | *Number* | *Percent* |
| 1 -100.000 | 6 | 21.43 |
| 100.001 - 1.000.000 | 2 | 7.14 |
| 1.000.001 -2.000.000 | 3 | 10.71 |
| 2.000.001 -5.000.000 | 10 | 35.72 |
| 5.000.001 - 10.000.000 | 4 | 14.29 |
| 10.000.001 -20.000.000 | 2 | 7.14 |
| 20.000.001-50.000.000 | 1 | 3.57 |
| *Total* | *28* | *100.00* |

From observed 28 joint stock companies from Sarajevo Canton which in their financial statements present position 051, 17 entities or 60.71% enter value on account 051 higher than 2 mil. BAM, which represents significant value for consolidation, so for work requirements right these entities represented target group of examinees and questionnaires were sent to them with intention of familiarization with praxes in these entities concerning preparation, presentation and usage of consolidated financial statements during making business decisions. Within a term estimated for returning of filled questionnaire to the researcher, 2 entities replied by phone that they don't have subsidiaries, and hereby they don't have obligation of preparation and presentation of consolidated financial statements, and on account 051 they record other categories of investment. From 15 remaining questionnaires, 9 filled questionnaires were sent to the researcher by the specified date. Presuming that 15 remaining joint stock companies from target group of examinees, really record on account 051 investments in subsidiaries and they are subject to obligations of IAS 27 application concerning preparation and presentation of consolidated financial statements, and taking in consideration number of returned filled questionnaires (9), percentage of participation of entities in researching of 60% can be considered as statistically relevant.

Analyzing received answered questions in connection with preparation of consolidated financial statements it is noticed that all surveyed persons answered affirmatively. Concerning issue of public presentation of consolidated financial statements, 8 entities (89%) replied that they present in public their consolidated financial statements, while 1 entity (11%) doesn't do that. Although, inspecting received replies (table 3) on question: to which organization they submit consolidated financial statements for inspection, it is doubtful quality of transparency and actual availability to public stated financial statements, from entities which declared that present their consolidated financial statements in public.

In purpose of establishing and improvement of reporting standards, Commission for securities of BH Federation (hereinafter: Commission) accepted Regulation about the content, terms and method of statements announcement of securities emittents (Official Gazette of FBH, No.32/07), which defines obliged persons[9] for submitting of statements to

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[9] "As an emittent in a sense of this Regulation, is considered a joint stock company recorded in a register of emittents at Commission, which emitted by public invitation, securities which have been placed on stock exchange trading or other regulated public market, bank and other financial institution, and company for insurance and reinsurance which have been recorded in emittent register at Commission" (Regulation, Article 2)

Commission, type, form and content of financial statement, and terms in which statements[10] should be presented and submitted to Commission. However, in praxis emittents of securities don't follow these requirements either consistently or in entirety.

**Table 3.**

**Examinees' answers summary**

| Number of entities | | Name of organization/institution/body whom an entity submit consolidated financial statements |
|---|---|---|
| 2 | | Agency |
| 1 | | Agency, Commission for securities of FBH, Departmental ministry of energetic, Agency for privatization of FBH |
| 1 | Σ 8 | Agency, shareholders assembly, business bank |
| 1 | | Company's supervisory board, Company assembly |
| 1 | | Company's supervisory board, business bank |
| 1 | | Daily press, business bank |
| 1 | **Σ 8** | Company didn't write to whom presents statements |

Based on examinees' answers to question of public presentation of consolidated financial statements (table 3) we can note that only 1 of 9 surveyed joint stock companies (11%) submit their consolidated financial statements to Commission. However, after insight in Commission's web page[11] content it's observed that only one business entity from FBH, from area of Canton Zenicko-dobojski (and not surveyed entity from Canton Sarajevo area), submitted consolidated financial statements to Commission[12]. In the RS, on the web page of Commission for securities of RS can't be found either single or consolidated financial statements of entities. Therefore in future, Commission for securities should improve its engagement in connection with control of fulfilling of requirements in connection with financial reporting of securities emitters.

## 4. POSSIBLE IMPROVEMENTS IN PREPARATION AND PRESENTATION OF CONSOLIDATED FINANCIAL STATEMENTS IN BH

Having in mind the fact that BH economy development, as well as in other transition countries, will lead in accordance with the principle of an open market economy to numerous business combinations of an entity, or forming of group of entities, more complete and higher quality studying of accounting business combinations and themes of consolidated financial statements gets higher meaning and significance. Consolidated financial statements would be prepared more frequently and there will be more of their users.

Since, targets of different users of consolidated financial statements are usually different, and sometimes in conflict, and at the same time parent's management

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[10] Securities emittents are obliged, in accordance with stated Regulation, to prepare followed statements: (a) semiannual business statement, within 30 days upon completion of a six month period; (b) annual business statement with auditor's opinion within 60 days upon completion of the year, and (c) statement about events that significantly affect on emittent business within 8 days from the day of the event, and delivering of them to Commission, stock exchange or another arranged market where emittent securities were included in a purpose of transparency improvement, publishing them on Commission's web page.

[11] February 15th, 2010, www.kvpfbih.org

[12] At the same time this entity sporadically submits consolidated financial statements to Commission – submitted consolidated financial statements for 2001 and 2004.

weighing benefits and publishing costs of every additional financial information, it is necessary to establish a structure of consolidated financial statements through legal solutions which reflects the best relation between different and conflicting targets from one side and on the other side their limitations in fulfilling and costs related to them. Forms for preparation of consolidated financial statements should be in accordance with IFRS requirements, and legislatorial bodies should impose to parent's transparent presentation of consolidated financial statements in order to help bringing of higher quality business decisions of other business actors. In that sense, it is necessary to specify an institution for submitting of consolidated financial statements through legal solutions as well as the term for their submitting. Emphasizing of transparency and reliability is based on their users' needs to understand used accounting policies since they affect their business decisions.

New Law on accounting and auditing in FBH[13] which will be on power from January 1st, 2010, has set foundations for more detailed and more complete arranging of accounting and auditing area in general, and particularly preparation and presentation of financial statements. According to this Law application of IFRS is compulsory for all entities seated in FBH[14] and in that way is extended obligation of IFRS application in FBH in relation with Regulation EU 1606/2002[15]. The same Law defines concept of consolidated financial statements, determines degree of frequency, their preparation, appoints institution for their submitting and specifies term for their submitting to the appointed institution for conduction of a single register of financial statements. The said regulations of the new Law will surely contribute rising of quality of preparation and presentation of consolidated financial statements in FBH, but it's under the question will small and intermediate firms be able to implement huge set of IFRS or they'll continue only to try to satisfy tax regulations?

Unfortunately, Law on accounting and auditing of FBH and Law on accounting of RS[16] are not coherent in many areas, and it is particularly interesting for requirements of this work, they do not define group[17] in the same manner and hereby consolidated financial statements, which significantly ruins comparability of prepared and presented consolidated financial statements in two BH entities. Besides of that there were provided different terms for submitting of consolidated financial statements, as well as certain exemptions from obligation of preparation and presentation of consolidated financial statements for entities from RS territory.

In forthcoming time, legal framework within BH should be harmonized and completed with regulations, decisions and solutions which would contribute to rising of quality level of financial reporting in BH. As support of what is said herein witnesses a general message of The World bank: "Legal framework in BH should be reviewed again and gradually harmonized with relevant parts of acquis communautaire. Regulation from accounting and auditing area shouldn't be revised separately, but in context of full scale inspection of legal framework which is related to financial reporting. It requires changing of relevant laws and other regulations (from area of firms, banks and insurance, securities' market, etc.) in order

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[13] Official Gazette of FBH No.83/09.

[14] Regulations of this law are relevant to entities and other forms of organizing, which an entity with residence in FBH has been established abroad, if according to regulations of these countries there are not determined obligation of maintaining of accounts and preparation of financial statements, as well as for entities and entity plants with residence out of FBH, if these entities and plants are taken as corporation tax payers in FBH (Article 3, Paragraphs 2 and 3)

[15] In EU member countries application of IFRS is mandatory only during preparation of consolidated financial statements whose securities are quoted on stock exchange or they are prepared for quoting, while freedom of own selection is left to other entities.

[16] Official Gazette of RS No.86/09, issued on April 08th, 2009, and in power from January 1st, 2010.

[17] Law on accounting and auditing in FBH, observes a group in narrower sense of words, while Law on accounting and auditing in RS defines a group in wider sense of words.

to establish a solid legislatorial and regulatory framework, as well as the base for institutional application of these increased requests". (May 2009, www.siteresources.worldbank.org)

## 7. CONSLUSION

Financial statements of single entities represent for longer period of time a foundation of business decision-making. They are key instrument for managers during conduction of planning activities, control and managing. Since importance of financial statements of single entities during making business decisions is undisputed, expedience of consolidated financial statements for the purpose of group managing should be also incontestable. There are more reasons for not paying of attention to consolidated financial statements in a process of business managing of a group: from preferring of importance of legal independence of group members in relations with their economic no independence, over criticizing of superannuation and excessive generality of financial information presented in consolidated financial statements, to somewhat difficult comparability between consolidated financial statements. However, the first and the biggest reason of poor utilization of consolidated financial statements in business decision making process in FBH is absence of their public presentation. It's unreal to expect paying more attention to consolidated financial statements in conditions when users can not access them in an easy and fast way.

At the end, let's highlight once more that economic subject in a group form according to regulations of IAS 27 is not a simple sum of single legally independent group members, therefore neither status nor success of the group cannot be determined by simple addition of values from single financial statements of group members. Besides of that, a group as an economic body has own board which is concerned and therefore it should be informed about its capability of group managing and achieved results. Since financial position and success of group business as an economic body can be reviewed only through consolidated financial statement, its preparation and public presentation should be mandatory for all parents.

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# KONSOLIDIRANI FINANCIJSKI IZVJEŠTAJI – SMISAO I SVRHA SASTAVLJANJA: RAZLOZI NEOBJAVLJIVANJA KONSOLIDIRANIH FINANCIJSKIH IZVJEŠTAJA U BOSNI I HERCEGOVINI

### *SAŽETAK*

*Konsolidirani financijski izvještaji predstavljaju sistematski pregled financijskog položaja i uspješnosti poslovanja više pravno samostalnih subjekata koji djeluju kao jedinstven poslovni subjekt, odnosno kao grupa. Izrada i prezentacija konsolidiranih financijskih izvještaja od ključne je važnosti za formiranje i izražavanje mišljenja o financijskom stanju i uspjehu poslovanja grupe poduzeća. Bez obzira na vrijednost i važnost objavljivanja istih, konsolidirani financijski izvještaji u BiH se javno ne prezentiraju. Cilj rada je sagledati razloge (ne)sastavljanja i (ne)objavljivanja konsolidiranih financijskih izvještaja od strane gospodarskih subjekata koji djeluju na području BiH. U radu se analiziraju problemi financijskog izvještavanja u BiH, te predlažu moguća rješenja za prevladavanje problema u izradi, prezentaciji i interpretaciji konsolidiranih financijskih izvještaja u BiH.*

*Ključne riječi: konsolidirani financijski izvještaji, grupa, matično društvo, zavisno društvo.*