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Content

From the Editor

The papers that we publish in Volume 12, Issue 1, cover both of the fields that are the focus of this journal – economics and business – and are mainly focused on the SEE region. It is worth mentioning that the last three papers are reports from the ICES2016 conference, traditionally organized and hosted by the School of Economics and Business, University of Sarajevo.

The first paper by Nyasha and Odhiambo, titled "Bank versus stock market development in Brazil: an ARDL bounds testing approach," investigates simultaneously the impact of bank-based and market-based financial developments on the growth of the Brazilian economy. The period in focus is 1980-2012, thus covering the structural brake that occurred over the last global economic downturn. The authors report a positive relationship between market-based financial development and economic growth in the long run, while the short-run positive effect is not identified. Contrary, there is no positive effect from bank-based financial development on economic growth. The paper concludes that it is the stock, rather than bank-based financial market development, that is important for the long-run trajectory growth of Brazilian economy.

In their paper "Critical mass in the boardroom of Croatian banks," Pavic-Kramaric and Miletic analyze the influence of gender diversity in the boardroom of Croatian banks and its effect on the banks' performance. Using critical mass theory as a conceptual underpinning for their research, the authors estimate static panel models for the period 2002-2014 and report a gendered finding. The main implication is that when a critical mass of 20%-40% of women on the management board is reached, bank performance improves. The policy implication is quite strong, emphasizing that gender discrimination towards women in the boardrooms of Croatian banks might lead to the lower economic performance of these banks, and the banking sector overall.

"Social transfers and income inequality in Bulgaria" by Mihaylova and Bratoeva-Manoleva focuses on the distributional effects of social transfers in Bulgaria in the period 2000-2014. The author finds that in general social transfers help in reducing inequality, but this effect is different when different types of transfers are analyed. As its policy implication, the paper concludes that government should not use social transfers as an isolated remedy for reducing inequality, but this should be accompanied by active labour market policies.

Hsing investigates the question "Is real depreciation or more government deficit expansionary? The case of Slovenia". The research is based on an empirical macroeconomic model that examines how real GDP is affected by the real exchange rate and fiscal policy, including additional macroeconomic influences. The main finding and policy implication is that the real depreciation of the Euro should help Slovenia's macroeconomic output to grow, while expansionary fiscal policy would not be effective in stimulating the Slovenian economy.

Williams and Yang are authors of the paper "Evaluating the use of personal networks to circumvent formal processes: A case study of vruzki in Bulgaria". This empirical paper contributes to the advancement of knowledge on informal institutions in Bulgaria by investigating the distribution of the use of personal connections (vruzki) to circumvent formal procedures by soliciting favors for and from others. In a survey conducted in 2015, some 30% of respondents had relied on vruzki, while this probability is higher for respondents whose norms, values and beliefs are not in symmetry with formal laws and regulations, perceiving the penalties and risk of detection as higher, and those who are unemployed, younger, higher income groups and living in larger households. The paper ends with theoretical and policy implications.

"The unemployed workers' perceptions of stress and employment prospects in Macedonia: the role of alternative adjustment mechanisms" is written by Nikoloski and Pechijareski. The authors use survey data among unemployed workers in Macedonia to investigate the psychological implications of unemployment, with a focus on stress and employment prospects. Because this is a country where unemployment has remained a key macroeconomic problem over the last twenty years of transition, the research angle in this paper provides useful policy implications.

Bilas, Bosnjak and Novak bring us a paper focused on "Explaining the relationship between financial development and international trade in Croatia". The paper relies on time-series (ARDL) quarterly data over the period of 1997-2015. The research results indicate that the link between financial development and international trade is different if investigated over different time horizons. There is a positive relationship between financial developments and international trade in Croatia, but a negative long-run relationship.

Balas Rant and Korenjak Cerne publish an interesting report titled "Becoming a hidden champion: from selective use of costumer intimacy and product leadership to business attractiveness". The authors focus their research on SME sector of Central and Eastern Europe and investigate determinants of hidden champion type of companies. The business attractiveness of hidden champions seems to be primarily affected by product leadership and customer intimacy, including combination of factors that are nicely elaborated in the paper.

"A nutritional analysis of the food basked in BiH: A linear programming approach" is written by Arnaut-Berilo, Delalic and Huseinbasic. The authors rely on linear and goal programming optimization models for analyzing the food basket in Bosnia and Herzegovina (BiH). The focus of the research is on nutritional needs and the authors report information about the minimal value and the structure of the food basket for an average person in BiH based on nutrient needs. As such, the paper provides policy implications with a link to poverty analysis.

Babic-Hodovic, Arslanagic-Kalajdzic and Imsirpasic offer their "Percieved quality and corporate image in mobile services: the role of technical and functional quality," which relies on the Gronroos service quality model and survey data among customers of the telecommunication operators in BiH. The paper finds that corporate image mediates the effects of both quality and technical dimensions.

"Portfolio diversification in the South-East European equity markets" by Zaimovic, Arnaut-Berilo and Mustafic investigates how SEE equity markets are integrated in the region by looking at the relationships between the returns of companies traded in these markets. The paper is empirical in its nature, while the findings have practical implications. The authors report that national capital markets are quite inefficient, while the SEE market efficiency frontier performs much better than national markets. Hence the main implication is that more integration should bring benefits.

We hope that the available portfolio of papers will reach its audience and provide useful inputs to current knowledge, as well as motivation for future research.

On behalf of Editorial Board
Adnan Efendic

University of Sarajevo
School of Economics and Business

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BANK VERSUS STOCK MARKET DEVELOPMENT IN BRAZIL: AN ARDL BOUNDS TESTING APPROACH

Sheilla Nyasha, Nicholas M. Odhiambo

Abstract

This paper examines the impact of both bank-based and market-based financial development on economic growth in Brazil during the period from 1980 to 2012. To incorporate all of the aspects of financial development into the regression analysis, the study employs a method of means-removed average to construct both bank-based and market-based financial development indices. Based on the ARDL approach, the empirical results show that there is a positive relationship between market-based financial development and economic growth in Brazil in the long run, but not in the short run. The results also show that bank-based financial development in Brazil does not have a positive effect on economic growth. This applies irrespective of whether the regression analysis is conducted in the short run, or in the long run. The study, therefore, concludes that it is the stock market, rather than banking sector development, that drives long-run economic growth in Brazil.
Keywords: Brazil, Bank-Based Financial Development, Market-Based Financial Development, Economic Growth

JEL classification: *G10, G20, O16*

1. INTRODUCTION

The relationship between banking sector development, stock market development and economic growth has generated a considerable amount of debate in recent years. This debate still rages on to this date – but with little consensus. A growing body of work reveals the close relationship between financial development and economic growth (Gelb 1989, Roubini and Sala-i-Martin 1992, King and Levine 1993a, 1993b). However, alternative views exist. Early works lending support to the positive relationship between financial development and economic growth include those of Schumpeter (1911), Goldsmith (1969), McKinnon (1973), Shaw (1973), King and Levine (1993a) and Odedokun (1996), among others. Studies that support a negative relationship include Van Wijnbergen (1983) and Buffie (1984); while studies by Robinson (1952), Lucas (1988) and Stern (1989), among others, either found no association, or a negligible relationship, between financial development and economic growth.

Previous studies on this subject, however, suffer from four major limitations. First, the majority of the

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previous studies relied mainly on bank-based proxies of financial development, giving market-based proxies little attention. Where latter studies have been undertaken, the empirical findings have been inconclusive (Levine and Zervos 1996, Akinlo and Akinlo 2009, Ujunwa and Salami 2010); evidence suggests that the outcome is proxy-dependent and country-dependent.

Second, the majority of the previous studies have mainly used either the residual-based co-integration test associated with Engle and Granger (1987), or the maximum-likelihood test (Johansen 1988, Johansen and Juselius 1990). Yet it is now well known that these co-integration techniques may not be appropriate when the sample size is too small (see Odhiambo 2009). Third, some of the previous studies over-relied on cross-sectional data, which may not have satisfactorily addressed country-specific issues (Ghirmay 2004, Casselli *et al.* 1996). Fourth, the bulk of the previous studies have mainly been based on the causal relationship between financial development and economic growth. Very few studies have examined in detail the relative impact of both bank-based and market-based financial development on economic growth.

It is against this backdrop that the current study attempts to examine the relative effect of bank-based and market-based financial development on economic growth in Brazil, using the newly developed autoregressive distributed lag (ARDL) bounds testing approach. In order to incorporate the various proxies of bank-based and market-based financial development in the empirical analysis, the current study employs a method of means-removed average to construct both bank-based and market-based financial development indices.

The rest of this paper is organised as follows: Section 2 gives an overview of the financial sector reforms and development in Brazil. Section 3 highlights the theoretical and empirical linkages between bank-based and market-based financial development and economic growth. Section 4 presents the empirical model specification, the estimation technique, and the empirical analysis of the regression results. Section 5 concludes the study.

2. FINANCIAL SECTOR REFORMS IN BRAZIL

While the Brazilian financial system is diverse, complex and characterised by a high degree of conglomeration, concentration, and public sector presence, its banking system is less globally integrated compared to its peer countries, while the opposite is true for its equity markets (International Monetary Fund 2013). Today, Brazil has several stock exchanges, which have gradually emerged over the years, and which have also gradually acquired one another and/or merged over the years to form one stock exchange: the BM&FBovespa, which is one of the world's largest stock exchanges.

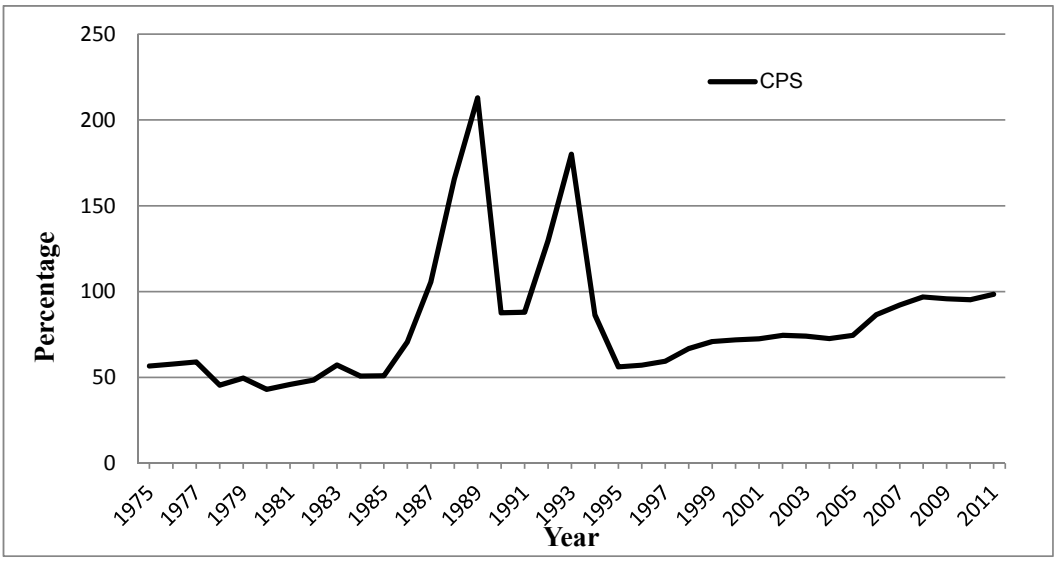
Over the years, the Brazilian financial sector, both the banking sector and the stock market, has been exposed to a number of reforms. The late 1980s marked the commencement of banking sector reform in Brazil. The reforms were wide-ranging in scope, and included programmes for: creating specialised financial institutions; restructuring private sector and state-controlled banks; and the decision to allow foreign banks entry into the national financial system (Carneiro *et al.* 1993). On the stock market side, amongst the reforms was the restructuring of the financial market, which came with the enactment of new laws and the revision of existing laws governing the stock market (Ministry of Finance, Brazil 2012). Thus the stock market reforms in Brazil have addressed the legal, regulatory, judiciary and supervisory aspects of the business, as well as general modernisation of the trading environment.

The rigorous reforms over time have given rise to an improved financial system in Brazil. In the banking sector, banking sector reforms undertaken in Brazil since the late 1980s saw the beginning of the evolution of the Brazilian bank-based financial system, leading to changes in how banks operate, and a subsequent increase in the number of banks. The growth of the Brazilian banking system is also evidenced by growth in private sector credit; low levels of non-performing loans; and an improvement in legal rights (World Bank 2012). Figure 1 illustrates the trends in banking sector growth, as shown by credit extension to the private sector (CPS) in Brazil during the period 1975-2013.

In the stock market, these reforms gave rise to an increased number of listed companies – from 394 listed companies at Bovespa in 2006 to 594 in 2012 (BM&F Bovespa 2012); and a modest increase in stock market capitalisation, total value traded and turnover ratio (World Bank 2012). Figure 2 tracks the performance and growth of the Brazilian Stock Market during the period 1988-2012.

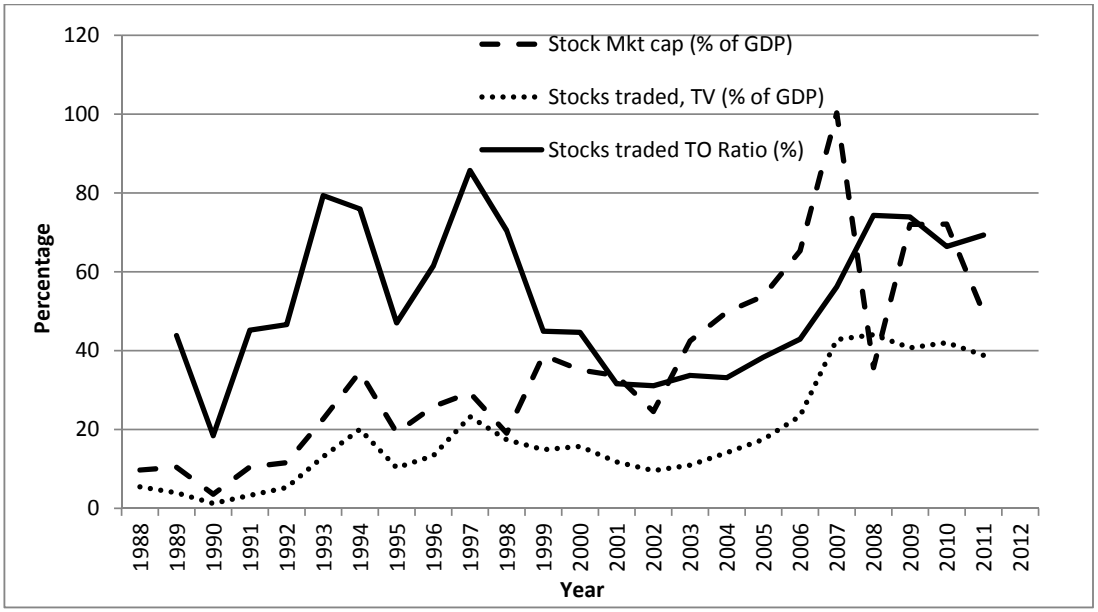
Despite this growth, the country's financial system still faces some challenges. These include coping with constraints on budget and human resources; ensuring adequate legal protection; a rise in non-performing loans; cuts in lending rates; still-prevalent short-term indexation; still-low liquidity in the secondary market; and managing the role of Brazil's National Development Bank (BNDES) (Park 2012).

Figure 1: Trends in Banking Sector Growth and Economic Growth in Brazil (1975-2012)



Source: World Bank (2014)

Figure 2: Trends in Stock Market Capitalisation, Total Value of Stocks Traded and Turnover Ratio of Stocks Traded in Brazil (1988-2012)



Source: World Bank (2014)

3. *BANK-BASED FINANCIAL DEVELOPMENT, MARKET-BASED FINANCIAL DEVELOPMENT AND ECONOMIC GROWTH: A REVIEW OF LITERATURE*

Generally, a financial system is made up of a bank-based component and a market-based component. According to Demirguc-Kunt and Levine (2001), if an economy is driven by financial intermediaries more than it is driven by financial markets, that economy's financial system is generally referred to as "a bank-based financial system". However, if securities markets share centre stage with banks in driving economic growth via savings mobilisation and allocation, exerting corporate control, and easing risk management, the financial system is generally referred to as "a market-based financial system". It is still believed, by most, that a bank-based financial system is better than a market-based system. In particular, Hoshi *et al.* (1990) argued that economic growth could be encouraged

more in the bank-based system; since it can induce longer-term investment in the real sector, whereas investment in the market-based system is too sensitive to stock market prices with short-term investment.

The bank-based system can encourage productive investment, as it is less affected by unstable financial markets (Hoshi *et al.*, 1990). Moreover, it is argued that expensive government policies can be carried out more easily in the bank-based system, because it provides governments with more measures to intervene in the financial sector than the market-based system (Pollin 1995). Proponents of the bank-based systems add that, without powerful banks to enforce repayment, external investors would be reluctant to finance industrial expansion in countries with underdeveloped institutions. Thus, if banks are not hampered by regulatory restrictions on their activities, they can exploit economies of scale in information processing, moral hazard amelioration through effective monitoring, and in the formation of long-run relationships with firms to ease asymmetric information distortions, thereby boosting economic growth.

However, the bank-based financial system is not without its own disadvantages. According to Allen and Gale (1999), banks may not be effective gatherers and processors of information, in new, uncertain situations involving innovative products and processes (Allen and Gale 1999). This has prompted some to lend support to a market-based financial system, arguing that markets provide a richer set of risk-management tools that permit greater customisation of risk-ameliorating instruments. According to Levine (2004), as economies mature and need a richer set of risk-management tools and vehicles for raising capital, they may concomitantly benefit from a legal and regulatory environment that supports the evolution of market-based activities – otherwise, overall growth may be retarded (Levine 2004).

The relationship between financial development and economic growth has received widespread attention in the empirical growth literature. Although it is now well recognised that bank-based financial development is positively associated with economic growth, inconsistencies in this conclusion still exist. While some studies attest to the existence of a positive relationship between bank-based financial development and economic growth (see Odedokun 1996, Ahmed and Ansari 1998, Christopoulos and Tsionas 2004, Nazmi 2005, Güryay *et al.* 2007, Kar, Peker, and Kaplan 2008, Kargbo and Adamu 2009, Yonezawa Azeez 2010, Awojobi 2013, Gambacorta *et al.* 2014, Oludele, Akinboade, and Chanceline 2015); other studies, although few, conclude that there is a negative relationship between bank-based financial development and economic growth (see De Gregorio and Guidotti 1995, Bolbol *et al.* 2005).

Regarding market-based financial development, just as with bank-based financial development and economic growth, some authors have shown a positive link between market-based financial development and economic growth (see, among others, Fama 1990), while others have argued that even large stock markets are unimportant sources of corporate finance (Mayer 1988). Although some economists have generally emphasised the central role of financial markets in economic growth, the empirical evidence on the relationship between market-based financial development and economic growth is apparently both scant and inconclusive. Some of the studies that have examined the relationship between stock market development and economic growth include those by Levine and Zervos (1996), Caporale *et al.* (2003), Bekaert *et al.* (2005), Adjasi and Biekpe (2006), Nurudeen (2009), Akinlo and Akinlo (2009), Ujunwa and Salami (2010), Bernard and Austin (2011), Masoud and Hardaker (2012) and Gambacorta *et al.* (2014). These studies found a positive relationship between market-based financial development and economic growth, as opposed to studies by Ujunwa and Salami (2010) and Bernard and Austin (2011) that found evidence of a positive association for some countries, and a negative association in others.

4. MODEL SPECIFICATION, ESTIMATION TECHNIQUES AND EMPIRICAL ANALYSIS

4.1 Model Specification

The empirical model used in this study to test the impact of financial development, both bank-based and market-based, on economic growth is based on Ram (1999), Christopoulos and Tsionas (2004), Majid (2008), and Kargbo and Adamu (2009). The model can be specified as follows:

$$GDP_t = \alpha_0 + \alpha_1 BFD_t + \alpha_2 MFD_t + \alpha_3 INV_t + \alpha_4 SAV_t + \alpha_5 TOP_t + \varepsilon_t \quad (1)$$

Where:
GDP (a proxy for economic (GDP) = annual growth rate of real gross domestic product;
BFD = bank-based financial development index;
MFD = market-based financial development index;
INV = investment;
SAV = savings; and
TOP = trade openness

The dynamic impact of bank-based and market-based financial development on economic growth in this study is re-examined using the autoregressive distributed lag bounds testing approach to cointegration analysis. Various measures have been used in the literature to proxy for economic growth and the "level of financial development". This section outlines the theoretical underpinnings of the general empirical model and subsequently presents the empirical model.

In this study, the annual growth rate of real gross domestic product is used as a proxy for economic growth (GDP). This proxy has been used extensively in the literature (see, among others, Wood 1993, Odedokun 1996, Shan and Jianhong 2006, Majid 2008).

On the other hand, financial development is proxied by bank-based and market-based financial indicators. Bank-based financial development is proxied by a bank-based financial development index (BFD) that is constructed from three bank-based financial development variables – namely, M2 to nominal GDP (M2), M3 to nominal GDP (M3), and domestic credit to private sector divided by nominal GDP (C). Market-based financial development is proxied by a market-based financial development index (MFD) that is constructed from three market-based financial development variables – namely, stock market capitalisation (CAP), total value of stocks traded (TV), and turnover ratio (TOR).

In modern literature, bank-based financial development is proxied by various indicators. However, for this study, the first variable used is the ratio of M2 to GDP, which measures the overall size of the financial intermediary in a country (see Levine 1993a, Levine 1997, Calderon and Liu 2003). A higher ratio of M2 to GDP shows a larger financial sector and, consequently, larger financial intermediation. The opposite is also true. The second variable is the ratio M3 to GDP. This variable reflects the change in liquidity of the banking sector in relation to time (Ghali 1999). An increase in M3 to GDP can be taken as progress in an economy's financial sector.

However, M2 and M3 alone can be rendered as inadequate measures of financial development, according to Ang and McKibbin (2007), because of the availability of foreign funds in the financial system. As such, credit provided to the private sector by financial intermediaries expressed as a percentage of GDP (C) – often claimed to be a more superior measure of financial development – has been used as well in this study. Since the private sector is able to utilise funds in a more efficient and productive manner as compared to the public sector, the exclusion of credit to the public sector better reflects the extent of efficient resource allocation (Ang and McKibbin 2007).

According to Ang and McKibbin (2007), these variables are highly correlated in most cases, yet there is no uniform argument as to which proxies are most appropriate for measuring financial development. This justifies the need for constructing an index as a single measure that represents overall development in the bank-based financial sector by taking the relevant financial proxies into account.

Thus, this study uses M2 to nominal GDP (M2), M3 to nominal GDP (M3), and domestic credit to private sectors divided by nominal GDP (C) as the proxies for bank-based financial development. Consequently, in order to produce an assessment of the overall level of "bank development" in Brazil, an index of bank-based financial development that averages together the information contained in the three individual indicators is produced. Following Demirguc-Kunt and Levine (1996), an index of bank-based financial development (BFD) is constructed using these three variables.

To compute a conglomerate index of bank-based financial development, the means-removed values of the three indicators of bank development are averaged in a two-step procedure. First, the means-removed values of M2, M3, and C are computed. The means-removed value of variable X is defined as Xm = [X - mean(X)] / [ABS(mean(X))], where ABS(z) refers to the absolute value of z. Second, a simple average of the means-removed M2, M3, and C is taken to obtain an overall index of bank-based financial development (BFD).

Market-based financial development is proxied by a market-based financial development index (MFD) that is constructed from three market-based financial development variables – namely, stock market capitalisation (CAP), total value of stocks traded (TV), and turnover ratio (TOR).

As with the dilemma encountered when choosing indicators for bank-based financial development, there is no best indicator for market-based financial development. However, the most commonly used are the three given above. Although many stock market development indicators are significantly correlated in an intuitively plausible fashion, the individual indicators produce different country rankings. Thus, to produce an assessment of the overall level of "stock market development" in a country, an index that averages together the information contained in the individual indicators is developed.

The first indicator of market-based financial development used in this study is market capitalisation ratio, calculated as the value of listed shares divided by GDP (CAP). Analysts frequently use this ratio as a measure of stock market size. In terms of economic significance, the assumption behind market capitalisation is

that market size is positively correlated with the ability to mobilise capital and diversify risk. The second indicator of market-based financial development utilised is the total value traded as a ratio of GDP, calculated as total shares traded on the stock market exchange divided by GDP (TV). The total value traded ratio measures the organised trading of equities as a share of national output. As a result, it is expected to positively reflect liquidity in an economy. Together, market capitalisation and total value traded gives a picture of stock market size and liquidity.

The third indicator of market-based financial development used in this study, which also happens to be the second measure of liquidity, is the turnover ratio (TOR), which is equal to the value of total shares traded divided by market capitalisation. High turnover often reflects low transaction costs. Turnover complements the total value of stocks traded/GDP as well. However, total value traded/GDP captures trading in relation to the size of the economy, while turnover measures trading relative to stock market size. As such, a small but liquid market will have a small total value traded/GDP ratio and a high turnover ratio.

Thus, incorporating information on market capitalisation, total value traded/GDP and turnover provides a more comprehensive picture of market-based financial development than the information provided by any single indicator. Therefore, a conglomerate index of market-based financial development (MFD) is computed using the same procedure for constructing a conglomerate index of bank-based financial development (BFD), as discussed above. Bank-based and market-based financial development are expected to exert a positive impact on economic growth; hence, their coefficients are expected to be positive.

In addition to the real GDP growth rate (GDP) and the financial development indicators (BFD and MFD), three other variables have been introduced in the model. These additional variables comprise the share of investment in GDP, the share of savings in GDP, and trade openness. These three variables have been included in the above model to fully specify the model. According to growth theory, the three additional variables exert a positive impact on economic growth; hence, their coefficients are also expected to be positive.

Investment in this study is calculated as gross fixed capital formation as a share of GDP (INV). According to Abu-Bader and Abu-Qarn (2008), this variable is considered to be one of the few economic variables with a robust correlation to economic growth, regardless of the information set. According to economic growth literature, investment is supposed to lead to economic growth; hence, its coefficient is expected to be positive.

The second control variable used is savings, calculated as savings as a share of GDP. The choice of savings ratio as an additional variable has to a large extent been influenced by the theoretical links between savings and economic growth. Traditional theories such as those suggested by Solow (1956), Romer (1986), and Lucas (1988) have emphasised the role of savings in economic growth. Solow (1956), for example, argues that an increase in savings generates higher growth in the short run during the transition between steady states (also see Odhiambo 2008). According to endogenous growth models developed by Romer (1986) and Lucas (1988), a permanent increase in growth can be determined by higher savings and capital accumulation. Following the argument above, savings as a share of GDP (SAV) has been chosen as one of the variables, and its coefficient is expected to be positive.

The third control variable utilised is trade openness (TOP). The positive relationship between trade and economic growth is well documented in the literature. Recent literature shows that trade openness and economic growth are related (Ang and McKibbin 2007). This variable has been included in order to capture the role of trade liberalisation in economic growth. The degree of openness is found by adding imports and exports as a percentage of GDP, and, in this case, its coefficient is expected to be positive and statistically significant.

4.2 Co-integration – ARDL Bounds Testing Procedure

This study utilises the newly proposed autoregressive-distributed lag (ARDL) bounds testing approach originally introduced by Pesaran and Shin (1999), and later extended by Pesaran *et al.* (2001) to examine the co-integration relationship between bank-based and market-based financial development and economic growth. The choice of this test is based on the numerous advantages it has over previous co-integration tests, such as the residual-based technique by Engle and Granger (1987), and the Full-Maximum Likelihood (FML) test based on Johansen (1988, 1991), and on Johansen and Juselius (1990).

First, while other co-integration techniques are sensitive to the size of the sample, the ARDL test is suitable even when the sample size is small. Thus, the ARDL test has superior small sample properties when compared to the Johansen and Juselius (1990) co-integration test (Pesaran and Shin 1999). Second, unlike other conventional co-integration techniques,

the ARDL bounds testing approach does not impose the restrictive assumption that all the variables under study must be integrated of the same order. In other words, the ARDL approach can be applied to test the existence of a relationship between variables – regardless of whether the underlying regressors are integrated of order one [I(1)], order zero [I(0)], or fractionally integrated. Third, while conventional co-integration methods estimate the long-run relationship within the context of a system of equations, the ARDL method employs only a single reduced form equation (Pesaran and Shin 1999). Fourth, the ARDL technique generally provides unbiased estimates of the long-run model and valid t statistics – even when some of the regressors are endogenous (Odhiambo 2008, Odhiambo 2011). Therefore, the approach is considered to be very suitable for analysing the underlying relationship, and it has been increasingly used in empirical research in recent years.

Following Pesaran *et al.* (2001), the ARDL representation of the model used in this study can be expressed as follows:

$$\Delta GDP_t = \alpha_0 + \sum_{i=1}^{n} \alpha_{1i}\Delta GDP_{t-i} + \sum_{i=0}^{n} \alpha_{2i}\Delta BFD_{t-i} + \sum_{i=0}^{n} \alpha_{3i}\Delta MFD_{t-i} + \sum_{i=0}^{n} \alpha_{4i}\Delta INV_{t-i} + \sum_{i=0}^{n} \alpha_{5i}\Delta SAV_{t-i} + \sum_{i=0}^{n} \alpha_{6i}\Delta TOP_{t-i} + \sigma_1 GDP_{t-1} + \sigma_2 BFD_{t-1} + \sigma_3 MFD_{t-1} + \sigma_4 INV_{t-1} + \sigma_5 SAV_{t-1} + \sigma_6 TOP_{t-1} + \gamma D + \mu_t \quad \ldots (2)$$

Where GDP is the growth rate of real gross domestic product (a proxy for economic growth), BFD is an index of bank-based financial development, which is a means-removed average of M2, M3 and credit provided to the private sector by financial intermediaries – a proxy for bank-based financial development (see also Demirguc-Kunt and Levine 1996); MFD is an index of market-based financial development, which is a means-removed average of stock market capitalisation, stock market traded value and stock market turnover – a proxy for market-based financial development (see also Demirguc-Kunt and Levine 1996); INV is a share of the investment in GDP; SAV is a share of savings in GDP; TOP is trade openness; D is a financial reform dummy; α_0 is a constant, α_1-α_6; σ_1-σ_6 and γ are regression coefficients, Δ is the difference operator, n is the lag length and μ_t is the white noise-error term.

The error correction model is specified as follows:

$$\Delta GDP_t = \alpha_0 + \sum_{i=1}^{n} \alpha_{1i}\Delta GDP_{t-i} + \sum_{i=0}^{n} \alpha_{2i}\Delta BFD_{t-i} + \sum_{i=0}^{n} \alpha_{3i}\Delta MFD_{t-i} + \sum_{i=0}^{n} \alpha_{4i}\Delta INV_{t-i} + \sum_{i=0}^{n} \alpha_{5i}\Delta SAV_{t-i} + \sum_{i=0}^{n} \alpha_{6i}\Delta TOP_{t-i} + \gamma\Delta D + \xi_1 ECM_{t-1} + \mu_t \quad \ldots (3)$$

4.3 Data Sources

This study utilised annual time-series data covering the period from 1980 to 2012. The annual data used in the study were obtained from the World Bank Economic Indicators (World Bank 2014), except for the market-based financial development proxies (stock market capitalisation, stock market traded value, and stock market turnover) for the period 1980 to 1988, which were obtained from the Emerging Stock Markets Factbook, 1991 (International Finance Corporation 1991). All the model estimations were computed using Microfit 5.0 software.

4.4 Stationarity Tests

Before any analysis was performed, the variables were first tested for stationarity, using the Dickey-Fuller generalised least-square (DF-GLS) and the Phillips-Perron (PP) tests. To accommodate the possibility of structural breaks within the dataset, the Perron (1997) test for unit root (PPURoot) was also utilised as the third unit-root testing method.

The DF-GLS lag length was selected automatically by SIC; the PP truncation lag was selected automatically on the Newey-West bandwidth; and the PPU-Root break years were also automatically selected. These dates ranged from 1986 to 2004, depending on the variable (see Appendix 1). The results of DF-GLS, PP and the PPU-Root stationarity tests for all the variables are presented in Table 1.

The results reported in Table 1 show that after differencing the variables once, all the variables were confirmed to be stationary. Even though the ARDL test does not require the pre-testing of variable, the unit-root test provides guidance as to whether ARDL is applicable, as it is only applicable for the analysis of variables that are integrated of order zero [I(0)] or order one [(1)]. In this instance, the variables are a mixture

Table 1: Stationarity Tests of all Variables

Dickey-Fuller generalised least square (DF_GLS)				
Variable	Stationarity of all Variables in Levels		Stationarity of all Variables in First Difference	
	Without Trend	With Trend	Without Trend	With Trend
GDP	-4.197***	-5.013***	–	–
BFD	-1.897	-2.169	-6.690***	-6.742***
MFD	-0.926	-3.194**	-7.387***	-7.419***
INV	-1.978**	-2.264	-5.105***	-4.164***
SAV	-3.061***	-3.101*	–	–
TOP	-1.176	-2.133	-5.004***	-5.115***
Phillips – Perron (PP)				
Variable	Stationarity of all Variables in Levels		Stationarity of all Variables in First Difference	
	Without Trend	With Trend	Without Trend	With Trend
GDP	-5.697***	-5.851***	–	–
BFD	-2.907*	-2.670	-7.179***	-7.094***
MFD	-1.115	-3.178	-7.367***	-7.237***
INV	-2.495	-2.245	-5.152***	-5.514***
SAV	-3.030**	-2.982	-8.611***	-8.439***
TOP	-1.209	-2.412	-4.968***	-4.948***
Perron, 1997 (PPURoot)				
Variable	Stationarity of all Variables in Levels		Stationarity of all Variables in First Difference	
	Without Trend	With Trend	Without Trend	With Trend
GDP	-4.822	-4.540	-6.952***	-6.775***
BFD	-3.671	-3.353	-6.541***	-6.461***
MFD	-3.494	-3.436	-7.604***	-7.849***
INV	-3.455	-3.252	-6.695***	-7.800***
SAV	-4.913	-4.736	-6.725***	-6.963***
TOP	-4.040	-3.690	-6.400***	-6.657***

Notes: *, ** and *** denote stationarity at 10%, 5% and 1% significance levels respectively.

of those integrated of order 0, and of those integrated of order 1. Therefore, the ARDL bounds testing procedure can be performed.

4.5 Co-integration and ARDL-ECM Model

In this section, the ARDL bounds testing procedure is used to examine the long-run relationship between the variables in the general model. The first step is to get the order of lags on the first differenced variables in equations (1) by using the Akaike Information Criterion (AIC) and the Schwartz Bayesian Criterion (SIC). This is followed by the application of a bounds F-test to equation (1) to establish a long-run relationship between the variables under study. The results of the bounds F-test are reported in Table 2.

The results of the F test suggest that a long-run relationship between GDP, BFD, MFD, INV, SAV and TOP exists. Following the estimation of the ARDL model and the use of AIC or SIC for optimal lag-length selection, the SIC based ARDL (1,1,1,1,0,1,0) model is selected because it is more parsimonious than the AIC-based model. The long-run results of the selected

Table 2: Model 1: Bounds F-test for Co-integration

Dependent Variable	Function				F-statistic	
ΔGDP	F(GDP|BFD, MFD, INV, SAV,TOP,D)				4.127**	
Asymptotic Critical Values						
Pesaran *et al.* (2001), p.300, Table CI(iii) Case III	1%		5%		10%	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
	3.15	4.43	2.45	3.61	2.12	3.23

Note: ** denotes statistical significance at 5% level.

Table 3: Results of the ARDL Model

Panel A: Long-run coefficients - Dependent variable is GDP				
Regressor	Co-efficient	Standard Error	T-Ratio	Prob
C	19.11***	4.84	3.95	0. 001
BFD	0.00	0.0	1.32	0.202
MFD	0.05*	0.03	1.87	0.076
INV	-0.98***	0.21	-4.61	0.000
SAV	0.20**	0.09	2.10	0.048
TOP	-0.08	0.08	-0.93	0.365
D	-2.61*	1.40	-1.87	0. 076
Panel B: ECM - Dependent variable is ΔGDP; Δ=first difference operator				
Regressor	Co-efficient	Standard Error	T-Ratio	Prob
ΔBFD	-0.00	0.00	-1.12	0.272
ΔMFD	-0.05	0.05	-0.90	0.377
ΔINV	0.22	0.26	0.85	0.405
ΔSAV	0.26*	0.13	2.02	0.054
ΔTOP	-0.52***	1.19	-2.78	0.010
ΔD	-3.48*	1.84	-1.89	0.071
ecm(-1)	-0.69***	0.13	-6.76	0.000

R-Squared	0.889	R-Bar-Squared	0.828
SE of Regression	1.186	F-Stat F(7,24)	22.8603[0.000]
Residual Sum of Squares	74.419	DW statistic	2.156
Akaike Info. Criterion	-70.910	Schwarz Bayesian Criterion	-79.704

Notes: 1. *, ** and *** denotes stationarity at 10%, 5% and 1% significance levels.

2. ΔGDP=GDP-GDP(-1); ΔBFD=BFD-BFD(-1); ΔMFD=MFD-MFD(-1); ΔINV=INV-INV(-1); ΔSAV=SAV-SAV(-1); ΔTOP=TOP-TOP(-1); ΔD=D-D(-1); (see also Pesaran and Pesaran, 2009: 311; 506-507).

model are reported in Table 3 Panel A, and the results of the ECM are reported in Table 3 Panel B.

The long-run regression results have shown that the coefficient of market-based financial development is statistically significant and has a positive sign, as expected. These results imply that in Brazil an increase in the level of market-based financial development leads to an increase in economic growth in the long run. The results displayed in Table 3 (Panel A) further reveal that in Brazil, bank-based financial development does not have an impact on economic growth, in the long run. This is evidenced by the coefficient of bank-based financial development, which is statistically insignificant. Based on these results, it can be concluded that Brazil's economic performance is positively related to market-based financial development and that

market-based financial development plays a vital role in the economic performance of Brazil. These results are consistent with the results of Adjasi and Biekpe (2006), Nurudeen (2009) and Akinlo and Akinlo (2009), among others.

Other long-run results also show that the coefficient of investment (INV) is statistically significant but has an unexpected negative sign. Increase in investment in Brazil is detrimental to the economic growth process of the country in the long run. The coefficient of savings (SAV) is statistically significant and has an expected positive sign. Thus an increase in savings in Brazil leads to an increase in the country's economic growth. Trade openness (TOP) has a statistically insignificant coefficient. The financial liberalisation dummy (D) is statistically significant, but has an unexpected positive sign. This implies that liberalisation of the Brazilian financial sector is detrimental to economic growth in the long run.

The short-run dynamics of the model are reported in Table 3 (Panel B). The coefficients of bank-based financial development (ΔBFD) and market-based financial development (ΔMFD) are insignificant, giving evidence of no relationship between bank-based financial development and economic growth, and between market-based financial development and economic growth, in Brazil, in the short run. The coefficient of investment is also insignificant. The coefficient of savings (SAV) is statistically significant and has an expected positive sign. This implies that, in Brazil, an increase in saving will lead to an improvement in economic growth in the short run. The coefficients of trade openness (TOP) and financial liberalisation dummy (D) are statistically significant but have unexpected negative signs. They show that in Brazil, an increase in trade openness leads to a drop in economic growth in the short run, and that in the short run financial liberalisation harms the economic growth process. The coefficient of ECM(-1) is statistically highly significant at the 1% significance level. Its negative sign is also expected, as it confirms the existence of a long-run relationship between the variables.

Although the Brazilian banking sector is one of the most developed banking sectors in Latin America, this study has found no significant impact of bank-based financial development on economic growth in Brazil. This could be because market-based financial development in Brazil has a more significant impact on economic growth than its bank-based counterpart, so that when both variables are incorporated into the growth equation, banking sector development becomes insignificant in the long run. Alternatively, the small sample size, prompted by the unavailability of sufficiently long-term time-series data for some key variables, could be the reason for the observed negligible impact of bank-based financial development on economic growth in Brazil.

Based on the empirical results of this study, market-based financial sector development was found to stimulate economic growth, though only in the long run. Thus, the policy implication is that for the Brazilian economy, immense efforts in promoting the development of the stock market are recommended in order to stimulate the real sector.

The regression for the underlying ARDL model fits well, as indicated by an R squared of 88.9%. Model diagnostic tests displayed in Table 4 show that the model passes all the diagnostic tests performed against serial correlation, functional form, normality and heteroscedasticity.

Table 4: ARDL – VECM Diagnostic Tests

LM Test Statistic	Results
Serial Correlation: CHSQ(1	0.334[0.564]
Functional Form: CHSQ(1)	0.174[0.677]
Normality: CHSQ(2)	0.728[0.695]
Heteroscedasticity: CHSQ(1	0.576[0.448]

The plots of Cumulative Sum of Recursive Residual (CUSUM) and Cumulative Sum of Squares of Recursive Residual (CUSUMQ) reported in Figures 3 and 4 show that both the CUSUM and CUSUMQ are within the boundaries. This shows that the long-run coefficients of the regressors are stable.

4.6 Limitations of the Study

Despite the efforts to make this study analytically defensible, it suffers from a few limitations, as is the case with many other scientific research studies. First, the study may suffer from the problem of insufficient data. The choice of annual data from 1980 to 2012 for empirical investigation was dictated by the availability of macroeconomic data. Unfortunately, stock market data are not readily available for a longer period. Although the use of an ARDL approach might have lessened the problem of data insufficiency, it may also be argued that a longer research period could affect the results. Moreover, the use of annual data in this study could have reduced the precision of the parameter estimates. In studies of this nature, quarterly data are more desirable. However, given that quarterly data for most of the variables in the study country were

Figure 3: Plot of cumulative sum of recursive residuals

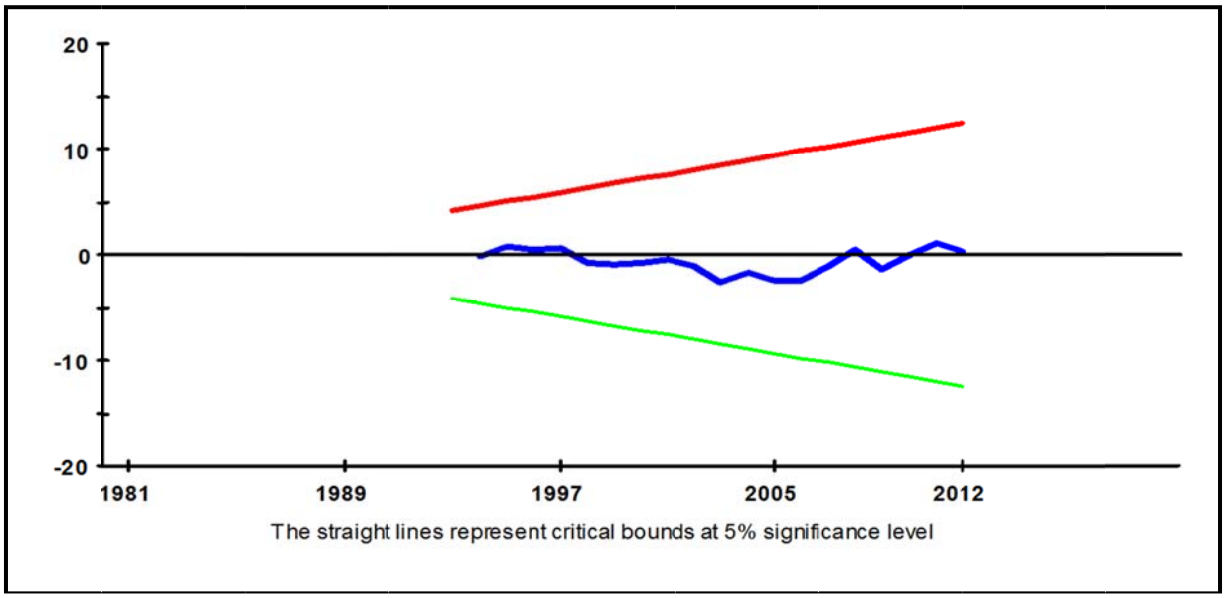
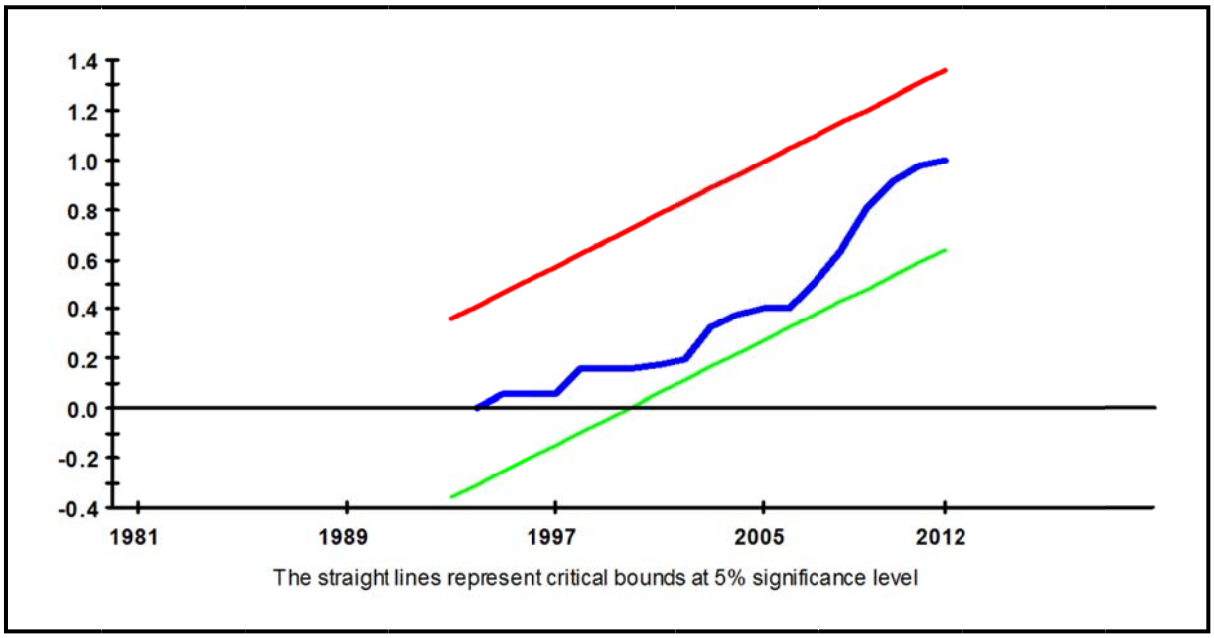


Figure 4: Plot of cumulative sum of squares of recursive residuals



not readily available, annual data had to be resorted to. It will, therefore, be interesting to compare the results of future research studies employing more data points and/or quarterly data. Second, the model may have been under-specified, a constraint that is related to data limitation. The model had only five independent variables. There are other variables that could have been included in the estimation of the model, including macroeconomic uncertainty and institutions. However, this was not possible because of the availability of only a few data points. Nevertheless, the variables incorporated in the model gave an adequate picture of the nature of the impact of financial development (bank-based and market-based) on economic growth in the country under examination. As such, it would be recommended that future studies consider other relevant variables that have not been included in this study and that they observe whether the results will differ fundamentally from those obtained for this study. Although these limitations could have affected the empirical results and evidence given in this study, it is assumed that their effects are minimal and that they have not significantly influenced the theoretical and empirical findings of this study.

5. CONCLUSION

In this paper, the relative impact of bank-based and market-based financial development on economic growth in Brazil during the period from 1980 to 2012 has been examined. Although a number of studies have been conducted on this subject, the majority of previous studies were mainly based on the causal relationship between financial development and economic growth. In addition, some of the previous studies relied mainly on bank-based financial indicators to measure financial development. Very few studies have examined in detail the relative impact of both bank-based and market-based financial development on economic growth. In addition, the majority of the previous studies relied mainly on the residual-based co-integration test, associated with Engle and Granger (1987), and the maximum-likelihood test, based on Johansen (1988) and Johansen and Juselius (1990) to test for co-integration. Yet it is now known that these techniques may not be appropriate when the sample size is too small. Unlike the majority of previous studies that used individual financial development indicators, the current study employs the method of means-removed average to construct both bank-based and market-based financial development indices. In addition, the study uses the recently developed ARDL bounds testing approach to examine this linkage. The empirical results show that there is a positive relationship between market-based financial development and economic growth in Brazil in the long run but not in the short run. The results also show that bank-based financial development in Brazil does not have a positive effect on economic growth. This applies irrespective of whether the regression analysis is conducted in the short run or in the long run. The study, therefore, concludes that it is the stock market rather than banking sector development that drives long-run economic growth in Brazil.

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APPENDIX 1: BREAK PERIOD FOR VARIABLES UNDER PPUROOT TEST

Variable	Break Period of all Variables in Levels		Break Period of all variables in First Difference	
	Without Trend	With Trend	Without Trend	With Trend
GDP	1989	1987	1988	1986
BFD	1993	1993	1993	1993
MFD	1999	1999	1995	1995
INV	1989	1989	1989	1989
SAV	1988	1988	1988	1988
TOP	1998	1998	2004	2004

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CRITICAL MASS IN THE BOARDROOM OF CROATIAN BANKS

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Abstract

This paper investigates the influence of gender diversity in the boardroom of Croatian banks on their performance. Specifically, we deal with both management and supervisory boards. Moreover, based on critical mass theory, the authors try to find out what constitutes critical mass. Using a static panel analysis on a sample of all commercial banks that operated in the period 2002-2014, three models were estimated with return on assets (ROA), return on equity (ROE) and net interest margin (NIM) as dependent variables. Board structure variables include gender of the chairperson, size of the board, share of women on the board and four dummy variables constructed on critical mass theory, specifically uniform group, skewed group, tilted group and balanced group. Other controls employed in the model include capital adequacy, the growth rate of assets at the bank level, ownership, age and a crisis dummy. The main finding is that when a critical mass of 20%-40% of women on the management board has been reached, bank performance improves.

Key words: *banks, corporate governance, firm performance, gender equality*

JEL classification: *G21, G34, J16, L25*

1. INTRODUCTION

Financial scandals have led to an increasing interest in the relationship between corporate governance and firm performance when control mechanisms are challenged. In this context, the board is considered to be a mechanism for corporate governance, assigned the task of protecting and increasing assets and maximizing the return on corporate investments (Villanueva-Villar, Rivo-López and Lago-Peñas 2016, p. 1).

One of the important elements of board effectiveness is board diversity. According to Tipuric et al. (2015, p. 39) the board, as a place of confrontation and harmonization of different views and the various requests of the stakeholders, should be composed of people who have different characteristics, interests and views. Such heterogeneity may have synergistic effects in its work and result in greater efficiency and better decision-making.

This variety of the board can be measured by a number of characteristics, with gender being one of the most important. Requirements for a higher share of female board members are, on the one hand,

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motivated by activism to create equal opportunities in the business community, but also with arguments that emphasize the selection and inclusion of individuals with different experiences, knowledge, skills and perspectives as a prerequisite for the effective and efficient operation of the board (Tipuric et al. 2015, p. 40).

This particularly refers to banks. According to de Cabo, Nogués and Nieto (2009, p. 5) gender diversity can be considered an important dimension in gaining better corporate governance of banks. In fact, a higher diversity of perspectives and points of view when perceiving environmental threats and opportunities can be especially important in a sector highly exposed to the risk of contagion and where crises can have disastrous consequences in terms of crippled economies, destabilized governments, and intensified poverty.

Despite seismic movements that have been made in last decades regarding gender diversity in different spheres of human life, there is no doubt that gender diversity is one of the most important issues of the modern age. This is especially the case with gender diversity in the workplace, particularly in leading positions within institutions such as banks. Therefore, the focus of our research is gender diversity in the boardroom of Croatian banks where top positions were traditionally held by men. Specifically, we will try to find out how both management and supervisory board characteristics affect bank performance.

Although there have been numerous works of research that have tried to find a direction in how gender diversity affects corporate performance, only a few have determined a positive effect from gender diversity on firm performance (e.g. Carter, Simkins and Simpson 2003; Campbell and Minguez-Vera 2007; Francoeur, Labelle and Sinclair-Desgagné 2007; Lückerath-Rovers 2011; Barta, Kleiner, & Neumann 2012). We are not trying here to address this issue from a social and ethical, or even psychological perspective, but merely find if there are financial benefits of gender diversity in the boardroom.

Specifically, we will try to test critical mass theory on the sample of all Croatian commercial banks that operated in the 2002-2014 period. This is particularly significant in light of imposing women quotas on European boards.

Although an EU proposal for a directive to improve female diversity on company boards that would set a mandatory 'procedural quota' of 40% has not been adopted yet, some countries have already set a minimum compulsory quota of 40% representation for each gender in the boardroom. The Norwegian quota law was one of the first of its kind in Europe (Crutchley Lending and Vähämaa 2016). In 2005, the Norwegian government passed a quota law requiring Norwegian public limited-liability companies to have at least 40% of each gender represented on their board of directors. Law enforcement began at the beginning of 2008 and by then all public limited liability companies (with very few exceptions) had already met the requirement of at least 40% (Torchia, Calabrò and Huse 2011, p. 300 citing Rasmussen and Huse 2011). France, Italy and Belgium have done so for company boards, while Denmark, Greece, Austria, Slovenia and Finland have introduced gender requirements in legislation for the composition of the boards of state-owned companies (CIPD 2015). Germany, however, has recently agreed a new law providing for a 30% quota for the supervisory boards of the country's largest listed companies from 2016 (European Parliament, The Policy on Gender Equality in Germany 2015). The law on effective gender equality adoption by the Spanish government in 2007 recommends specifically that large companies with more than 250 employees and IBEX 35 gradually appoint women to their boards in order to achieve 40%-60% of each gender (European Commission, The current situation of gender equality in Spain – Country Profile 2012, p. 10).

The European Commission database on women and men in decision-making bodies, (which are usually supervisory boards) which covers gender balance in key positions in the largest publicly listed companies at the European and national levels, shows that women are underrepresented in economic decision-making positions in the EU-28. Croatia is no exception. According to data from April 2016, women account for 23% in the highest decision-making body at the EU level, while in Croatia they make up 22% (European Commission, Gender Equality 2016).

Our empirical investigation builds explicitly upon critical mass theory, which has been tested by Joecks, Pull and Vetter (2013). Joecks, Pull and Vetter (2013, p. 5-6), citing Kanter (1997) note that, in her analysis of group interaction processes, Kanter constructs four different categories of groups according to their composition: uniform groups, skewed groups, tilted groups and balanced groups. *Uniform groups* are groups in which all members share the same (visible) characteristic. I.e., with respect to gender, all members of the group are either male or female. *Skewed groups* are groups in which one dominant type (e.g. the males) controls the few (e.g. the females) and therefore also controls the group and its culture. The few are called "tokens" and are not treated as individuals but as representatives for their category. Kanter suggests that a male dominated *skewed* group consists of up to 20% women. *Tilted groups* are groups with a less extreme distribution. Unlike in skewed groups,

minority members can ally and influence the culture of the group. They do not stand for all of their kind, instead they represent a subgroup whose members are to be differentiated from each other in their skills and abilities. A male dominated *tilted* group consists of 20 to 40% women. In a so-called *balanced group*, the majority and minority turn into potential subgroups where gender-based differences become less and less important. The focus turns to the different abilities and skills of the men and women. A *balanced* group with respect to gender representation has 40 to 60% women.

Compared to their study, our contribution is multi-fold. First, we employ two corporate governance mechanisms, i.e. management and supervisory boards. Second, we measure corporate performance by introducing three dependent variables: ROA, ROE and NIM. Third, our analysis is conducted using a static panel model in comparison to *ordinary least squares* (OLS) and random effects (RE) regressions used by the aforementioned authors. Finally, new variables are added in the model that try to explain what determines bank profitability, as well as to find what forms the critical mass of women for a bank to perform better.

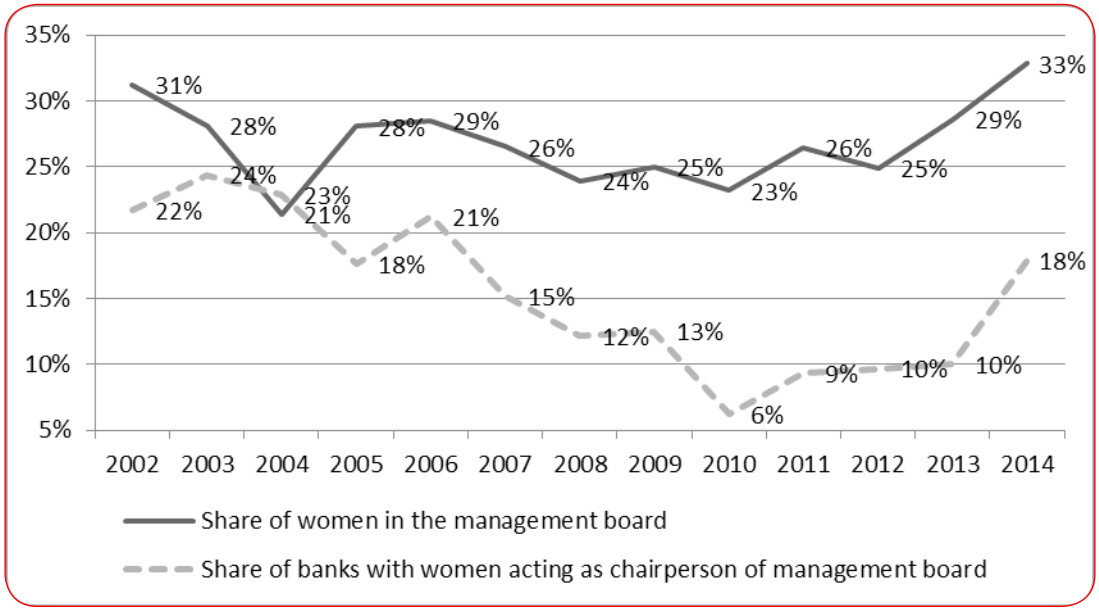
The paper is structured as follows. After the introduction given in Section 1, Section 2 outlines aspects of corporate governance in the banking sector in Croatia. Section 3 provides insight into previous research on the issue analyzed, while Section 4 describes the model's variables and provides a rationale for the potential effects of each variable on bank performance. Sample construction and econometric specification are given in Section 5, while Section 6 presents main the study's empirical results. Section 7 concludes.

2. SOME ASPECTS OF CORPORATE GOVERNANCE IN THE CROATIAN BANKING SECTOR

According to the Credit Institutions Act (Official Gazette No. 59/2013, 19/2015 and 102/2015) banks in Croatia must apply the dual board system, i.e. they should have a management board and a supervisory board. The management board of a bank in Croatia must have at least two members; moreover, the members of the management board must possess adequate collective knowledge, skills and experience required to direct the business of the bank independently without undue influence from other persons, and in particular to understand the bank's activities and its main risks. Furthermore, the members of the supervisory board must possess adequate collective knowledge, skills and the experience required to supervise the business of the bank independently without undue influence from other persons, and in particular to understand the bank's activities and its main risks.

In terms of implementing a quota of at least 40% of each gender, Croatia encourages a voluntary approach to improving gender balance in company boardrooms.

Figure 1: Women on the Management Boards of Croatian Banks



Source: authors' calculation

On average, the share of women on management boards in the period of 2002-2014 amounted to 27%. As shown in Figure 1, in the total period covered by the analysis the share of women on the management boards of Croatian banks ranged between 21% and 33%, which peaked in 2014. This increasing trend observed in recent years is particularly welcome, since the share of women on the management boards of Croatian banks is higher than the mandatory quota imposed in some European countries. However, the situation is worrisome when observing data on women acting as chairpersons of management boards. Specifically, in 2010, only 6% of Croatian banks had a female chairperson.

Another important aspect of the management board is its size. According to the Credit Institutions Act (Official Gazette No. 59/2013, 19/2015 and 102/2015) the management board of a bank must have at least two members who direct the business of the bank and represent it. One of the members of the management board must be appointed chairperson of the management board. In the 2002-2014 period the management board in the Croatian banking sector was on average made up of three members.

As shown in Figure 2, the situation regarding gender diversity in the boardroom of the Croatian banking sector deteriorates when observed in terms of supervisory boards. On average, the share of women on supervisory boards in the period of 2002-2014 amounted to only 17%. In the total period covered by the analysis this share ranged between 13% and 20%. This is particularly low given the proposed EU Directive of a 40% quota for women non-executives. However, the situation is even worse when observing data on women acting as chairpersons of the supervisory board. Specifically, the share of banks with women acting as chairperson of the supervisory board ranged between 3% and 19%, with a decreasing trend in recent years.

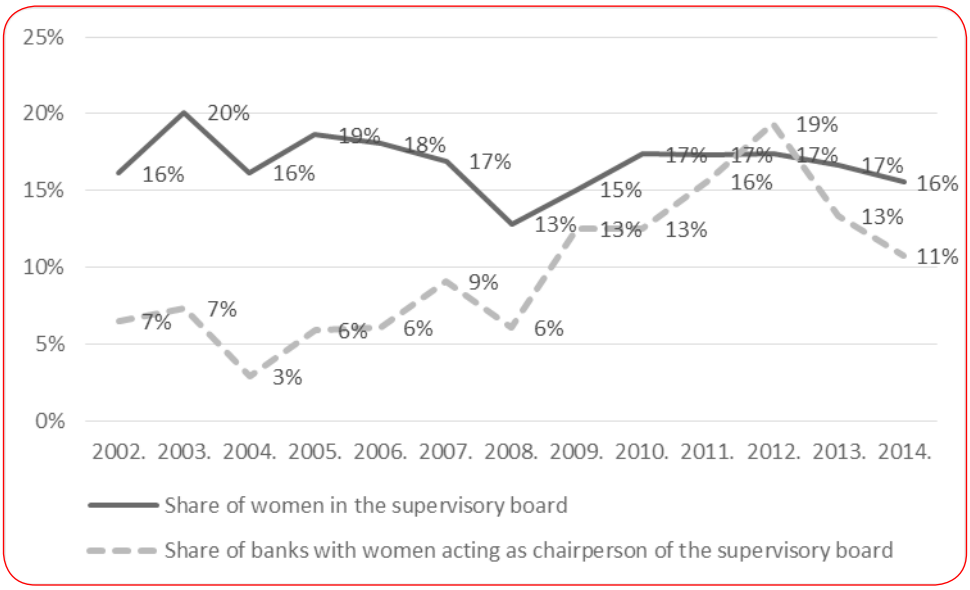
This paper deals with the size of the supervisory board as a feature that might influence performance. It should be noted that the Credit Institutions Act (Official Gazette No. 59/2013, 19/2015) does not stipulate a minimum requirement regarding the overall number of supervisory board members. In the 2002-2014 period supervisory boards in the Croatian banking sector were on average made up of five members.

3. REVIEW OF PREVIOUS RESEARCH

The influence of board composition in terms of gender diversity has been widely explored. Therefore, here we will focus on papers dealing, at least to a certain extent, with critical mass theory. This theory regarding gender diversity on boards has been largely analyzed in the context of women's political representation. However, this is not the case in the field of corporate governance.

Joecks, Pull & Vetter (2013) examined gender diversity in the boardroom and firm performance using a data set of 151 listed German firms for the years 2000-2005. The authors compared firm performance for different board types according to the classification

Figure 2: Share of Women in the Supervisory Boards of Croatian Banks



Source: authors' calculation

by Kanter (1977), and then analyzed the link between board type and firm performance in a multivariate regression analysis. They then regressed firm performance on their measure of gender diversity in both its linear and quadratic terms to account for potential nonlinearities and to endogenously determine the "critical mass" of women on the supervisory board. Since an aim of their research was to further substantiate results on the critical mass of women in the boardroom, the authors conducted a regression on the apparent "magic number" of women in the boardroom. In all models, Ordinary Least Squares estimators (OLS) with robust standard errors and firm clusters were used. They found evidence of the critical mass of female representatives on the board to be reached at a share of about 30%. Over and above that threshold, the performance of a more diverse board exceeded that of a completely male board. Joecks, Pull and Vetter (2013) further substantiated their results, distinguishing firms with (a) no woman on their supervisory board from firms with (b) one woman on the board, (c) two women on the board and (d) three or more women on the board. Running OLS and RE-regressions the authors found that having three or more women on the board significantly increases ROE as compared to having only one woman on the board.

In order to study the effect on boardroom dynamics of increasing female presence Konrad and Kramer (2006) interviewed 50 women directors, 12 CEOs (nine of them male), and seven corporate secretaries (one of them male) at *Fortune* 1000 companies. Their findings exposed dramatic differences among boards with one, two, or at least three women directors. They point out that solo women on boards often feel isolated and marginalized. When they are effective, it is not *because of* but in *spite of* being the only woman. Adding a second woman to a board helps reduce the sense of isolation, but it does not always cause change and may create its own difficulties. Two women may be perceived as a separate group and may find they have to be careful not to appear to be conspiring. What's more, they may not be distinguished from each other. Their research shows that a clear shift occurs when boards have three or more women: women tend to be regarded by other board members not as "female directors" but simply as directors, and they do not report being isolated or ignored. Three women or more can also change the dynamic on an average-size board.

De Cabo, Nogués and Nieto (2009) analyzed 612 EU-25 banks using the BankScope database. They included variables such as bank size, ROA, cost to income ratio and leverage. To consider the risk that each bank assumes as well as its dynamism, the authors have included the log of the standard deviation of ROA over the study period in order to control for bank risk, and the mean of the growth rate of total assets over the same period as a proxy for bank growth. Moreover, they have also considered dummy explanatory variables that control for the country of origin of the bank, with Germany as the reference country, the type of bank activity, with commercial bank the reference category, and whether banks are listed in the stock market. The banks' board size was considered as a proxy for the preference for homogeneity. They have found that women are less likely to appear on those boards of directors where there is some evidence that monitoring plays a minor role, that is, those with a small board, where preference for homogeneity is stronger. Additionally, banks with lower risk have a higher proportion of women. There is also some evidence of Becker's discrimination, given that those banks that have more women, and therefore are less likely to present discrimination bias, are precisely those that have greater growth rates in their total assets. Finally, the authors have also found that there are cultural differences that explain part of the heterogeneity in the presence of women on the boards, since they have found significant differences among European countries.

Drawing on critical mass theory, Torchia, Calabrò and Huse (2011) address the question of whether an increased number of women directors results in the build-up of critical mass that substantially contributes to firm innovation. Tests are conducted on a sample of 317 Norwegian firms during 2005/2006 and the first half of 2006 using a questionnaire of 256 questions. The dependent variable (organizational innovation) was measured with several items on a seven-point Likert-type scale addressing the board members' perceptions on firm innovation, highlighting the different perspectives of individuals involved in the innovation process. The number of women directors served as the independent variable. Specifically, the sample was divided into four groups based on their number of women. In particular, the first group included firms with boards with no women; the second had only one woman, the third had two women directors and the last had at least three women directors. To control for different variables influencing the level of firm organizational innovation, authors included variables such as firm size, the number of employees provided by the CEOs, dummy variable for industrial sector, board demographic characteristics (board size, CEO and chairperson tenure, CEO and chairperson gender), the length of board meetings and the directors' knowledge and competence. Their findings suggest that boards with one or two women directors are unable

to contribute to firm organizational innovation. By validating at least three women directors as the size that the minority group has to reach to make a significant contribution to firm organizational innovation, their findings show that it is possible to operationalize the critical mass construct.

4. DESCRIPTION OF VARIABLES

The dependent variables employed in the model measuring performance are accounting measures such as ROA and ROE, as well as NIM. Since only a small fraction of Croatian banks are listed on the stock-exchange, a stock-performance measure could not be used. ROA is calculated by dividing a company's after tax annual profits by its total assets. In order to make the results more robust and less sensitive to how profitability is measured, the authors wanted to test for the effect of board composition on other measures of profitability apart from ROA. Therefore, the ROE variable was introduced in the model, which is calculated by dividing a company's after tax annual profits by its total equity. These variables are often employed as measures of bank performance (e.g. Athanasoglou, Brissimis and Delis 2005; Dietrich and Wanzenried 2011). Moreover, the dependent variable NIM also often serves as a performance measure because it focuses on profit earned on interest activities (e.g. Ben Naceur 2003; Bonin, Hasan and Wachtel 2004; Sameh, Bouzgarrou and Louhichi 2016).

The explanatory variables, which refer to board composition, are described below.

The gender of the chairperson of the management board (CHAIR_MB_dummy) and supervisory board (CHAIR_SB_dummy) are included in the model as dummy variables with 0 representing male presidents and 1 female.

The share of women in the management board (SHARE_W_MB) and supervisory board (SHARE_W_SB) is calculated as the number of board female members divided by the total number of board members.

Studies show mixed effects from gender diversity on performance. Some find that gender diversity on boards is associated with greater profitability (Herring 2009), other studies find women have neutral effects on performance (Farrell and Hersch 2005; Carter et al. 2010; Dobbin and Jung 2011), while Shrader, Blackburn and Illes (1997) find in some tests that companies with greater gender diversity underperform in terms of profitability. Although the findings on the board gender diversity - bank corporate performance relation suggest that banks usually do not benefit from higher participation from women on boards, greater representation of women on boards is often observed from positive perspective. According to the resource based theory of competitive advantage, we assume that banks utilizing a high fraction of women on their boards would perform better. As stated by Pathan and Faff (2013), women spend more effort on their tasks and, accordingly, could improve board effectiveness in terms of decision making and information flow. A key factor, as documented by Fields and Keys (2003, p. 13), in diversity's successful impact on firm performance is the value found in the heterogeneity of ideas, experiences, and innovations that diverse individuals bring to the firm. Therefore, we expect a positive sign for the variables gender of the chairperson of the management board and supervisory board, as well as share of women in both management and supervisory boards.

Diversity as variety conceptualizes categorical differences across the relevant characteristics between group members, with variety being commonly measured by both Blau's index and Shannon-Wiener entropy (Solanas, Selvan, Navarro and Leiva 2012). Therefore, the authors applied this concept in order to measure the diversity of the management and supervisory board.

The Blau index, also known as the Simpson index, measures gender diversity on the management board (BLAU_MB) and supervisory board (BLAU_SB), taking into account the number of gender categories (two) as well as the evenness of the distribution of board members among them. It is measured as:

$$1 - \sum_{i=1}^{n} p_i^2$$

where p_i is the percentage of board members in each category (men and women) and n is the total number of board members. The values of the Blau index for gender diversity range from 0 to a maximum of 0.5, which occurs when the board comprises an equal number of men and women (Campbell and Mínguez-Vera 2008, p. 442).

The Shannon index, or Shannon-Wiener entropy, measures gender diversity on the management board (SHANNON_MB) and supervisory board (SHANNON_SB) as well. It is calculated as:

$$-\sum_{i=1}^{n} p_i \, lnp_i \qquad (2)$$

where p_i is the percentage of board members in each category (men and women) and n is the total number of board members. The minimum value of Shannon index is zero and diversity is maximized when both genders are represented in equal proportions, at which point the Shannon index amounts to 0.69. Being a logarithmic measure of diversity it is

more sensitive to differences in small relative abundances (Baumgartner 2006). The authors also expect these diversity measures to positively influence performance. This assumption is built upon Iles and Auluck (1993), cited by Shrader, Blackburn and Illes (1997, p. 356), who found that diverse work forces were beneficial to firms because they facilitated team problem solving and synergy. Furthermore, the ability to manage diversity fostered the incorporation of various perspectives into organizational decision-making, and firms that united a wider range of participants performed well.

The size of the management board (LN_SIZE_MB) and supervisory board (LN_SIZE_SB) variables are calculated as natural logarithms of the total number of board members and are an important feature of the board. As reported by Lipton and Lorsch (1992, p. 65), in large boards it becomes more difficult for all of the members to express their ideas and opinions in the limited time available during board meetings. Moreover, Jensen (1993, p. 865) emphasizes that keeping boards small can help improve their performance, stating that when a board gets beyond an optimal number of people (seven or eight) they are less likely to function effectively. Furthermore, some literature finds evidence that supports the view that a smaller board is related to better firm performance (Yermack 1996; Huang et al. 2011). However, some researchers find a positive relation between board size and corporate performance (Dalton 1999) whereas Hardwick, Adams and Zou (2011) find no evidence of board size on profit efficiency. Based on previous studies, there is unclear empirical evidence on the relation between firm performance and board size. Therefore, the expected influence of this variable on performance in ambiguous.

Due to the specific characteristics of different industries that affect their corporate performance, we have identified control variables frequently employed in empirical studies in the banking field. These are explained below.

According to Ongore and Kusa (2013, p. 240) capital adequacy shows the internal strength of the bank to withstand losses during crisis. It is directly proportional to the resilience of the bank to crises. Since it should capture the general average safety and soundness of the financial institutions (Staikouras and Wood, 2004), capital adequacy (CAP) was introduced to the model while it was obtained directly from various issues of Banks Bulletin of Croatian National Bank (CNB). With the aim of preventing failures and protecting the interests of depositors, it is necessary to require banks to maintain a high level of capital adequacy. According to the Credit Institutions Act (Official Gazette No. 59/2013, 19/2015 and 102/2015) a bank must at all times ensure an amount of capital that is proportionate to the nature, scale and complexity of its activities as well as the risks to which it is or might be exposed to while providing services.

Since 1 January 2014, the framework for determining the capital and capital ratios of credit institutions has been governed by the Regulation (EU) No 575/2013 and Directive 2013/36/EU, which was transposed into Croatian legislation via the Credit Institutions Act. The new rules brought new, stricter definitions of capital and a broader scope of risk coverage, as well as different regulation of capital ratios. The minimum total capital ratio amounted to 8%, while common equity tier 1 capital ratio was 4.5% and tier 1 capital ratio 6%. In addition, also since 1 January 2014, credit institutions have been obligated to maintain a capital conservation buffer of 2.5% of total exposure, while in 19 May 2014 the requirement for systemic risk was set at 1.5% of the total risk exposure for all credit institutions and an additional 1.5% for institutions of relatively larger scope and complexity of operations (CNB, Banks Bulletin No. 29, 2016). Given the abovementioned, we expect capital adequacy to positively affect performance. A similar finding was obtained by Demirgüç-Kunt and Huizinga (1999).

The growth rate of assets (GROWTH_ASSETS) variable is calculated as follows: $(Assets_t - Assets_{t-1}) / Assets_{t-1}$. The authors expect that banks with increasing growth rates should experience improved performance. Demirgüç-Kunt and Huizinga (2011, p. 3) show that asset growth increases profitability indicators for most banks, worldwide. The authors note, however, that for the vast majority of banks, growth appears to offer a trade-off between risk and return.

The size variable is introduced to account for the existence of economies or diseconomies of scale in the banking market. It is calculated as the natural logarithm of total assets (LN_ASSETS). The size variable is expected to positively influence performance since the conventional wisdom is that, as stated by Lee (2009, p. 200), larger firms tend to be more profitable than their smaller counterparts, either due to efficiency gains or higher market power. The view suggesting that large companies generally outperform smaller ones because they realize economies of scale is supported by the work by Demirgüç-Kunt and Huizinga (2011). As stated by Athanasoglou, Brissimis and Delis (2005), the effect of a growing size on profitability has been proved to be positive to a certain extent, although in research by Demirgüç-Kunt and Huizinga (2011) size proved to be insignificant in all of the relevant regressions. Moreover, for banks that become extremely large, the effect of size could

be negative due to bureaucratic factors and other reasons (Athanasoglou, Brissimis and Delis 2005). Therefore, the influence of the size variable on profitability is ambiguous.

The market share variable (MS) is calculated as assets of an individual bank divided by the total assets of the banking industry in a particular year. It is employed in the model to test the relative-market power hypothesis that argues that only large banks with some "brand identification" can influence pricing and raise profits (Jeon and Miller 2005, p. 11). Therefore, a positive relationship of this variable on bank performance is expected.

The majority of Croatian banks are foreign owned: specifically, 17 out of 27 banks were foreign owned in 2014. This is 90.09% of total assets. To control for this, an ownership dummy (OWN) variable was introduced in the model with 0 referring to foreign owned banks and 1 for domestic ones. As it the case with most post-transition countries, the variety and quality of banking products offered increased with the entrance of foreign capital. Therefore, foreign owned banks are expected to perform better, which is consistent with the notion that international investors facilitate the transfer of technology and know-how to newly privatized banks (Bonin, Hasan and Wachtel 2004, p. 23). On the contrary, the hypothesis that domestic ownership leads to more profitable banks can be explained by Fok , Chang and Lee (2004, p. 91) stating that foreign banks do not rely on local deposits and can raise equity capital internationally.

The age of a bank (AGE) as a control variable was calculated as the natural logarithm of the number of years the bank operated in the market, i.e. as the current year of the analysis reduced by the foundation year of the bank. The expected effect of a bank's age on performance is ambiguous. For example, Coad, Segarra and Teruel (2013, p. 26) support evidence that firms improve with age, finding that ageing firms experience rising levels of productivity, profits, larger size, lower debt ratios, and higher equity ratios. But they also find that older firms have lower expected growth rates of sales, profits and productivity, lower profitability levels (when other variables are controlled for), and also that they appear to be less capable of converting employment growth into growth of sales, profits and productivity.

Since the time span of the analysis comprises non-crisis as well as crisis years, a year dummy variable (CRISIS_dummy) was introduced to the analysis. It takes the value 1 if the country is going through crisis and 0 otherwise. The authors distinguish the period prior to the acute crisis starting with the collapse of Lehman Brothers in September 2008 (Schuknecht, von Hagen and Wolswijk 2010) but also take into account data on GDP growth in Croatia. The basis for selection of the year in which the dummy variable takes the value 1 is the negative growth rate of GDP. Specifically, negative GDP growth rates were registered in the 2009-2014 period, whereas during 2002-2008 this variable takes a value of 0. It is expected that crisis years negatively affect performance.

A brief description and measurement of variables is provided in Appendix 1.

The data used in this research were drawn from annual reports published by the CNB and, for some banks, the Zagreb Stock Exchange (ZSE). Variables dealing with corporate governance were manually collected and calculated using annual reports and double checked with data from banks' corporate web pages. The age variable was also calculated using manually collected data on establishment data from banks' corporate web pages. The macroeconomic data was taken from CNB web pages relating to Statistics – main economic indicators.

5. *SAMPLE CONSTRUCTION AND ECONOMETRIC SPECIFICATION*

Our sample consists of all Croatian commercial banks that operated in the 2002-2014 period. However, as the number of banks in our sample changes over time due to new entrances or exits in the industry, our sample is an unbalanced panel. Moreover, we excluded those banks that were active in only one year of the total observed period (a total of three banks) and banks that have the falsely positive financial indicator ROE (totally two banks). There were, on average, 33.61 banks per year, making for a total of 437 observations.

Descriptive statistics of the variables explained in Section 4 are given in Table 1.

A pairwise correlation matrix is given in Appendix 2. available at the following link http://personal.oss.unist.hr/~mamiletic/table2.pdf. As can be seen from the table, a multicollinearity problem occurs between some variables, with collinearity coefficients above 0.7. Therefore, these were omitted from further analysis and comprise the Blau index (BLAU_MB and BLAU_SB), Shannon index (SHANNON_MB and SHANNON_SB), as well as size based on assets (LN_ASSETS) and market share (MS) variables.

Table 1: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
ROA	437	-0.0920	4.8520	-74.5946	4.9907
ROE	437	-0.5088	31.3988	-375.2120	27.1487
NIM	437	3.7540	8.1989	-0.6700	171.4029
CAP	437	21.5912	17.7380	6.1300	220.6800
GROWTH _ASSETS	437	15.1890	35.7050	-83.7441	421.3304
LN_ASSETS	437	14.5194	1.7903	9.2808	18.4873
MS	437	2.9576	5.5764	0.0000	26.8645
OWN	436	0.5665	0.4961	0	1
AGE	437	2.5829	0.8168	0.0000	4.6052
CRISIS _dummy	437	0.3570	0.4797	0	1
CHAIR_MB _dummy	437	0.1602	0.3672	0	1
LN_SIZE_MB	437	1.0025	0.3893	0.6931	2.0794
SHARE_W_MB	437	0.2697	0.2689	0.0000	1.0000
BLAU_MB	437	0.2496	0.2255	0.0000	0.5000
SHANNON_MB	437	0.3569	0.3187	0.0000	0.6931
UNIFORM_MB _dummy	436	0.4358	0.4964	0	1
SKEWWED_MB _dummy	437	0.0366	0.1880	0	1
TILTED_MB _dummy	435	0.2207	0.4152	0	1
BALANCED_MB _dummy	437	0.2975	0.4577	0	1
CHAIR_SB _dummy	437	0.0961	0.2951	0	1
LN_SIZE_SB	437	1.5311	0.3359	0.6931	2.3979
SHARE_W_SB	437	0.1685	0.2189	0.0000	1.0000
BLAU_SB	437	0.1845	0.1879	0.0000	0.5000
SHANNON_SB	437	0.2788	0.2771	0.0000	0.6931
UNIFORM_SB _dummy	437	0.4805	0.5002	0	1
SKEWWED_SB _dummy	437	0.1121	0.3159	0	1
TILTED_SB _dummy	437	0.2723	0.4457	0	1
BALANCED_SB _dummy	437	0.0984	0.2982	0	1

Source: authors' calculation

For the purpose of econometric data analysis, we employed static unbalanced panel data analysis. Model (1) forms the basis of our estimation.

$$Y_{it} = c + \sum_{k=1}^{K} \beta_k X_{it}^k + \varepsilon_{it} \qquad (1)$$
$$\varepsilon_{it=} z_i + u_{it},$$

where:

- Y_{it} is the profitability of bank i at time t, with i = 1,..., N; t = 1,…, T presented with three different measures of profitability: ROA, ROE and NIM. By iterating these profitability measures, we account for three different models depending on the dependent variable used.

- X_{it} are k independent variables as discussed above.

ε_{it} is the disturbance with z_i being the unobserved bank-specific effect and u_{it} being the idiosyncratic error. The presented model is a one-way error component regression model where $z_i \sim IIN(0, \sigma_z^2)$ and independent of $u_{it} \sim IIN(0, \sigma_u^2)$

Three models were employed in the research; depending on the dependant variable used (ROA, ROE and NIM).

Before the panel analysis was conducted, the stationarity in a panel dataset was tested. Because the sample is unbalanced, a Fisher-type unit-root test based on an augmented Dickey-Fuller test was implemented. The presence of unit roots was tested in all

variables except dichotomous. The results are shown in Table 2.

The results for the variables CAP, LN_SIZE_MB and SHARE_W_SB showed that these variables are not stationary. After finding the first difference for these variables, the same unit-root test was conducted and the result showed that the first differences of these variables were stationary. After that, differenced variables were used in research. Instead of the variables CAP, LN_SIZE_MB and SHARE_W_SB, the variables D_CAP, D_LN_SIZE_MB and D_SHARE_W_SB were included in model.

Various tests were used in order to determine which static panel (pooled panel, static panel with fixed effects or static panel with random effects) would be the most appropriate for this research. An F test was applied to analyze the applicability of the panel with fixed effects compared to a pooled panel, whereas a Lagrange Multiplier test was used to analyze the applicability of panel with random effects compared to a static pool panel. Finally, the applicability between models with fixed and random effects was determined using a Hausman test. The results of this test are shown in Table 3.

A static model with fixed effects proved to be the most appropriate when analyzing the effect on profitability measured with ROA and ROE. On the other hand, when analyzing the effect on profitability via the NIM variable, the static pooled model proved to be the most appropriate. In this case, the Hausman test was not conducted, since the F test and Lagrange Multiplier test showed that the pooled model is appropriate in comparison to models with fixed and random effects.

The Breusch-Pagan test for heteroscedasticity also fit into the research. The P-value was 0,0000, which showed that heteroscedasticity was present. Heteroscedasticity causes standard errors to be biased so robust standard errors were used in the research.

Table 2: Fisher-type unit-root test

Variables	Inverse chi-squared p-value	Inverse normal p-value
ROA	0.0325	0.0663
ROE	0.0639	0.0789
NIM	0.0000	0.0004
CAP	0.0005	0.1049
GROWTH _ASSETS	0.0000	0.0000
AGE	0.0000	0.0000
LN_SIZE_MB	0.4514	0.0136
SHARE_W_MB	0.0000	0.0000
LN_SIZE_SB	0.0000	0.0000
LN_SIZE_SB	0.0000	0.0000
SHARE_W_SB	0.6780	0.1618

Source: authors' calculation

Table 3: Tests for determination of which static panel would be the most appropriate

Tests	ROA	ROE	NIM
F test	8.1600***	4.0700***	1.1400
Breusch and Pagan Lagrangian multiplier	44.4100***	30.2500***	0
Hausman test	169.1400***	96.7500***	

*** Statistically significant at the 1% level,

Source: authors' calculation

6. EMPIRICAL FINDINGS

The empirical results for all three models, i.e. the models with ROA, ROE and NIM used as dependent variables, are presented in Table 4, while their interpretation follows.

As expected, capital adequacy (CAP) has a positive impact on performance. It is significant in models where performance is measured with ROA. It stands for the internal strength of the bank, i.e. for its safety and soundness. As already stated, a similar finding was obtained by Demirgüç-Kunt and Huizinga (1999). Moreover, Pessarosi and Weill (2013) find an increase in capital requirements has a positive effect on cost efficiency. According to Holmstrom and Tirole (1997), Allen, Carletti and Marquez (2011) and Mehran and Thakor (2011), cited in Pessarossi and Weill (2013, p. 5), by increasing the surplus generated in the bank-borrower relationship and by improving monitoring incentives, capital ratios have a positive effect on bank's profitability.

When ROA is used as a dependent variable, the ownership variable (OWN) positively affects performance, suggesting that domestic ownership leads to banks that are more profitable. Fok , Chang and Lee (2004, p. 91) note that due to diversification and the resulting lower cost of capital, foreign banks might provide a price advantage to borrowers in host countries by charging lower interest rates than domestic banks, which can lead to lower profitability levels.

In all models, whether ROA, ROE or NIM are used as dependent variables, AGE significantly and negatively affects performance. Loderer and Waelchli (2010, p.

Table 4: Parameter Estimates of Static Panel Model

	ROA	ROE	NIM
D_CAP	0.3418*** (0.0486)	2.0401 (1.4588)	0.4346 (0.1934)
GROWTH _ASSETS	-0.0138 (0.0152)	-0.0023 (0.0375)	0.0160 (0.2599)
OWN	1.0379** (0.4672)	9.4098 (6.6842)	0.3355 (0.8053)
AGE	-0.7722** (0.3142)	-8.0714* (4.7452)	-1.2441*** (0.4031)
CRISIS _dummy	-0.8517*** (0.2048)	-7.8397*** (2.8414)	-1.4191 (1.7210)
CHAIR_MB _dummy	0.0212 (0.2753)	4.7223 (3.7229)	0.5371 (1.1840)
D_LN_SIZE_MB	0.1276 (0.4525)	3.5509 (5.4589)	6.6798 (6.4593)
SHARE_W_MB	-0.1930 (1.0953)	-18.4975 (23.1397)	0.5023 (1.9883)
UNIFORM_MB _dummy	0.1212 (0.5128)	-7.6925 (10.4754)	9.7300 (10.6095)
SKEWWED_MB _dummy	0.0544 (0.2283)	-0.4997 (4.7622)	30.8692*** (10.2753)
TILTED_MB _dummy	0.3699* (0.2098)	2.0138 (4.0910)	7.0912 (10.6548)
BALANCED_MB _dummy	0.3169 (0.26407)	4.6626 (4.4406)	9.7571 (10.7558)
CHAIR_SB _dummy	-0.3688 (0.3759)	2.8893 (5.6042)	-2.5787* (1.3895)
LN_SIZE_SB	1.4586** (0.6660)	3.2074 (6.5963)	-0.2099 (1.3759)
D_SHARE_W_SB	-0.7074 (0.5717)	-29.5898* (16.6433)	-9.4080* (5.3179)
UNIFORM_SB _dummy	-0.8574* (0.4617)	-4.9002 (5.9261)	1.8571 (3.4827)
SKEWWED_SB _dummy	-0.6029 (0.3983)	-0.5247 (5.8570)	0.3324 (3.1961)
TILTED_SB _dummy	0.2084 (0.3260)	4.5012 (7.4471)	-0.9304 (3.5784)
BALANCED_SB _dummy	-0.4046 (0.4178)	-9.8574 (10.7318)	1.2484 (3.9078)
constan	0.0668 (1.5187)	20.7561 (24.0655)	-0.9096 (12.3036)
Model p value	0.0000	0.0000	0.0000
R2 within	0.4118	0.2051	0.0202
R2 between	0.0001	0.0932	0.7957
R2 overall	0.0373	0.0720	0.0008

*,**,*** Statistically significant at the; 10%, 5%, 1% level, respectively. Standard error are between parentheses.

Source: authors' calculation

1) support the negative influence of age on performance, stating that corporate aging could reflect a cementation of organizational rigidities over time. Accordingly, costs rise, growth slows, assets become obsolete, and investment and R&D activities decline. In addition, older firms are more likely to have a rigid administrative process and more bureaucracy.

Another variable that significantly and negatively affects performance when performance is measured with ROA, but also with ROE, is the crisis variable (CRISIS_dummy) suggesting the procyclical nature of bank profitability. Due to the negative context of crisis, such a finding was expected. This is explained by Athanasoglou, Brissimis and Delis (2005, p. 17) stating that lending could decrease during cyclical downswings, since such periods are normally associated with increased risk. In a similar context, provisions held by banks will be higher due to the deterioration of the quality of loans, and capital could also have procyclical behaviour, as equity tends to follow the phase of the cycle. They explain further that demand for credit and stock market transactions would be strengthened substantially during economic booms and the interest margin may widen. Therefore, revenues could grow faster than costs, leading to increased profits, while the opposite may hold true during economic slowdowns.

Corporate governance variables that significantly influence performance vary depending on the dependent variable being used. When ROA is used as the dependent variable, TILTED_MB_dummy, size of the supervisory board and UNIFORM_SB_dummy significantly affect performance. Specifically, the positive effect of the tilted groups variable in management board suggests support for a critical mass of women in the boardroom, as proposed by Joecks, Pull and Vetter (2013) citing Kanter (1997). Furthermore, the size of the supervisory board also has a significant and positive effect on performance, suggesting that larger boards

bring additional value-added expertise. As stated by Dalton (1999, p. 674), resource dependence theory is the primary foundation for the perspective that larger boards will be associated with higher levels of firm performance. The negative effect of uniform group in the supervisory boards also speaks in favour of gender diversity in the boardroom, since completely male supervisory boards inhibit performance measured with ROA.

In models where performance is measured with both ROE and NIM, the variable share of women (D_SHARE_W_SB) in the supervisory board negatively and significantly affects performance, suggesting that adding more women on boards inhibits performance. As stated by Galinsky et al. (2015, p. 744) diversity can incite detrimental forms of conflict and resentment.

Furthermore, in the model with NIM acting as dependent variable, the gender of the chairperson of the supervisory board (CHAIR_SB_dummy) and SKEWED_MB_dummy significantly affect performance. The negative sign of the chairperson of the supervisory board (CHAIR_SB_dummy) variable suggests that banks with a male acting as chairperson of the supervisory board would underperform in terms of profitability, which speaks in favour of greater gender diversity in the boardroom as documented by Carter, Simkins and Simpson (2003), Erhardt, Werbel and Shrader (2003), Herring (2009) and Pavic Kramaric, Milun and Pavic (2016), to name a few. Furthermore, as documented by the variable SKEWED_MB_dummy, gender also appears to play a significant role in determining profitability. Specifically, if there are up to 20% women in the management board a bank's performance improves.

To sum up, the results obtained definitely speak in favour of gender diversity in the management board. First of all, we find that tilted management boards, i. e. management boards having 20-40% of women, positively influence performance in terms of ROA. As stated by Joecks, Pull and and Vetter (2013) citing Kanter (1997) members of tilted groups influence the culture of the group and are differentiated from each other in their skills and abilities. Furthermore, we find, in terms of NIM, that management boards with up to 20% of women outperform completely male ones. In skewed group men control the few, i.e. women, controlling also the group and its culture. Although Kanter (1977) cited in Joeck, Pull and Vetter (2013, p. 6) regards skewed groups to be especially problematic since the tokens might be either in the focus or are overlooked, and they may be subject to stereotyping, this finding should be observed in the context of the industry and country in question. Specifically, Croatia as a post-transition country has undergone a long period of transition from self-managing socialism with no preconditions for greater gender diversity development. This particularly refers to the banking industry, where leading positions used to be dominantly held by men, and therefore even slight improvement is welcomed. Finding support for a critical mass of women in the boardroom is particularly important in light of a proposed EU Directive with the aim of attaining a 40% quota of women in non-executive board-member positions.

The finding that female chairs of supervisory boards have a positive impact on performance when measured with NIM supports resource based theory. As suggested by Shrader, Blackburn and Illes (1997, p. 359) citing Rosener (1995), women have extraordinary managerial skills in that they are good at seeing big picture issues and can have a strong impact as top managers on productivity, morale and profit. Moreover, the positive influence of women acting as chairperson can be explained by the fact, as stated by Adams and Ferreira (2009, p. 291), that female directors have better attendance records and that gender diverse boards allocate more efforts to monitoring. This is also supported by findings in terms of ROA, where a completely male supervisory boards inhibit performance. However, when adding more women onto a board, performance deteriorates, which is found in models with ROE and NIM as dependent variables.

Although to the authors' knowledge there are no papers exploring the critical mass of women in the boardroom of Croatian companies, there are papers dealing with board characteristics that influence performance. E.g. Pavic Kramaric and Pervan (2016) examined how board structure affects the performance of Croatian banks. Their analysis was also conducted on a sample of Croatian banks in the 2002-2013 period. It differs from our research in that it uses only four measures of board structure and includes neither dummy variables constructed on critical mass theory nor various other controls. Moreover, the aforementioned authors have used only ROA as a dependent variable. Their results, obtained by employing an Arellano-Bover/Blundell-Bond estimator, show that the growth of the proportion of women in both management and supervisory boards negatively affects bank performance. Furthermore, Pavic Kramaric, Milun and Pavic (2016) examined how gender diversity in the boardroom of Croatian listed firms influence performance measured by Tobin's q. Their research is conducted on a sample of listed firms in 2014 that belong to different industries and uses linear regression analysis. The results suggest a positive and significant influence from women in management boards on the financial success of the firm.

7. CONCLUSION

The question of how boardroom structure, especially in terms of its gender composition, affects performance has been largely investigated, but there is still no clear consensus on whether such a relationship exists.

This paper brings new evidence on how gender diversity plays an important role in influencing performance, and contributes to the current debate on gender-diversified boardroom by suggesting that banks could benefit from more diverse boards.

Specifically, using an unbalanced static panel analysis on a sample of all commercial banks that operated in the 2002-2014 period, three models were estimated using ROA, ROE and NIM as dependent variables. The board composition variables include the gender of the chairperson, the size of the board, the share of women on the board and four dummy variables constructed on critical mass theory, specifically uniform group, skewed group, tilted group and balanced group. Other controls employed in the model comprise capital adequacy, growth rate of assets on the bank level, ownership, age and a crisis dummy. The empirical results suggest capital adequacy has a positive and significant impact on performance when it is measured with ROA, as is the case with the ownership variable. Older banks have a negative influence on performance in all three models. Moreover, the crisis variable significantly affects performance when performance is measured with ROA and ROE, suggesting the procyclical nature of bank profitability. The size of the supervisory board is significant only in the model with ROA as dependent variable, where it has a positive influence.

In the context of gender diversity, the results obtained suggest a significant and positive influence on performance with respect to ROA and NIM. Our findings are interesting in the context of the primary goal of this research, which was to examine the critical mass of women in the boardroom that influences performance. This is particularly important in light of a proposed EU Directive with the aim of attaining a 40% quota for women in non-executive board-member positions.

Since we prove the existence of a critical mass of women of 30% or 40% in the management board for a significant influence on performance, one cannot claim that there is no scientific ground for imposing a quota of 30% or 40% as some EU countries have already done. The results speak in favour of promoting gender balance in the labour market and emphasize the necessity of companies to evolve so as to hire highly skilled women in their decision-making process. As a consequence, this will demonstrate the intention of respecting EU principles and the value of equality.

However, our research has certain limitations, since there might be other factors influencing performance that have not been taken into account. Future research might encompass how a critical mass of 20% of women translates into an absolute number of women on the board. Additionally, it might be useful to see the influence of gender diversity on performance, not only in leading positions but in the bank as a whole. Furthermore, one of the possible directions for future research might be the inclusion of a stock-performance measure such as Tobin's Q.

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APPENDIX 1: Description of variables used in the model

Variable	Calculation
ROA	It is calculated by dividing a company's after tax annual profits by its total assets
ROE	It is calculated by dividing a company's after tax annual profits by its total equity
NIM	It is calculated as net interest income divided by total assets
CAP	Capital adequacy ratio variables were obtained directly from various issues of Banks Bulletin of Croatian National Bank
GROWTH _ASSETS	Growth rate of assets is calculated using the following formula:
LN_ASSETS	Size variable is calculated as the natural logarithm of total assets
MS	It is calculated as assets of an individual bank divided by the total assets of the banking industry in a particular year
OWN	Dummy variable that takes value 1 for domestic banks while 0 refers to foreign owned banks
AGE	The natural logarithm of the number of years the bank operated in the market, i.e. as the current year of the analysis reduced by the foundation year of the bank
CRISIS _dummy	Dummy variable that takes value 1 if the country is going through crisis (in the 2009 – 2014 period when negative GDP growth rates were registered) and 0 otherwise, i. e. in the 2002-2008 period
CHAIR_MB _dummy/CHAIR_SB _dummy	Dummy variable referring to the gender of the chairperson of the management/ supervisory board that takes value 1 in the board with female president and 0 otherwise
LN_SIZE_MB/ LN_SIZE_SB	It is calculated as natural logarithm of the total number of management/supervisory board members
SHARE_W_MB/ SHARE_W_SB	The share of women in the management/supervisory board is calculated as the number of board female members divided by the total number of management/ supervisory board members
BLAU_MB/ BLAU_SB	It is calculated as where pi is the percentage of management/supervisory board members in each category (men and women) and n is the total number of management/supervisory board members
SHANNON_MB/SHANNON_SB	It is calculated as where pi is the percentage of management board members in each category (men and women) and n is the total number of management board members
UNIFORM_MB _dummy/ UNIFORM_ SB _dummy	Dummy variable that takes value 1 if there are no women on the management/ supervisory board and 0 otherwise
SKEWWED_MB _dummy/ SKEWWED_ SB _dummy	Dummy variable that takes value 1 if there are up to 20% women on the management/supervisory board and 0 otherwise
TILTED_MB _dummy/ TILTED_SB _dummy	Dummy variable that takes value 1 if there are between 20-40% women on the management/supervisory board and 0 otherwise
BALANCED_MB _dummy/ BALANCED_SB _dummy	Dummy variable that takes value 1 if there is at least 40% on the management/ supervisory board and 0 otherwise

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SOCIAL TRANSFERS AND INCOME INEQUALITY IN BULGARIA

Svilena Mihaylova , Silviya Bratoeva-Manoleva

Abstract

The paper analyzes the distributional effects of social transfers in Bulgaria in the period 2000-2014, using income inequality decomposition by factor components. The results suggest that social transfers mitigate income inequality, but this effect varies depending on the type of transfer. Pensions exert the strongest influence due to their significant share in total income, which also rises over time. Family allowances are pro-poor in nature, but because of their small share in beneficiaries' total income, their impact on overall inequality is much weaker. "Other social benefits" have the weakest inequality-reducing effect, which is due to their higher concentration towards the richest decile and increasing share in total income. Despite the inequality-decreasing impact of social transfers, we argue that they should not be regarded as the sole remedy for the sharp income disparities in the country, but need to be accompanied by relevant active labor market policies.

Key words: *social transfers, income inequality, redistribution*

JEL classification: *I38, H55, D31*

1. INTRODUCTION

The determinants and consequences of high income inequality have become one of the most debated topics among academics and policy makers in the aftermath of the last global economic crisis. The social and economic costs of high income inequality are largely recognized and there is a widespread view that a certain level of government intervention is needed to tackle extreme income disparities, poverty and social exclusion. However, differences remain in the perceptions of the extent of such intervention and the adequate tools for its implementation. Therefore, understanding the distributional effects of various social policy instruments is not only of academic interest, but also has important practical implications.

As in most post-socialist economies, the market transition in Bulgaria has been accompanied by a rise in income inequality: from 22.8 in 1990, the country's Gini coefficient increased to 30.4 in 2014 according to the National Statistical Institute. Based on Eurostat data, which are compiled through a different methodology and allow comparison with other countries, Bulgaria has even higher inequality (35.4), which is the third largest in the European Union (EU) in 2014. At the same time, the country has the lowest GDP per capita among member states, limited social protection

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expenditures and faces adverse demographic trends, as well as persistent labor market problems. All of these issues undoubtedly pose challenges to the social policy of the country and its capacity to alleviate existing income disparities. Therefore, the question of how social transfers affect income inequality in Bulgaria is particularly relevant in terms of policy choices. Given its weak presence in the literature, it requires the attention of researchers. Taking this into account, the present paper aims to explore the distributional effects of social transfers in Bulgaria in the period 2000-2014 by using an income inequality decomposition method proposed by Pyatt, Chen and Fei (1980). In conducting the analysis we are led by the understanding (also found in Barr (2004) and Niehues (2010)) that it is very important to make a distinction between the different categories of social benefits with regard to their impact on income inequality. We reckon that unveiling how each type of social transfer manifests its distributional effect will provide deeper insight into the current role and the future opportunities of social policy in the country.

The rest of the paper is organized as follows: Section 2 provides a summary of the literature on the relationship between social transfers and income inequality. Section 3 describes briefly the main features of the social protection system in Bulgaria. Section 4 presents the methodology used in the analysis. Section 5 discusses the empirical results and Section 6 concludes the paper.

2. LITERATURE REVIEW

The impact of social policy on income distribution has generated much debate among social scientists and policy makers. The widespread view of the existence of a trade-off between equity and efficiency has been central to this debate for a long time. On the one hand, market forces alone do not necessarily provide a desirable income distribution with regard to equity, which is seen as a justification for government intervention through redistribution. On the other hand, many economists reckon that redistributive policies, used to alleviate income inequality, hamper efficiency and growth. However, this trade-off has been recently revisited as some studies find that redistribution and the induced reduction in inequality are associated with higher and more durable growth (Ostry, Berg and Tsangarides 2014).

With regard to the success of social policies in fighting inequality and poverty, there has been also a long-standing controversy in the welfare state literature over the question of whether social transfers should be targeted to the most needy or universal. On the one side there are those who believe that a welfare state can only mitigate inequality and poverty effectively and efficiently when benefits are mainly targeted to those most in need, i.e. when benefits are selective. The underlying argument is that selective benefit systems are cheaper, entail lower taxes and are more conducive to economic growth, which benefits the poor directly (Marx, Nolan and Olivera 2015). However, several lines of counter-arguments have been established against targeting. First, there are important dysfunctions of means-testing – higher administrative costs compared to universal benefit systems, higher non-take up partly because of stigmatization issues and decreasing incentives to work leading to poverty traps (Van Oorschot 2002). Second, in contrast with universal benefit systems, selective welfare systems have less political support for redistribution and therefore fewer resources available for redistributive policies. As a result, the redistributive role of such systems tends to be weaker.

The comparison of the two types of welfare systems forms the core of the highly influential "Paradox of Redistribution" proposed by Korpi and Palme (1998). According to the authors, selective systems that strongly target resources towards the poorest, paradoxically, have a smaller redistributive impact than universal systems, whereas the latter, while being least distributive on paper, distribute in fact the most.

The far-reaching importance of the distributional impact of social policies has led to the emergence of many empirical studies. One can distinguish between two approaches in the literature regarding the distributional role of welfare systems (Fuest, Niehues and Peichl 2010). The first approach compares pre-social-spending income inequality with post-transfers inequality. More specifically, it sequentially applies different benefit instruments and compares the resulting income distribution with the counterfactual distribution without the benefit in question. The majority of studies that have used this approach find substantial inequality-decreasing effects of social transfers (for example, Immervoll et al. (2006); Whiteford (2008) and Fuest, Niehues and Peichl (2010)). However, as noted by Niehues (2010), this standard approach of measuring redistribution is problematic because it neglects the fact that social benefits have behavioral second-order effects, which infuence the distribution of market incomes before government intervention. If benefit levels discourage recipients from taking part in the labor market at all, this leads to an increase in the unemployment rate, which in turn also worsens pre-transfer income inequality. Taking these effects into account, Niehues (2010) finds that more social

spending effectively reduces inequality. However, this result is mainly due to unemployment benefits and public pensions, whereas more targeted benefits do not significantly reduce income inequality because of their substantial disincentive effects. Furthermore, Sinn (1995) even finds an inequality-enhancing role of social transfers due to increased investment in risky assets and moral hazard effects induced by higher social spending. Hence, more redistribution may result not only in more pre-transfer but also in more post-transfer inequality.

The second approach in measuring the distributional impact of social transfers is the factor source decomposition technique suggested by Rao (1969), Pyatt, Chen and Fei (1980) and Shorrocks (1982). It allows calculating the contribution of each social transfer to overall inequality simultaneously. This approach has been used in a number of cross-national and individual country studies. For example, Milanovic (1999) applies this method to analyze income inequality in six transition economies (Bulgaria, Hungary, Latvia, Poland, Russia and Slovenia) over the period 1987 – 1995. With respect to social transfers, he finds that pensions have increased inequality in Central Europe, while non-pension transfers were too small and two poorly focused to make much difference. In a study on the impact of cash social transfers on inequality in thirteen EU member-states, Heady, Mitrakos and Tsakloglou (2001) find that the distributional effect of these transfers is greater in countries that spend a higher proportion of income on them, but that there are other important determinants, including the distribution of funds between different types of transfers and the degree of targeting for each transfer.

As for studies at the individual country level, Koutsampelas (2011) examines the distributional impact of social transfers in Cyprus and finds that all transfers redistribute income, but this effect varies depending on the type of transfer. Family benefits and "other benefits" have the smallest redistributive effect, whereas public assistance and child benefits have the strongest. In a study for Turkey, Baslevent (2014) also finds varying distributional effects of the different types of social transfers. Social assistance and disability benefits alleviate income inequality, whereas the redistributive impact of pension payments and unemployment benefits does not appear to be very large, since especially the latter are received mainly by individuals who are outside the lower end of the income distribution. Studying the redistributive role of the social welfare system in Greece, Mitrakos (2014) finds evidence of an inequality-reducing effect of transfers. Medeiros and Souza (2015) examine inequality in Brazil and their results suggest that the pension system in the country is slightly inequality-increasing. While social assistance transfers tend to mitigate inequality, this effect is minimal because of their minor share in total income.

Bulgaria, as a post-socialist economy that has experienced a rise in inequality during its transition, has also attracted the interest of researchers in the field of social policy and distribution. For example, Hassan and Peters (1995) find that the social safety net in Bulgaria is not well targeted – most social benefits are found to be pro-poor, in the sense that they improve income distribution, but many benefits accrue to better-off households as well. Kotzeva (1999) finds that while in 1992 social transfers reduced inequality, in 1996 they turned into a driver of income inequality and their contribution to the overall Gini coefficient was around 6%. Nikolova et al. (2011) examine the impact of public policy on income inequality in Bulgaria during the period 1992-2006. Using income inequality decomposition and regression analysis, the authors find that unemployment benefits and child allowances are the main social payments reducing inequality among Bulgarian households. Comparing Gini coefficients before and after social transfers, Tzanov et al. (2013) find that this policy instrument prevents a drastic increase in the ratio between the incomes of the poor and the rich social groups in Bulgaria. The authors outline several reasons for the growing importance of the role of social transfers: an aging population, the increase in the number of persons of retirement age, the emigration of the young and educated, rising unemployment rate and crisis trends during the examined period.

To sum up, the prevailing finding in the empirical literature is that social transfers mitigate income inequality. However, recent studies distinguishing in detail between the distributional effects of the various types of social transfers in Bulgaria are relatively scarce. Therefore, we focus on examining this issue, but as a starting point we first outline the main features of the Bulgarian social protection system.

3. *THE BULGARIAN SOCIAL PROTECTION SYSTEM*

The social protection system in Bulgaria encompasses both contributory social insurance schemes and noncontributory social assistance benefits and social service programs. Social insurance (contributory) programs include old age, disability and survivor pensions, sickness and healthcare benefits. There are also active and passive labor market policies, including training, employment incentives and unemployment

and early retirement benefits. Social assistance (non-contributory) programs include monthly family allowances, housing and heating allowances, social pensions for the elderly, disability benefits, last resort social assistance programs and numerous other small benefits. Social insurance programs account for the largest share of total expenditure on social protection, while social assistance programs constitute a very small part (International Monetary Fund 2014).

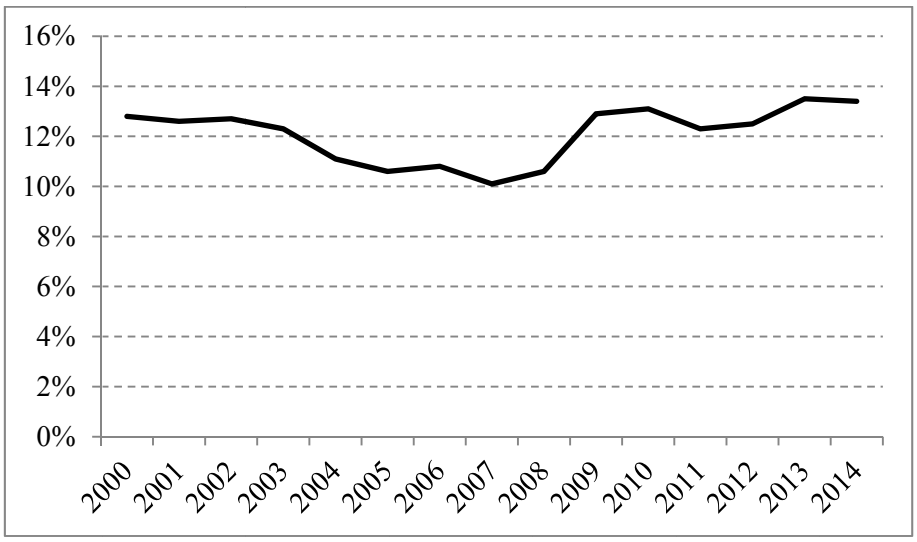
The distinction between contributory and non-contributory programs is important because of the different distributional effects that they tend to exert. While the amount of social insurance benefits depends mainly on past contributions of individuals, likely making their redistributive effect small, social assistance benefits are typically means-tested (i.e. provided on the basis of an income test) and thus are expected to have a larger redistributive impact. With the purpose of studying the distributional effects of various types of social transfers, in the present paper we focus on those included in total income, namely: social insurance, social assistance benefits, and, from labor market measures, unemployment benefits.

The state and development of the social protection system in Bulgaria in the last 26 years have been under the influence of the social and economic changes taking place in the country since the start of the market transition. The first years of the transition process were marked by output drop, rising unemployment, high inflation and increasing social tension. Key liberalization, privatization and restructuring processes were strongly influenced by an uncontrolled struggle of interests. Specific to these processes was the accumulation of wealth in a few hands and its appropriation for unproductive and speculative purposes (Nenovsky and Koleva 2002). Together with market reforms, this led to a significant rise in income inequality and poverty in the first years of transition.

Bulgaria entered the market transition process with a universal social protection system inherited from the previous regime that faced a number of challenges in the new reality: the fact that the state was no longer the sole provider of employment and insurance; high and persistent unemployment in contrast to full employment under socialism; the emergence of various forms of economic activity and the development of an informal sector; and the erosion of the principles of solidarity between generations (Tzanov et al. 2012). Although the existing system was inadequate, there was political pressure for its maintenance in the first years of transition, which led to further income disparities.

Until 1996 the dominant measures for social protection were unemployment benefits and social aid, which were clearly passive measures. Unemployment prevention was implemented through subsidizing non-profitable state enterprises or early retirement, which led to a significant rise in the proportion of pensioners in the working-age population. However, since 1996-1997, when the country experienced a severe economic crisis, there has been an increase in the importance of active measures aimed at stimulating labor participation (Tache and Neesham 2011). The introduction of a currency board in 1997 led to macroeconomic stabilization and marked the beginning of a period of high economic growth, decreasing unemployment and massive foreign direct investment inflows, which lasted until the economic recession in 2009. However, the fiscal discipline imposed by the currency board and the convergence criteria in relation to the EU accession in 2007 restricted the room for implementing robust social protection. This is evident in the decreasing levels of government social protection expenditure as a percentage of GDP during the period of favorable economic development until 2008. As seen in Figure 1, the share of government expenditure on social protection in GDP fell from 12.8% in 2000 to 10.1% in 2007.

Figure 1: Government expenditure on social protection (% of GDP) in Bulgaria, 2000-2014



Source: Eurostat

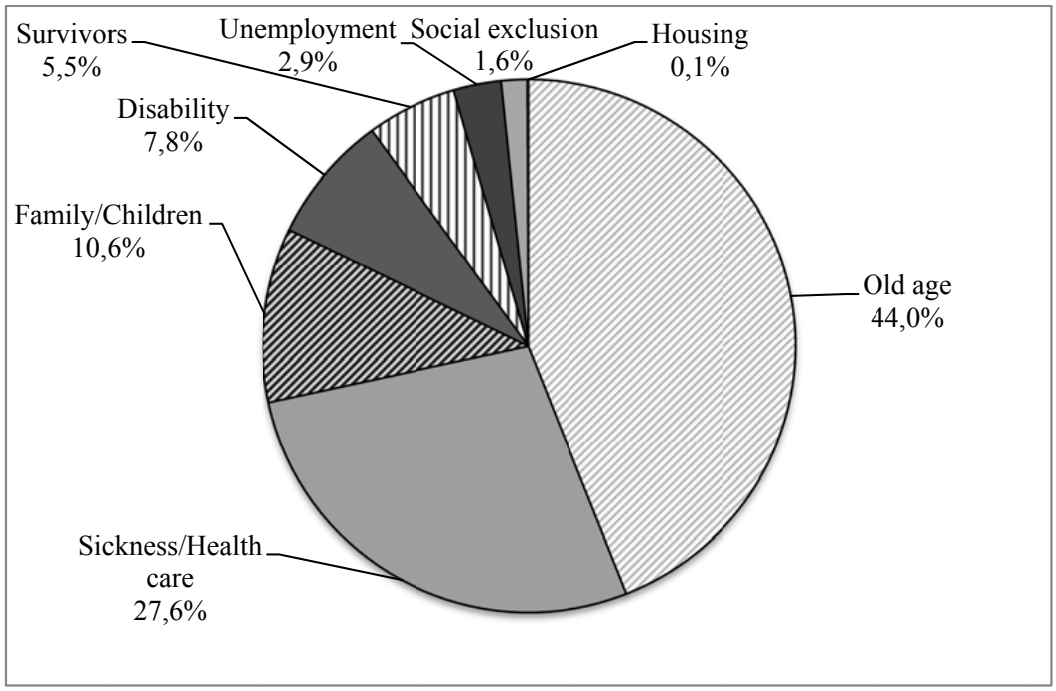
After the country was hit by the global economic crisis, social transfers were frozen in the period 2010-2011. Slight budget-neutral increases in targeted social protection were approved in 2013. The first aid package increased assistance to households that were most affected by the crisis and focused on employment and energy assistance measures. The emphasis of the second was on child and heating allowances.

Among all social protection benefits, those related with old age have the largest share, followed by sickness and healthcare benefits. As shown in Figure 2, in 2014 old age social benefits constituted 44% of total social benefits, while the share of sickness and healthcare benefits was 27.6%. The prevalence of those two types of social benefits is due to an unfavorable demographic structure, the aging of the population and the deterioration of its health status.

Compared to other EU members, Bulgaria has one of the lowest shares of social protection expenditure in GDP, which is the reason why some authors such as Drahokoupil and Myant (2010) put the country in the category of a "minimal welfare state model". As noted by Tache and Neesham (2011), the welfare system in Bulgaria during the transition period cannot be approximated by any particular type of "classical" welfare regimes such as the liberal, corporatist and social-democratic regimes, proposed by Esping-Andersen (1990) or the Mediterranean (Southern) regime, subsequently suggested by other authors (for example, Ferrera 1996). According to Tache and Neesham (2011) the welfare system in Bulgaria is of a mixed type because it displays characteristics of various welfare regimes. As far as funding is concerned, the Bulgarian welfare system is more similar to the liberal type. In terms of benefit and service coverage, it resembles the social-democratic type. However, if one considers workplace-related status differentials in benefit provision, as well as the preference for a social insurance based system, then the welfare system is closer to the corporatist type. The important role of the family in welfare provision makes the system similar to the Mediterranean type.

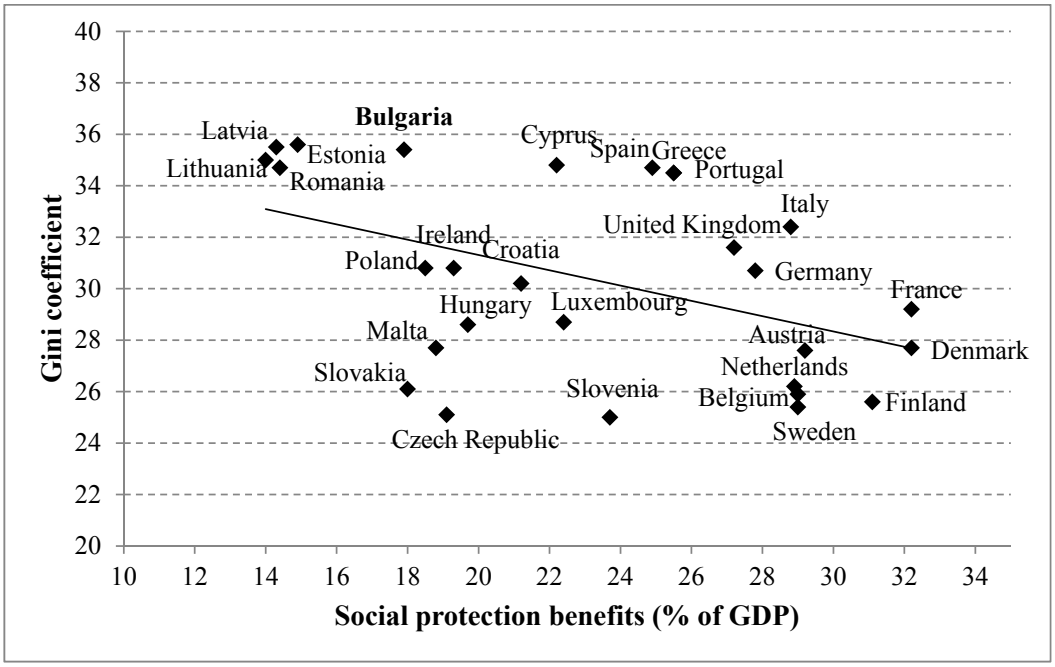
It is a common view and an established empirical finding that countries that spend more on social protection have lower levels of income inequality and poverty. Although there are a variety of factors affecting income distribution, higher social spending reflects the capacity of a country to influence the level of inequality. As seen in Figure 3, Bulgaria and Romania, along with the Baltic countries, spend the least on social protection and also have the highest levels of income inequality in the EU by Gini coefficient. On the contrary, countries such as Denmark and Finland, where social protection benefits as a percentage share in GDP are the highest, have significantly lower income disparities.

Figure 2: Structure of social protection benefits by function in Bulgaria, 2014



Source: Eurostat

Figure 3: Social protection benefits (% of GDP) and income inequality in the EU, 2014



Source: Eurostat

Besides having one of the highest levels of income inequality in the EU, Bulgaria also faces adverse demographic trends (an aging population, negative population growth and a high mortality rate), structural unemployment, low labor force participation ratio and substantial regional social and economic disparities. Addressing these problems is of vital importance with respect to promoting sustainable development and inevitably brings up the question of the type of social policy instruments that would be most appropriate to achieve this goal. These issues are of far more than just academic interest and have significant practical implications, which are also evident in the National program for development of Bulgaria until 2020. Tackling poverty, inequality and social exclusion are some of its main priorities, which focus on providing sustainability and adequacy of social transfers, as well as active labor market polices.

4. METHODOLOGY

The data used for the empirical research were drawn from household budget surveys compiled by the National Statistical Institute. We use average per capita total household income by sources and decile groups for the period 2000-2014. The data on social transfers are grouped into four main categories: unemployment benefits, pensions, family allowances and "other social benefits". The latter includes sickness and healthcare benefits, disability benefits, housing and heating allowances, last resort social assistance and numerous other small benefits.

The methodology is based on Pyatt, Chen and Fei (1980), who have proposed one of the most extensively used methods for income inequality decomposition by factor components. As illustrated by the authors, overall inequality depends on the differentiation of each income source, the extent of correlation between the income of each source and total income and the share of each income source in total income.

In order to estimate the inequality of distribution of the various social transfers and their impact on overall income inequality, we use concentration curves. These curves show the distribution of a certain social transfer when recipients are ranked by total income. When the concentration curve of a social transfer is above the Lorenz curve, this type of transfer reduces income inequality. The further the concentration curve is above the Lorenz curve, the stronger the inequality-decreasing effect. Conversely, if the concentration curve is below the Lorenz curve, this type of transfer contributes to an increase in income inequality. If the concentration curve crosses the Lorenz curve, the social transfer has a mixed impact on overall income inequality, i.e. in some segments of the income distribution it has an equalizing effect and in others it promotes greater inequality (Bishop and Formby 1994).

From a concentration curve a concertation coefficient can be obtained. It has the following formula:

$$C\left(\frac{z}{t}\right) = \frac{2cov\left(z, r(t)\right)}{n\bar{z}}$$

where $C\ (z/t)$ is the concentration coefficient, z is the amount of a certain social transfer, $\bar{z}$ is its mean, t is total income, $cov(z,r(t))$ is the covariance between z and the ranking of the recipient according to total income $(r(t))$ and n is the number of observations.

The concentration coefficient shows how evenly a social transfer is distributed over total income. It ranges from -1 when all transfers are received by the poorest individual through 0 when all individuals receive the same amount of transfer, to 1 when all transfers are received by the richest individual. When the concentration coefficient is 0, the concentration curve coincides with the 45° line of perfect equality. When the concentration coefficient is lower than the Gini coefficient, this type of transfer reduces income inequality and the concentration curve is located above the Lorenz curve. Conversely, when the concentration coefficient of a social transfer is larger than the Gini coefficient, it has an inequality-increasing effect and the concentration curve lies below the Lorenz curve. Furthermore, the concentration coefficient can take negative values, which suggest that the social transfer has not only an inequality-reducing effect, but that it is also more concentrated among the poorest individuals.

Next, by using the concentration coefficients, we calculate the elasticity of the Gini coefficient with respect to a proportional change in each social transfer:

$$E_i = S_i . g_i - S_i$$

where E_i is the elasticity of the Gini coefficient with respect to social transfer i, S_i is the share of social transfer i in total income, and g_i is the relative concentration coefficient of social transfer i. The latter is calculated as a ratio between the concentration coefficient of social transfer i and the overall Gini coefficient:

$$g_i = \frac{C_i}{G}$$

If g_i is greater (or lower) than 1, ceteris paribus, an equiproportionate increase in social transfer i will cause an increase (or decrease) in aggregate inequality. As for elasticity, if it is greater than 0, an increase in social transfer i is associated with an increase in income inequality. If $E_i < 0$, social transfer i mitigates income inequality.

5. EMPIRICAL RESULTS

For the purposes of studying the distributional effects of the various types of social transfers, first we examine the distribution of each transfer by decile group. As illustrated in Table 1, the most unevenly allocated transfers are family allowances: 27.1% of them are concentrated in the poorest decile, whereas the richest decile receives only 3.3%. "Other social benefits" are also unequally distributed but in favor of the richest income group, which receives 29% of this type of transfer against only 6% for the poorest decile. The social transfers with the most equal distribution are unemployment benefits.

Next, we continue with a calculation of the shares of each transfer in total income by decile group. As illustrated in Table 2, social transfers in general have the greatest importance for the four poorest deciles (their shares in total income range between 45.5% and 46.4%). On the contrary, social transfers are only 12.4% of the total income of the richest decile. When looking at the importance of the different types of social transfers, it is evident that pensions have the highest share in total income for all decile groups. For most deciles unemployment benefits have the lowest share in total income, followed by family allowances.

Table 1: Distribution of social transfers by decile groups, 2014 (%)

Types of social transfers	Decile groups									
	1	2	3	4	5	6	7	8	9	10
Pensions	3.3	7.6	9.8	11.3	12.3	12.2	11.9	11.6	11.2	8.9
Unemployment benefits	8.7	12.5	7.2	7.2	8.7	11.8	12.9	11.4	11.4	8.0
Family allowances	27.1	15.1	12.2	11.1	8.7	8.5	7.1	3.5	3.5	3.3
"Other social benefits"	6.0	5.7	6.6	8.5	7.3	8.5	11.2	9.5	7.7	29.0
Total transfers	4.3	7.8	9.6	11.0	11.7	11.8	11.7	11.2	10.7	10.2

Source: Authors' calculations based on data from "Household budgets in the Republic of Bulgaria" (2014), National Statistical Institute

Table 2: Social transfers as a percentage of total income by decile groups, 2014

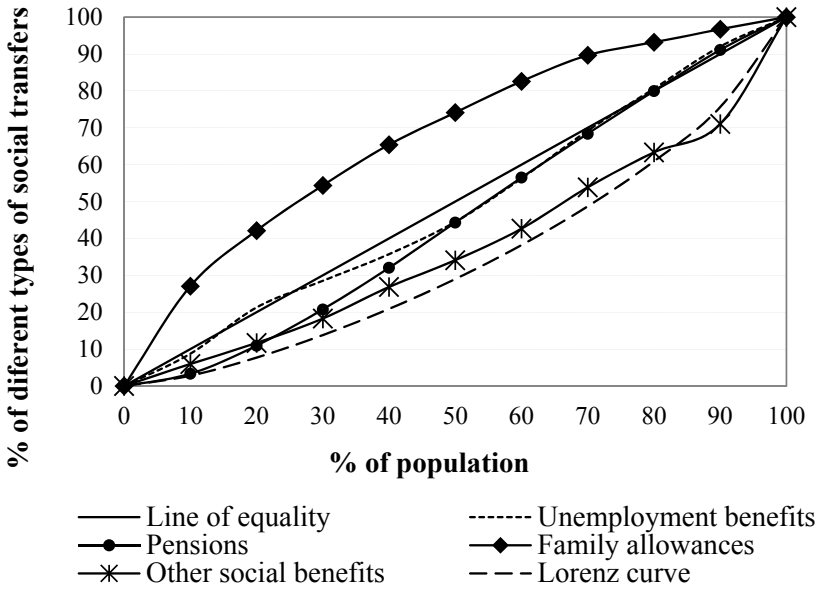
Types of social transfers	Decile groups									
	1	2	3	4	5	6	7	8	9	10
Pensions	30.8	39.7	41.2	40.8	39.1	34.3	29.2	24.6	19.6	9.4
Unemployment benefits	1.7	1.4	0.6	0.6	0.6	0.7	0.7	0.5	0.4	0.2
Family allowances	8.6	2.7	1.8	1.4	1.0	0.8	0.6	0.3	0.2	0.1
"Other social benefits"	4.8	2.6	2.4	2.7	2.0	2.1	2.4	1.8	1.2	2.7
Total transfers	45.9	46.4	46.1	45.5	42.7	37.9	32.9	27.1	21.4	12.4

Source: Authors' calculations based on data from "Household budgets in the Republic of Bulgaria" (2014), National Statistical Institute

In order to quantify the distributional effects of the different types of social transfers, we turn to the income inequality decomposition technique described in the previous section. Figure 4 shows the concentration curves of all social transfers, as well as the Lorenz curve.

All concentration curves (with the exception of "other social benefits") are above the Lorenz curve, which suggests that social transfers mitigate income inequality. This effect is the strongest in the case of family allowances as seen from the position of their curve, which lies at the highest distance from the Lorenz curve. This effect is due to the fact that family allowances are concentrated mostly in the poorest deciles. Conversely, "other social benefits" exert the weakest inequality-reducing impact, as their concentration curve is the most closely located with respect to the Lorenz curve. However, it should be noted that in the last decile this concentration curve falls below the Lorenz curve, which means that in this segment of the distribution "other social benefits" deepen income inequality. This could be explained by the higher share of the richest decile in this type of social transfer (29%) than their corresponding share in total income (24.4%). As for pensions and unemployment benefits, they are the most equally distributed as shown by the proximity of their concentration curves to the line of equality, suggesting the lack of a strong pro-poor distributional effect. This finding could be explained by the insurance-based nature of these two types of

Figure 4: Concentration curves of different types of social transfers, 2014



Source: Authors' calculations based on data from "Household budgets in the Republic of Bulgaria" (2014), National Statistical Institute

transfers, which aim at maintaining previous status and income rather than redistributing from the rich to the poor.

In order to examine how the distributional effect of social transfers changes over time we calculate their concentration coefficients for the period 2000-2014.

As Table 3 shows, the concentration coefficients of all social transfers in all years are lower than the corresponding Gini coefficients, which suggests that all types of transfers mitigate income inequality. However, this effect is most pronounced in the case of family allowances as confirmed by their negative concentration coefficient. As seen by its change within the examined period, the inequality-reducing impact of this type of transfer gets stronger over time. Unemployment benefits also mitigate income inequality, but their effect weakens as shown by the change in the sign of their concentration coefficient. As for pensions, their concentration coefficient decreases over time, which means that they become more equally distributed among decile groups. Conversely, the concentration coefficient of "other social benefits" increases, suggesting that their inequality-reducing impact weakens and that they tend to favor mainly the higher income groups of the population.

The results discussed above show that all social transfers play a role in alleviating income inequality, but to estimate the strength of their influence we calculate the elasticity of the Gini coefficient with respect to each social transfer.

As shown in Table 4, the elasticities of all social transfers have negative signs, meaning that an increase in any would lead to a reduction in income inequality. The overall inequality-decreasing effect of social transfers becomes more pronounced over time as suggested by the increase of their elasticities (in absolute terms). The results for 2014 show that a 10% increase in total social transfers would lead to a decline

Table 3: Concentration coefficients of social transfers, 2000-2014

Types of social transfers	Concentration coeffcicients							
	2000	2002	2004	2006	2008	2010	2012	2014
Pensions	0.147	0.148	0.152	0.098	0.048	0.145	0.077	0.085
Unemployment benefits	-0.031	-0.058	-0.193	-0.121	-0.094	-0.145	0.045	0.026
Family allowances	-0.053	-0.139	-0.225	-0.222	-0.226	-0.236	-0.265	-0.350
"Other social benefits"	0.018	0.132	0.228	0.157	0.208	0.169	0.251	0.244
Total transfers	0.126	0.133	0.141	0.091	0.059	0.131	0.078	0.083
Gini coefficient	0.310	0.342	0.339	0.304	0.295	0.291	0.312	0.304

Source: Authors' calculations based on data from "Household budgets in the Republic of Bulgaria" (2000-2014), National Statistical Institute

Table 4: Share in total income (%) and elasticities of social transfers, 2000-2014

Types of social transfers	2000	2002	2004	2006	2008	2010	2012	2014
	Share in total income (%)							
Pensions	21.4	20.1	22.2	22.6	23.2	30.9	26.7	25.8
Unemployment benefits	1.1	0.8	0.4	0.4	0.2	0.6	0.7	0.5
Family allowances	0.8	0.5	0.7	0.7	0.7	0.9	0.8	0.9
"Other social benefits"	1.2	1.6	1.6	2.0	3.1	1.8	1.9	2.3
Total transfers	24.5	23.0	24.8	25.6	27.1	34.3	30.0	29.5
	Elasticity							
Pensions	-0.113	-0.114	-0.122	-0.154	-0.194	-0.156	-0.201	-0.186
Unemployment benefits	-0.012	-0.010	-0.007	-0.005	-0.002	-0.009	-0.006	-0.005
Family allowances	-0.009	-0.007	-0.011	-0.012	-0.012	-0.016	-0.015	-0.019
"Other social benefits"	-0.011	-0.010	-0.005	-0.010	-0.009	-0.008	-0.004	-0.004
Total transfers	-0.146	-0.141	-0.145	-0.180	-0.217	-0.189	-0.225	-0.214

Source: Authors' calculations based on data from "Household budgets in the Republic of Bulgaria" (2000-2014), National Statistical Institute

in income inequality by 2.14%.

Pensions exert the strongest inequality-decreasing effect, as their elasticity is the highest in absolute value. Based on data for 2014, if the amount of pensions rises with 10%, income inequality would decrease by 1.86%. Furthermore, their influence deepens over time despite the lack of pro-poor targeting. This is due to the fact that pensions have the highest share in total income and this share also experiences the most significant increase under the examined period (from 21.4% in 2000 to 25.8% in 2014) due to the aging of the population.

Compared to pensions, the elasticities of the other social transfers are significantly lower, suggesting that their inequality-reducing effect is weaker. For example, the elasticity of unemployment benefits in 2014 is -0.005, meaning that if they increase by 10%, overall income inequality would be reduced by 0.05%. The decrease of the elasticity of this transfer (in absolute terms) from 2000 to 2008 shows that its impact diminishes over time. This could be explained by the declining share of unemployment benefits in total income (from 1.1% in 2000 to 0.2% in 2008) during the pre-crisis period of macroeconomic stability, high economic growth and lowering unemployment rate. In the years following the economic crisis the share of unemployment benefits in total income rises and their concentration coefficient turns positive, which together explain the slight increase in their elasticity.

The elasticity of "other social benefits" varies within a similar range as unemployment benefits. The results for 2014 show that an increase in "other social benefits" by 10% would cause a reduction of the Gini coefficient by 0.04%. This type of social transfer has the weakest inequality-reducing effect, which is due to its higher concentration towards the richest decile and its increasing share in total income.

As for family allowances, the results for 2014 suggest that if this transfer increases by 10% it would lead to a reduction in income inequality by 0.19%. Moreover, their elasticity shows an upward trend (in absolute terms). This strengthening of the inequality-decreasing effect of family allowances is due to their pro-poor distribution, which also becomes more pronounced over time. It is worth noting that family allowances exert this influence despite the fact that their share in total income is stable during the examined period. The pro-poor distributional effect of family allowances is explained by the fact that they are means-tested and are targeted towards individuals whose income is below a certain level. However, it is worth noting that although family allowances have the largest share in social assistance programs and the highest number of beneficiaries, their efficiency has been subject to criticism. The main arguments regarding this relate to the lack of differentiation of family allowances with regard to social status and financial situation, as well as their formal nature and loose control - less than 1% of the monthly allowances are suspended because of lack of regular school attendance (Institute for Market Economics 2015). Therefore, if measures are undertaken to tackle these problems, the pro-poor distributional effect of family allowances revealed above could be even higher, contributing to a stronger inequality-reducing effect and in the end to an improved efficiency for this type of social assistance.

A key task of an efficient social protection system is enabling individuals to quickly leave the programs they benefit from, rather than just achieving a sustained and long-term mitigation of the negative consequences of social exclusion. This brings up the question of whether the social protection system stimulates beneficiaries to start a job or creates disincentives for work. This problem is particularly relevant for the lowest income groups, where unemployment benefits and social assistance payments have the highest importance - in 2014 they constitute 15% of the total income of the poorest decile in contrast to only 3% for the richest. Moreover, the past and potential future earnings of the lowest income deciles are very often likely to be lower than currently received social transfers. This serves as a disincentive for starting a job and creates unemployment traps. Therefore, although social transfers have an inequality-decreasing effect, their provision should be accompanied by relevant active labor market policies.

6. CONCLUSION

The paper explores the distributional effects of different types of social transfers in Bulgaria in the period 2000-2014, using an income inequality decomposition method. The main empirical finding is that social transfers mitigate income inequality, which is in line with the results from previous studies for other countries. Looking at the distributional effects of each social transfer provides a more detailed picture of the role that the social protection system plays in inequality reduction. While pensions and unemployment benefits are the most equally distributed among deciles, family allowances are increasingly pro-poor and "other social benefits" are highly concentrated towards the richest decile. With regard to the strength of the inequality-reducing effect, pensions exert the strongest influence due to their significant share in total income, which also rises over time. As for family allowances,

which have the highest share in social assistance benefits, they are pro-poor in nature, but because of their small share in beneficiaries' total income, their impact on overall inequality is much weaker.

It has to be noted that despite the revealed inequality-reducing effect of social transfers, they have to be used with caution as a social policy tool for tackling income disparities. Taking into account some important country-specific factors such as limited resources for social protection, fiscal discipline considerations, an aging population and low economic activity, it becomes clear that public discussions cannot focus on social transfers as the only remedy for high income inequality. Their use should be accompanied by the implementation of crucial active labor market policies, such as increasing labor force participation and the quality of human resources. Furthermore, efforts should be directed towards achieving better targeting of social transfers, since this would lead to an improved efficiency and a stronger inequality-reducing effect of the social protection system. Given the findings of the paper, future research in the field of social policy in Bulgaria might focus on exploring whether the redistributive outcomes of various social transfers are offset by possible behavioral disincentive effects.

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IS REAL DEPRECIATION OR MORE GOVERNMENT DEFICIT EXPANSIONARY? THE CASE OF SLOVENIA

Yu Hsing

Abstract

The purpose of this paper is to examine the impacts of the real exchange rate, the government deficit and other relevant variables on aggregate output in Slovenia. Few of the previous studies have applied the AD/AS model to examine the impacts of major macroeconomic variables on aggregate output. This paper makes contributions to the literature by applying a rigorous model to examine how real GDP is affected by the real exchange rate, fiscal policy and other related variables. The exponential GARCH model is applied in empirical work. The paper finds that real depreciation of the Euro may affect Slovenia's aggregate output positively or negatively and that more central government deficit as a percent of GDP does not affect aggregate output. In addition, Slovenia's aggregate output is positively associated with the real stock price, the real oil price and real total labor cost or wage and is negatively influenced by the real lending rate and the expected inflation rate. Recent real depreciation of the Euro would help Slovenia's aggregate output whereas expansionary fiscal policy would not be effective in stimulating the economy.

Keywords: *exchange rates, government deficits, interest rates, stock prices, labor cost*

JEL classification: *F31, E62*

1. INTRODUCTION

The Slovenian economy shows strengths and weaknesses. The economic growth rate of 2.9% in 2015 was higher than the EU average of 2.0%. Employment grew 0.86% from 797.792 thousand in 2014 to 804.637 thousand in 2015. The unemployment rate continued to decline from a recent high of 10.1% in 2013 to a low of 9.0% in 2015, which was slightly lower than the average unemployment rate of 9.4% in the European Union. International trade has improved as evidenced by a trade surplus of 2,031 million Euro in 2015 from a recent trade deficit of 610 million Euro in 2011, suggesting that its export sector became more competitive globally. The negative inflation rate of -0.8% in 2015 preserved the value of the Euro and consumer buying power. Holding other factors constant, recent depreciation of the Euro from US$1.4708 per Euro in 2008 to US$1.1095 per Euro in 2015 is expected to stimulate exports but raise import costs. The relatively low government bond yield of 1.71% in 2015 was slightly higher than the EU average of 1.44% and made the borrowing less costly. The 2.9% government

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budget deficit as a percent of GDP in 2015 met the 3.0% Maastricht criterion whereas the 81.7% central government debt as percent of GDP in 2015 was well above the 60% Maastricht criterion. (Sources of data: The Bank of Slovenia, Eurostat, International Financial Statistics). The International Monetary Fund (2016) provides an assessment of Slovenia's macroeconomic policy and economic performance.

This paper attempts to analyze whether real depreciation of the Euro is expansionary or contractionary for Slovenia. To the author's best knowledge, few of the previous studies have applied the aggregate demand and aggregate supply model to examine the impact of real depreciation of the Euro on aggregate output in Slovenia. Moreover, this is the only study which in its specification takes into account aggregate demand and aggregate supply. Other relevant variables such as the government deficit, the real interest rate, the real stock price, real labor cost, etc. will be considered in the model as well.

The paper is structured in the following manner. The background is described in the second section. Literature review is presented in the third section. The model is presented in the fourth section. The data are described in the fifth section. A discussion of findings and results is presented in the sixth section. Summary and conclusions are made in the last section.

2. BACKGROUND

Since the adoption of the Euro in 2007, Slovenia has conducted monetary policy based on the guidelines of the European Central Bank. The Bank of Slovenia relies on the main refinancing operations to provide liquidity to banks, the marginal lending facility to offer banks overnight loans, and the deposit facility for bank to make overnight deposits.

Slovenia pursued a managed floating exchange rate regime during 1991-2001, a crawling band during 2002-2004, joined ERMII during 2005-2006, and has adopted the Euro since 2007. As the European Central Bank adopts a free floating exchange rate system, significant depreciation or appreciation of the Euro is expected to affect Slovenia's exports, imports, domestic prices, inflation, and international capital flows.

Generous pensions, preferential tax treatment of pensions, early retirement age, rising healthcare costs, lack of a broad-based property tax, the high cost of recapitalization of state-owned banks, continuing budget deficits, etc. have increased government debt fourfold during 2008-2015. Fiscal adjustment programs are needed to reduce rapidly rising government debt.

The slow process of privatization of state-owned enterprises, a high financial leverage of small and medium enterprises, low interest margins, low lending volume, slow process of the reduction of bank nonperforming loans are expected to slow economic growth and increase financial instability. (International Monetary Fund 2016)

3. LITERATURE REVIEW

There have been major studies of the impacts of the exchange rate, fiscal policy and other relevant variables on aggregate output for Slovenia. Hsing (2009) reveals that real depreciation causes the trade balance in Slovenia to deteriorate in the short run and long run and that there is lack of support for a J-curve in Slovenia. Audzei and Brázdik (2015) find that the contribution of real exchange rate shocks to output in Slovenia is 12% in the short run and 15% in the long run and that the real exchange rate can be regarded as a shock-absorbing factor. Stavárek and Miglietti (2015) show that the real effective exchange rate and output in Slovenia have a weak correlation and that the role of the exchange rate in explaining the variation in economic fundamentals may be limited.

Josheski and Eftimoski (2016) report that real appreciation raises output. Hence, real depreciation is contractionary and is not recommended. In addition, more world output, a lower world interest rate, a lower inflation rate raises output whereas the coefficient of government spending as a percent of GDP is insignificant, suggesting the Ricardian equivalence hypothesis may be valid.

Karadam and Özmen (2016) indicate that real depreciation is contractionary for developing countries with high external debt and expansionary for advanced countries and that a high degree of trade openness strengthens the contractionary impact of real depreciation.

Kramolišová and Spáčilová (2015) find a strong negative relationship between the growth rate and the debt-to-GDP ratio for 27 EU countries during 2001-2007. Combes, Minea, Mustea and Yogo (2016) find that government spending multipliers are positive but relatively low, vary across countries, and are sensitive to other factors such as fiscal standing, exchange rate regimes, the stage of economic development, and the degree of openness. Gyódi (2016) shows that sovereign debt risk affects macroeconomic variables significantly, that sovereign credit ratings affect government bond yields significantly, and that there was regional contagion during the debt or financial crisis. Papaioannou (2016) indicates that more government spending has a significant positive

impact on economic growth if the real interest rate is negative. Globan and Matošec (2016) argue that stimulating economic growth is a better way to solve the high debt-to-GDP problem and that a country would pay a high price for unsustainable public debt. Bökemeier and Stoian (2016) examine the debt ratios for 10 CEEC countries during 1997-2013. For Slovenia, the current debt ratio was below the sustainable debt ratio, but the gap became small due to the increase the debt ratio after the global financial crisis. They also find that the debt-to-GDP ratios in 2015 for Bulgaria and Romania were not sustainable whereas the other 8 countries had sustainable debt-to-GDP ratios.

4. THE MODEL

The aggregate demand and aggregate supply model is a major macroeconomic tool to analyze the potential impact of a change in one of the exogenous variables such as the exchange rate, fiscal policy, supply shocks, etc. on the equilibrium real GDP (Romer 2000; Mishkin 2012; Hubbard, O'brien, and Rafferty 2014). The exogenous variables considered are determined by economic theory, country economic conditions, data availability, and other factors. We specify that aggregate demand in Slovenia is determined by the inflation rate, government spending, government tax revenue, the real interest rate, the real stock price, and the real effective exchange rate and that short-run aggregate supply is a function of the inflation rate, the real oil price, real total labor cost and the expected inflation rate. We can express the aggregate demand and short-run aggregate supply functions as:

$$Y^d = f(\pi, G, T, R, S, \varepsilon) \tag{1}$$

$$Y^s = h(\pi, E, W, \pi^e) \tag{2}$$

where

- Y^d = aggregate demand,
- π = the inflation rate,
- G = government spending,
- T = government tax revenue,
- R = the real interest rate,
- S = the real stock price,
- ε = the real effective exchange rate,
- Y^s = short-run aggregate supply,
- E = the real oil price,
- W = real total labor cost, and
- π^e = the expected inflation rate.

In equilibrium, $Y^d = Y^s$. Solving for the two endogenous variables, Y and π, we have the equilibrium real GDP:

$$\overline{Y} = w(\varepsilon, G - T, R, S, E, W, \pi^e) \tag{3}$$

The sign beneath each of the exogenous variables shows the impact of a change in the exogenous variable on the equilibrium real GDP. We expect that the equilibrium real GDP has a positive relationship with the real stock price, a negative relationship with the real interest rate and the expected inflation rate and an unclear relationship with the real effective exchange rate, the government deficit, the real oil price and the real total labor cost.

Whether real exchange rate depreciation would increase or reduce aggregate output has been investigated extensively. Real depreciation tends to make domestic-made goods and services cheaper and more competitive globally, increase exports, and shift aggregate demand upward. On the other hand, real depreciation tends to make imports more costly, raise domestic inflation, and shift the short-run aggregate supply curve leftward. The net effect of real depreciation on aggregate output is unclear and needs to be found empirically. There have been several studies on the impact of real depreciation on aggregate output in selected Eastern and Southeastern European countries. Mills and Pentecost (2001) show that real appreciation may increase, reduce or not affect real output in different countries in the long run. Mitchell and Pentecost (2001) reveal that devaluations reduce real output in the short run and long run. Miteza (2006) finds that devaluations cause real output to decline in the long run. Bahmani-Oskooee and Kutan (2008) report that real depreciation may increase, reduce or not affect real output in different countries in the short run and has no long-term effect on real output.

Empirical studies on the impact of the government deficit/debt on real output are inconclusive. The Ricardian equivalence hypothesis (Barro 1974, 1989) suggests that the effect of deficit- or debt-financed government spending is neutral in the long run. Feldstein (1982), Hoelscher (1986), Cebula (1997), Cebula and Cuellar (2010), Cebula (2014a, 2014b), Cebula, Angjellari-Dajci, and Foley (2014) and others maintain that more government deficit/debt raises real interest rates and tends to crowd out spending by households and businesses. However, studies by McMillin (1986), Gupta (1989), Darrat (1989, 1990), Findlay (1990), and Ostrosky (1990) argue that more government deficit/debt would not raise the interest rate.

A higher real oil price due to a negative supply shock would shift the short-run aggregate supply

curve to the left. On the other hand, if a higher real crude oil price is caused by a demand shock, it would shift the aggregate demand curve to the right. Hence, the net impact is uncertain (Hamilton 1996; Kilian 2008a, 2008b).

A higher real labor cost is expected to shift short-run aggregate supply to the left due to a higher production cost. On the other hand, a higher real total labor cost or wage tends to increase labor productivity, consumption spending, aggregate demand and real GDP. Real wages and output may be pro-cyclical or counter-cyclical. Hence, the sign of real total labor cost is unclear (Abraham and Haltiwanger 1995; Mills and Pentecost 2001; Miteza 2006; Narayan and Smyth 2009; Castle and Hendry 2014; Spencer 2015).

5. THE DATA

The data were collected from the Bank of Slovenia, the *Eurostat* by the European Commission and IMF's *International Financial Statistics* (2007). Real GDP is measured in million Euro. An increase in the real effective exchange rate means real appreciation, and vice versa. The deficit variable is measured as central government deficit a percent of GDP. The real lending rate is the difference between the nominal lending rate and the expected inflation rate. The real stock price is equal to the equity price adjusted for the consumer price index. Real total labor cost is measured as nominal total labor cost divided by the consumer price index. The expected inflation rate is calculated as the average inflation rate of the past four quarters. Except for the real lending rate, the government deficit as a percent of GDP and the expected inflate rate with negative values, other variables are measured on a log scale. The sample ranges from 2003.Q1 to 2015. Q4. The data for the lending rate are not available before 2003.Q1.

An analysis of the data (Figure 1) shows that the relationship between real GDP and the real effective exchange rate seem to exhibit a positive relationship during 2003.Q1 – 2008.Q3 and a negative relationship during 2008.Q4 – 2015.Q4. Hence, a binary variable is created with a value of one during 2008.Q4 – 2015. Q4 and zero otherwise. An interactive term and an intercept binary variable are added to the estimated regression (Gujarati and Porter 2009). Figure 2 reveals that it is unclear whether real GDP and the government deficit as a percent of GDP display a positive or negative relationship during the sample period.

Figure 1: Scatter Diagram between Real GDP (RGDP) and the Real effective Exchange Rate (REER)

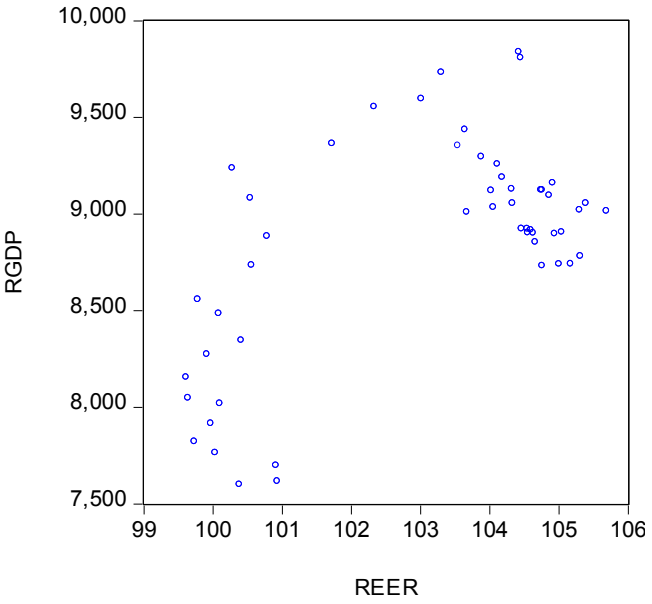
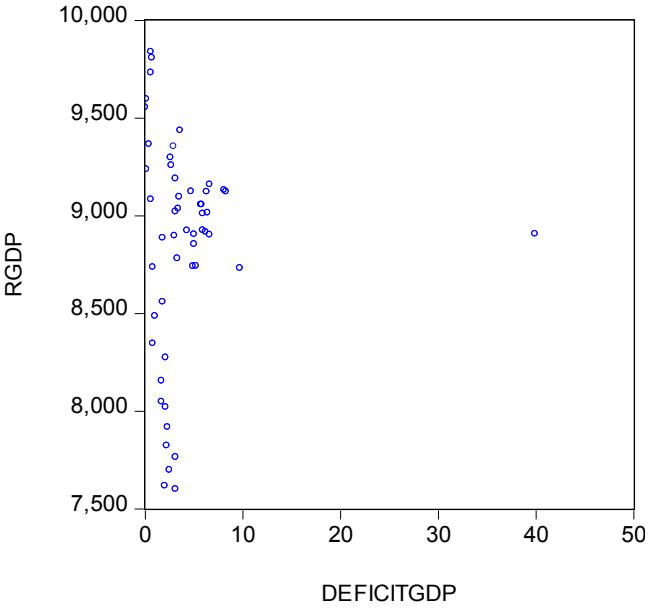


Figure 2: Scatter Diagram between Real GDP (RGDP) and government deficit as a percent of GDP (DEFICITGDP)



Due to the dynamic relationships between real GDP and the real effective exchange rate in Figure 1, the regression to be estimated is given by:

$$\overline{Y} = x(\varepsilon, \varepsilon \times B, B, G-T, R, S, E, W, \pi^e) \quad (4)$$

where B is the binary variable defined above.

6. DISCUSSION OF FINDINGS AND RESULTS

The DF-GLS test on the regression residuals is applied to determine whether these time series variables are cointegrated because cointegration of the residuals suggests that these time series variables have a long-term stable relationship. The DF-GLS test is an augmented Dickey–Fuller (ADF) test except that the time series is transformed via a generalized least squares (GLS) regression before performing the test. Elliott, Rothenberg, and Stock (1996) have shown that this test has significantly greater power than the previous versions of the augmented Dickey–Fuller (ADF) test. In the test equation with the trend and intercept, the value of the test statistic is estimated to be -3.5811, which is greater than the critical value of -2.6111 at the 1% level in absolute values. Therefore, these time series variables have a long-term stable relationship.

The estimated regression and relevant statistics are reported in Table 1. The EGARCH method is employed to estimate the variance equation and regression parameters. The advantage of EGARCH model is that the parameters in the variance equation have less restrictions. The right-hand side variables can explain approximately 94.57% of the variation in Slovenia's real GDP. Except that the coefficient of G - T, all other coefficients are significant at the 1% level. Real GDP in Slovenia has a positive relationship with ε during 2003.Q1 – 2008.Q3, S, E, and W and a negative relationship with ε during 2008.Q4 – 2015.Q4, R and π^e. These results suggest that real appreciation of the Euro raised real GDP during 2003.Q1 – 2008.Q3 but reduced real GDP during 2008.Q4 – 2015.Q4. In percent terms and absolute values, ε during 2003.Q1 – 2008.Q3 has the largest impact. The relatively low mean absolute percent error of 1.0395% suggests that the estimated regression performs relatively well in forecasting. The relatively low value of the Theil inequality coefficient also implies that the estimated regression fits the sample data relatively well.

If the negative significant coefficient of the real effective exchange rate during 2008.Q4 – 2015.Q4 continues to hold into the future, real depreciation of the

Table 1: Estimated regression of log(real GDP) in Slovenia

Variable	Coefficient	z-Statistic	P-value
Intercept	-3.781310	-108.2331	0.0000
Log(ε)	2.626894	797.6275	0.0000
Log(ε) x B	-5.211625	-9.673728	0.0000
B	24.20720	9.660977	0.0000
(G – T)	-9.18E-05	-0.384498	0.7006
R	-0.007946	-3.596307	0.0003
Log(S)	0.073492	8.299237	0.0000
Log(E)	0.041185	4.591706	0.0000
Log(W)	0.058848	3.994484	0.0001
π^e	-0.013156	-6.832947	0.0000
R-squared	0.945720		
Adjusted R-squared	0.934088		
Akaike info criterion	-5.416691		
Schwarz criterion	-4.966404		
MAPE	1.039537%		
Theil inequality coefficient	0.008874		
Sample period	2003.Q1–2015.Q4		
Number of observations	52		
Methodology	EGARCH		

Notes: Except for the coefficient of the central government deficit as a percent of GDP, all other coefficients are significant at the 1% level.
2.626894 is the estimated slope coefficient during 2003.Q1 – 2008.Q3.
G – T: The government deficit is measured as a percent of GDP.
EGARCH stands for the exponential GARCH model.
MAPE is the mean absolute percent error.
The Theil inequality coefficient ranges between 0 and 1. A value of 0 means perfect fit.

Euro would reduce Slovenia's aggregate output. The negative and insignificant coefficient of the government deficit as a percent of GDP suggests that a sustainable increase in the government deficit as a percent of GDP may not be harmful to economic growth. The positive significant coefficient of the real stock price shows that an increase in real stock values would raise household wealth, household consumption spending, and real GDP. The positive and significant coefficient of real total labor cost indicates that the positive effect of a higher real labor cost or wage such as higher labor productivity or more consumption spending outweighs the negative effect of a higher real labor cost or wage during the sample period.

In comparison, this paper finds that the real effective exchange rate has significant impacts on real GDP whereas Stavárek and Miglietti (2015) reveal that the correlation of real GDP and the real effective exchange rate is weak. This study shows that the real effective exchange rate may increase or reduce real GDP depending upon the time periods whereas Josheski and Eftimoski (2016) find that real appreciation raises real GDP and that real depreciation is not recommended. This paper finds that government deficit spending is insignificant. Josheski and Eftimoski (2016) also report that the coefficient of government consumption spending is insignificant.

7. SUMMARY AND CONCLUSIONS

This paper has examined the effect of real depreciation of the Euro, fiscal policy and other relevant variables on Slovenia's aggregate output based on aggregate demand and aggregate supply analysis. A reduced form equation is estimated by the EGARCH model. Real appreciation of the Euro is found to have different effects on real GDP during different time periods. Real appreciation of the Euro raised real GDP during 2003.Q1 – 2008.Q3 but reduced real GDP during 2008.Q4 – 2015.Q4. Central government deficit as a percent of GDP did not affect real GDP. In addition, a lower real lending rate, a higher real stock price, a higher real oil price, a higher real total labor cost or wages or a lower expected inflation rate is expected to increase real GDP.

There are policy implications. To promote economic growth, the Slovenian government needs to pursue fiscal prudence, hold the real interest rate low, maintain a healthy financial and stock market, and reduce inflation expectations. Different impacts of real appreciation of the Euro before and after 2008.Q4 suggest that the global financial crisis beginning in 2008 may have caused the Euro exchange rate to have a significant structural break on real GDP. The insignificant coefficient of the government deficit as a percent of GDP implies that expansionary fiscal policy may not be an effective macroeconomic tool to stimulate the economy. The Euro exchange rate and the oil price are external factors and need to be monitored closely.

A limitation of the paper is the relatively short sample period of 2003.Q1-2015.Q4. Hence, once new data become available, the regression may need to be re-estimated to determine whether estimated coefficients may change. Future research may consider the impact of labor productivity on real GDP.

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EVALUATING THE USE OF PERSONAL NETWORKS TO CIRCUMVENT FORMAL PROCESSES: A CASE STUDY OF *VRUZKI* IN BULGARIA

Colin C. Williams, Junhong Yang

Abstract

The aim of this paper is to evaluate the prevalence and distribution of the use of personal connections to circumvent formal procedures by soliciting favours for and from others, known as vruzki, and how this can be explained and tackled. Reporting data from 2,005 face-to-face interviews conducted in late 2015 in Bulgaria, the finding is that 30 per cent of respondents had used vruzki in the 12 months prior to the survey, particularly when accessing medical services and finding a job. Estimating a logit model and then calculating the marginal effects, the population groups significantly more likely to have used vruzki are those whose norms, values and beliefs are not in symmetry with the formal laws and regulations, perceiving the penalties and detection risks as higher, those reporting their financial situation as very comfortable, and the highest income groups, but also younger people, the unemployed, and those living in larger households. The paper concludes by discussing the theoretical and policy implications along with the future research required.

Keywords: *informal sector; corruption; cronyism; nepotism; Bulgaria; South-East Europe*

JEL classification: *H26, J46, K34, K42, O17*

INTRODUCTION

The use of personal connections to circumvent formal procedures by soliciting personal favours for and from others prevails in all societies to varying degrees. This is known as *guanxi* in China (Chen et al. 2011, 2013; Luo 2011; Yang and Wang 2011), *wasta* in the Arab world (Smith et al. 2011), *jeitinho* in Brazil (Ardichvili et al. 2010; Ferreira et al. 2012), 'pulling strings' in English speaking countries (Smith et al. 2012), *blat* in post-Soviet spaces (Ledeneva 2008, 2009, 2013), *vrski* in FYR Macedonia, *veze* in Serbia, Croatia, and Bosnia and Herzegovina, and *vruzki* in Bulgaria. The reason this practice is important to study is because it hinders the development of meritocratic processes and results in the persistence of cronyism, nepotism and corruption. The aim of this paper is to contribute to the advancement of knowledge on this practice by evaluating the prevalence and distribution of *vruzki* in Bulgaria and discusses how it can be explained and tackled. Until now, no known empirical studies have been undertaken of *vruzki*. The intention in this paper is to start to fill this gap.

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In the first section of this paper, therefore, the existing literature will be reviewed on the use of personal networks to circumvent formal procedures to get things done. This will reveal that despite the use of personal connections to circumvent formal procedures being studied elsewhere in the world, there has been very little focus upon its prevalence and usage in South-East Europe. To fill this gap, the second section introduces a study of the use of *vruzki* in Bulgaria based on 2,005 face-to-face interviews conducted in late 2015. The third section then reports the findings. This will display the prevalence of *vruzki* and who uses it, along with how it can be explained and tackled, by estimating a logit model and then calculating the marginal effects. The final section then draws some conclusions and explores how these corrupt practices can be eradicated.

USING PERSONAL CONNECTIONS TO CIRCUVENT FORMAL PROCEDURES

All countries have to produce, distribute and allocate goods and services. Three separate ways of doing this are commonly differentiated, namely the 'market' (private sector), 'state' (public sector) and 'community' (informal or third) sectors (Giddens 1998; Gough 2000; Polanyi 1944; Thompson et al. 1991). The notion that these are separate realms is brought starkly into the question when examining the use of personal networks to circumvent formal procedures because it reveals the permeation of the private and public sectors by the informal realm.

Social networks have been recognised as resources that populations draw upon to meet their needs ever since the studies by Stack (1974) and Young and Wilmott (1975), which emphasised the beneficial effects of the help provided by and for close ties. In recent decades, moreover, the social capital literature has also highlighted the beneficial effects arising when ties are forged between people who do not know each other very well (Putnam 2000), or what Granovetter (1973) calls the 'strength of weak ties'. The resulting emphasis has been on the positive effects of the help provided by and for not only close ties (i.e. 'bonding' social capital) but also the weaker ties of people who do not know each other well (i.e. 'bridging' social capital) (Gittell and Vidal 1998; Putnam 2000).

A smaller literature, however, has highlighted how social capital also has a more negative 'darker side' (Ayios et al. 2014; Garigiulo and Benassi 1997; Gu et al. 2008; Putze, 1997; Schulman and Anderson 2009). This has shown how the use of social networks can result in cronyism (i.e., helping acquaintances and friends), nepotism (i.e., favouritism to kin), and/or corruption (i.e., the use of public office for private gain), as well as hinder meritocracy (Ayios et al. 2014).

Exemplifying this 'dark side' of social capital is the use of social networks to circumvent formal procedures. In China, *guanxi* ('connections') describes a network of contacts from whom favours can be received in terms of accessing a good or service or bypassing bureaucratic procedures, which must then be reciprocated in the future (Hsuing 2013; Mikhailova and Worm 2003). Indeed, it is seen as extensively used in Chinese business and culture (Luo 2011; Luo et al. 2011; Shou et al. 2014; Zhan 2012). Although a few studies draw attention to its negative effects, such as when nepotism prevails in job recruitment (Chen et al. 2011), most studies simply see it as an unavoidable feature that needs recognising when doing business in China (Chen et al. 2013; Munro et al. 2013; Yang and Wang 2011; Zhuang et al. 2010).

In Arab countries meanwhile, *wasta* is the most common term used to describe connections rooted in family and kinship ties that are used to sidestep formal procedures (Hutchings and Weir, 2006; Smith et al., 2011), or *ma'arifa* in North African nations such as Tunisia, Algeria and Morocco (Mellahi and Wood 2006; Yahiaoui and Zoubir 2006). Most studies in Arab countries again reveal a neutral or positive attitude towards its usage (Bailey 2012; Barnett et al. 2013; Kilani and Sakijha 2002; Mohamed and Mohamed 2011; Tlaiss and Kauser 2011), with a 'no nepotism' policy being absent in the Arab business world and favouritism, rather than merit, widely employed in hiring and promotion decisions.

In Brazil and other Portuguese speaking countries, meanwhile, the term commonly used is either *pistolão* ('contacts') or *jeitinho* ('find a way') when referring to circumventing formal procedures by the use of connections which again, is viewed as a helpful coping practice (Ardichvili et al. 2010). English-speaking countries employ the term 'pulling strings', which refers to favours obtained through often longstanding links with influential persons, often derived from family connections or shared schooling (Smith et al. 2012). A cross-national comparative study of attitudes reveals English people view the use of connections to circumvent formal procedures even more positively than the Chinese, Arabs and Brazilians (Smith et al. 2012).

In the post-Soviet world, meanwhile, the use of personal networks to obtain goods and services in short supply, or circumvent formal procedures, is known as *blat* (Arnstberg and Boren 2003; Ledeneva 2006, 2008, 2009, 2013; Mikhailova and Worm 2003; Smith et al. 2011). Under the Soviet system, money had relatively

little value given the shortage of goods to purchase. It was thus more important to have a wide network of friends and acquaintances to call upon in times of need, and a commonly heard phrase during the Soviet period was 'it is better to have a hundred friends than a hundred roubles'. *Blat* networks thus 'loosened up the rigid constraints of the political regime' (Ledeneva 2009, p. 257) and was used to negotiate almost all aspects of life from acquiring everyday goods such as food, and periodic events such as holidays, to life-cycle events such as obtaining kindergarten and university places. Thus, *blat* in its traditional meaning in Soviet society was widely viewed in a positive or neutral manner since it helped people to cope with the inefficiencies of the command economy. Indeed, *blat* was an important status symbol and source of pride and prestige for those able to help others (Williams et al. 2013). Few therefore regarded such friendly help as being in anyway a corrupt practice (Williams et al. 2013). The consensus in the literature is that the use of connections to gain preferential access to services persists in post-Soviet societies, but that connections and access to assets are increasingly treated as a commodity, with gifts and/or money received and given for this (Ledeneva 2009, 2013 Onoshchenko and Williams 2013, Williams and Onoshchenko 2014a,b). Al Ramahi (2008) has noted a similar trend in relation to *wasta*. Indeed, this is reflected in recent studies. Take, for example, the study of informality in health services. Rather than study *blat*, studies now focus upon the use of informal payments to gain access to medical services (Gordeev et al. 2014; Kaitelidou et al. 2012; Stepurko et al. 2013; Williams et al. 2016).

In South-East Europe, meanwhile, such connections are variously referred to as *vrski* in Macedonian, *veze* in Serbia and *vruzki* in Bulgaria. Until now, not only is there hardly any scholarly literature, with the notable exception of Chavdarova (2013) who has discussed *vruzki*, but there are also no known empirical studies of the prevalence and usage of connections in South-East Europe. Despite this, the use of connections to circumvent formal procedures is widely discussed in popular culture and is often at the heart of many critiques by Bulgarians of how their society operates. Such connections are seen to help create significant privileges for individuals connected to the ruling powers and state apparatus, as well as to private firms and their owners. However, it is also sometimes seen more positively as a way of getting things done. Until now, nevertheless, empirical studies of the prevalence and distribution of *vruzki* in contemporary Bulgarian society are notable by their absence. So too are studies which evaluate how this practice might be explained and tackled.

To explain the use of connections and to consider ways of tackling this practice, one way forward is to apply to the study of *vruzki* the theoretical perspectives used to explain and tackle undeclared work. As the literature on undeclared work, two dominant perspectives have been adopted (Williams and Horodnic 2015a,b, 2017). First, a rational economic actor approach has argued that people weigh up the costs and benefits of engaging in such activities and decide to do so when the benefits outweigh the costs (Allingham and Sandmo, 1972). The resultant policy approach, which has been widely adopted, is to raise the costs by increasing the perceived and/or actual penalties and risks of detection. In recent years, however, there has been recognition that many citizens do not engage in such illicit activities even when the benefits outweigh the costs, and this has resulted in the emergence of a social actor approach. Viewed through the lens of institutional theory (Baumol and Blinder 2008; North 1990), every society is seen to possess both formal institutions, namely laws and regulations defining the legal rules of the game, as well as informal institutions, namely 'socially shared rules, usually unwritten, that are created, communicated and enforced outside of officially sanctioned channels' (Helmke and Levitsky 2004, p. 727). From this viewpoint, the greater is the asymmetry between the formal institutions (i.e., 'state morale') and informal institutions (i.e., 'citizen morale'), the greater will be the participation in such illicit activities (Williams and Franic 2015; Williams and Horodnic 2015a,b, 2017; Williams et al. 2014). Indeed, this has been recently highlighted to be the case in the specific context of Bulgaria, albeit only in relation to entrepreneurs (Williams and Vorley, 2016). To tackle illicit activities, therefore, there is a need to reduce the level of asymmetry between the formal and informal institutions. Here, for the first time, these theoretical perspectives can be applied to study of the use of personal connections using a case study of *vruzki* in Bulgaria.

DATA AND VARIABLES

Data

To evaluate the prevalence and distribution of *vruzki* in contemporary Bulgarian society, as well as how it might be explained and tackled, data is reported from 2,005 face-to-face interviews conducted in Bulgaria in late 2015. This household survey included questions on whether respondents used and provided favours to circumvent formal procedures, and the spheres in which they did so, as well as questions on their perceptions regarding the penalties and risks of

detection when participating in illicit activities, and whether they view engagement in illicit activities as acceptable so as to measure the level of symmetry between their morale and the state morale of formal institutions. To collect this data, a multi-stage random (probability) sampling methodology was used to ensure that on the issues of gender, age, region and locality size, the national level sample, as well as each level of the sample, was representative in proportion to its population size. In every household the 'closest birthday' rule was applied to select respondents, while every subsequent address was determined by the standard 'random route' procedure.

Variables

To evaluate the use of *vruzki*, the dependent variable used is a dummy variable with recorded value 1 for respondents who answered 'yes' to the question: "Have you in the last 12 months asked anyone for a favour/help using connections in any of the following spheres?", and zero otherwise if they had not used *vruzki*. The spheres analysed were: medical services (skipping queue, getting better examination, surgery); solving problems with the law enforcing authorities (traffic police, customs); finding a job; education (places in higher education/ obtaining degree/diploma etc.); legal services and courts; everyday services at better quality or better price (e.g., bank services, hairdressers); repairs (housing, garages, car); tickets for events, theatre, concerts; hobbies and entertainment, tourist resorts, travel tickets; consumer goods excluding foodstuffs; communicating with local authorities on business matters (e.g. delaying tax payment); foodstuffs; speeding up bureaucratic procedures (e.g. at the municipal hall), and any other realms. This enabled the degree to which it is used in each of these spheres to be analysed.

To evaluate the distribution of *vruzki*, meanwhile, the following independent variables were analysed, derived from wider studies evaluating the associated issue of the important socio-demographic and socio-economic variables influencing participation in undeclared work (Williams and Horodnic 2015a,b, 2016; Williams and Padmore 2013a,b):

- *Gender:* a dummy variable with value 0 for women and 1 for men.
- *Age:* an interval variable indicating the exact age of the respondent.
- *Marital status:* a categorical variable with value 1 for married/remarried, value 2 for cohabiting and value 3 for single/divorced.
- *Household size:* a categorical variable with value 0 for one person, value 1 for two persons, value 3 for three persons, value 4 for four or more persons.
- *Occupation:* a categorical variable with value 0 for unemployed, value 1 for self-employed, value 2 for employed and value 3 for other (retired, students, disabled, etc).
- *Financial situation:* a categorical variable with value 0 for no money problems, value 1 for just comfortable, value 2 for maintaining, and value 3 for struggling.
- *Net income:* a categorical variable of the net income of individuals with value 0 for no income, value 1 for less than €350 per month, value 2 for €350-700, value 3 for €701-1000, value 4 for €1001-1300, value 5 for €1301-1800 and value 6 for more than €1800 per month.
- *Type of locality:* a categorical variable with value 0 for rural area or village, value 1 for small or middle-sized town, value 2 for large urban area.
- *Regions:* a categorical variable with value 0 for North Central, value 1 for North Eastern, value 2 for North Western, value 3 for South Central, value 4 for South Eastern, and value 5 for South Western.

To evaluate the competing ways of explaining and tackling *vruzki*, three explanatory variables were used. Firstly, to evaluate whether the perceived risk of detection influences engagement, a dummy variable was used describing the perceived risk of being detected, with value 0 for a very small and fairly small risk, value 1 for fairly high risk and very high risk. Secondly, to evaluate how penalties are associated with participation, a dummy variable was employed, describing the expected sanctions, with value 0 for those asserting that the normal tax or social security contributions would be due, value 1 for those stating that the normal tax or social security contributions due, plus there would be a fine or for imprisonment.

Third and finally, to evaluate the association between engagement in *vruzki* and the level of institutional asymmetry, an interval variable was used by constructing an index of self-reported attitudes towards the acceptability of various illicit activities based on a 10-point Likert scale. Rather than use a single question to assess the gap between citizen and state morale (i.e., the level of institutional asymmetry), this survey uses a range of questions by asking the following:

> Now I would like to know how you would rate various actions or behaviours. For each of them, please tell me to what extent you find it acceptable or not. Please use the following scale: "1" means that you

find it absolutely unacceptable and "10" means that you find it absolutely acceptable: (1) someone receives welfare payments without entitlement; (2) an individual is hired by a household for work and s/he does not declare the payment received to the tax or social security authorities even though it should be declared; (3) A firm is hired by a household for work and it does not declare the payment received to the tax or social security authorities; (4) a firm is hired by another firm for work and it does not declare its activities to the tax or social security authorities; (5) a firm hires an individual and all or a part of the wages paid to him\her are not officially declared and (6) someone evades taxes by not declaring or only partially declaring their income.

Collating the responses to these six questions, and giving equal weighting to each response, an aggregate 'citizen-state morale alignment index' is constructed for each individual. The Cronbach's Alpha coefficient of the scale is 0.87 which shows a good internal consistency of the scale (Kline 2000). The index is represented here in the 10-point Likert scale original format. The lower the index value, the higher is the citizen morale (i.e., the more aligned is citizen morale with state morale).

Given that there were a considerable number of missing values and inconclusive answers (i.e., refusal and 'don't know') across the dependent and independent variables, multiple imputation was used to predict the values. This is done using a system of chained equations for each variable with missing values, with 50 imputations simulated for each missing value. Furthermore, population weights are applied based on age and gender to correct for under- and over-representation in the sample. Table 1 provides a summary of the key variables that includes the number of observations, mean values, and missing data. None of the independent variables are highly correlated.

To analyse its usage in different realms, descriptive statistics are presented. To evaluate who is significantly more likely to use *vruzki* in contemporary Bulgarian society, as well as the explanations and how it might be tackled, a logit model is estimated and then the marginal effects calculated. Below, the results are reported.

FINDINGS

Examining the nationally representative sample of 2,005 respondents interviewed face-to-face in late 2015 in Bulgaria, just 5 per cent held the view that the use of *vruzki* was not important in order to get things done. Some 21 per cent asserted that it is somewhat important, 41 per cent that it is important, and 33 per cent that it is very important. This is reflected in the findings on whether they used *vruzki* to get things done. Some 30 per cent of all respondents surveyed had used *vruzki* in the last 12 months in order to circumvent formal processes.

Analysing the spheres in which the respondents had used *vruzki* to get things done, 13 per cent had used *vruzki* to gain access to medical services (e.g., jumping the queue, getting a better examination), 12 per cent to find a job, 8 per cent to get repairs (e.g., to their home or car), 6 per cent to gain access to everyday services such as hairdressers and bank services, 4 per cent to acquire food, 4 per cent to gain access to

Table 1: Summary statistics of key variables.

Variable	Mean	SD	Min	Median	Max	N(missing)
Use *vruzki*	0.300	0.460	0	0	1	49
Tax morale	1.93	1.85	0	1.3	10	116
Detection risk	0.26	0.44	0	0	1	321
Expected sanctions	0.62	0.49	0	1	1	545
Women	0.52	0.5	0	1	1	0
Age	47.68	17.32	15	48	85	0
Marital status	1.71	0.9	1	1	3	16
Household Size	2.67	1.02	1	3	4	0
Employment status	3.09	0.9	1	3	4	0
Financial situation	3.15	0.71	1	3	4	21
Personal income	2.72	1.08	1	3	7	105
Locality type	2.2	0.86	1	2	3	0
Regions	4.02	1.74	1	4	6	0

Notes: This table reports summary statistics of key variables. We use sampling weights to ensure that our statistics are representative of the population.

consumer goods (excluding food), 3 per cent to solve problems with the law enforcement authorities such as the traffic police or customs, 3 per cent to speed up bureaucratic procedures with the public administration, 3 per cent to deal with the legal services and the courts, 2 per cent to gain access to education such as places in higher education or obtain a degree or diploma, 2 per cent to gain access to their hobbies or entertainment, travel tickets and so forth, 2 per cent communicate with local authorities on business matters such as delaying a tax payment, and 1 per cent to access tickets for events, the theatre or concerts.

When it is recognised that not all respondents needed to obtain these services in the past 12 months (e.g., medical services, finding a job, solving problems with the law enforcement authorities), *vruzki* appears to be commonly used to get things done. Indeed, for future research, enumerating whether respondents had engaged with these realms in the past year before asking them whether *vruzki* had been used, would be useful so as to evaluate the proportion of instances in which *vruzki* is used. Here, therefore, it can only be concluded that *vruzki* appears to be very commonly used when gaining access to medical services, finding a job, dealing with legal services and the courts, and accessing education, which are activities that only a relatively small proportion would have accessed in the year prior to the survey, and less commonly used when acquiring foodstuffs and consumer goods, which are activities that most would have engaged in during the year prior to the survey.

Who, therefore, uses *vruzki* in order to get things done in Bulgaria? Table 2 estimates a logit model and calculates the average marginal effects. This investigates whether individual socio-demographic, socio-economic and spatial variables are significantly associated when other variables are taken into account and held constant. For continuous independent variables, the average marginal effects provide a good approximation to the probability of the change in *vruzki* that will be impacted by a one-unit change in the variable. And, varying one dummy variable from '0' to '1' changes the mean probability, taking into account all explanatory variables. Starting with the socio-demographic variables, this reveals that there are no significant gender variations in the use of *vruzki*. However, age does have a significant influence on its usage; younger age groups are more likely to use *vruzki* than older age groups. So too are larger households with four or more adults more likely to use connections

Table 2: Marginal effects after logit estimate of the propensity to use personal connections in Bulgaria

	Model 1 Marginal effect (Standard error)	Model 2 Marginal effect (Standard error)	Model 3 Marginal effect (Standard error)
Women	-0.010	-0.011	-0.009
	(0.022)	(0.022)	(0.022)
Age	-0.003***	-0.003***	-0.003***
	(0.001)	(0.001)	(0.001)
Marital status: (BG: Married/Remarried)			
- Cohabitating	0.010	0.000	0.008
	(0.033)	(0.032)	(0.033)
- Single	0.049	0.049*	0.048
	(0.030)	(0.030)	(0.030)
Household Size: (BG: One Person)			
- Two	0.048	0.050	0.049
	(0.038)	(0.038)	(0.038)
- Three	0.038	0.037	0.036
	(0.040)	(0.040)	(0.040)
- Four or more	0.078*	0.080**	0.080*
	(0.040)	(0.041)	(0.041)
Employment status: (BG: Unemployed)			
- Self-employed	-0.067	-0.065	-0.066
	(0.070)	(0.071)	(0.071)
- Employed	-0.166***	-0.168***	-0.168***
	(0.049)	(0.049)	(0.049)
- Other (Retired, students, disabled, etc.)	-0.139***	-0.142***	-0.137***
	(0.044)	(0.044)	(0.044)

Table 2: Continued

Financial situation (BG: Very comfortable)			
- Just comfortable	-0.218**	-0.204**	-0.218**
	(0.101)	(0.102)	(0.101)
- Maintaining	-0.212**	-0.203**	-0.219**
	(0.101)	(0.102)	(0.101)
- Struggling	-0.165	-0.156	-0.172*
	(0.104)	(0.105)	(0.104)
Personal income (BG: No income)			
- Less than 350 euros	0.057	0.046	0.051
	(0.039)	(0.040)	(0.039)
- 350-700 euros	0.085**	0.075*	0.082*
	(0.043)	(0.044)	(0.043)
- 700-1000 euros	0.102*	0.098*	0.100*
	(0.054)	(0.055)	(0.055)
- 1000-1300 euros	0.124*	0.125*	0.124*
	(0.065)	(0.066)	(0.065)
- 1300-1800 euros	0.257**	0.268**	0.263**
	(0.114)	(0.115)	(0.114)
- More than 1800 euros	0.371**	0.371***	0.363**
	(0.148)	(0.143)	(0.145)
Locality type: (BG: Rural area)			
- Small/medium town	0.034	0.027	0.028
	(0.028)	(0.028)	(0.028)
- City	0.056**	0.055**	0.057**
	(0.025)	(0.025)	(0.025)
Regions (BG: North Central)			
- North Eastern	-0.140***	-0.117***	-0.136***
	(0.042)	(0.041)	(0.042)
- North Western	0.154***	0.182***	0.174***
	(0.048)	(0.049)	(0.049)
- South Central	0.116***	0.140***	0.126***
	(0.041)	(0.040)	(0.041)
- South Eastern	0.058	0.085*	0.065
	(0.045)	(0.044)	(0.045)
- South Western	-0.121***	-0.116***	-0.126***
	(0.038)	(0.037)	(0.038)
Tax morale	0.018***	0.016***	0.016***
	(0.006)	(0.006)	(0.006)
Detection risk (BG: Very small/ Fairly small)			
- Fairly high/Very high	-0.067**		-0.066**
	(0.028)		(0.029)
Expected sanctions (BG: contributions due)			
- Plus a fine/ Prison		-0.065**	-0.064**
		(0.028)	(0.028)
Number of imputation	50	50	50
N	2005	2005	2005

***, **, and * indicate significance at the 1, 5 and 10 percent level respectively.
Source: authors' calculations from GREY survey

to get things done than single person households. Turning to the socio-economic variables, the finding is that the employed and economically inactive are significantly less likely than the unemployed to use connections, as are those reporting their financial situation as struggling, maintaining or comfortable

significantly less likely to use connections than those reporting their financial situation as very comfortable. Similarly, the higher is the personal formal income of a respondent, the more likely they are to use *vruzki* to get things done. Indeed, those earning over €1800 are 36.3 per cent more likely to have used *vruzki* in the past 12 months than those with no formal income. The use of *vruzki* is also significantly higher in urban than rural areas, and there are also significant regional variations in its usage.

Turning to the explanations and policy approaches for tackling the use of connections, we include risk of detection and level of penalties separately in columns 1 and 2. In column 3 we include them together in the model. The results remain the same. Models 1 and 3 reveal that those perceiving high risk are less likely to use connections to circumvent formal procedures, confirming the rational actor thesis. Based on the magnitude of the marginal effects in model 3, we find that those who perceive high risk (fairly high/very high) in comparison to those who perceive low risk (very small/fairly small) have 6.7% lower probability to be engaged in *vruzki*. In addition, models 2 and 3 reveals that those perceiving the sanctions to be higher are less likely to use connections to get things done. This, therefore, suggests that increasing penalties will reduce the likelihood of people using connections to get things done, as will increasing the risks of detection. For the variable of tax morale, the finding is that the greater is the asymmetry between citizens' norms, values and beliefs, and the formal rules and regulations, the greater is the likelihood of using *vruzki* to get things done, thus confirming the social actor explanation and suggesting that tackling the asymmetry between formal and informal institutions might be an effective policy approach. As a robustness check, an OLS model was estimated to see if the results are consistent. This was the case, providing further support for these findings.

DISCUSSION AND CONCLUSIONS

This paper has evaluated whether the social practice of using personal networks to circumvent formal procedures, known as *vruzki*, is prevalent in Bulgaria and who uses such connections. Reporting a survey of 2,005 respondents conducted in late 2015, the finding is that 30 per cent of respondents had used *vruzki* in the past 12 months to get things done, particularly when accessing medical services or finding a job. Estimating a logit model and then calculating the marginal effects, the population groups significantly more likely to have used *vruzki* are those whose norms, values and beliefs are not in symmetry with the formal laws and regulations, those reporting their financial situation as very comfortable, and the highest income groups, but also younger people, the unemployed, and those living in larger households. A limitation of this research is that respondents were not asked whether they had engaged with these realms in the past year before asking them whether *vruzki* had been used. For future research, this would be useful so as to evaluate the proportion of instances in which *vruzki* is used.

Nevertheless, theoretically, and when explaining the use of *vruzki*, this paper has evaluated the rational economic actor and social actor perspectives, derived from the study of undeclared work. This has revealed some support for the rational economic actor perspective that citizens engage in such endeavour when the benefits outweigh the costs. Increasing the penalties for engaging in such illicit activity and the risks of detection reduces the likelihood of people using connections to get things done. Moreover, strong support is found for the social actor approach. There is a strong statistically significant correlation between the use of *vruzki* and the level of institutional asymmetry; the greater is the asymmetry between citizens' norms, values and beliefs, and the formal rules and regulations, the greater is the likelihood of using *vruzki* to get things done. This suggests that beyond a deterrence approach, tackling the asymmetry between formal and informal institutions is required in order to tackle this endeavour.

How, therefore, can this illicit social practice be tackled? This has not before been considered in any known studies. Several policy options are available. On the one hand, governments can pursue its eradication using tougher penalties and increasing the risks of detection, although whether the political will exists to do this is open to question. On the other hand, it can be also tackled by reducing the asymmetry between formal and informal institutions. To achieve this, firstly, attempts can be made to change the norms, values and beliefs of citizens (i.e., the informal institutions) regarding the acceptability of such an illicit practice, such as by running awareness raising campaigns about the negative consequences of *vruzki* and the positive consequences of adopting meritocratic values across society. Secondly, it can also be pursued by modernising the formal institutions so as to reduce the formal institutional inefficiencies and imperfections that lead to *vruzki* being used. None of these are mutually exclusive approaches, and can be sequenced in different ways such as by organising an awareness raising campaign alongside improving modernising public services so as to reduce the

circumvention of formal procedures, and then following this up with tougher penalties for those who still engage in these practices that result in nepotism, cronyism and corruption. Whether this is the appropriate sequencing has not so far been evaluated.

What is certain, however, is that on the whole, the use of *vruzki* cannot continue in a modern meritocratic society and doing nothing is not an option. Although there might be particular instances where this practice could be seen as positive and beneficial, it is on the whole a practice that results in nepotism, cronyism and corruption, and prevents the advent of meritocratic allocation practices. If this paper therefore stimulates research on its prevalence and distribution across a wider array of countries, as well as greater debate on what needs to be done to eradicate this practice, including a two-way and three-way analysis of the interaction effects between the different policy measures, which is a limitation of the current research, then it will have achieved its intention.

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THE UNEMPLOYED WORKERS' PERCEPTIONS OF STRESS AND EMPLOYMENT PROSPECTS IN MACEDONIA: THE ROLE OF ALTERNATIVE ADJUSTMENT MECHANISMS

Dimitar Nikoloski, Ljupcho Pechijareski

Abstract

Depressed labour market conditions in Macedonia manifested by high and persistent unemployment rate, strong segmentation and prevailing long-term unemployment is considered as a heritage of more than two decades long period of transition. Unemployment has a number of negative consequences such a decreased income which is assumed to influence the subjective experience of unemployment. The negative macroeconomic shocks in Macedonia have been mitigated due to the strengthened role of alternative labour market adjustment mechanisms such as: employment in the informal sector, emigration and inactivity. However, their impact on the unemployed workers' perceptions of stress and future labour market prospects is less clear-cut. In this paper we use results from a survey carried out on a sample of unemployed workers in Macedonia in order to identify the psychological implications of unemployment by assessing the perceived stress and employment prospects with particular reference to the role of alternative labour market adjustment mechanisms.

Keywords: *Labour market, unemployment, stress, employment prospect.*

JEL classification: *I31, J64*

1. INTRODUCTION

The past two decades Macedonia has gone through the process of transition which is still shaping the social, political and economic ambience in the country. As a part of South-Eastern Europe, the Macedonian economic growth is constrained by the general regional predispositions, which amongst other things are determined by the political instability of the region. Hence, the economic performance of the South-Eastern European countries (SEECs) has not been strong enough compared to Central-Eastern Europe countries (CEECs), which already take part of the European Union. In this sense, Macedonia and other SEECs, are known as 'lagging reformers' with regard to completion of the reforms in all spheres of the society.

The initial transitional recession has *inter alia* manifested salient effects on the labour

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market performance (Pechijareski and Rocheska 1998). Generally, the transitional reforms initially had negative effects on labour markets, which were manifested in declining participation rates and in persistent high unemployment. The processes of ownership restructuring and sectoral reallocation assumed a large-scale transformation of state owned firms into privatised ones and, a reallocation of a substantial part of the labour force from the manufacturing and agricultural sectors towards the expanding service sector (Blanchard 1997). The experience in almost all transition countries, including Macedonia shows that the creation of new jobs in the emerging private sector was not initially strong enough to absorb the mass of workers laid-off from the restructured state-owned firms. At the same time, the mismatch between the skill requirements of newly created jobs and effective skills owned by the workers has become a substantial problem (Svejnar 2002). Consequently, the labour markets in early transition became less dynamic with a relatively stagnant unemployment pool leading to increases in unemployment and especially long-term unemployment (Cazes and Nesporova 2003). The initial 'transitional unemployment' differed in several aspects from other types of unemployment in that it was characterised by pronounced labour market segmentation, long average duration of unemployment and a low probability of exiting unemployment into employment (Nikoloski 2009).

The negative macroeconomic shocks in Macedonia have been mitigated due to the strengthened role of alternative labour market adjustment mechanisms such as: employment in the informal sector, emigration and inactivity. These mechanisms cushion the social implications of unemployment by absorbing a part of unemployed workforce and providing additional incomes for their households. However, their impact on the unemployed workers' perceptions of stress and future labour market prospects is less clear-cut. Thus, examining the interplay between the alternative labour market adjustment mechanisms, from one side and the unemployed workers psychological wellbeing represents a challenging research task. In this context, our research question is whether the alternative forms of labour market adjustment play significant role in dealing with unemployment and, consequently influence the perceived stress and optimism about finding a new job.

The aim of the paper is to assess the unemployed workers' perceptions of stress and employment prospects as a function of various socio-demographic variables, by paying particular attention to the role of alternative forms of labour market adjustment in Macedonia. For this purpose we use the empirical results from a survey of registered unemployed workers. To our knowledge this is the first study addressing this issue in Macedonia, which brings two main contributions. First, it reveals the psychological implications of unemployment and alternative coping strategies on the unemployed workers' perceptions of stress and future employment prospects. Second, the results from the analysis can be used in designing appropriate social and labour market policies aiming to improve the psychological wellbeing of disadvantaged labour market segments.

The paper is structured as follows. In section 2 we review the general characteristics of the Macedonian labour market. Next, in section 3 we present the theoretical background, whereas the empirical assessment of unemployed workers' perceptions of stress and employment prospects is subject of analysis in section 4. Finally, in section 5 we provide discussion and formulate recommendations for the labour market policies that focus on improving the psychological wellbeing of the unemployed population.

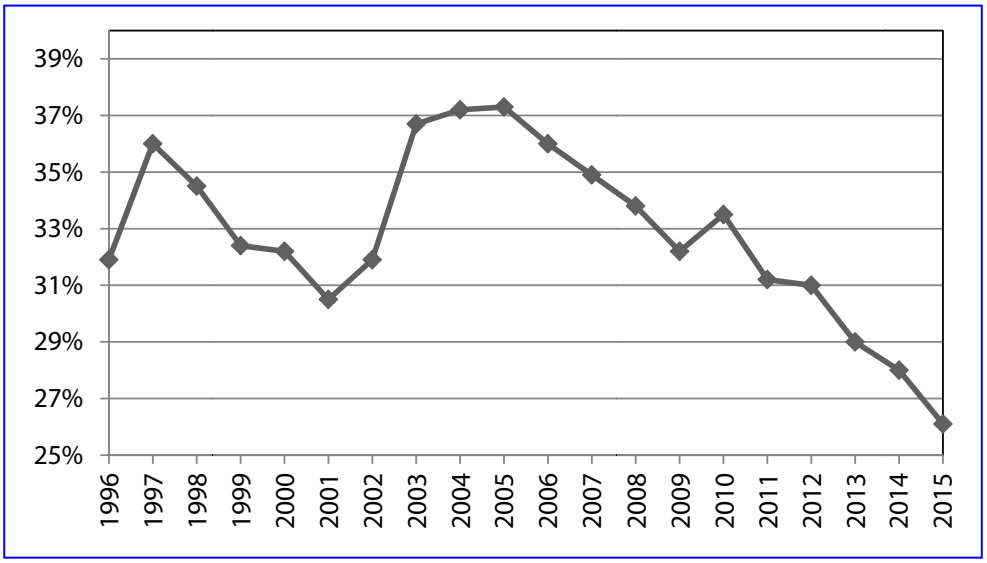
2. *MACEDONIAN LABOUR MARKET PERFORMANCE*

In order to investigate the features of the Macedonian labour market during transition, it is appropriate to divide the transitional period into two sub-periods. The first period encompasses the transformational recession from 1990 to 1995, with the second period starting immediately thereafter and lasting until the present. The changes of the unemployment rate in relative terms during the business cycle are rather small, which reflects the depressed characteristics of the Macedonian labour market (Nikoloski 2009). The dynamics of the unemployment rate in Macedonia during the period 1996-2015 is shown on Figure 1.

The first Labour Force Survey (LFS) in Macedonia was conducted in 1996, and since then we have detailed data concerning labour market trends. During the period 1996-2003, the Macedonian LFS was conducted on a yearly basis, whereas since 2004 it is conducted as a continuous survey throughout the year with quarterly processing of data. For the period prior to 1996 we can explore labour market trends based on the number of registered unemployed workers. According to both sources of data we can generally distinguish several features of Macedonian labour market presented as follows.

During the initial phase of transition, the labour force participation and employment rates fell for most of this period, while the unemployment rate steadily

Figure 1: The unemployment rate in Macedonia 1996-2015



Source: Macedonian Statistical Office, Labour Force Survey

increased. These trends are in line with the normal labour market patterns found in other transition countries *i.e.* declining employment under the initial shock of recession and subsequent persistence of sluggish demand for labour. Although, the mature phase of transition is characterised by broad stability in all three rates, we can observe recessions in 2001 primarily caused by the political instability and in 2009 due to the global economic crisis. Namely, Macedonia has not remained apart from the negative global macroeconomic tendencies engendered by the recent economic crisis. Although recession has started one year later, after three consecutive quarters of negative GDP growth the macroeconomic performance by the end of 2009 has already demonstrated some signs of recovery and since then the unemployment rate has manifested continuous declining trend.

The sectoral reallocation of labour has been characterised by a significant increase of subsistence agriculture and other non-standard forms of employment at the expense of rapid shrinkage of employment in manufacturing (European Training Foundation 2007). These trends in employment by sectors indicate that in Macedonia new jobs are not predominantly created in the more productive industries and service sector, but rather in agriculture and low productivity services (Micevska 2008). The increase in the share of employment in agriculture suggests that this sector has become a buffer for some people who have lost their jobs in the state-owned industrial enterprises (Nikoloski 2009). However, the recent changes show that service sector gradually becomes to play increasingly important role by absorbing more than half of the employed workforce, whereas the agricultural sector starts to shrink. Given the rigidities in the standard adjustment through employment and wages, less traditional labour market adjustment mechanisms may play a more significant role. Among the alternative labour market adjustment mechanisms we particularly distinguish the non-participation, emigration and employment in the informal sector.

The Macedonian labour market is affected by strong segmentation, meaning that certain social groups such as youths, less skilled workers, and women, face a higher risk of unemployment and inactivity than the rest of the labour force. As a consequence, the high Macedonian unemployment rate has enormous social implications such as rising poverty, income inequality and social exclusion of deprived social segments (Nikoloski 2012). When considering the marginalised categories, we assume that the same labour market segments are the most inclined toward informal employment arrangements or temporary emigration where jobs are characterised with low security and lower wages compared to jobs in the formal sector. Furthermore, the marginalised segments are affected by the fluctuations in the business cycles more than the rest of the labour force which is evident from the last economic downturn.

In addition, the Macedonian labour market is characterised by a relatively stagnant unemployment pool that has been translated into increasing long-term unemployment[1]. For instance, long-term unemployment accounts for more than 80 percent of total unemployment which represents high relative share compared

1 As long-term unemployed are consider those who look for job more than one year;

to international standards. Long-term unemployment has significantly contributed to an erosion of skills and motivation of unemployed workers, making them less employable over time. The deterioration of skills further reduces the attractiveness of the labour force and contributes to a blurring of the difference between the states of unemployment and non-participation. The long-term unemployed are not viewed by employers as attractive fillers of vacancies, meaning that their employability is relatively weak.

After remaining unemployed for a long period of time, a considerable part of unemployed workers stops looking for jobs and quits the labour force. This is known as the phenomenon of 'discouraged workers', a characteristic for depressed labour markets where labour demand is insufficient and unemployed workers face poor employment prospects. Discouraged workers do not fulfil the requirements of job search as a precondition to be counted as unemployed which means that they are *de facto* non-participants. On the other hand, they can easily re-enter the labour force if, conditions on the demand side of the labour market improve (Kingdon and Knight 2006). For example, the estimated number of discouraged workers according to the LFS in 2012 was 30322 which represent more that 10 percent of the total number of unemployed.

The size of the employment in the informal sector[2] in Macedonia is relatively large compared with the more advanced transition countries. For instance, according to the LFS data in 2012 the share of employed in the informal sector was estimated about 22.5 percents. However, having in mind the nature of the informal sector, any assessment based on self-reporting as in the case of LFS, will potentially underestimate its true size. The Macedonian informal sector predominantly consists of small-scale agricultural production carried out by workers with low levels of education who are either employees without stable contracts or unpaid contributing family workers. Thus, workers in the informal sector are usually low skilled or unskilled and they are less competitive in the labour market (Nikoloski et al. 2012). In addition, a majority of these workers experience the so-called 'informal employment trap' *i.e.* they face a low probability of exiting the informal employment (Bernabe 2002). At the micro level, there is increased human capital erosion experienced by workers who work in the informal sector due to the labour-intensive characteristics of the informal employment and absence of vocational training.

2 Although there are various terms used to denote the informal sector, we assume that it covers all unrecorded economic activities that are legal by the nature of produced goods and services, but are undertaken in order to meet the basic needs (also known as 'coping strategies').

3. LITERATURE REVIEW

The implications of unemployment are various and research has clearly demonstrated that it causes psychological distress. The employment status is widely acknowledged to have a large influence on individual perceptions, with unemployment in particular associated with a strong negative impact on measures of life satisfaction (Winkelmann and Winkelmann 1998; Waters 2000). For instance, the empirical findings show that unemployed have higher levels of perceived stress compared to employed and among the lowest level of psychological wellbeing of all people (Meer 2014). The assumption that unemployment is associated with lower level of wellbeing stems from the fact that unemployed have lower incomes, decreased human and social capital which consequently implies diminished live satisfaction and happiness.

Although unemployment is generally considered as an economic problem, the psychological consequences of the unemployment go beyond the pure economic considerations (Winefield 2002). Namely, unemployment status imposes to individuals and their families additional burden as non-pecuniary costs since employment is not only a source of income, but also provides social relationships, identity in the society and individual self-esteem (Winkelmann and Winkelmann 1998; Tøge 2016). The empirical literature shows that unemployed persons manifest significant symptoms of deteriorated health conditions such as higher incidence of stress, anxiety and depression (Bordea and Pellegrini 2014). Furthermore, higher social capital and communication skills do not appear as significant factors in reducing the harmful effect of unemployment (Winkelmann 2009; Pelzer et al. 2014).

Since unemployment is a stressful experience, coping with unemployment is emotionally demanding situation which varies from person to person. According to Lazarus and Folkman (1984), coping is the "process of attempting to manage the demands created by stressful events that are appraised as taxing or exceeding a person's resources". Coping is typically classified in two categories: efforts to deal with the problem or efforts to deal with the emotions. Hence, coping strategies mediate the potentially negative effects of stressors and thus influence mental health. The development of successful coping behaviours is likely to reduce stress and help a person to solve personal problems and maintain their psychological wellbeing (De Fazio et al. 2016).

The duration of unemployed also affects the perceived stress and optimism about finding a new job. According to the adaptation hypothesis, by the course of time individuals can adapt to unemployment which implied that longer-duration unemployment has

a smaller effect on self perceived health than does shorter-duration unemployment. Alternative theoretical view is that unemployed do not adapt to unemployment status. In this case, it is assumed that long-term unemployed are more likely to experience the phenomenon of 'discouraged worker' which would subsequently lead to bad self-perceived health (European Commission 2016). This category of workers is considered as marginally attached and is viewed as distinct labour market state lying between the non-attached and the unemployed (Jones and Riddell 1998).

Besides considering unemployment at the individual level, the total unemployment as a macroeconomic phenomenon might affect the individual perceptions and is strongly related to increased reports of bad self-perceived health (Tay and Kuykendall 2014; European Commission 2016). In this context, two competing theories are used to explain the effect of the overall unemployment on the individual perceptions of unemployed people. First, having more unemployed individuals will result in lower psychological wellbeing at aggregate level which, in turn, may exert negative spill-over effects on other members in the society. On the other hand, the prevailing high unemployment rate may become norm for more individuals to be unemployed which subsequently attenuates detrimental effects of personal unemployment (Clark 2003; Oesch and Lipps 2013).

The experience in transition countries shows that socio-political changes had a strong negative impact on individual perceptions of unemployed. Some studies show that even after 20 years of transition, most transition countries have not regained the level of wellbeing they enjoyed at the outset of transition (Gruen and Klasen 2012). According to the empirical evidence, it seems that vulnerable individuals such as adults affected by labour market reform may represent specific affected group (Orosa 2013). For instance, Blanchflower (2001) finds out that most of unemployed in transition countries are unhappy and are dissatisfied with the direction of reform, presumably because it has excluded them. However, the impact of the alternative labour market adjustment mechanisms on the individual perceptions of unemployed workers in transition countries has so far received little attention.

4. EMPIRICAL ANALYSIS

As stated above, the Macedonian labour market is characterised with persistent unemployment which can be *inter alia* attributed to factors that we denote as alternative labour market adjustment mechanisms. While the conventional forms of labour market adjustment through wages and/or working hours are mostly characteristic for the employed workers, the non-standard forms are mainly alternatives for the unemployed. According to our hypothesis, the alternative labour market adjustment mechanisms such as employment in the informal sector, emigration and inactivity may play significant role in shaping the unemployed workers' perceptions of stress and future labour market prospect. This is reasonable since, these forms of adjustment as alternatives in dealing with unemployment provide means of subsistence particularly for disadvantaged labour market segments.

4.1 Data and sample

To our knowledge, there is a lack of consistent cross-section data about the unemployed workers' perceptions in Macedonia. In order to estimate to what extent the unemployed are prone toward the non-standard forms of adjustment we have designed and carried out a survey based on a sample of registered unemployed workers. Although different from the LFS criterion, the advantage of applying the registration criterion for selection can be viewed in the possibility to unambiguously identify eligible respondents in the sample. Due to the lack of exhaustive list of registered unemployed which is considered as confidential, the interviewers had freedom to choose eligible respondents randomly.

The survey was conducted during a reference period from mid October to mid November, 2011. The sample consisted of 2300 unemployed workers which represented about 1 percent of the total number of registered unemployed workers. By taking into account the missing values, the final sample size used for estimation was 2091 unemployed workers. In order to provide representativeness of the sample, the geographical distribution was maintained by selecting a proportional number of respondents with respect to the total number of registered unemployed workers in each branch office. Having in mind the cross-section character of the survey, its weakness is viewed in the fact that it cannot be used to assess changes of unemployed workers' perceptions over time. The structure of the sample according to the main socio-demographic characteristics is given in Table 1.

The survey was traditionally conducted in a pen and paper format by using self-administered questionnaires[3]. The questionnaire consists of 53 questions

3 The questionnaire is available at request which should be sent to the corresponding author.

Table 1: The sample structure according to various socio-demographic characteristics

Gender		Place of living		Age	
Male	50.30%	Urban	77.89%	15-20	4.09%
Female	49.70%	Rural	22.11%	21-25	23.27%
				26-30	19.23%
Education		Ethnicity		31-35	11.70%
Primary or less	15.11%	Macedonian	81.80%	36-40	10.61%
Secondary	50.35%	Albanian	10.21%	41-45	10.61%
Higher	34.54%	Turk	2.26%	46-50	8.96%
		Roma	2.26%	51-55	6.92%
Marital status		Serbian	1.95%	56-60	3.61%
Single	40.43%	Vlahos	1.00%	61-65	0.87%
Married	53.66%	Bosnian	0.35%	65 and more	0.13%
Divorced	3.74%	Other	0.17%		
Widowed	2.18%				

Source: Authors' calculations

that had been previously tested with a pilot survey. Most of the questions are close-ended with multiple choices, *i.e.* they are accompanied by a range of answers from which the respondent is asked to indicate the most applicable one. Only two questions are open ended, designed in order to get personal opinion from the respondent about the psychological perceptions of being unemployed. Besides the questions about the various economic activities or sources of income we attempted to assess the adjustment mechanisms indirectly by using the time allocation to various activities as well as individual values and perceptions.

4.2 The alternative labour market adjustment mechanisms

Among the alternative adjustment mechanisms we pay particular attention to the role of employment in the informal sector, emigration and social transfers. As informal economic activities will be considered only those who are legal in nature but not officially registered such as subsistence farming. The emigration as a coping strategy will include temporary work abroad as well as reliance on remittances from the relatives who are permanent emigrants. Finally, the inactivity will mainly encompass reliance on social transfers including both direct and inter household transfers.

In our empirical analysis 38.3% of the surveyed unemployed workers declared that they earn income from various types of additional activities that are informal by nature, while half of them declared that other household members also perform such types of activities. With respect to this, we argue that in depressed labour markets which lack job creation in the formal sector, informal employment helps people to enter the workforce by offering an alternative to unemployment or inactivity and, prevents a further decline in living standards.

The majority of the unemployed workers who stated that are informally employed are engaged in subsistence activities such as agriculture, farming and seasonal work in the country that together represent about 60%. On the other hand, the entrepreneurial activities such as running own business, artisanship or own production and trade are represented to lesser extent. Therefore, we can conclude that most of the unemployed workers that operate in the informal sector are usually low skilled or unskilled and perform labour-intensive operations. The above argument is in line with the sectoral reallocation in Macedonia during transition, according to which the share of employment in subsistence agriculture demonstrated a significant rise. Nevertheless, this should not be a general conclusion for the productivity in the informal sector, since in this case we do not include the informal activities performed as a second job by those who are otherwise formally employed.

The income gained from informal activities on average is 34.2% of the total household incomes, which represents significant financial contribution. However, expressed in absolute terms the average monthly income from informal activities is moderate since one third of the respondents declared to earn less than 100 Euros and another third declared an amount between 100 and 200 Euros. As a consequence, we can argue that unemployed workers are primarily involved in informal businesses that usually operate on a small-scale basis either in the form of self-employment or as micro or small enterprises.

Furthermore, in our empirical analysis we found that 27.7% of the surveyed unemployed workers

would emigrate permanently if they had the possibility, whereas 33.9% have intentions to work abroad temporarily. However, about 46% of those who declared having intentions to emigrate undertake concrete activities to find work abroad, while the remaining 54% do not undertake such activities. On the other hand, 11.7% of the respondents stated they have close relatives who are currently emigrated from the country two thirds of who receive financial aid for covering their costs of living. The share of remittances for this category of households in their total income is about 28.2%, which represents a considerable proportion.

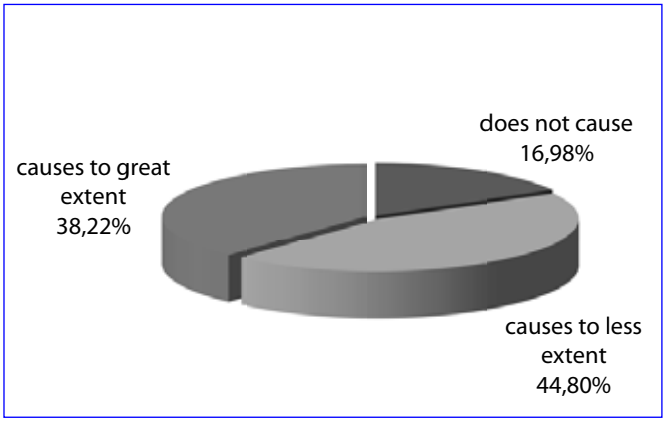
We consider the inactivity as mechanism for labour market adjustment since it provides additional income for the households through various types of social transfers. Moreover, we assume that in Macedonian society dominates the traditional system of values that promote egalitarianism, distributional justice and solidarity. In this context, the inter-household transfers might play important role in maintaining the wellbeing of the households. Namely, in deprived households with one or more unemployed members the income from various sources can be distributed to all members of the household in order to satisfy their basic needs. With respect to this, in our empirical analysis we particularly pay attention to the pensions and social assistance.

Regarding the use of pensions, we revealed that 28.5% of the surveyed unemployed have retired close relatives in their household. Moreover, 79% of the respondents confirmed that their retired close relatives participate in covering the costs of living in the household. The average amount of pensions in the sample is about 120 Euros which represents 25% of the total income for this category of households. On the other hand, we found that only 8.65% of the respondents or another member of their households receive social assistance from the government. The average amount of the social assistance is about 45 Euros, which represents 12.7% of the total income for this category of households.

4.3 The unemployed workers' perceptions of stress

Generally, unemployment is considered as a stressful experience that negatively affects an individual's perception of his/her overall wellbeing. With respect to this, we attempt to assess unemployed workers' perceptions by asking whether the unemployment causes stressing situation or other health problems. Our analysis shows that the unemployment represents an embarrassing situation for the majority of unemployed workers. For instance, 38.2% of the

Figure 2: Unemployment as a cause for stress and/or other health problems



respondents declared that unemployment represents stressing situation and/or causes other health problems to great extent, while these effects prevail to lesser extent among 44.8% of the interviewed unemployed. The distribution of respondents' opinions with respect to this question is presented in Figure 2.

In order to assess the unemployed workers' perceptions of unemployment as a stressor and/or reason for other health problems, furthermore we estimate a multinomial logistic regression, where as a reference category is considered the choice "does not cause". We divide the possible determinants in four groups: Personal traits, alternative adjustment mechanisms, household characteristics and policy treatment variables. In this context, there might be endogeneity problem suspected since workers to whom unemployment causes more stress are more inclined to emigrate or find informal employment. Hence, we are aware of this common problem in treating the psychological implications of unemployment and we interpret the estimations cautiously. The results from the estimated multinomial logistic regression are presented in Table 2.

From Table 2 we can notice that the relative probability that unemployment causes stress and/or other health problems to less extent rather than it does not cause increases with the age, level of education, duration of unemployment, job searching activity and intention to emigrate. Namely, this probability would increase by 3.3% for each additional year of age, by 14.2% for each additional level of education and by 9% for each additional level of unemployment duration[4]. In addition, the probability that unemployment causes stress to less extent is 17.7% higher among those respondents who actively search for job and 16.7% higher among those who have intention to

4 The unemployment duration is divided in 10 class intervals with unequal class width.

Table 2: Estimated multinomial logistic regression for perception of stress

Variable	Unemployment causes stress and/or other health problems to less extent			Unemployment causes stress and/or other health problems to great extent		
	Coeff.	Standard error	Diff. in odd ratio	Coeff.	Standard error	Diff. in odd ratio
Constant	-1.5816	1.1708		-3.9452***	1.2287	
Personal traits						
Gender	0.0469	0.1312		0.0875	0.1419	
Age	0.0320***	0.0089	3.3%	0.0680***	0.0091	7.0%
Marital status	-0.1126	0.1350		0.0737	0.1394	
Place of living	-0.0182	0.1575		-0.1079	0.1707	
Level of education	0.1332***	0.0476	14.2%	0.1712***	0.0511	18.7%
Duration of unemployment	0.0864***	0.0263	9.0%	0.1884***	0.0283	20.7%
Actively search for job	0.1632***	0.0627	17.7%	0.3742***	0.0691	45.4%
Alternative adjustment mechanisms						
Has intention to emigrate	0.1544**	0.0828	16.7%	0.3680***	0.0894	44.5%
Engaged in informal employment	-0.0738	0.1378		-0.0943	0.1471	
Household characteristics						
Household size	0.0040	0.0624		-0.0047	0.0661	
Number of employed members	-0.0447	0.0859		-0.0899	0.0930	
Has another unemployed member(s)	-0.1719	0.1398		-0.5078***	0.1490	-39.8%
Has retired member(s)	-0.1664	0.1523		-0.2825*	0.1627	-24.6%
Has emigrated member(s)	0.3012	0.1916		0.4514**	0.2080	57.1%
Policy treatment						
Social assistance beneficiary	0.1738	0.2988		-0.2854	0.2954	
Health insurance beneficiary	-0.1642	0.1304		-0.0979	0.1418	
Unemployment benefit recipient	-0.3670	0.2888		-0.4657	0.2971	
Participation in active programmes	0.2163	0.2069		0.3511	0.2261	

Note: **, ** and *** represent statistical significance at the 10%, 5% and 1% levels respectively.*

emigrate. Thus, being proactive unemployed worker in the Macedonian labour market is associated with higher probability of experiencing stress from unemployment.

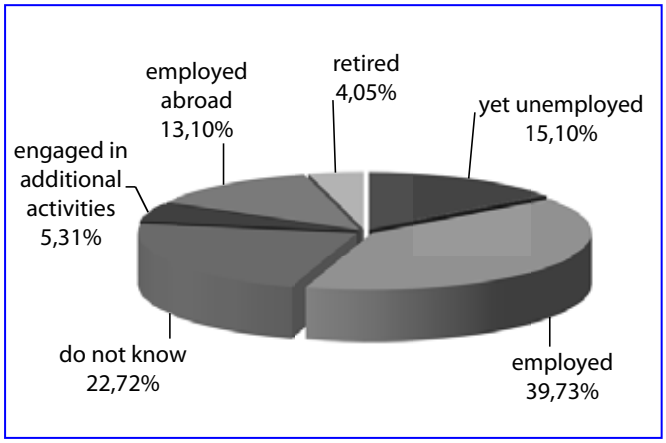
The similar and even more pronounced pattern can be observed for the relative probability that unemployment causes stress and/or other health problems to great extent rather than it does not cause. Namely, this probability would increase by 7% for each additional year of age, by 18.7% for each additional level of education and by 20.7% for each additional level of unemployment duration. Furthermore, the probability that unemployment causes stress to great extent is 45.4% higher among those respondents who actively search for job and 44.5% higher among those who have intention to emigrate. In addition, this relative probability is 57.1% greater if the respondent's household has emigrated member(s), whilst it is lower by 39.8% and 24.6% in cases the respondent's household has another unemployed member or retired member(s) respectively. The pseudo R^2 of this model is 0.083, while the p-value of the calculated χ^2 which is 0.000 leads us to conclude that at least one of the regression coefficients in the model is not equal to zero.

4.4 The unemployed workers' perceptions of employment prospects

Besides being a stressful situation, the optimism about finding job in the near future is considered as another psychological aspect of unemployment. With respect to this we asked respondents how they see themselves within a time horizon of five years. The results show that about 15.1% think they will remain unemployed, whereas 22.7% do not have opinion. In contrast, about 39.7% of the respondents hope they will find formal job, while the remaining 22.5% would search for alternative opportunities such as employment in the informal sector (5.3%), emigration (13.1%) or retirement (4%). This finding reflects relatively mixed perceptions among unemployed workers regarding their future prospects on the labour market. The distribution of respondents' opinions with respect to the future labour market prospects is presented in Figure 3.

In order to assess the factors that influence the unemployed workers' perceptions of future employment prospects we further estimate a multinomial logistic regression, where as a reference category is

Figure 3: Perception of the labour market status after 5 years



considered "perceives himself after 5 years as yet unemployed". Similarly, as in the case of estimating the impact of unemployment as a stressor, we divide the possible determinants in four groups: Personal traits, alternative adjustment mechanisms, household characteristics and policy treatment. Again, we are aware about the possible endogeneity problem and we interpret the estimates with caution. The results from the estimated multinomial logistic regression are presented in Table 3.

From Table 3 we can notice that female respondents have on average 34.4% lower probability to perceive as employed after 5 years relative to unemployed as reference category, while this probability decreases by 7.9% and 25.2% for each additional year of age and additional level of unemployment duration respectively. In contrast, the relative probability of perceiving as employed after 5 years rather than unemployed increases by 33% for each additional level of education. In addition, this probability is about 76% and 84.4% higher for those respondents who reported that actively search for job and have another unemployed member in the household respectively.

Furthermore, we observe that the relative probability of being uncertain about the labour market status after 5 years is 33.8% and 28.4% lower for female unemployed and those living in rural areas respectively. In addition, the uncertainty decreases by 4.2% and 14.1% for each additional year of age and

Table 3. Estimated multinomial logistic regression for perception of employment prospects

Variable	Perceives himself after 5 years as employed			Perceives himself after 5 years as uncertain			Perceives himself after 5 years as engaged in the informal sector		
	Coeff.	Standard error	Diff. in odd ratio	Coeff.	Standard error	Diff. in odd ratio	Coeff.	Standard error	Diff. in odd ratio
Constant	2.0073	1.3450		1.7262	1.2824		3.9160	1.856	
Personal traits									
Gender	-0.4223***	0.1657	-34.4%	-0.4129**	0.1637	-33.8%	-0.5141**	0.2417	-40.2%
Age	-0.0818***	0.0096	-7.9%	-0.0434***	0.0090	-4.2%	-0.0530***	0.0138	-5.2%
Marital status	0.0383	0.1622		0.2296	0.1564		0.1656	0.2307	
Place of living	-0.3045	0.1876		-0.3346*	0.1836	-28.4%	-0.0955	0.2691	
Level of education	0.2855***	0.0583	33%	0.0648	0.0546		0.2818***	0.0872	32.6%
Duration of unemployment	-0.2910***	0.0345	-25.2%	-0.1524***	0.0349	-14.1%	-0.1846***	0.0487	-16.9%
Actively search for job	0.5652***	0.0768	76%	0.2215***	0.0697	24.8%	0.1053	0.1051	
Alternative adjustment mechanisms									
Has intention to emigrate	-0.1428	0.1038		0.0214	0.1011		-0.3417**	0.1584	-28.9%
Engaged in informal employment	0.0705	0.1652		0.0589	0.1624		-0.5343**	0.2392	-41.4%
Household characteristics									
Household size	-0.0020	0.0741		-0.0055	0.0717		-0.0475	0.1090	
Number of employed members	0.1504	0.1108		0.1836*	0.1096	20.2%	0.0862	0.1611	
Has another unemployed member(s)	0.6122***	0.1694	84.4%	0.5389***	0.1683	71.4%	-0.0971	0.2441	
Has retired member(s)	0.1429	0.1834		-0.0042	0.1797		-0.4960**	0.2543	-39.1%
Has emigrated member(s)	-0.0321	0.2506		-0.0681	0.2416		0.0753	0.3717	
Policy treatment									
Social assistance beneficiary	0.3640	0.2958		0.0287	0.2557		0.2059	0.4123	
Health insurance beneficiary	-0.2409	0.1669		-0.2321	0.1661		0.2282	0.2419	
Unemployment benefit recipient	0.4211	0.3000		0.3546	0.2814		-0.2253	0.3975	
Participation in active programmes	-0.3940	0.2761		-0.1204	0.2816		-0.3066	0.3728	

Note: *, ** and *** represent statistical significance at the 10%, 5% and 1% levels respectively.

Table 3: (continues) Estimated multinomial logistic regression for perception of employment prospects

Variable	Perceives himself after 5 years as employed abroad			Perceives himself after 5 years as retired		
	Coeff.	Standard error	Diff. in odd ratio	Coeff.	Standard error	Diff. in odd ratio
Constant	0.7840	1.6911		-12.5644	3.0936	
Personal traits						
Gender	-0.6488***	0.2012	-47.7%	-0.0691	0.3212	
Age	-0.0946***	0.0129	-9%	0.2338***	0.0308	26.3%
Marital status	0.2005	0.1975		0.2959	0.2741	
Place of living	-0.8299***	0.2436	-56.4%	0.0481	0.3884	
Level of education	0.0897	0.0711		0.1727*	0.1028	18.9%
Duration of unemployment	-0.2439***	0.0415	-21.6%	-0.1859***	0.0619	-17%
Actively search for job	0.2691***	0.0929	30.9	-0.0608	0.1308	
Alternative adjustment mechanisms						
Has intention to emigrate	1.5175***	0.1438	356.1%	-0.1867	0.2290	
Engaged in informal employment	-0.3356*	0.2001	-28.5%	-0.2983	0.3248	
Household characteristics						
Household size	0.0510	0.0922		0.1664	0.1423	
Number of employed members	0.0144	0.1337		0.2953	0.2069	
Has another unemployed member(s)	0.5356***	0.2044	70.8%	0.0759	0.3270	
Has retired member(s)	-0.0004	0.2228		-0.3075	0.3332	
Has emigrated member(s)	-0.4461	0.2890		0.1491	0.4446	
Policy treatment						
Social assistance beneficiary	0.8469**	0.4074	133.2%	0.5763	0.4758	
Health insurance beneficiary	-0.1357	0.2031		0.5070	0.3458	
Unemployment benefit recipient	-0.0226	0.3907		-1.3583***	0.3955	-74.3%
Participation in active programmes	0.0249	0.3393		0.1447	0.5516	

Note: **, ** and *** represent statistical significance at the 10%, 5% and 1% levels respectively.*

additional level of unemployment duration respectively. In contrast, the uncertainty about the future labour market prospects is 24.8% higher for those who actively search for job, 20.2% higher for an additional employed member in the household and 71.4% higher if the respondent's household has another unemployed member.

We further notice that relative probability of perceiving as engaged in the informal sector after 5 years is 40.2% lower for female, while it decreases by 5.2% and 16.9% for each additional year of age and unemployment duration level respectively. In contrast, this probability increases by 32.6% for each additional level of education. Additionally, the relative probability of perceiving as informally employed after 5 years is 28.9% lower if the respondent manifests intention to emigrate, 41.4% lower if the respondent is currently informally employed and 39.1% lower if the respondent's household has retired member.

Moreover, it is noticeable that relative probability of perceiving as employed abroad after 5 years is 47.7% lower for female unemployed, while it is 56.4% lower for respondents living in rural areas. In addition, this probability is 9% and 21.9% lower for each additional year of age and additional unemployment duration respectively. In contrast, perceiving as employed abroad is 30.9% more probable for those who actively search for job and about 3.5 times more probable for those who have intention to emigrate. Finally, the relative probability of perceiving as employed abroad is 28.5% lower for those who are engaged in informal employment, but 70.8% and 133.2% higher if the respondent's household has another unemployed member and the respondent is social assistant beneficiary respectively.

Finally, we can notice that relative probability of perceiving as retired after 5 years increases by 26.3% for each additional year of age and increases by 18.9% for each additional level of education. In contrast, this probability is 17% lower for each additional unemployment duration level and is 74.3% lower if the respondent is unemployment benefit recipient. The pseudo R^2 of this model is 0.218, while the p-value of the calculated χ^2 which is 0.000 leads us to conclude that at least one of the regression coefficients in the model is not equal to zero.

5. DISCUSSION AND POLICY IMPLICATIONS

In this paper we have analysed the psychological implications of high and persistent unemployment in Macedonia with particular accent on unemployed workers' perceptions of stress and future employment prospects. With this regard, we have been particularly interested to assess the role of the alternative mechanisms such as employment in the informal sector, emigration and non-participation in shaping the unemployed workers' perceptions by cushioning the social and economic consequences of the high and persistent unemployment. For this purpose, we have carried out a survey in order to empirically assess the extent to which these adjustment mechanisms absorb a part of the unemployed workforce and/or contribute to their household income, which indirectly affects their individual perceptions of unemployment.

Considering the employment in the informal sector we found that considerable number of unemployed workers is engaged in various forms of informal employment. Furthermore, we revealed that income earned from additional informal activities represents more than one third of the total household income. Hence, employment in the informal sector alongside other forms of labour market adjustment significantly contributes to the well-being of the unemployed workers. However, most of the informal arrangements of the unemployed workers are low-productivity and small-scale predominantly in the agricultural and farming sector.

With respect to emigration we found that more than half of unemployed workers if they have the possibility will emigrate either permanently or temporarily. This intention is particularly emphasised among those who perceive unemployment as stressing situation and those whose living standard was the mostly affected by the recent economic crisis. Moreover, we revealed that only small proportion of unemployed have emigrated close relatives, but they heavily rely on the remittances that receive from them. Therefore, remittances alongside other forms of labour market adjustment significantly contribute to the well-being of the unemployed workers.

Regarding the unemployed workers' perceptions of stress, we found that the level of stress increases with the age, level of education and unemployment duration. From the point of view of human capital theory, these results are somewhat expected since the opportunity cost of unemployment increases with the level of education, while longer duration of unemployment has detrimental effects on the accumulated human capital. In addition, the unemployment is more stressful experience for those who actively search for job and those who manifest intention to emigrate and/or have emigrated household members. Hence, by considering the emigration as an alternative coping strategy, the unemployed workers experience more stress which most probably is due to the related higher uncertainty. In contrast, having another unemployed or retired member(s) in the household would reduce the perceived level of stress that might be attributed to the easier adaptation to unemployment or support from inter-household transfers.

Furthermore, we revealed that the perception of future employment prospects by the unemployed workers is a complex phenomenon. In this context, the optimism to perceive as employed is particularly pronounced among those who actively search for job and have other unemployed household members. A similar pattern can be observed among those who are uncertain about their future labour market status which points out to an added worker effect as a response to a loss of real income due to unemployment. The perception of employment in the informal sector and emigration as alternatives to unemployment is more pronounced among younger, male and short-term unemployed. Generally, the unemployed workers consider the engagement in the informal sector as temporary solution to unemployment since being actually employed in the informal sector reduces the probability of perceiving as informally employed in the future. In contrast, the emigration has been considered as more prospective coping strategy which is consistent with the actual workers' intentions to emigrate and job searching behaviour.

From this analysis of unemployed workers' perceptions of stress and future employment prospects we have learned useful lessons that can guide decision makers in designing and applying appropriate policy measures in order to increase the employability and improve the psychological wellbeing of unemployed workers. First, the labour market issues should be tackled on both demand and supply side which means that increased number of created jobs must be accompanied with wise investments on the side of the quality of the labour force. Second, the possible intervention programmes should be tailored to suit the individual since the experience of unemployment is not the same for every unemployed person. In this context, the labour market segmentation might have serious negative implications on the labour market functioning that have to be set off by using appropriate policy measures. Third, a greater accent should be given to the active labour market policies and their complementarities with passive labour market policies. With respect to this, it is advisable to combine the job searching assistance with psychological assistance for those unemployed who may need it. Fourth, the

process of formalisation of jobs in the informal part of the economy has to be done prudently with an accent to the sustainability of the formalised jobs. Since, the informal employment has been generally considered as a strategy of last resort, the process of formalisation has to bring to unemployed workers a decent work defined as simultaneous pursuit of several objectives such as: income opportunities, social protection, fundamental rights at work and social dialogue. Fifth, the role of social transfers to non-participants should be reassessed and adequately redesigned in the light of the planned economic development. Hence, the very nature of economic development calls for addressing social protection and employment and income opportunities together, as part of the same policy package.

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EXAMINING THE RELATIONSHIP BETWEEN FINANCIAL DEVELOPMENT AND INTERNATIONAL TRADE IN CROATIA

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Abstract

This paper examines the relationship between financial development and international trade in Croatia over the period from the first quarter of 1997 and the last quarter of 2015. The autoregressive distributed lag (ARDL) bounds testing approach to cointegration is applied to examine the long-run and short-run relationships among the series. The research hypothesis is accepted and the relationship between financial development and international trade in Croatia is established and confirmed. The research results reveal unidirectional Granger causality from financial development to international trade at the 10% significance level, and negative long-run and the positive short-run relationships between financial developments and international trade in Croatia.

Keywords: *financial development, international trade, Croatia*

JEL classification: *F14, G1, C01*

1. INTRODUCTION

International trade theories do not take the role of finance into consideration as a source of comparative advantage. A vast empirical literature in finance has indicated the importance of financial development for industries that need more external finance. Nevertheless, the effects of finance in international trade theory are still unexplored (Ju and Wei, 2011). The complexity of the financial environment and economic history are different for different countries, so the relationship between international trade and financial development should be examined on a single country basis or on a group of similar countries. Financial liberalization in Croatia has resulted in an increase in financial inflow from abroad. According to Croatian National Bank (CNB) data on Foreign Direct Investment (FDI) from the year 1993 on, the greatest portion of FDI in Croatia has been directed towards the financial intermediation sector (mainly foreign

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owned credit institutions). In Croatia, the banking system has been rapidly turned into one of the most dynamic sectors of the Croatian economy. At the same time, trade liberalization has been prominent in Croatia. International trade liberalization in Croatia has been achieved through several phases, namely membership in the World Trade Organization (WTO), the Stabilization and Association Agreement (SAA) with the European Union (EU), the negotiation process for EU membership (Goldner Lang and Perišin, 2011) and eventually full membership in the EU. The direct linkages between two of the aforementioned phenomena have not been yet examined in Croatia. However, Bilas and Bošnjak (2015) provided empirical evidence for statistically significant long-run and short-run effects of banking loans to private individual growth rate on personal consumption growth rate in Croatia. Using a cointegration approach, Bilas and Bošnjak (2015) found empirical evidence for debt-financed consumption in Croatia for a period of fifteen years. Bošnjak, Novak and Šverko (2013) empirically confirmed the personal consumption effects on import demand in Croatia. The present research on whether financial development in Croatia is related to Croatian international trade brings a missing puzzle to the previous related research. In this paper the research hypothesis can be stated thus: there is a relationship between financial development and international trade in Croatia.

The rest of the paper is organized as follows: Section 2 briefly summarizes the existing literature on the research topic. Section 3 presents research data and methodology, while Section 4 provides empirical results and a discussion. The final section provides an overview of the main findings of the research and conclusions.

2. BRIEF LITERATURE OVERVIEW

The relationship between financial development and international trade has been examined from the perspective of economies of scale, and the results showed that international trade has been affected by the financial sector (Beck 2003; Svaleryd and Vlachos, 2005). As a potential explanation of the influence from financial development, Beck (2003) as well as Svaleryd and Vlachos (2005), suggested that a more developed financial sector may channel more savings to the private sector, which may facilitate enterprises to the use of external financing and eventually help firms overcome liquidity constraints. Kletzer and Bardhan (1987) showed that countries with a relatively well-developed financial sector have a comparative advantage in industries and sectors that rely on external finance. A developed domestic financial sector is also helpful in increasing the foreign firm's borrowing to broaden their innovative activities in the domestic economy (Omran and Bolbol 2003). Following Rajan and Zingales (1998), financial development helps firms to avoid moral hazard and adverse selection problems and to enhance export growth by using external financing. Manova (2013) points out that more developed financial markets support industries with a higher dependence on external finance in exporting more. Amiti and Weinstein (2011) confirmed the link between access to external finance and international trade at the firm level. Kim, Lin and Suen (2010) examined the influence of international trade on financial development. The research results point out the importance of trade openness in determining levels of financial development. Furthermore, the results indicate different long-run and short-run effects of trade, and that the relationship between international trade and financial development may be country-specific. Samba and Yan (2009) found similar results for selected East Asian Countries, pointing out that international trade leads to financial development in most of the countries in the sample. Susanto et al. (2011) found the positive effect of financial development on bilateral trade flows and that the effect is more prominent in the manufacturing sector, with relatively large economies of scale. Furthermore, according to the results of their research, an export from developing countries is more affected by financial development than an export from developed countries. Demir and Dahi (2011) indicate that a well-developed financial sector has positive impacts on exports with higher value added and on exports of manufactured goods that depend on external finance. Awojobi (2013) examined the relationship in Greece and found unidirectional causality from trade openness to financial development. Kar et al. (2013) examined the relationship in Turkey for the period of 1989-2007 and found a unidirectional relationship from financial development to international trade. Gries, Kraft and Meierrieks (2009) examined the relationship among financial development, international trade and economic development and found the evidence indicates that financial deepening and trade openness have swayed economic development rather marginally. According to Goksel (2012), there are negative effects from financial constraints in a country on its exporting performance and the differences in financial structures between countries affect bilateral trade. Empirical findings in his study show that financial development encourages the amounts of countries' exports, since firms need credits to cover their costs. Therefore, trade volume between

countries that have relatively healthier financial markets will be higher. Following Feng and Lin (2013), export-oriented firms face larger fixed costs in production and rely more on external finance. Therefore, worsening financial conditions affect export-oriented firms more adversely than domestic-oriented ones. Following Mishkin (2009), international trade will stimulate financial development. An economy with more developed financial markets and institutions tends to have a significantly higher economic growth rate (Shahbaz and Rahman 2012). Chimobi (2010) examined the causal relationship among financial development, trade openness and economic growth in Nigeria using data from 1970-2005; the Johansen multivariate approach to cointegration was applied, but found no cointegrating relations between growth, trade openness and financial development. Shaheen et al. (2011) also confirmed a long-run relationship between financial development, international trade and economic growth in the case of Pakistan. Korhan et al. (2015), based on the empirical results for Pakistan, suggests that better financial system will promote international trade and consequently economic growth. Following Korhan et al. (2015), financial development may represent a certain degree of comparative advantage for at least those industries that have a higher dependence on external financing. Such industries are likely to have higher shares of exports and obtain more trade benefits in countries that have higher levels of financial development. However, there is another potential linkage between financial development and international trade. The interrelationship between financial development and international trade may exist through the linkage between debt-finance consumption and imports. Strong growth in domestic demand financed by the inflow of foreign loans and real appreciation of domestic currencies stimulated the consumption of mainly imported goods and resulted in current account deficit in European transition countries (Aristovnik 2008; Zakharova 2008; Bakker and Gulde 2010; Obadić et al., 2014). Kiendrebeogo (2012) examined the linkage between financial development and international trade in developed and developing countries for the period of 1961-2010. The research results indicate a bidirectional relationship between financial development and international trade. Furthermore, the results indicate that due to different levels of economic development the causality varies between developed and developing countries. Conclusively, the existing literature does not point to a consistent conclusion with regard to the relationship between financial development and international trade.

Following the last global financial crisis, the importance of the relationship between finance and international trade has been highlighted (Manova and Foley, 2015; Contessi and de Nicola 2012). We want to contribute to this growing literature by testing whether financial development and international trade in Croatia are interconnected.

3. RESEARCH DATA AND METHODOLOGY

Following Gries, Kraft and Meierrieks (2009), Kiendrebeogo (2012) and Kar, Nazlıoglu and Agır (2013), the relationship between financial development and international trade in Croatia is examined using equation (1).

$$TRADE_t = f(LPS_t, GRW_t, FX_t) \quad (1)$$

The variable *TRADE* in equation (1) is the sum of exports and imports of goods and services measured as a percentage of gross domestic products (GDP). *LPS* denotes loans to the private sector by credit institutions as a percentage of GDP. *GRW* represents the quarterly GDP growth rate (comparison with previous quarter) and *FX* represents the official exchange rate (EUR/HRK period average). Both are taken as control variables in the equation.

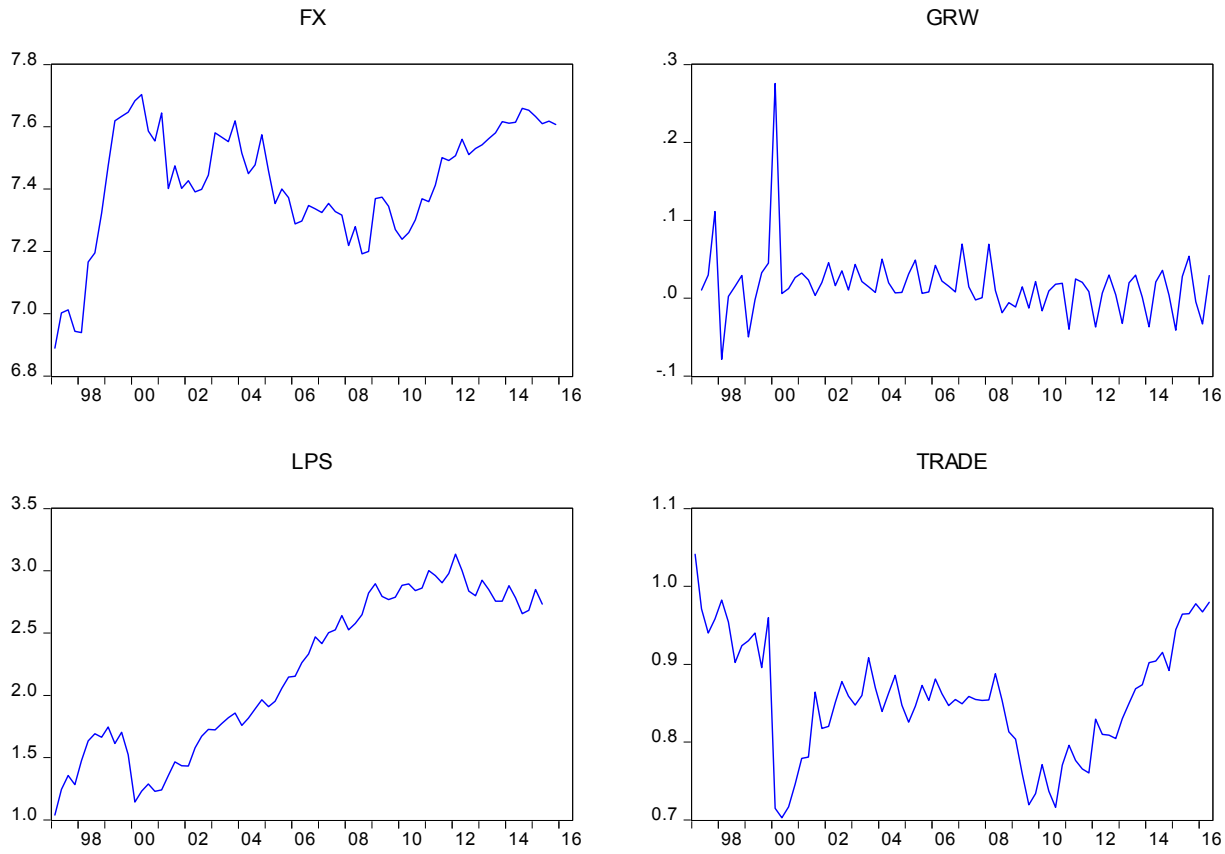
The quarterly data representing international trade and GDP growth in the model are taken from the Croatian Bureau of Statistics and the data representing LPS and FX are taken from the Croatian National Bank. The period of the study encompasses the data between the first quarter of 1997 and the last quarter of 2015. Graphs related to the series used in the model are shown in Figure 1.

Following Figure 1and the fact that we observed a quarterly data series, the variables in the model are seasonally adjusted.

First, to avoid spurious results it is essential to check each time series for stationarity, the results of which are the baseline for the methodology selection. The stationarity properties for each time series are examined using unit-root tests. Itis well known that unit-root tests cannot easily distinguish between a unit root and close alternatives as originally noted by Elliott (1998). So, an ADF test (Dickey and Fuller 1979), PP test (Phillips and Perron 1988) and KPSS test (Kwiatkowski, Phillips, Schmidt and Shin 1992) are employed. The results are summarized in Table 1.

The unit-root test results in Table 1 indicate that the variables trade openness and loans to the private sector by credit institutions as a percentage of GDP are integrated at order one I(1) i.e. they are stationary in their first differences. Following unit root tests

Figure 1: The graphs of variables used in the model



Source: Croatian Bureau of Statistics, Croatian National Bank

Table 1: Unit root test results

Variable and test	Levels		First difference	
	Constant	Constant and trend	Constant	Constant and trend
ADF test	t-stat			
TRADE	-2. 098693	-2.723216	-10.03419	-10.20880
LPS	-0.973849	-2.290963	-3.510029	-4.975360
GRW	-3.586357	-4.300109	-5.037932	-5.029814
FX	-4.222501	-4.136535	-7.375159	-7.405736
PP test	Adj. t-stat			
TRADE	-2. 098693	-2.626339	-10.17432	-10.77127
LPS	-1.655690	-1.487807	-7.984908	-8.003575
GRW	-8.618663	-9.702147	-40.75387	-40.35274
FX	-2.801568	-2.698637	-2.893556	-2.880313
KPSS test	LM-stat			
TRADE	0.169432	0.10556	0.75103	0.581915
LPS	0.078221	0.036727	1.086959	1.220862
GRW	0.556030	0.074168	0.833235	0.332703
FX	0.727731	0.318540	0.839944	0.309041

Source: Authors.

Table 2: Testing for the existence of a level relationship among the variables in the ARDL model

F-statistic	99% Upper Bound	97.5% Upper Bound	95% Upper Bound	90% Upper Bound
8.826421	5.23	4.68	4.23	3.74
	99% Lower Bound	97.5% Lower Bound	95% Lower Bound	90% Lower Bound
	4.30	3.80	3.38	2.97

Source: Authors.

results for the variables quarterly GDP growth rate and foreign exchange rate, these two variables are stationary at its levels. Mance et al. (2015) found the EUR/HRK foreign exchange rate stationary at this level as well. Taking into account the aforementioned unit-root tests results, to estimate the equation an autoregressive distributed lag (ARDL) modeling approach is used. The ARDL model introduced by Pesaran and Shin (1995) and extended by Pesaran, Shin and Smith (2001) deals with a single cointegration equation, making it simple to implement and interpret. The another advantage of ARDL approach and the main reason for it being employed in this paper is that it can be applied irrespective of whether the independent variables are I(0) or I(1). Furthermore, different variables can be assigned different lag-lengths as they enter the model. Following an ARDL approach, the bounds test for cointegration is performed and following the test results the long-run relationship and the associated error correction model are estimated. Bounds test results for cointegration are given in Table 2.

The results in Table 2 show computed F-statistics, as well as the lower and upper bounds for the corresponding confidence interval. If the computed F-statistics falls below the lower bound, the null hypothesis of no long-run relationship can be accepted without needing to know whether the variables are I(0) or I(1), or fractionally integrated. In the case of the computed F-statistics being between these two bounds, the result is inconclusive and depends on whether the variables are I(0) or I(1), and the unit root tests on the variables may be performed. Since the computed F-statistic exceeds the upper bounds, the null hypothesis of no long-run relationship is rejected.

Since the model is being estimated on quarterly data, the maximum lags order in the baseline ARDL model is 4 and the trend is included[1]. The ARDL financial development and international trade equation in its general form is represented as follows:

$$\Delta TRADE_t = c_0 + c_1 \cdot t + \sum_{I=1}^{n} \alpha_i \cdot \Delta TRADE_{t-i} + \sum_{I=1}^{n} \beta_i \cdot \Delta M_{t-i} + \sum_{I=1}^{n} \delta_i \cdot \Delta GRW_{t-i} + \sum_{I=1}^{n} \theta_i \cdot \Delta FX_{t-i} + \gamma_1 \cdot TRADE_{t-1} + \gamma_2 \cdot \Delta M_{t-1} + \gamma_3 \cdot \Delta GRW_{t-1} + \gamma_4 \cdot \Delta FX_{t-1} + \varepsilon_t \quad (2)$$

Wherere c_0,c_1 presents constant and trend, y_1, y_2, y_3 and y_4 are the long-run multipliers while a_i, β_i, δ_i and θ_i represent the short-run dynamic coefficients. Following the Akaike info criterion (AIC), ARDL(1,2,4,4) model is selected. Eventually, since the long-run relationship is confirmed, Engle and Granger (1987) and Granger (1988) causality analyses are performed.

4. RESULTS AND DISCUSSION

The level relationship, i.e. the long-run ARDL (1, 2, 4, 4) financial development and international trade equation, is presented in Table 3.

Following the results in Table 3, estimated long-run coefficients are generally statistically significant, with the exception of the EUR/HRK exchange rate (FX) that is not significant at a usually accepted significance level. The variables of interest together make a long-run equilibrium. According to the results in Table 3, the relationship between financial developments an international trade is negative; i.e., higher loans to the private sector by credit institutions as a percentage of GDP is correlated with lower trade openness in the long-run. Table 4 summarizes estimation results for the error correction equation form.

The estimation results in Table 4 show a statistically significant error correction. Furthermore, the error correction term is negative, as expected. The variables are strongly interrelated and form a long-run equilibrium. Furthermore, if the variables move from the equilibrium state they form together, the previous period disequilibrium will be corrected at a speed of 16%. In

1 The comparison of the information criteria (AIC – Akaike Information Criterion, SBC – Schwarz Bayesian Criterion and HQ – Hannan-Quinn Criterion) showed that higher values of the information criterion achieve models that include a trend.

Table 3: Estimated long-run coefficients of the ARDL (1, 2, 4, 4) financial development and international trade equation

Dependent variable: TRADE				
Variable	Coefficient	Std. Error	T- Statistic	Prob.
LPS	-0.474790	0.221706	-2.141532	0.0036
GRW	-4.496218	2.208871	-2.035527	0.0468
FX	-0.152383	0.319105	0.477533	0.6349
@TREND	0.012700	0.006560	1.936005	0.0582

Source: Authors.

Table 4: Error correction representation of the ARDL (1, 2, 4, 4) financial development and international trade equation

Dependent variable: ΔTRADE				
Variable	Coefficient	Std. Error	T- Statistic	Prob.
ΔLPS	-0.035922	0.044023	-0.815983	0.4182
ΔLPS(-1)	0.172412	0.044729	3.854567	0.0003
ΔFX	-0.030509	0.042139	-0.724002	0.4722
ΔFX(-1)	-0.107516	0.041728	-2.576571	0.0128
ΔFX(-2)	0.202648	0.040279	5.031109	0.0000
ΔFX(-3)	0.077266	0.042020	1.838780	0.0716
ΔGRW	-0.692211	0.097001	-7.136089	0.0000
ΔGRW(-1)	0.186339	0.160372	1.161918	0.2505
ΔGRW(-2)	0.018167	0.116216	0.156325	0.8764
ΔGRW(-3)	-0.152423	0.077336	-1.970911	0.0540
C	0.415561	0.093288	4.454606	0.0000
CointEq(-1)	-0.159966	0.035692	-4.481802	0.0000
CointEq = TRADE - (-0.474790*LPS - 0.1524*FX - 4.4962*GRW + 0.0127*@TREND)				
R-squared = 0.883514			Adjusted R-squared = 0.850546	
Log likelihood = 166.1991			Akaike info criterion = -4.353598	
Schwarz criterion = -3.835545			Hannan-Quinn criter = -4.148069	

Source: Authors.

other words, it will take about year and a half to retain their long-run equilibrium steady state. Holding the desired significance level at 5%, the results in Table 4 indicate that change in loans to private sector measured as a percentage of GDP is significant with lag one. The change in EUR/HRK exchange rate is significant with lag one and lag two while the change in percentage of quarterly GDP growth rate is significant without lag. However, in comparison to the estimated results for the long run we found the opposite sign for the short–run relationship between international trade and financial development and for the international trade and EUR/HRK foreign exchange rate relationship. Furthermore, the EUR/HRK exchange rate is not a significant variable in the long-run. About 88.35% of the variation in Croatian international trade can be explained by variations in loans to the private sector by credit institutions as percentage of GDP, quarterly GDP growth rate (comparison with previous quarter) and the official EUR/HRK exchange rate. Afterwards, model assumptions were tested. Residuals properties for the estimated model are presented in Table 5.

Table 5: Residuals normality diagnostics of the ARDL (1,2,4,4) financial development and international trade equation

Mean = -8.06e-17	Median = 0.001620
Maximum = 0.057744	Minimum = -0.071048
Std. Dev. = 0.021921	Skewness = -0.282381
Kurtosis = 3.825828	Jarque-Bera = 2.877723

Source: Authors.

Following Table 5, residuals are normally distributed, and therefore the T- statistic is relevant to determine the significance of the independent variables in the model. A correlogram shows no autocorrelation or partial correlations up to leg twenty eight, and the heteroskedasticity test indicates constant variance. Unbiased and efficient estimates were obtained. Conclusively, the diagnostic tests suggest that the model is adequately estimated and that the conclusions of the model are reliable.

Since cointegration is confirmed in the estimated model, we tested Granger causality among the variables observed. Granger causality test results are presented in Table 6.

Granger causality test results in Table 6 point out on existing unidirectional Granger causality from financial development to international trade at a significance level of 10%. Holding the significance level at 10%, bidirectional Granger causality has been found between financial development and economic growth and unidirectional Granger causality from EUR/HRK exchange rate to international trade.

Hence the relationship between financial development and international trade in Croatia exists. An increase of loans to the private sector by credit institutions as a percentage of GDP is positively correlated with an increase in trade openness in the short-run but in the long run the relationship is negative. Bilas and Bošnjak (2015) established and confirmed long-run and short-run effects of banking loans to private individuals' growth rate on the personal consumption growth rate in Croatia. If it is the consumption of mainly imported goods as reported by Obadić et al. (2014) for example, it might increase the trade in the short-run. Furthermore, the Granger causality test results in Table 6 indicate the relationship between financial development and economic growth. If it is the case that influence from financial development to economic growth is more prominent than influence from financial development to international trade in the long run the final result will be negative.

Furthermore, Croatia is a highly indebted country with regard to public debt (Sopek 2011) and foreign debt (Rahman 2011). Intuitively, the effect of financial development might be more prominent on the demand side, i.e. imports in Croatia. Additional effort might be needed to establish a more effective relationship between the Croatian financial system and the production side of the Croatian economy to enhance export growth by using external financing.

5. CONCLUDING REMARKS

There are several conclusions that can be drawn from the research presented in this paper. First, the existing literature points to various channels for the relationship between financial development and international trade. The relationship might be unidirectional and bidirectional. Furthermore, the relationship between financial developments to international trade might be import-dominant or export-dominant. Second, we found a strong cointegration between financial development and international trade in Croatia and accepted our initially stated research hypothesis. The research results reveal the negative sign of the relationship between financial development and international trade in the long-run, while the

Table 6: Granger causality test results for the observed variables with lag four

Null Hypothesis	Obs	F-Statistic	Prob.
LPS does not Granger Cause TRADE	70	2.23690	0.0754
TRADE does not Granger Cause LPS	70	0.25153	0.9077
GRW does not Granger Cause TRADE	73	0.52535	0.7174
TRADE does not Granger Cause GRW	73	1.33956	0.2650
FX does not Granger Cause TRADE	72	2.11264	0.0893
TRADE does not Granger Cause FX	72	1.64547	0.1740
GRW does not Granger Cause LPS	69	2.14147	0.0867
LPS does not Granger Cause GRW	69	6.49055	0.0002
FX does not Granger Cause LPS	70	6.05545	0.0004
LPS does not Granger Cause FX	70	0.22161	0.9254
FX does not Granger Cause GRW	71	0.70411	0.5921
GRWdoes not Granger Cause FX	71	0.36650	0.8316

Source: Authors.

relationship in the short-run is positive. The relationship might be import-dominant due to consumption of mainly imported goods. International trade, real GDP growth and loans to the private sector by credit institutions as a percentage of GDP are closely related in Croatia in the long-run, while the EUR/HRK exchange rate obtained its significance only in the short-run. The effects of the financial system and its development on international trade in Croatia might be more prominent on the demand side, meaning there might be space to take more advantage of financial development in Croatia. More effort should be directed towards establishing a closer relationship between the corporate and financial sectors in Croatia. Financial system development in Croatia might be redirected toward exporting companies to facilitate enterprises with the use of external financing and eventually help firms overcome possible liquidity constraints.

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BECOMING A HIDDEN CHAMPION: FROM SELECTIVE USE OF CUSTOMER INTIMACY AND PRODUCT LEADERSHIP TO BUSINESS ATTRACTIVENESS

Melita Balas Rant, Simona Korenjak Cerne

Abstract

This paper sheds light on factors that support SMEs becoming market leaders on an international scale. Specifically, it studies the hidden champion type of companies, defined as SMEs that hold market leadership in narrow business segments on a regional or wider international scale. The market positioning of hidden champions is defined subjectively by CEOs in such a way that they create a high level of business attractiveness. This explorative study reveals that product leadership and customer intimacy are two blocks that build the business attractiveness of hidden champions. More specifically, the study on data from 93 niche leaders from Central and Eastern Europe showed that product leadership negatively moderates the business attractiveness-performance relationship, while the impact of the combination of product leadership and customer intimacy on the business attractiveness-firm performance relationship is not straightforward and depends on different combinations of these values.

Key words: *strategy, value proposition, industry attractiveness, product leadership, customer intimacy.*

INTRODUCTION

Recent research has revealed that exporters from the SEE region are not significantly more resilient to recession than companies focused on domestic markets; they are not necessarily employing more staff than average or paying higher salaries (Botrić and Broz 2016). The same research also revealed that smaller exporters are more volatile in terms of growth and employment to recessions than ger exporter.

This is contrary to findings on the hidden champion type of companies, which are small and medium-sized companies that seem to consistently grow and manage to operate in international markets even during market recessions and financial turmoil (Simon 1996, 2009; McKiernan and Purg 2013).

The author of the concept of the "hidden champion" type of company, Hermann Simon, initially studied the phenomenon in the 1990s to explain how German small and medium-sized enterprises more consistently (and during recessions) contributed to the export activities of the Germany economy more than highly visible corporations such as Volkswagen, Siemens, BASF, Bosch, etc. Simon named these companies "hidden champions" because they hold revenue below 4 billion USD (they are small) and possess low levels of public awareness (they are hidden), and yet consistently hold the number one, two, or three position in the global market, or number one in the company's

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continent, as determined by market share (they are market leaders, hence real champions).

Simon (1996) and subsequent research (Simon 2009; Rache 2003; Rammer and Spielkamp 2015) revealed that hidden champions' success can be attributed to specific elements of their strategy: they set very high aspirations for gaining the market leadership position internationally; this aspiration is not purely quantitative, as stated in sales growth and market share targets, but includes elements such as shaping the rules of the game and influencing trends in their designated markets, making in consequence their markets more attractive for them (and less attractive for others). They are successful at bringing this aspiration to reality by pursuing a strategy of specialization in complex, complicated technological products and services in the B2B sector (Simon 1996; 2009; Witt and Carr 2014). A major characteristic of hidden champions is also a high level of innovation, both incremental and breakthrough innovations within the area of their specific market niche with a goal of making their niche and business more appealing. The innovation that gains product leadership in terms of quality, reliability and technological advancement involves charging a significant mark-up. Last but not least, Simon's repeated research on German hidden champions a decade later uncovered that hidden champions invest more and more into customers to become a sort of system provider to their clients. As a result, the emerging element of hidden champion strategy is customer intimacy (Simon 2009).

Research on hidden champions has been repeated over many countries and economies, yet has been mostly professional in nature, with limited statistical validity and reliability (Blackburn et al. 2001). However, the recent research of Schlepphorst et al. (2016) has closed down this gap via the econometric testing of differences in different elements of strategy between hidden champion and non-hidden champion types of internationalized SMEs. The econometric models confirmed two distinct features of hidden champions that are statically different from non-hidden champions. First, they implement the strategy of product leadership, through which they gain market leadership. Second, the strategy of product leadership is achieved via intensive R&D activities and also via improvement of technological processes. Third, these innovations are purely generated by HC employees and not via alliances or other forms of innovation creation. However, the econometric models did not explore whether customer intimacy provides significant differentiation between hidden champions and non-hidden champions.

In this research paper we would like to close this research gap and explore two issues on a sample of hidden champion companies from Central and Eastern Europe: (1) whether hidden champions from the CEE region apply the strategy of product leadership as a path to shape the attractiveness of their market niches; and (2) whether customer intimacy plays a significant role in the effectiveness of the strategy of product leadership; and (3) if so, whether customer intimacy plays any significant role in shaping the influence of the attractiveness of market niches.

More specifically, we study the moderating impact of product leadership and customer intimacy on the relationship between business attractiveness and firm performance on a sample of hidden champion companies from Central and Eastern Europe. We attempt to contribute to the existing strategic literature in three ways. First, by showing that the small and medium sized companies can shape the influence of attractiveness of their market niches we imply that SMEs hold substantial market power in the form of niche-makers. We contribute to the literature on the internationalization of SMEs. Second, we reveal the strategic characteristics of a subgroup of companies from the CEE region which, despite their size, have grown fast and seem to be more resilient to recession than the average exporter. Such an explorative approach to these types of companies can also serve policy makers to consider how to create institutional and other support mechanisms for the emergence of a new type of hidden champion.

The remainder of this paper is organized into four parts. The second section briefly reviews the literature on the strategy of differentiation, business attractiveness, and firm performance. In the third section three hypotheses that outline the moderating impact of value propositions (product leadership, customer intimacy) on the effect of business attractiveness on firm performance are refined. The fourth section outlines the research method, including how variables were measured, and data were sampled and gathered. The fifth section presents the results and limitations of the research. The results are discussed in the final section, concluding with a brief section on the implications for practice, and the limitations of the study.

VALUE PROPOSITION, BUSINESS ATTRACTIVENESS, AND FIRM PERFORMANCE

Hidden champions are niche-oriented global (regional) players (Simon 1996, 2009). These companies achieve top three global market positions, or regional dominance, while staying remarkably focused and

proactive, often in obscure niche sectors such that their revenues remain below 4 bio USD (Simon 2009). Despite their outstanding performance, there is still very little clarification on hidden champions' exact strategic behaviour. Therefore, Witt and Carr (2013) argue that hidden champions should be more systematically studied using the rigours of scholarly strategic-organizational frameworks. In this paper we attempt to connect the strategic behaviour of hidden champions with elemental concepts of strategic thinking, namely where to compete and how to compete. We address the phenomena of hidden champions with the frameworks of a deterministic school of strategy (Porter 1980; 1985). Specifically, we look at the question of where to compete from the perspective of business attractiveness and how to compete from the perspective of product leadership and customer intimacy. We explore the proposition of whether hidden champions shape their niched and business attractiveness by approaches such as product leadership and customer intimacy; and if yes, which of the two approaches is a more effective strategic mechanism of performance.

From the perspective of a deterministic school of strategy, firm performance is a function of company positioning. Positioning consists of two choices: where to compete and how to compete (Porter 1980; McGahan and Porter 1997). In relation to the former (where to compete), companies need to choose combinations of products and customer need similarities. These combinations define business attractiveness (Wit and Meyer 1994). However, business attractiveness is foremost a perceptual phenomenon held in the eye of beholder, in this case by the top management (Ellegaard and Ritter 2007). More specifically, Ellegaard and Ritter (2007) proposed that perceived business attractiveness is an outcome of management emotions, value creation mechanism, and the customer interaction process, whereby value creation involves innovation development and market access, while interaction involves processes that build up trust, satisfaction and a resulting commitment between suppliers and customers.

Value creation and the customer interaction process correspond nicely with Treacy and Wiersema (1993) on product leadership and customer intimacy, who present two distinct, internally consistent approaches to competing. In relation to the later (how to compete), companies must select a way of competing within a selected scope of doing business (Porter 1985), whereby hidden champions follow a very narrow scope, a niche, which together with product leadership and customer intimacy creates an "alchemic" reaction of resilient, growth-oriented firm performance (Simon 2009; Leitner and Guldenberg 2010).

To sum up, if firm performance is a function of business attractiveness, as well as product leadership and customer intimacy as two distinct approaches to competing and differentiating the firm from competitors, the question remains how the indirect effects of the interplay between business attractiveness, product leadership and customer intimacy shape firm performance. These indirect effects are hypothesized in the following section.

HYPOTHESES

In this study we examine how the indirect effects of the interplay between business attractiveness, product leadership and customer intimacy shape firm performance with three hypotheses that we further test on sample data from 93 niche leaders from Central and Eastern Europe.

Product leadership is inwardly-oriented, focused on product and technology. In the most general terms, product leadership constitutes superior technological solutions in a given line of business (Christensen and Raynor 2003). Product leadership is sometimes misplaced by product innovation, yet the two are not the same. Product leadership incorporates intense product and process innovation, but also market development capability (Lew and Sinkovics 2013).

Generally, the literature on product and process innovation, market development capability and product leadership argues for a positive impact on firm performance. The main argument behind this is that product leadership presents an internally consistent set of choices about the design of an activity system (Porter 1985; Treacy and Wiersema 1993; Stabell and Fjeldstad 1998; Porter and Siggelkow 2004). The business activity system is designed around novelty, whereby research has confirmed that the novelty-centered activity system exhibits a positive impact on firm performance (Zott and Amit 2008).

Product leadership is an effective strategic response in unstable and complex business environments (Miller 1988), because in such settings experimentations learning from failure and local search are the most effective approaches to strategy, competitive advantage and market development (Gavetti and Rivkin 2007). However, other streams of research on product innovation have shown that in environments with high product complexity and lots of product innovations and variations, firm performance decreases because: (1) customers face difficulties distinguishing superior products from inferior ones (Friar 1995); (2) hasty new product innovations lead to poorer product

quality (Calantone, Schmidt, and Benedetto 1997), and (3) frequent product innovations increases competitive rivalry (D'Aveni, Gunther, and Harrigan 1995; Larsen, Markides, and Nattermann 2003). Basically, product leadership via innovation may have a negative impact on firm performance because it makes with some time the lag niche structurally less attractive (Porter 1991). Lee et al. (2000) found that new product introductions have a positive, significant impact on short-term stock prices and also increase rivals' imitation and competitive rivalry, which results in stock price decreases in the longer term.

Due to our first research question on whether hidden champions from the CEE region apply the strategy of product leadership as a path to shape the attractiveness of their market niches we empirically test the following hypothesis based on the ambiguities of the above arguments:

Hypothesis 1. Product leadership negatively moderates the effect of business attractiveness on firm performance.

Customer intimacy is outwardly-oriented, or focused on customers. A cornerstone of customer intimacy is close, trustful, and durable relationships with customers (Bove and Johnson 2001). Customer intimacy, referred also as customer closeness, is established and sustained via a focus on particular customer problems, and the search for the best possible solutions for the identified problems. From the activity system perspective it is also referred to as a value shop (Stabell and Fjeldstad 1998). The core activities a firm performs to establish customer intimacy are: customer intelligence, intelligence dissemination, and customer responsiveness (Kohli and Jaworski 1990).

Customer intimacy improves customer retention rate (Verhoef 2003); maximizes the revenues from existing customers and minimizes customer acquisition costs (Reichheld and Sasser 1990); improves employee satisfaction, customer satisfaction, loyalty, profitability (Heskett and Schlesinger 1994; Heskett, Sasser, and Schlesinger 1997; Liljander 2000), enhances cash flows, lowers the volatility and vulnerability of cash flows, and increases the residual value of cash flows (Srivastava, Shervani, and Fahey 1999).

Customer intimacy allows for a better understanding of customer preferences and needs. Because consumers' preferences are fuzzy, unstable, and liable to influence, and being close to the customer allows suppliers to shape and influence their preferences, in addition to serving existing preferences (Simonson 1993). Specifically, firms with high customer intimacy can either: (1) shape the set of alternatives under consideration; (2) shape the criteria in which alternatives are evaluated; (3) shape the descriptions of alternatives; (4) impact the timing and quantity of purchasing decisions; and (5) add features and promotions with limited perceived value to a brand choice. Customer intimacy in general allows shaping products and services in such a way as to make the business landscape more attractive (Ellegaard and Ritter 2007).

Yet ,on the other hand, because product leadership and customer intimacy require different business systems design, bundling them together under one roof can create many design conflicts (Hagel and Singer 1999; Fjeldstad and Haanaes 2001). We explore this paradox in greater detail in next section.

Many authors have showed that the joining of customer intimacy with product leadership can be advantageous to the firm. For instance, in the case of product leadership characterized by numerous product variations, customers are unable to differentiate products on the basis of functional performance, and thus the company also needs to establish product superiority in customers' minds through customer intimacy (Friar 1995). Next, customers are one of the most important sources of information for successful innovations in terms of product leadership. Pejić-Bach, Lojpur, Peković and Stanovčić (2015) in their cross-sectional study of usage of different information sources' influence on internal and external research and development (R&D) activities in Croatia, France and the Netherlands in 2006-2008, showed that customers are one of the most reliable and useful sources of information of any kind of innovation. A similar finding was obtained by Zhou, Brown, and Dev (2009) in their global hotel industry study, where they found that the greater a firm's customer closeness, the more the firm is able to develop a competitive advantage based on offer (product) innovation and business differentiation. Gruner and Homburg (2000) showed that during early product development stages customer intimacy has a positive impact on new product success and future company sales figures. In relation to our second research question on whether customer intimacy plays a significant role in the effectiveness of the strategy of product leadership we empirically test the following hypothesis:

Hypothesis 2. Customer intimacy positively moderates the effect of product leadership on firm performance.

Customer intimacy also has a positive impact on firm performance in later stages of product maturity, when companies design new offerings that include a

higher degree of service content (Vandermerwe and Rada 1989) in order to reduce the tendency of product commoditization (Christensen 1997). This phenomenon is also referred to as 'servitization' (Robinson, Clarke-Hill, and Clarkson 2002). Servitization underlies a shift from selling innovative products to selling integrated products coupled with service and customer intimacy (Baines et al. 2009; Simon 2009). The majority of studies reported a positive relationship between company performance and the servitization of manufacturing firms (Mathieu 2001; Neely, Benedettini, and Visnjic 2008; Kindström 2010). A merger of product leadership with customer intimacy has thus positive performance effects.

Based on the above findings, we explore how the effect of business attractiveness on firm performance depends on a combination of different levels of product leadership and customer intimacy with the empirical test of the following hypothesis:

Hypothesis 3. The combined effect of product leadership and customer intimacy on business attractiveness-firm performance relationship depends on the combination of their levels.

METHODS

The hypotheses were tested on a sample of niche leader firms from Central and Eastern Europe, where the original measured variables were combined based on the results of exploratory factor analysis (Dillon and Goldstein 1984; Field 2000; Lattin, Carroll, and Green 2003; DiStefano, Zhu, and Mindrila 2009). The influence of business attractiveness on firm performance with product leadership and customer intimacy as moderators was observed using multiple regression analyses and interpreting interactions (Aiken and West 1991, Hayes 2013, Dawson 2014). Analyses were made with the program IBM SPSS Statistics, Version 21. More detailed observations were obtained with PROCESS (Hayes 2013), the add-on for SPSS.

DATA GATHERING AND SAMPLE

The sample for testing the above hypothesis is composed of hidden champions from the CEE region and Turkey (McKiernan and Purg 2013). Hidden champions from the CEE region are defined by three criteria (Simon 2009; McKiernan and Purg 2013): (1) they hold position number one, two, or three in the global market, or number one on the company's continent or at least the CEE region, as determined by market share; (2) they have revenues below $4 billion; and (3) they have a low level of public awareness.

The hidden champion type of sample was chosen for two reasons: first, product leadership and customer intimacy are core value propositions that account for competitive differentiations (Simon 1996; Simon 2009); second, a hidden champion type of firm holds substantial market share on an international scale and thus they are the leaders in specific lines of business (Porter 1985).

The sample included the following countries: Albania, Belarus, Bosnia and Herzegovina, Croatia, the Czech Republic, Estonia, Hungary, Kazakhstan, Latvia, Macedonia, Poland, Romania, the Russian Federation, Serbia, the Slovak Republic, Slovenia, Turkey, and Ukraine. Overall, 32 field-researchers from 18 countries identified 112 hidden champions (HCs). In the process of identifying HCs, field-researchers carefully scanned various sources of information, ranging from national to international statistical reports, economic studies, databases and networks of research and education institutions, business rankings, journal articles and business magazines, constancy reports, information available through ministries, chambers of commerce, and other public bodies. Field researchers then requested to interview the CEOs of identified hidden champion companies and after the interview filled the questionnaire developed by Herman Simon (Simon 2009). Completed questionnaires were the last stage of data gathering sent for checking and approval to the CEO (Balas Rant 2013).

The sample of hidden champion companies carry considerable variability in terms of industry, size and age. Companies in the sample came from the following industrial sectors: manufacturing of machinery and equipment, chemicals, electrical, the electronic industry, paper industry, transportation, the automotive industry, and/or steel industry, food industry, textiles, ICT and nano-tech, consumer products production, and pharmaceutical products. The size measured with the number of employees varies significantly: the number of employees ranges from a minimum of 1 to a maximum of 185,000 employees, with the average 2,720 employees, the sample standard deviation 17,536 employees, and the median 297.5 employees. From age perspective, the youngest firm in the sample is three years old and the oldest is 140 years, the average in years is 25, the sample standard deviation is 22 years, and the median is 19 years.

Due to the incomplete data, we had to exclude 18 companies from further analysis, so the final sample included 93 firms.

DEPENDENT VARIABLES

We used the internal Simon (2009) questionnaire for hidden champions (the full hidden champions diagnostic questionnaire has not been published in academic journals; however, it is accessible at the Institut für Mittelstandsforschung, Bonn). We extracted nine performance indicators: capacity utilization (CU), ensuring survival in the market (SM), employee satisfaction (ES), profit (PRF), cost savings (CS), competitive position (CP), growth (GRW), overall satisfactory (OPS), and performance through recession (PRI). The indicators were assembled into two second order constructs of efficiency (EFI) and effectiveness (EFE). The CEO of the company needed to assess satisfaction with performance indicators over the last decade (2000-2010).

Descriptive statistics and bivariate linear correlations showed many significant correlations among the measured variables, so we decided to reduce the dimensionality. We used an exploratory FA and reduced the dimensionality with the calculation of averages (DiStefano et al. 2009). Factor analysis showed two main factors, presented in the Appendix in Table A1. Based on these results, the following two constructs for firm performance as measures of efficiency and effectiveness are used:

EFI – efficiency (the average of cost savings, employee satisfaction, and capacity utilization)

EFE – effectiveness (the average of competitive position, growth, profit, ensuring survival in the market, overall satisfactory, and performance through recession).

For efficiency the Cronbach's Alpha is 0.750, and for effectiveness 0.846.

EXPLANATORY VARIABLES AND MODERATORS

We were interested to observe how business attractiveness, product leadership, and customer intimacy influence firm performance. In our data, business attractiveness is measured by the market size, which is measured on a 7-point Likert scale (1-Strongly decreased, 4-Not changed, 7-Strongly increased). We also used the Simon (2009) questionnaire for hidden champions' core competences scheme of 8 competence indicators: product quality (STR_Q), on-time delivery (STR_OT), ratio price to performance (STR_RPP), information system (STR_IS), flexibility (STR_FLX), presales (STR_PSAD), after-sales service (STR_ASAD), and cooperation (STR_COOP). Each indicator was assessed from the perspective of firm positioning along with specific indicators relative to the strongest competitor (i.e., the firm is better or worse off on a 1-7 Likert scale). Since in the case of the hidden champion type of companies there is no strong unambiguous theoretical base for combining indicators into desired constructs, we identified the common factors with an exploratory factor analysis, and then combined the related indicators into new constructs with a calculation of averages (DiStefano et al. 2009). The results of the FA showed two main factors, which are presented in the Appendix in Table A2. According to the obtained relations, we defined two variables that we further used also as moderators:

PL – product leadership:
PL = (STR_OT+STR_Q+STR_RPP+STR_COOP+STR_IS+STR_FLX)/6
CI – customer intimacy: CI = (STR_PSAD+STR_ASAD)/2

Furthermore, we verified the internal consistency of constructs with Cronbach's alpha, which are presented in the Appendix in Table A2 with other descriptive statistics for all three of the included explanatory (independent) variables: Business Attractiveness (BA), Product Leadership (PL), and Customer Intimacy (CI).

ANALYSIS AND RESULTS

We used multiple-regression (MR) models with interaction effects to test our hypothesis (Aiken and West 1991, Preacher, Curran, and Bauer 2006, Dawson 2014). More detailed observations were obtained with PROCESS (Hayes 2013), the add-on for SPSS. Model assumptions were verified with approaches proposed in Chen et al. 2003 (Regression Diagnostics). Tests of multicollinearity (for all combinations variance inflation factors (VIF) were below 1.5) enable the usage of a MR with interactions. Hypotheses were tested using two sets of regression models (one for effectiveness and one for efficiency).

Table 1 provides the statistical results of efficiency and effectiveness.

Our baseline model is Model 1. The results show that product leadership, customer intimacy, and business attractiveness have a positive impact on firm performance, whereby only the effect of business attractiveness is statistically significant in both tables, while product performance is significant only for efficiency.

To examine the impact of value propositions on the effect of business attractiveness on firm performance when a company operates in attractive or unattractive businesses (when volume and prices go up or down), a moderated multiple analysis is conducted. Hypothesis 1 predicts that product leadership

Table 1: Regression models for efficiency and effectiveness

		Model 1 (baseline model) b (p-value)		Model 2 b (p-value)		Model 3 b (p-value)		Model 4 b (p-value)		Model 5 b (p-value)	
	Hypothesis	Efficiency	Effectiveness	Efficiency	Effectiveness	Efficiency	Effectiveness	Efficiency	Effectiveness	Efficiency	Effectiveness
Intercept		1.200 (.054)	3.062*** (.000)	-4.325 (.106)	-1.777 (.507)	1.475 (.559)	8.683*** (.001)	-3.600 (.296)	3.677 (.271)	12.113 (.289)	16.725 (.134)
Business Attractiveness (BA)		.151** (.031)	.180*** (.010)	1.101** (.016)	1.012** (.028)	.150** (.033)	.168** (.014)	1.109** (.019)	1.128** (.014)	-1.720 (.393)	-1.221 (.532)
Product Leadership (PL)		.468*** (.000)	.167 (.141)	1.483** (.003)	1.056** (.034)	.418 (.362)	-.854* (.057)	1.369** (.041)	.046 (.943)	-1.625 (.455)	-2.440 (.250)
Customer Intimacy (CI)		.086 (.187)	.065 (.313)	.094 (.140)	.073 (.256)	.034 (.940)	-.982** (.030)	-.070 (.884)	-1.058** (.024)	-2.837 (.153)	-3.356* (.083)
Moderator: Product leadership (BA x PL)	H1			-.175** (.035)	-.153* (.066)			-.180** (.043)	-.172** (.045)	.358 (.350)	.274 (.461)
BA x CI								.003 (.937)	-.004 (.918)	.501 (.151)	.409 (.227)
Moderator: Customer intimacy (PL x CI)	H2					.009 (.910)	.189** (.020)	.026 (.749)	.208** (.011)	.548 (.141)	.641* (.077)
Three-way interaction between Product leadership, Customer intimacy, and Business attractiveness (BA x PL x CI)	H3								3.677	-.093 (.150)	-.078 (.219)
N		93	93	93	93	93	93	93	93	93	93
R2		.328	.164	.362	.196	.329	.215	.363	.256	.378	.269
Adj. R2		.306	.136	.333	.159	.298	.179	.318	.204	.327	.209
se		0.80553	.80626	.78977	.79530	.81003	.78594	.79834	.77388	.79326	.77149
F		14.512	5.830	12.469	5.361	10.766	6.017	8.155	4.931	7.381	4.472
p-value		.000	.001	.000	.002	.000	.000	.000	.000	.000	.000

*p<.10, **p<.05, ***p<.001

Note: Values b (p-value) represent regression coefficient and its corresponding p-value.

negatively moderates the relationship between business attractiveness and firm performance. As shown in Model 2 in Table 1 the interaction of product leadership with business attractiveness is significant for efficiency at 0.035 with a regression coefficient -0.175. The interaction is slightly weaker for effectiveness, with the regression coefficient -0.153 at 0.066 significance. This suggests that: (1) product leadership impacts the business attractiveness-performance relationship; however, the impact is more significant for efficiency than for effectiveness; and (2) that the impact is negative, which means that when product leadership improves (PL grows) the slope (the effect) of presenting the impact of business attractiveness on performance diminishes.

Furthermore, we analyzed where the impact of product leadership on the business attractiveness-firm performance relationship is significant. We calculated two regression lines at the mean value of the variable customer intimacy, whereby the first regression line (dashed line in Figure 1) refers to the product leadership value, where the value is one standard deviation below the mean value (PL low) and the second (solid line in Figure 1) to the value where product leadership is one standard deviation above the mean value (PL high). We further tested if the simple slope (the impact of business attractiveness on efficiency and effectiveness) is zero for the three values of product leadership for both efficiency and effectiveness. The results showed a significant non-zero regression slope at low value of product leadership for both; at

Figure 1: Interaction plot for the moderating effect of product leadership on the relationship between business attractiveness and (efficiency, effectiveness) firm performance [1]

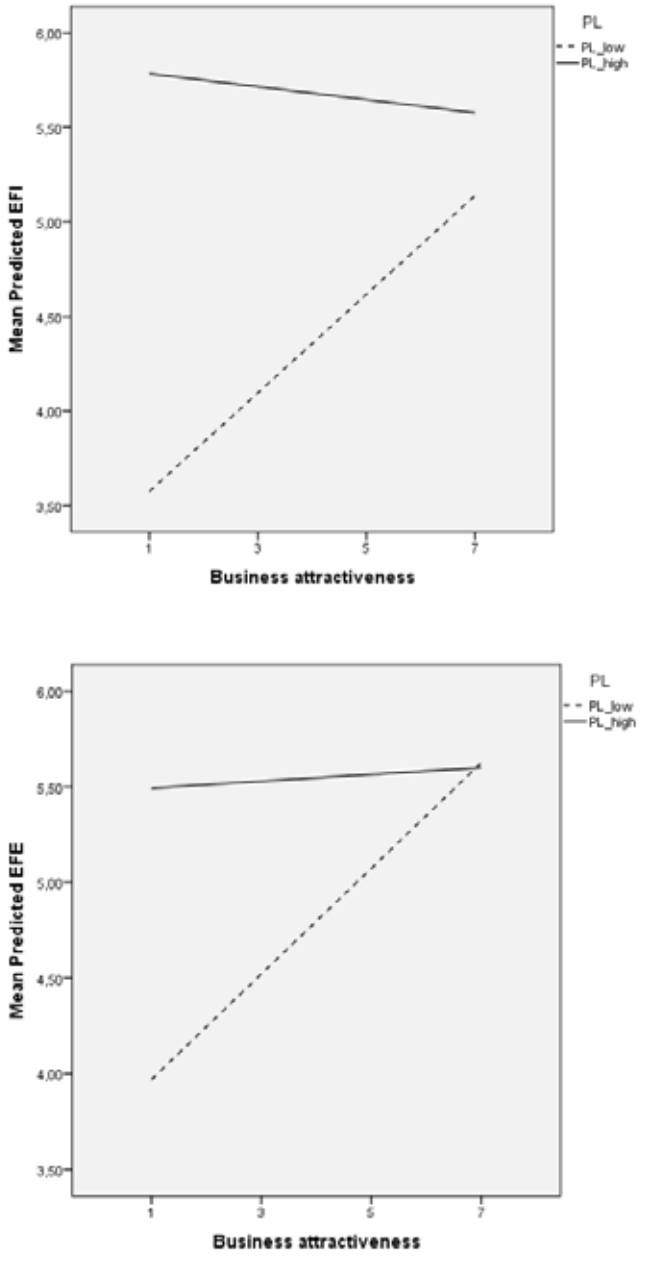
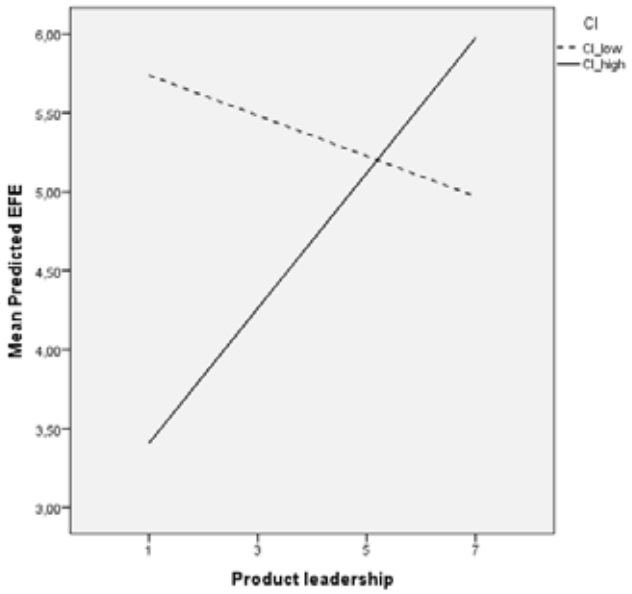


Figure 2: Interaction plot for the moderating effect of customer intimacy on the relationship between product leadership and effectiveness



[1] In Model 2:
CI = mean = 5.3145,
PL_high = mean + 1 std. = 5.6600 + 0.84288 = 6.50288, EFI' = 5.819 – 0.035 BA, EFE' = 5.475 + 0.018 BA;
PL_low = mean – 1 std. = 5.6600 – 0.84288 = 4.81712, EFI' = 3.315 + 0.261 BA, EFE' = 3.694 + 0.276 BA.

[2] In Model 4:
BA = mean = 5.688,
CI_ low = mean – 1 std. = 5.3145 – 1.47115 = 3.84335, EFE' = 5.867 – 0.128 PL,
CI_high = mean + 1 std. = 5.3145 + 1.47115 = 6.78565, EFE' = 2.978 + 0.428 PL.

mean value of the product leadership variable significance was only confirmed to effectiveness; and insignificant at a high value of product leadership. Based on this sample we can conclude that in companies that do not compete with product leadership (PL low), growing business attractiveness improves both efficiency and effectiveness as is presented by the dashed lines in Figure 1 (dashed line is statistically significant below 0.05). On the other hand, for companies that compete with product leadership (high PL), growing business attractiveness decreases the efficiency of business operations and causes a diminishing rate of increase in effectiveness (solid lines in Figure 1).

Hypothesis 2 predicts that customer intimacy positively moderates the product leadership-firm performance relationship, meaning that the positive impact of product leadership on performance increases with higher values of customer intimacy. The results lend full support to Hypothesis 2 for effectiveness (Table 1, Model 3 for effectiveness: regression coefficient 0.189 significant as 0.020), but not for efficiency (Table 1, Model 3 for efficiency). In the second step of Hypothesis 2's analysis we at different values of customer intimacy observed how customer intimacy impacts the product leadership-firm performance. We again used the method of two regression lines, this time calculated at the mean value of business attractiveness. The lines are presented in Figure 2, where the first (dashed) line refers to the value of customer intimacy one standard deviation below the mean value (CI low) and the second (solid) to the value of customer intimacy one standard deviation above the mean value (CI high). Further analysis confirmed a statistically significant regression slope at high values of customer intimacy, and insignificant at low values of customer intimacy. Based on the analysis of low-high regression lines, we infer that: (1) when customer intimacy is low (one standard deviation below the average), product leadership negatively impact effectiveness (this relationship is presented by the dashed line in Figure 2 and is not significant); and (2) when customer intimacy is high (one standard deviation above the average), competing with product leadership (high PL) increasingly and positively impacts effectiveness (the solid line in Figure 2; this relationship is significant at 0.05).

Finally, we are interested in how the effect of business attractiveness on firm performance depends on the combination of different levels of product leadership and customer intimacy. Therefore, we analyzed the interactions between business attractiveness, product leadership, and customer intimacy. In the general model the three-way interaction effect is not statistically significant (see model M5 in Table 1). But more detailed observation at selected values of product leadership and customer intimacy showed that at a low value of product leadership the effect of business attractiveness on firm performance is statistically significant and is larger at larger values of customer intimacy (see Table 2 for efficiency and Table 3 for

Table 2: Conditional effect of business attractiveness on efficiency presented with a couple (b,p) at different values of product leadership and customer intimacy in Model M5 (three-way interaction)

		Customer Intimacy (CI)		
		CI low	CI mean	CI high
Product Leadership (PL)	PL low	b=0.201, p=0.055	b=0.276, p=0.002	b=0.351, p=0.009
	PL mean	b=0.200, p=0.092	b=0.159, p=0.044	b=0.118, p=0.203
	PL high	b=0.199, p=0.372	b=0.042, p=0.742	b=-0.115, p=0.375

PL low = 4,817, PL mean= 5,660, PL high = 6,503, CI low = 3,843, CI mean = 5,315, CI high = 6,786
Couple (b,p) represents regression coefficient b (for business attractiveness) and corresponding p-value

Table 3: Conditional effect of business attractiveness on effectiveness presented with a couple (b,p) at different values of product leadership and customer intimacy in Model M5 (three-way interaction)

		Customer Intimacy (CI)		
		CI low	CI mean	CI high
Product Leadership (PL)	PL low	b=0.235, p=0.022	b=0.287, p=0.001	b=0.338, p=0.010
	PL mean	b=0.215, p=0.063	b=0.170, p=0.027	b=0.125, p=0.165
	PL high	b=0.194, p=0.369	b=0.054, p=0.668	b=-0.087, p=0.487

Note: Values of PL low, PL mean, PL high, CI low, CI mean, and CL high are the same as in the Table 2.

effectiveness at PL low). It is also statistically significant at the mean value of product leadership, but not for all values for customer intimacy. A comparison of the conditional effect of business attractiveness on firm performance at a low value of product leadership (one standard deviation below mean) and at the mean value of product leadership shows the opposite impact of business attractiveness on firm performance at different values of customer intimacy: while at lower value of product leadership the effect of business attractiveness on firm performance is larger at higher values of customer intimacy (see at PL low and at CI mean and CI high), at the mean value of product leadership (PL mean) higher customer intimacy decreases the effect of business attractiveness on firm performance (see at Pl mean and at CI low and CI mean in Table 2 and 3).

In general, this explorative approach to the building blocks of the strategic success of hidden champion companies illuminates several regularities: (1) Competing internationally via product leadership for SMEs is effective only when their current attractiveness of their business niches is low; and (2) pursuing product leadership can increase the business attractiveness of their niches, but only when product leadership is combined with sufficient customer intimacy.

Although exploratory data on this sample did not confirm a statistically significant three-way interaction between business attractiveness, product leadership, and customer intimacy, it shows that product leadership and customer intimacy can be mutually exclusive or mutually inclusive approaches to competing. More specifically, the exploratory data on this sample suggests that product leadership and customer intimacy can mutually strengthen the impact of business attractiveness on firm performance at a low value of product leadership and higher values of customer intimacy, which cannot be said (or can be even the opposite) for higher values of product leadership.

The question of whether the identified regularities of effective strategic behaviors may hold true only for Central and Eastern European hidden champions, or could be generalizable also for hidden champions regardless of national or rwider institutional context, or even to any type of international niche leaders in terms of B2B segment, would be a welcome subject of subsequent research.

DISCUSSION AND CONCLUSION

Firm performance is the outcome of the attractiveness of a business and firm's distinctive way of competing (Porter 1985). Customer intimacy or product leadership are two internally consistent, yet mutually exclusive approaches to competing (Treacy and Wiersema 1993). Combining product leadership and customer intimacy is an effective way of competing for global niche market leaders – hidden champions – (Simon 2009) who operate in the B2B segment and would like to raise their levels of business attractiveness, as showed by explorative research in this paper.

More specifically, this paper addressed how the interplay of business attractiveness, product leadership and customer intimacy shapes firm performance. We studied moderating effects across these three constructs. Our research shows that product leadership negatively moderates the relationship between business attractiveness and firm performance. The negative moderation effect is more significant for efficiency than for effectiveness.

When a company is weak in product leadership, the size of its market has a much larger influence on its efficiency and effectiveness that when it has superior product leadership. The effect of the market size becomes even stronger when such weak product leadership firms rise in customer intimacy. On the other hand, the effect of market size is much smaller when paired with superior product leadership, while the effect of customer intimacy could not be statistically confirmed. Our results also show that product leadership positively impacts effectiveness (yet not efficiency) when a company has established substantial intimacy with customers. The greater the customer intimacy, the more positive the impact of product leadership on effectiveness. However, the positive effect of a customer intimacy-product leadership merger is present only when customer intimacy is well-developed (customer intimacy is above average). Well-developed customer intimacy is critical for the overall effectiveness of a hidden champion strategy. To be well-developed and thus effective, Žabkar and Arslanagić-Kalajdžić (2014) suggest a design integrating customer intimacy systematically into marketing processes in such a way that marketing people become actually accountable for how the customers perceive the value the company creates for them.

This study's main contribution lies in shedding light on strategic approaches to competing that support an SME company becoming a market leader. The phenomena of hidden champions is studied by using the framework of the positioning school of strategy. By using this scholarly approach to the study of hidden champions, the paper contributes to the strategic management field in three ways. First, it uses the concept of value disciplines (Hagel and Singer 1999) – product leadership and customer intimacy - to capture the dominant way of competing and it applies

to explaining the dynamics between industry attractiveness and performance. Past research has used the concept of value propositions to explain the effective design of business models (Zott, Amit, and Massa 2011) and marketing strategies (Anderson, Narus, and Rossum 2006), but none have used value propositions in relation to the analysis of dominant approaches to competing and industry-performance relationship. By bringing the concept of value propositions (product leadership, customer intimacy) into an analysis of approaches to competing and the industry-performance relationship, we uncover the hidden dynamic between different approaches to competing.

Second, existing research on the dynamics of the relationship between approaches to competing (product leadership, customer intimacy) and market change (change in business attractiveness) has mainly used a grounded theory approach applied to in-depth case study analysis (Christensen 1997; Tripsas and Gavetti 2000; Gavetti and Rivkin 2007). Though such an approach is appropriate in new topic areas, it is less so for testing the relationships between existing theoretical concepts (Eisenhardt 1989; Yin 2009). In this paper we use a quantitative approach to study the dynamics of the relationship between approaches to competing (product leadership, customer intimacy) and market change (change in business attractiveness).

Finally, this paper studies in greater detail only one of Porter's four generic strategies, namely the strategy of focused differentiation, whereby we disassembled this strategy into two further concepts of product leadership and customer intimacy. Specifically, we pay attention to the product leadership and customer intimacy of hidden champion firms (Simon 2009), which are well equipped for competing in a highly globalized, interconnected business world. They are a good reference point for learning how to compete on international markets with sustainable success.

The research results also imply several insights and advice for managerial practice. Companies can successfully establish a competitive edge on an international scale if they: (1) select an attractive business segment that allows for above-average profitability, or build their own attractive business segments through an effective combination of product leadership and customer intimacy; (2) carefully determine how much to invest in product leadership, bearing in mind that too much product leadership can demolish the attractiveness of business and consequently performance; and (3) carefully determine how to build customer intimacy in parallel with product leadership, whereby customer intimacy hedges the risk of making unnecessary product development investments.

Despite the revealed interactions in this study we have to be aware of some of its limitations. In this context we would like to expose the following two: First, the study sample bears some weaknesses because it is constrained to the hidden champion-type companies from Central and Eastern Europe and Turkey. We assume that the characteristics of successful strategies of hidden champions are of general importance, regardless of the company's location. Nonetheless, we cannot assert that the general findings are equally valid for all countries in the study, nor that the findings are readily transferable to other regions and cultural contexts. Specifically, the CEE region has been faced with substantial institutional turmoil over the last two decades and these still exist today. Therefore, we believe that comparative studies of the phenomena of hidden champions and internationalization strategic of SMEs would be very welcome.

Next, the data gathering process also bears some substantial weaknesses. The data consist of self-reported perceptions of CEOs, which are important for subjective concepts like attractiveness, yet are far from sufficient. We relied on survey data for several reasons: (1) In many CEE countries public reporting does not exist, and consequently it was not possible to gather hard financial data or longitudinal data;. (2) hidden champions by definition like to stay hidden and unrevealed and cannot be effectively diagnosed by other research approaches due to their hidden nature; (3), the reliability of data is further compromised because of language differences, misinterpretations, and the subjectivity errors of interviewees. As a result, due to these research deficiencies the overall findings may not be absolutely replicable within the same sample over the time. On a positive note, Brush and Vanderwerf (1992) and Dess and Robinson (1984) established proof that self-reported data can be considered valid and reliable.

Despite all of these drawbacks, we believe that the obtained results revealed important interplays between product leadership, customer intimacy, business attractiveness, and firm performance. We hope that they will contribute to further studies on testing the relevance of these interplays.

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APPENDIX

Table A1: Rotated factor matrix for firm performance measures, product leadership and customer intimacy

	Factor	
	1 Effectiveness	2 Efficiency
Competitive position (CP)	.732	
Growth (GRW)	.715	
Profit (PRF)	.711	
Ensuring survival in the market (SM)	.688	
Overall satisfactory(OPS)	.602	
Performance through recession (PRI)	.500	
Cost savings (CS)		.704
Employee satisfaction (ES)		.618
Capacity utilization (CU)		.612
Extraction Method: Principal Axis Factoring. Rotation Method: Varimax with Kaiser Normalization.		
Rotation converged in 3 iterations.		
	Factor	
	1 Product leadership	2 Customer intimacy
On-time delivery (STR_OT)	.778	
Product quality (STR_Q)	.641	
Ratio price to performance (STR_RPP)	.601	
Cooperation (STR_COOP)	.485	
Information system (STR_IS)	.402	
Flexibility (STR_FLX)	.505	
After-sales service (STR_ASAD)		.921
Pre-sales service (STR_PSAD)		.806
Extraction Method: Principal Axis Factoring. Rotation Method: Varimax with Kaiser Normalization.		
Rotation converged in 3 iterations.		

Table A2: Descriptive statistics and bivariate linear correlations for explanatory variables

	Mean	Median	Std. Deviation	Minimum	Maximum	Cronbach's Alpha	Business Attractiveness (BA)	Product Leadership (PL)	Customer Intimacy (CI)
Business Attractiveness (BA)	5.688	6	1.2852	2	7		1	.273**	.251*
Product Leadership (PL)	5.66	5.6667	0.84288	4	7	0.729	.273**	1	.442**
Customer Intimacy (CL)	5.3145	6	1.47115	1	7	0.865	.251*	.442**	1

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

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A NUTRITIONAL ANALYSIS OF THE FOOD BASKET IN BIH: A LINEAR PROGRAMMING APPROACH

Almira Arnaut-Berilo, Adela Delalic, Adisa Huseinbasic

Abstract

This paper presents linear and goal programming optimization models for determining and analyzing the food basket in Bosnia and Herzegovina (BiH) in terms of adequate nutritional needs according to World Health Organization (WHO) standards and World Bank (WB) recommendations. A linear programming (LP) model and goal linear programming model (GLP) are adequate since price and nutrient contents are linearly related to food weight. The LP model provides information about the minimal value and the structure of the food basket for an average person in BiH based on nutrient needs. GLP models are designed to give us information on minimal deviations from nutrient needs if the budget is fixed. Based on these results, poverty analysis can be performed. The data used for the models consisted of 158 food items from the general consumption of the population of BiH according to COICOP classifications, with average prices in 2015 for these products.

Key words: *linear programming, goal programming, optimization, cost, nutrition, budget*

JEL classification: *C61, C82, I31, I32*

1. INTRODUCTION

Two specialized agencies of the United Nations, the FAO (Food and Agriculture Organization) and WHO (World Health Organization) are making efforts to define international recommendations for the intake of essential nutrients. Estimations of the quality and quantity of food lack for people with compromised nutritional status are based on nutritional needs standards. The results of these estimations can be used for targeting the food supply.

The results also can be used in planning for agricultural production and the creation of national programs, such as, for example, the enrichment of food. The target intake of nutrients for a population is the average intake of certain food components or individual food groups preferable for maintaining health, where health is defined as the low incidence of disease directly associated with food intake. Unlike many

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countries that have set nutrition-based recommendations, BiH has no such recommendations or studies that address the question of setting nutrition-based recommendations for its citizens.

This is the reason why this study aims to apply linear programming and goal programming optimization models for determining and analyzing the food basket in BiH using nutritional needs harmonized with the recommendations of the World Health Organization (WHO) and the World Bank (WB). The linear programming (LP) model and goal linear programming model (GLP) are adequate since prices and nutrient content are linearly related to the weight of food items.

The paper is divided into five parts. The literature review provides an overview of the theoretical background and application of linear programming models for analyzing nutrition needs for specific age groups and specific countries. Section 3 explains the data and methodology used for the analysis of the food basket in BiH. The results and analysis are presented in Section 4, which is divided into four main parts: a determination of the absolute minimal daily costs; a determination of minimal daily costs according to the food pyramid; an analysis of the BiH food basket provided by WB and the creation of an LP model to increase food basket efficiency. Finally, brief summary and concluding remarks are given in Section 5.

2. LITERATURE REVIEW

Application of linear programming to analyze food intake is mostly related to cost minimization. There have been many studies that use a linear programming approach focused on countries with extreme poverty or a society's vulnerable groups, such as infants, children, the elderly, people suffering from specific diseases, etc.

Skau, J. et al. (2013) have used linear programming to investigate whether four different complementary food products could contribute to fill nutrient gaps in the local diets for 6-11 month-old Cambodian infants and therefore to ensure an adequate diet. Even though this study has its limitations (a small sample size regarding dietary data, and dietary data collected by using the average recipes of mixed-food dishes, etc.), it emphasized the value of LP for planning a nutritional-intervention program. Darmon, N., Ferguson, E. and Briend, A. (2002) explained the use of linear programming as a method to design nutrient-adequate diets of optimal nutrient density and to identify the most stringent constraints in nutritional recommendations and food consumption patterns in a population's diet in rural Malawi, Africa. This study showed that linear programming can be used to identify dietary patterns and limiting nutrients and to assess whether a nutritionally adequate diet is achievable with locally available foods in different seasons, as well as to identify combinations of foods and portion sizes needed to achieve a nutrient-dense diet and desirable modifications to observed food patterns.

In addition, a certain number of studies analyze the food poverty threshold and recommend methods that enable reducing the population under the poverty threshold, based on an analysis of the food basket. Recommendations are related to specific food items and agricultural activities, Pretty, J.N., et al. (2003); Greer and Thorbecke (1986) and Kyereme and Thorbecke (1987). In this way, Drewnowski, A. and Specter, S.E., (2004) analyzed the relationship between food quality and economic value and the effect of the increase of high energy density food intake as a result of a convenient ratio of cost and energy. The study associates inequality, poverty and education with the increase of inadequate food patterns.

Anderson, A.S et al. (2007) analyzed healthy food baskets without the application of any mathematical model. Instead, the study is based on a qualitative analysis of food (population-based dietary surveys and the current definition of healthy foods by the UK Food Standards Agency). The aim of study was *"to develop an objective, nutrient-based, healthy eating indicator shopping basket (HEISB) tool for use in studies of access to healthy food."* The final HEISB tool comprised 35 items within the following categories – 17 from fruit and vegetables, nine from potatoes, bread and cereal, five from fish/meats, three from dairy, and one from fatty and sugary foods. The availabilty of food items for the chosen food basket is determined in all Schotland areas, with significant price variations depending of area and sale type, Dawson, J. et al. (2008).

The studies that use LP as a tool to design and analyze food baskets are mainly associated with nutritional food quality. Darmon, N., Ferguson, E.L. and Briend (2002), apart from identifying the lowest cost of a nutiritional diet, also analyzed different uses of LP. They developed an LP model that simulates influences one isolated factor to other variables. The goal function is defined as the sum of relative measures of absolute deviations from the average intake of a food item for corresponding LP variables. They concluded that costs cause an increase of a certain food intake and *"added considerable support to the idea that economic constraints are a major factor in determining the nutritional value of foods purchased."* By using the same goal function design, Darmon, N., Ferguson, E.L. and Briend (2006) analyzed the influence of cost constraints to food selection and an adequate nutritional

diet for French women. The study indicates that, without cost constraints, the modeled diet prefers energy from fish, fruits and vegetables. If cost constraints are included, the share of meat, eggs and milk intake is increased. Authors concluded that WHO recommendations are achievable for middle – and upper – income French women, but for those on a low food budget, a different food – based recommendation is required. Rambeloson, Z.J., Darmon, N. and Ferguson, E.L. (2008) used LP to "*identify the minimum changes required in the actual donation to achieve the French recommendations.*" They stated that "*French food-bank-delivered food aid does not achieve the French recommendations for dietary fibre, ascorbic acid, vitamin D, folate, magnesium, docosahexaenoic acid, α-linolenic acid and the percentage of energy from saturated fatty acids.*" The study showed that, by using an LP model, these recommendations are achievable if more fruits, vegetables, legumes and fish were collected and less cheese, refned cerals and foods rich in fat, sugar or salt. Oktubo, H. et al. (2015) developed mathematically optimized food intake patterns that met the recommended daily intakes for 28 nutrients studied in each sex and age group (192 healthy Japanese adults aged 31 -76 years divided into two groups <50 and ≥ 50 years). Using a linear programming model they identified optimal food intake patterns providing practical food choices and meeting nutritional recommendations for the Japanese population.

Gerdessen, J.C. and De Vries, J.H.M. (2015) explained the usage of extended goal programming tools in designing diets that are consistent with nutritional, palatability and cost constraints. The authors defined different goal functions and applied them on a diet problem which included 144 foods, 19 nutrients and several types of palatability constraints. Nutritional constraints are modeled with fuzzy sets. The study investigated the sensitivity of results in different models and states that a range of solutions with various properties can be obtained from the same dataset.

In Bosnia and Herzegovina, Pašić, M. et al. (2011) developed a linear programming optimization model of food consumption with minimal costs to meet the daily nutritional needs of the average woman and the average man, in accordance with World Health Organization standards. They have used the 59 most frequent food items gained out of a survey of 50 households as decision variables. Pašić, M. et al. (2012) showed that it is possible to develop a goal programming model with available household budget and at the same time meets required nutritional needs.

3. THE DATA AND METHODOLOGY

This paper aims to find the absolute minimal daily food intake costs that meet nutritional needs and to analyze the adequacy of the official BiH food basket provided by the World Bank. Based on the official food basket, linear programming modeling is used to provide a more efficient solution for the food basket. We used World Health Organization recommendations for the daily nutritional needs of average men and women, and price information on 158 food items from the BiH Statistical Agency. The data used for modeling consists of 158 food items from the BiH consumption expenditure according to a COICOP classification. The food item's average prices in 2015 are used.

The form of the basic model used in this study is:

$$\min f = c_1x_1 + c_2x_2 + \cdots + c_nx_n$$
$$a_{i1}x_1 + a_{i2}x_2 + \cdots + a_{in}x_n \leq UL(i)$$
$$a_{i1}x_1 + a_{i2}x_2 + \cdots + a_{in}x_n \geq RDI(i)$$
$$x_j \geq 0; i = \overline{1,m}; j = \overline{1,n}$$

where, ci – is the average price of the products in 2015; – χ_i is the 158 food item decision variables (η=158). The constraints are UL -Upper daily limits and RDI -Recommended daily intake for nutrients. The daily nutritional needs of average adults are used according to the US Department of Health & Human Services – NIH (National Institutes of Health)[1] and incorporated into model constraints. The nutrients that are used in the constraints are divided into three groups: macronutrients, vitamins and minerals. Finally, we formed a model with 54 constraints (m=27).

Later, according to the goals and requirements of analysis, the basic model is modified. We have developed a goal programming model in order to minimize deviations from nutrients constraints for a fixed budget. The LP model is modified and improved by using the parts of solution obtained by application of the GP model.

4. RESULTS AND DISCUSSION

Through the application of linear programming models are determined with the absolute minimal daily costs, the minimal daily costs according to food pyramid, maximal food basket efficiency, and which analyze the official BiH food basket provided by the WB.

1 https://ods.od.nih.gov/Health_Information/Dietary_Reference_Intakes.aspx

4.1 Determination of absolute minimal daily costs

We estimated the model with the absolute minimal costs and which satisfied nutritional needs. The resulting food basked is analyzed according to the US Department of Health and Human Services food pyramid (where food items are divided into 6 major groups: 1. cereals, bread and pasta 40%; 2. sugar and fat 1-2%; 3. meat, fish and eggs (12,5%); 4. milk and dairy products (12,5%); 5. fruits (14%) and 6. vegetables (20%)).

The obtained results show that the minimal daily costs for men amount to 1.95 KM. However, by analyzing the content of the optimal food basket for the first model, we found that a small number of food items (just 11) are included. Also, by comparing the percentage shares of food groups with the corresponding groups in the food pyramid, we found that the obtained values significantly deviate from those recommended (Figure 1).

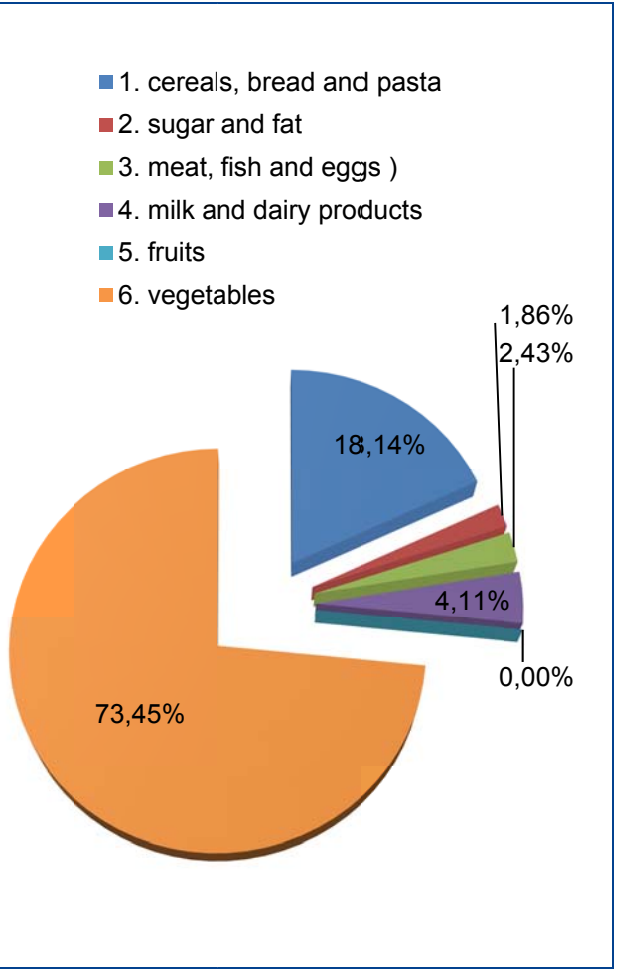
Similar results are obtained for women with a minimal daily food cost of 1.84 KM (Figure 2). Again, very few food items are included in the food basket and there is significant deviation from the percentage shares of food groups recommended by the food pyramid.

4.2 Determination of minimal daily costs according to food pyramid

In order to improve the first model, we expanded the set of constraints by the percentage shares of food groups recommended by the food pyramid. The models with the exact percentage shares and also with +/- 10% and +/- 20% from the recommended percentage

Figure 1: Nutritional constraint report and percentage of food groups in optimal LP solution for an average man.

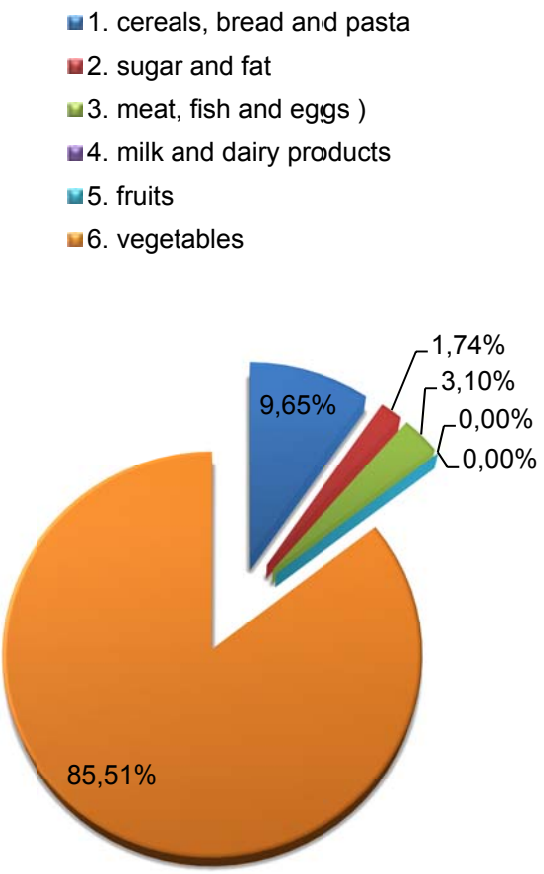
Minimum C = 1,95KM			UL	RNI	Plan
Macronutrients	Kcal		2000	3000	2417
	Carbohydrates	g	347	474	453,3
	Feat	g	42	84	42
	Protein	g	63	95	63
Vitamins	A	mcg	625	3000	625
	C	mg	75	2000	90,09
	D	µg	10	100	100
	E	mg	12	1000	13,91
	K	µg	120	NU	120
	B1	mg	1	NU	3,11
	B2	mg	1,1	NU	1,454
	B3	mg	12	35	35
	B6	mg	1,1	100	3,92
	B9	µg	320	1000	505,7
	B12	µg	2	NU	5,083
	B5	mg	5	NU	7,589
Minerals	Ca	mg	800	2500	800
	Fe	mg	6	45	19,27
	Mg	mg	350	420	420
	P	mg	580	4000	1372
	K	mg	4700	NU	4700
	Na	mg	1500	2300	1500
	Zn	mg	9,4	40	9,4
	Cu	mg	0,7	10	9,37
	Mn	mg	2,3	11	6,394
	Se	µg	45	400	113,5



Source: Authors

Figure 2: Nutritional constraint report and percentage of food groups in optimal LP solution for an average woman.

Minimum C = 1,84KM			UL	RNI	Plan
Macronutrients	Kcal		1800	2400	1,8404
	Carbohydrates	g	271	369	1956,4
	Feat	g	33	65	369
	Protein	g	49	74	34,527
Vitamins	A	mcg	500	3000	49
	C	mg	60	2000	1098,1
	D	µg	10	100	97,796
	E	mg	12	1000	100
	K	µg	90		12
	B1	mg	0,9		90
	B2	mg	0,9		2,3279
	B3	mg	11	35	1,1511
	B6	mg	1,1	100	29,183
	B9	µg	320	1000	4,1652
	B12	µg	2		351,81
	B5	mg	5		11,518
Minerals	Ca	mg	800	2500	7,8624
	Fe	mg	8,1	45	800
	Mg	mg	265	350	13,575
	P	mg	580	4000	350
	K	mg	4700		1170
	Na	mg	1500	2300	4700
	Zn	mg	6,8	40	1500
	Cu	mg	0,7	10	6,9323
	Mn	mg	1,8	11	4,4564
	Se	µg	45	400	3,5435



Source: Authors

shares are tested. Table 1 presents the results of these analyses for standard men. Based on tested models, the minimal daily costs obtained are too high (between 3.96 KM and 4.62 KM), and the models fail to provide sufficient food diversity. For example, a daily cost of 4.30 KM implies minimal monthly food consumption of 130 KM per person.

Based on this conclusion, we decided to include in our model the food items suggested in the BiH food basket provided by official BiH statistical Agency.

Table 1: Minimal daily food cost according to nutrition needs and food pyramid for a standard man and woman.

Food pyramid constraints	Men	Min Daily Cost	No of food items	Food pyramid constraints	Women	Min Daily Cost	No of food items
	exactly	4.36	14		exactly	4.62	13
	± 10%	4.17	13		± 10%	4.68	11
	± 20%	3.96	13		± 20%	4.51	11

Source: Authors

4. *Analysis of the BiH food basket provided by the WB*

According to selected nutritional constraints, we have analyzed two BiH food basket structures provided by the WB. We used the food basket structure given in the "Poverty and Living Conditions" report from the Household Budget Survey 2007. This document doesn't provide a methodology for the selection of food items or a criteria for their corresponding quantities, so we aimed to investigate whether the LP model fits into frame presented or whether it can provide better solution from a nutritional point of view.

Food basket methodology documentation in Montenegro decribes how the selection of the included food items for a food basket, both in Montenegro and other former Yougoslav countries, was inherited from the official statistical agencies of Yougoslavia. The food basket consisted of 66 food items. Reaserch on a food basket including 156 food items was conducted in Montenegro. It concluded that over 90% of consumption was associated with 54 items, all of which were already included in a previous list of 66 food items. This is the one of probable reasons why the WB recommends a food basket of 66 food items for BiH.

In the abovementioned document, "Poverty and Living Conditions", two different food basket structures are given: the first is named the "starting food basket," and the second the "optimal food basket." This list of food items is different from that which we obtained under the COICOOP classification, so it was necessary to make certain adjustments. Based on the LP model, we obtained minimal costs with the suggestions of the structures of "food basket 1" and "food basket 2".

The results for an average man are given in Table 2. In the first food basket, minimal costs amount to 3.54 KM, but not all of the constraints are met. For example, in the case of an adult man, there are deficiencies in the adequate intake of vitamins B12 and B5, and also Calcium, Magnesium, Sodium and Potassium. It can

Table 2: Minimal costs with constraint analysis of the WB suggestions of "food basket 1" for average man.

men	3,54 KM		RDI	UL	Food basket	intake
Macro-nutrients	Kcal		2000	3000	2000,00	ok
	Carbohydrates	g	347	474	307,00	lower limit
	Feat	g	42	84	66,15	ok
	Protein	g	63	95	51,09	lower limit
Vitamins	A	mcg	625	3000	1953,26	ok
	C	mg	75	2000	65,43	lower limit
	D	µg	10	100	19,02	ok
	E	mg	12	1000	13,17	ok
	K	µg	120	NU	169,16	ok
	B1	mg	1	NU	3,59	ok
	B2	mg	1,1	NU	2,16	ok
	B3	mg	12	35	25,96	ok
	B6	mg	1,1	100	1,59	ok
	B9	µg	320	1000	428,32	ok
	B12	µg	2	NU	1,67	lower limit
	B5	mg	5	NU	2,33	lower limit
Minerals	Ca	mg	800	2500	584,94	lower limit
	Fe	mg	6	45	22,65	ok
	Mg	mg	350	420	203,00	lower limit
	P	mg	580	4000	783,38	ok
	K	mg	4700	NU	1541,69	lower limit
	Na	mg	1500	2300	1266,62	lower limit
	Zn	mg	9,4	40	5,96	lower limit
	Cu	mg	0,7	10	3,08	ok
	Mn	mg	2,3	11	3,62	ok
	Se	µg	45	400	82,45	ok

Source: Authors

be investigated whether the permanent lack of these nutrients can cause certain diseases.

In the second model, the minimal costs are 3.21 KM and, in several cases, exceeded the lower or upper limits. Table 3 presents the results from the second model.

Again, there are lacks in the adequate intake of E vitamin, Calcium, Magnesium and Potassium, and an excessive intake of vitamins A and B3 and Sodium.

4.4 Creation of an LP model to increase food basket efficiency

In the end, based on the LP model, we suggested a more efficient food basket structure that would meet all constraints with lower costs. We have modified the LP model constraints by including restrictions related to variables or sets of variables according to the structure of the food basket suggested by the WB. We also used the results of the GP model obtained on the basis of a fixed budget to modify the constraints of the LP model in order to minimize deviation from the original food basket. The results of the GP model offer different structures for food baskets according to constraints and a pre-defined budget. For all of these different food baskets we have analyzed the structure related to the food pyramid, and selected a food basket with a budget of 3.54 KM. This is the same budget that we calculated in "food basket 1" (Table 2) except that we offer a different food basket structure. Our food basket meets the nutritional requirements for an average man. The resulting food basket, presented in Table 4, follows the structure of the "66 item" food basket, costs 3.54 KM on a daily basis and satisfies all of the recommended nutritional needs.

Table 3: Minimal costs with constraint analysis of the WB suggestions of "food basket 2" for average man.

men	3,21 KM		RDI	UL	Food basket	intake
Macro – nutrients	Kcal		2000	3000	2247,52	ok
	Carbohydrates	g	347	474	360,45	ok
	Feat	g	42	84	57,73	ok
	Protein	g	63	95	74,58	ok
Vitamins	A	mcg	625	3000	4831,09	upper limit
	C	mg	75	2000	104,91	ok
	D	µg	10	100	17,31	ok
	E	mg	12	1000	9,24	lower limit
	K	µg	120	NU	123,67	ok
	B1	mg	1	NU	4,34	ok
	B2	mg	1,1	NU	4,38	ok
	B3	mg	12	35	40,57	upper limit
	B6	mg	1,1	100	2,41	ok
	B9	µg	320	1000	751,07	ok
	B12	µg	2	NU	44,63	ok
	B5	mg	5	NU	6,86	ok
Minerals	Ca	mg	800	2500	620,81	lower limit
	Fe	mg	6	45	28,36	ok
	Mg	mg	350	420	243,54	lower limit
	P	mg	580	4000	1219,31	ok
	K	mg	4700	NU	2138,07	lower limit
	Na	mg	1500	2300	5306,80	upper limit
	Zn	mg	9,4	40	9,70	ok
	Cu	mg	0,7	10	11,02	upper limit
	Mn	mg	2,3	11	4,41	ok
	Se	µg	45	400	131,49	ok

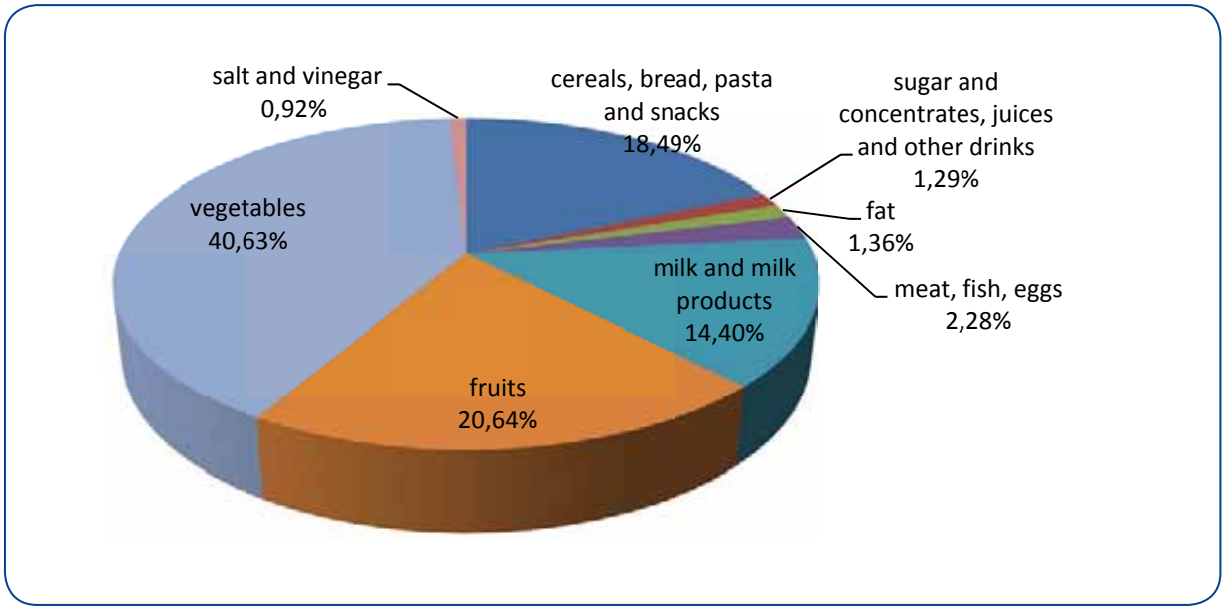
Source: Authors

Table 4: Food basket optimal structure based on LP model.

Food items	Quantity (kg per month per person)	Food items	Quantity (kg per month per person)
Rice	0,1712	Salt	0,148737
Other grains	0,744	Coffee	0,1304
Wheat flour (all types)	3,96	Fruit syrup, fruit juices	0,2328
Other flour	0,216	Beer	0,6616
Bread	2,9	Fresh citrus fruits	0,330432
Pasta	0,284	Bananas	0,12
Biscuits, confectionery	0,106316	Apples	0,2352
Beef, veal	0,328	Pears	0,0928
Poultry (fresh, or frozen)	0,3864	Grapes	0,0832
Other products of animal origin	0,04	Nuts	0,072
Freshwater and saltwater fish	1,053625	Other fruits (strawberries, ...)	0,1504
Other fish products	0,04	Walnuts, almonds ...	0
Fresh milk	4,554308	Dried fruits	0,0376
Yogurt and sour milk,	0,6168	Leafy fresh vegetables	1,519994
Sour cream	0,1816	Cabbages	0,392
Cream cheese	0,2296	Tomato	0,2664
White cheese	0,1808	Pepper	0,2104
Eggs	0,192	Cucumber	0,1664
Butter	0,072	Peas and beans	0,0512
Margarine, shortening	0,0792	Dried beans	2,441595
Cooking oil	0,56	Carrot	0,072
Other animal fat	0,2536	Onions	0,1704
Sugar	0,6168	Garlic	1,119706
Jam, jelly	0,1128	Potato	23,35035
Other confectionery products (ice cream, ...)	0,04	Other fresh vegetables	0,665716
Vinegar	0,0616	Processed and canned vegetables	0,159474

Source: Authors

Figure 3: Percentage of food groups in optimal food basket obtained by LP.



Source: Authors

The resulting food basket follows the structure of the food pyramid more efficiently than the food basket from the first model (Figure 2).

Note that the structure of the food basket follows the list of food items contained in the document "Poverty and Living Conditions" report from the Household Budget Survey 2007, from the BiH Statistical Agency. In this document, certain groups of products are classified into groups or not listed. For example, no. 36 is coffee, while numbers 37, 38 are omitted, and in the original list should be tea and cocoa.

5. CONCLUSION

This paper analyzes the food basket, aiming to minimize daily food costs while satisfying recommended nutritional daily requirements. A few LP models were created and the results showed that the minimal daily food costs in BiH were 1.95 KM for the average man and 1.84 KM for the average woman. The structure of the optimal food basket contained approximately 74% vegetables. Therefore, an additional request regarding adherence to the food pyramid structure was included. In the sequel, instead of the food pyramid, the structure of the food basket provided by World Bank was used. For the proposed two food baskets (starting and optimal), determined LP models had resulted showing daily food costs of 3.21 KM and 3.54 KM, while nutritional constraints were not met. The LP model was modified in several ways and the GP model was introduced in order to minimize deviation from the proposed food basket proposition with nutritional needs met. The results were included into a modified LP model and the optimal food basked resulted in daily food costs of 3.54 KM, with all nutritional needs satisfied.

Specifically for BiH we can see that the food basket consists of a large percentage of vegetables and fruits, and cost reduction is achieved by increasing the percentage of vegetables. We found that a food basket that can satisfy nutrition demands for a healthy diet can be created even below the extreme poverty line (according to EU commission data, the extreme poverty line is 1 $ to 2.15 $[2]). We believe that this result can be used in the poverty analysis in Bosnia and Herzegovina (for the analysis of the adequacy of a nutritional poverty threshold or in determining the size and causes of extreme poverty results),and that this result can be used in the planning of agricultural production.

Methodologically, this paper brings a new and different application of LP to nutrition basket analysis. The LP model has been transformed according to GP logic, so that the previous LP goal function has become a budget constraint and the new goal function is defined as the minimum deviation from the previously given values. In our case this was the structure of the food basket, which was known in advance. This research is mainly quantitative and we believe that the qualitative aspect with the appropriate involvement of nutritionist experts will lead to improved research.

2 The $1 per day concept came from collecting together the standards used by 15 of the world's poorest countries and for the CEE/CIS countries the World Bank has suggested an absolute poverty line of $2.15, Manuscript European Commission (2011), http://ec.europa.eu/social/

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PERCEIVED QUALITY AND CORPORATE IMAGE IN MOBILE SERVICES: THE ROLE OF TECHNICAL AND FUNCTIONAL QUALITY

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Abstract

The purpose of this study is to assess the technical (output) and functional (process) quality of mobile services, as well as the role of corporate image as a mediator between technical/functional quality perceptions and overall quality assessment of mobile services. Grönroos's service quality model is used as the conceptual base of the study. Technical quality was operationalized through two sub-dimensions: baseline network quality and augmented technical quality. The SERVPERF framework was used in the operationalization of the functional quality. A quantitative survey was conducted with (n = 414) customers of the telecommunication operator in B&H. The results suggest that corporate image mediates the effects of (1) two functional quality dimensions (tangibles and assurance) and (2) both technical quality dimensions on the overall service quality assessment. The core technical quality dimension (network) is also directly related to overall service quality perception. A discussion of the results and their implications for theory and practice is then presented.

Keywords: *mobile services, technical service quality, SERVPERF, perceived image*

JEL classification: *M31, M80*

1. INTRODUCTION

Due to its specific nature, the concept of quality is of extremely high importance in services, both for service providers and for service customers. Perceived service quality is the result of a customer's evaluation of the specific superiority or deficiency in a service (Lovelock and Wirtz 2011; Zeithaml 1988). It may also be viewed as a customer attitude resulting from a comparison between customers' expectations and experiences with service performance (Angell, Heffernan and Megicks 2008; Kahn, Strong and Wang 2002; Parasuraman, Zeithaml and Berry 1988). Perceived quality is hence a subjective category and cannot be compared with objective quality, which involves the objective assessment of products, objects, or standardized processes. It should be indicated that it is much more difficult for customers to assess service

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quality than to evaluate product quality (Hoffman and Bateson 2010), especially when it comes to external services (Marković 2006). The quality assessment of services is usually done based on service outcome and service process (Grönroos 1984; Lovelock and Wirtz 2011; Mittal 2016).

A customer's evaluation of service quality relies profoundly upon the degree of contact and the presence of the customer when the service is provided. On the one hand, for services that assume intense customer participation and (typically) interaction with first-line employees, service quality is assessed in the process of providing services (Brady and Cronin 2001; Firdaus 2006; Lehtinen and Lehtinen 1982). For example, Sandada and Matibri (2016) used a modified service quality model for airline services and evaluated only dimensions directly related to the service process (tangible elements of the trip and employee attitudes). On the other hand, low-contact services assume a low level of interaction and customers have a relatively passive role (Bowen and Youngdahl 1998; Verma and Young 2000) since they are the recipients of services developed through and based on technical performance and successful service activation. In these cases, quality perception is more output-oriented.

Grönroos's service quality model (1984) includes three main concepts that explain the process of overall service quality: technical (output) quality, functional (process) quality and corporate image. Accounting for both technical and functional quality, both contact-intensive and low-contact services are encompassed and can be evaluated. While functional quality has been conceptualized and operationalized in great detail in previous literature (starting from SERVQUAL; Parasuraman, Zeithaml and Berry 1988), it is very difficult to consistently conceptualize technical quality in different service industries. Thus, technical quality has not yet been conceptualized in a form that could be generally applied across industries (Mohsin and Lockyer 2010).

The focus of this study is on the mobile services industry, which is one of the fastest growing industries in recent decades. Furthermore, this industry combines evaluation of technical (output) quality, which is primarily assessed as it is in the core of mobile services, and functional quality (process) quality, assessed through all points of contact with the provider (i.e. customer support). This makes mobile services a good prototype to test perceptions of service quality (e.g. Nimako et al. 2012; Lai, Griffin and Babin 2009; Liang, Ma and Qi 2013).

The intended contribution of this research is twofold. First, in a similar manner as Kang and James (2004), we apply Grönroos's model to the mobile service industry, but now focusing on a developing country setting. Our application of the model is unique since it (1) focuses on the customer perceptions for all elements in the model and (2) allows all dimensions of technical and functional service quality to be related to the outcomes in the model in order to better understand the differential effects of different dimensions.

Second, we propose and empirically test a two-dimensional measure of technical service quality in mobile services. Previous studies analyzed technical quality (e.g. Nimako et al. 2012; Kang 2006; Kang and James 2004) as an overall (uni-dimensional) construct. Since the mobile services industry has advanced significantly in recent years, its core technical service should be assessed in a more in-depth approach. We thus aim to gain a better understanding into the technical (output) quality of mobile services.

The rest of the paper is organized as follows. We first make a detailed overview of corporate image and service quality concepts in order to develop our conceptual model and hypotheses. We then proceed with the methodology outline, the results of the study and a discussion of the implications for further research, and conclusions.

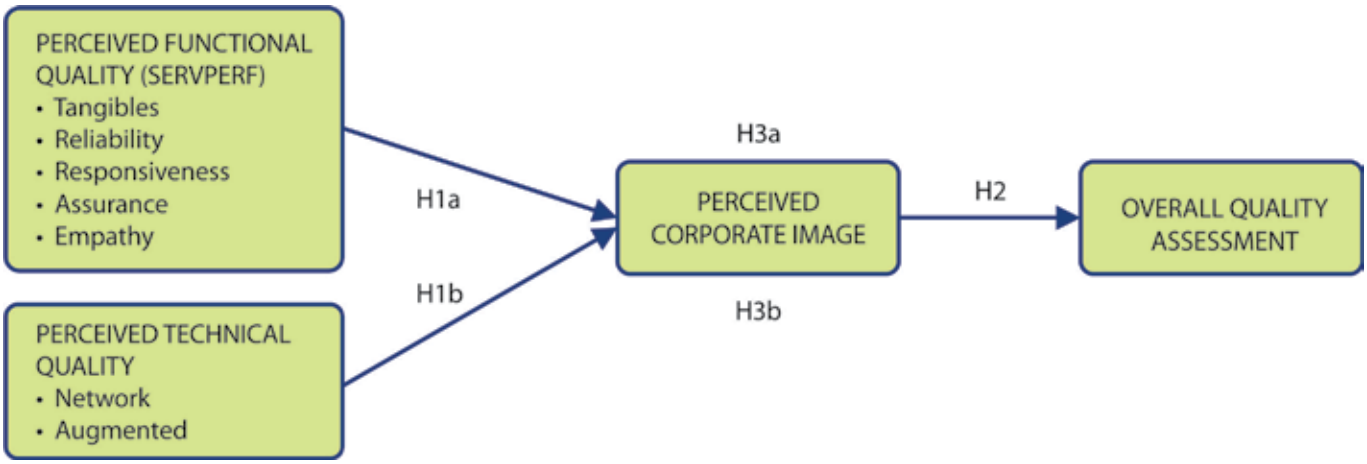
2. LITERATURE REVIEW AND CONCEPTUALIZATION

For the purposes of our research we adapt Grönroos's (1984) perceived service quality framework (see Figure 1). We first review the existing literature, and then develop and empirically test the links between perceived functional and technical quality, perceived corporate image and overall quality assessment.

2.1 Perceived corporate image

Researchers have used different levels of analysis and conceptualization when discussing the concept of corporate image. Keller (1993) defines company-level image as perception of an organization reflected in the associations held in customers' memory, while Bitner (1991), Grönroos (1984) and Gummesson and Grönroos (1988) have insisted on the importance of corporate image in the overall evaluation of the service and the company. Other literature streams advocate the opposite view, that corporate image may be created even without personal experience with the service (e.g. Bravo, Montaner and Pina 2009; Hawabhay, Abratt and Peters 2009; Huang et al. 2014; Lin and Lu 2010).

Figure 1: Conceptual framework



Many authors (e.g. Hatch and Schultz 1997; 2003; Fombrun 1996; Kazoleas et al. 2001) understand corporate image as the "overall impression" created in a customer's mind based on previous experiences with the organization or accumulated customer experience (Weiwei, 2007). This comprises, in short, customers' feelings and attitudes, transformed into a positive/negative meaning which customers connect with the name of the organization. Previous research connects corporate image with the company, its meaning, and promises to stakeholders. In services, image is also related with consistency in service provision, interaction and delivered quality. Barich and Kotler (1991) explain corporate image as the overall impression that a person holds about a firm; Aaker (1996) as "the net result of all the experiences, impressions, beliefs, feelings and knowledge that people have about a company" (p. 113), while Nandan (2005) and Brown et al. (2006) support these explanations by defining corporate image simply as everything that individuals know or believe about an organization. In the study, corporate image is conceptualized as a perception of a firm's presentation in a customer's mind.

Andreassen and Lindestad (1998) suggest that a service company's image has a role of a *filter* in the perception of quality. Being able to recall corporate image in their mind, customers simplify the whole decision-making process when considering alternative services and service providers, which makes the evaluation of services easier. This explanation is consistent with Grönroos's (1984) proposal about the role of corporate image in the evaluation of technical and functional quality dimensions in the total service quality perceived by customers. Practically, this means that if a service firm has a positive image in public, the negative effects of possible failure do not immediately translate into in a form of dissatisfaction (or bad evaluation), but are instead buffered by customers' favorable image of the organization. Similarly, companies with a negative image face problems no matter how excellent their service interactions are, they may not have a significant impact on customer perceptions of quality or satisfaction. Namely, they are being filtered through the prism of a poor corporate image.

2.2 Overview of service quality models

Research in the field of service quality has increased dramatically over the last three decades (selected examples: Angell, Heffernan and Megicks 2008; Ban and Ramsaran, 2017; Babakus and Boller 1992; Brochado 2009; Finn and Lamb 1991; Firdaus 2006; Murgulets et al. 2002; Parasuraman et al. 1985, 1988, 1991, 1994; Shekarchizadeh, Rasli and Hon-Tat 2011; Zeithaml et al. 1990, 1993). Service quality is usually explained through the disconfirmation theory (Brown and Kirmani 1999; Jiang, Klein and Crampton 2000; Oliver 1997; Oliver 1980; Spreng and Page 2003; Spreng and Mackoy 1996): *Service quality determines the extent to which the services provided have met customers' expectations. Providing high-quality services means the continuous confirmation of customers' expectations.* The most prominent disconfirmation-based model is the SERVQUAL model (Service Quality Model; Parasuraman, Zeithaml and Berry 1988) categorized as the "American" perspective of the conceptualization of service quality measurement. Further, a SERVPERF model version has been extracted from the SERVQUAL model (Cronin and Taylor 1992), assuming only customers' perceptions when evaluating perceived service quality. This model demonstrated superiority to SERVQUAL in some aspects, and it has been used when focusing on customer perceptions of quality

outcomes (Dlačić et al. 2014; Brady, Cronin and Brand 2002; Cronin and Taylor 1992).

Grönroos (1984), who belongs to the so-called "Nordic" perspective, also defines his service quality model based on the disconfirmation paradigm. He further defines service quality as the unity of service process and service output quality evaluation (Grönroos 1982, 1984). In contrary, both the SERVQUAL and SERVPERF models are dominantly focused on *functional (process)* quality measurement (Richard and Allaway 1993). Although Parasuraman et al (1985), under the influence of European scholars, accept ideas about the importance of technical quality (service output quality), their model still reflects the functional aspect only (Kang and James 2004). In this study, we also use SERVPERF for conceptualization of the functional quality dimension, as well as perceptions for all other constructs from the original Grönroos model (1984).

Service quality models were applied and tested in many industries, including the mobile and telecommunication service industry (e.g. Leisen and Vance 2001; Negi, 2009; Van der Wal, Pampalis and Bond 2002; Wang and Lo 2002; Ward and Mullee 1997). SERVQUAL was specifically used for fixed line telephone services (Leisen and Vance 2001), fixed line and mobile services (Johnson and Sirikit 2002), and mobile services (Van der Wal, Pampalis and Bond 2002).When it comes to mobile services, Wang and Lo (2002) found that network quality and empathy are the two most important factors of service quality perception among Chinese users of mobile services, while Ranaweera and Neely (2003) used SERVPERF for a fixed line telephone services study, but with slight modification; they included prices and indifference, which are confirmed in having moderate effects on service quality perception. Kim, Park and Jeong (2004) found that service quality had a strong impact on customer satisfaction and that call quality was the most important factor affecting service quality perception. Mobile service providers were studied in different cultural contexts e.g. Brazil (Souki and Filho 2008), China (Lai, Griffin and Babin 2009), Greece (Sigala 2006), India (Sukumar 2007), Malaysia (Arokiasamy and Abdullah 2013), Pakistan (Khan 2010), South Africa (Barhnhoorn 2006), Thailand (Johnson and Sirikit 2002) and Turkey (Özer and Aydin 2005), but no study has yet examined it in the context of a developing European country.

2.3. Functional and technical service quality

There is a consensus among authors about the multidimensionality of service quality (Berry 1986; Grönroos 1982, 1990; Parasuraman et al. 1985), but not about the exact nature and content of these dimensions (Brady and Cronin 2001). Lehtinen and Lehtinen (1982) discuss physical quality (which is acceptable in cases when the results of the service process are tangible, such as in architectural or restaurant services), interactive quality and corporate image in a similar manner as Grönroos (1982). Later, Lehtinen (1983) explained service quality in terms of process quality and output quality, although without discussion of corporate image. Swartz and Brown (1989) synthesized the discussions above into "what" (issues evaluated after service is delivered) and "how" (issues evaluated during the process of service delivering). Rust and Oliver (1994) stated that customers evaluate a service encounter based on the mutual interaction between customers and employees (functional quality), the service environment (physical quality) and the outcome (technical quality), while in understanding of others (i.e. SERVQUAL model), functional and physical quality are usually observed jointly, as a process element of the quality.

Functional quality could be explicated as a perception of the way in which a service was provided; it defines a customer's perception of interaction that takes place during the service provision process and relates to the satisfaction that the service recipient feels toward the process or experience of receiving the service (Arora and Stoner, 1996). On the other hand, technical quality reflects the result of the service action, service output or what the customer received after the service encounter.

A very important issue for understanding this conceptualization of service quality is customers' ability to assess the technical quality types of services. Service customers are frequently unable to evaluate service output quality, even after the service encounter, since they do not have suitable expertise/knowledge or experience (Grönroos 1984; Lehtinen and Lehtinen 1982; Opoku et al. 2009; Babic-Hodovic 2010). As a result, functional quality often becomes a compensation for the technical quality evaluation and customers often over-stress this dimension (Grönroos 1990; Richard and Allaway 1993). This is especially the case in professional and highly sophisticated services (e.g. medical, consulting or educational ones). In the case of telecommunication and/or mobile services customers usually have fewer problems in evaluating technical quality. Even without knowing technical details, they evaluate the results of using the service (e.g. successful connection, disturbances during usage).

Researchers also agree about the fact that technical quality significantly affects customer perceptions of overall service quality (Carman, 2000, Grönroos 1982,

1984, 1990, Rust and Oliver 1994). Grönroos (1984, p. 38) defines this factor as "what remains to the customer when the service process has been completed". Solomon et al. (1985) express technical output as an "actual" service and consider it the determinant in assessing the quality of a service encounter, while Rust and Oliver (1994) explicate service output as a "service product" and believe it to be a relevant characteristic that customers assess after the service encounter.

Schneider and Bowen (1995) demarcated technical quality as the essence of the service, defining it as the measure of the "core service". They accept the importance of service processes and interaction, but also point out that the process (e.g. delightful environment or friendly contact staff) cannot eliminate dissatisfaction due to the poor core service (e.g. lousy food, poor financial advice, or inadequately maintained mobile service). Consequently, they insist that core service could become prevalent compared to other elements related to service delivery. The nature and quality of this core service is what influences customer perception of quality the most. This explanation is based on the assumption that the characteristics of services being offered are equally or even more important as the way in which the service is provided (Rust and Oliver 1994). In the context of mobile services, researchers have discussed the high impact of the results of using mobile services, which can cause customer dissatisfaction even in the cases of prestige mobile operators (Blery et al 2009; Khan 2010; Seth and Gupta 2008;Tiwari and Verma 2008).

Despite acceptance of the idea that technical quality significantly affects customer perceptions of service quality (Grönroos, 1982, 1990; Rust and Oliver, 1994) marketing scholars have yet to identify the attributes of this dimension; the problems are related specifically to the possibility of the generalization of those attributes. Studying the mobile service category, the research is aimed at identifying the possibility for measuring the technical and functional dimensions of mobile service quality, and at determining the levels of impact from each on overall service quality, with corporate image as the filter between these relations.

Research on technical (output) service quality has taken different approaches. A study conducted in the USA measures technical quality dimensions through network coverage, voice service quality and un-established calls, price plans and the content of individual services (Lim, 2005), while a study conducted for mobile services in South Korea took into account only the "voice" service for defining technical quality (Kang and James, 2004). Other research conducted in Hong Kong showed that the most important factors for customers include network coverage and transmission quality, since they are a pre-requisite for using other services (Woo and Fock, 1999).

The starting point for the conceptualization of technical quality in this research was an understanding of the notion of mobile services in the telecom sector. It implies the core services, the use of which satisfy the customer's need or desire for communication. It is common that the following four types of core services: voice, SMS, GPRS, and MMS, could be found with each mobile provider, with other services based on these core services. Customers will base their evaluation of the technical quality on the assessment of core services. The technical dimension of service quality in the case of telecom operators output (result) is a result of the interaction for the customer who uses phone calls, sends an SMS, etc. Customers can assess if the call was successfully completed, interrupted without their will, if noises or echo are present during the conversation, or whether an SMS was successfully sent; this gives them the possibility to evaluate technical quality without problems.

It is also very important to determine the key factors of the technical dimension of mobile network service quality for customers. In accordance with technical recommendations in the field of telecom services, quality of service (QoS) in technical terms is defined as the *"overall influence of service performance that determines the degree of a customer's satisfaction with the provided service"* (E.800, 1994). The focus here is on the output quality, which has several stages (GSM Association, PRD IR.41, 2002): (1) network access**,** network indication on the phone display is a signal to the customer that he can use the operator's services; (2) service access**,** if the customer wants to use some of the available services, the operator should allow the fastest service access possible; (3) service integrity, describes the quality of service during the use of service (e.g. voice transfer without noise, echo, data transmitted from point A to point B should be identical, without data loss during the transfer); (4) service retainability**,** the capacity to retain the service. Service retainability describes service termination due to the customer's will (the customer has by his own will finished using the service, or the use of service was terminated for another reason beyond the customer's will – loss of signal, unsuccessful 'handover'). In order to specify various QoS parameters (customer aspect) and NP parameters (network aspect), the following nine generic parameters can be used (ETR 003 ed.2, 1994): (1) speed of service access, (2) accuracy in access, (3) access certainty, (4) speed of information transmission, (5) accuracy of information transmission, (6) certainty of information transmission, (7) speed of termination of service use, (8) accuracy of termination,

(9) certainty of termination. They were taken as a starting point for the conceptualization of technical service quality.

The technical and functional service quality dimensions described above are used as important cues for the evaluation and perception of corporate image (Bravo et al. 2009). Since corporate image is defined as perception of a firm's presentation in the customer's mind, additional perceptions customers gain through the assessment of technical (Schneider and Bowen 1995) and functional (Cronin and Taylor, 1992) quality will be directly related to the formulation of perceived image (LeBlanc and Nguyen, 1996; Nguyen and LeBlanc 2001). Furthermore, as recommended by Grönroos (1984) and further evaluated by Nimako et al. (2012), Kang and James (2004) perceived that corporate image will impact the overall quality assessment and will serve as a filter and carrier (Andreassen and Lindestad, 1998) of the effect of technical and functional quality on the overall quality assessment. Based on the outlined theoretical framework and the review above (see Figure 1), we hypothesize:

H1: Perceived mobile service provider's corporate image is positively influenced by perceived (a) technical and (b) functional service quality.

H2: Perceived mobile service provider's corporate image positively impacts overall quality assessment of mobile services.

H3: Perceived mobile service provider's corporate image mediates the effect of (a) technical and (b) functional service quality on overall quality assessment of mobile services.

3. METHODOLOGY

In order to operationalize key concepts in the study, literature was consulted for the existing measures on functional quality (SERVPERF, Cronin and Taylor 1994), and corporate image (Kim and Hyun 2011). When it comes to technical quality, the selection of indicators was done based on qualitative research and a pre-test. First, a pool of 21 items for technical quality criteria was generated pertaining to: (1) ability of the customer to register and evaluate the quality of the service, (2) importance of the indicator for the customer. A set of 16 in-depth interviews were then conducted with customers who evaluated the face validity of the items and assessed whether they could provide answers and perceive/observe all phases of technical quality assessments. During the interviews, respondents confirmed the concept of three phases of service use: access to the service, service integrity and retainability (all given in the technical recommendations of the GSM association PRD IR.41).

Customers then narrowed down the pool to the set of 11 items that relate to the services of talking, SMS, MMS, and data transfer. Overall quality was measured based on one item – overall impression and assessment of the quality by the customer. Finally, we conducted a pre-test with 38 customers, asking them to rate the items on a 1-5 Likert scale to assess the properties of the items. All the items showed good reliability, so we proceeded with the main study.

To empirically validate the proposed theoretical framework, a quantitative study was conducted in a developing market, selecting customers from one telecommunications provider. The telecommunications industry is undergoing oligopolistic competition. There are only a few telecommunication service providers, but they are in very extreme competition and are trying to build a good image in the industry relative to their competitors. Therefore, the main focus of these corporations is to retain their existing customers after attracting new customers, and to accomplish this customer perception of service quality and their attitudes regarding corporate reputation are extremely important.

The sample was derived from the overall database of customers of the selected telecommunication company, based on the following set of criteria: (1) they are registered for using the basic range of mobile services (voice services) and data mobile services (SMS, access to mobile Internet through GPRS, MMS), (2) they contacted the Customer Care Center in the previous six months before the start of research. The telecom sector belongs to service sectors where service delivery is mostly based on a technological equipment, and it is a facility/equipment based industry where the customer in the process of using services mostly has no contact with the operator's staff except in the case of a problem or complaint. For measuring the functional quality dimension it was necessary for customers to have some experience being in contact with the operator's staff; and hence (3) they had provided the operator with their e-mail. A total of 800 customer contacts were then randomly drawn from the database of the provider. An e-mail with the electronic version of the questionnaire was sent to customers, assuring them of anonymity. After a several reminders, a total of 414 usable responses (52% response rate) was received and used for subsequent analysis. When it comes to descriptive statistics, 65% of the respondents were female, 44% falling into the age group 25-35, and 44% with monthly incomes higher than the national

average. When it comes to relationship length, most respondents (54%) were long-term customers of the given telecommunications operator – between 10 and 15 years.

4. RESULTS

We first conducted an exploratory factor analysis (Principal axis factoring method, Varimax rotation) in order to examine the underlying structure of 11 selected technical quality items. A factor analysis solution converged in two dimensions, explaining 60% of variance (Average variance extracted = 59.93) with factor loadings ranging from 0.61 to 0.78 for all of the items. The first extracted factor encompasses the following six items: network signal, success in establishing a call, no noise and echo during the call, no unplanned interruptions of the call, success in sending SMSs, and confidence in quick SMS delivery. The second extracted factor encompasses the following five items: success in establishing mobile Internet connection, maximum speed of data transfer, no unplanned interruptions in mobile Internet connection, success in sending MMSs and ability to open the received MMS. By examining the substance of the two extracted factors, we labeled the first factor as the network (in terms of core network/technical services) dimension and the second factor as the augmented (in terms of additional network/technical services) dimension. Both dimensions have Cronbach's Alpha scores of 0.89.

We then proceeded to conduct a confirmatory factor analysis (CFA) in Lisrel 8.71, to test for validity and reliability of the selected measures (see Table 1). It could be observed that all indicators are within the given thresholds (Anderson and Gerbing 1988, 1991), with factor loadings ranging from 0.56 to 0.92, composite reliability being higher than 0.80 in all cases, and the average variance extracted higher than 0.50 (Bagozzi and Yi 2012). Further, discriminant validity was assessed by assessing correlation coefficients and their relation to the average variance extracted (Mackenzie, Podsakoff, and Podsakoff 2011). The measurement model shows a good fit (df = 637; χ^2= 1,713.53 χ^2/df = 2.69; RMSEA = 0.06; NNFI = 0.98; CFI = 0.98; SRMR = 0.05).

The hypothesis test was conducted using a covariance-based structural equation modeling (SEM) approach, again in LISREL 8.71 (see Table 2).

The hypothesis test shows that the hypothesis related to functional quality (H1a) is only partially confirmed, with tangibles (β = 0.478, p < 0.001) and assurance (β = 0.247, p < 0.05) being the only two significant SERVPERF dimensions. On the other hand, both dimensions of the proposed technical quality dimensions, network (β = 0.272, p < 0.001) and augmented (β = 0.102, p < 0.05) are significant. This fully confirms the second part of the hypothesis (H1b). When it comes to the second hypothesis, it is confirmed, since corporate image positively and strongly impacts overall quality (β = 0.636, p < 0.001). Finally, our third hypothesis assumed a mediating role of corporate image for the effect of functional and technical quality on overall quality evaluations. We can see that for functional quality (H3a) is partially confirmed, since corporate image does fully mediate the effect of tangibles and assurance, while for technical quality (H3b) it is fully confirmed, with partial mediation found for the effect of the network dimension of technical quality (direct effect on overall quality is β = 0.130, p < 0.05) and full mediation of the effect of the augmented technical quality dimension.

Table 1: Confirmatory factor analysis, correlations and discriminant validity

#	Construct	Loadings	CR	1	2	3	4	5	6	7	8
1	FQ: Tangibles (4 items)	0.56-0.72	0.80	**0.51**	0.18	0.18	0.23	0.24	0.07	0.09	0.22
2	FQ: Reliability (5 items)	0.63-0.81	0.83	0.43	**0.50**	0.33	0.30	0.28	0.13	0.12	0.21
3	FQ: Responsiveness (4 items)	0.65-0.92	0.88	0.43	0.57	**0.65**	0.38	0.34	0.09	0.10	0.19
4	FQ: Assurance (4 items)	0.72-0.86	0.89	0.48	0.55	0.62	**0.67**	0.40	0.11	0.12	0.25
5	FQ: Empathy (5 items)	0.62-0.81	0.84	0.49	0.53	0.58	0.63	**0.51**	0.14	0.15	0.26
6	TQ: Network (6 items)	0.67-0.82	0.89	0.27	0.35	0.30	0.33	0.37	**0.57**	0.22	0.17
7	TQ: Augmented (5 items)	0.72-0.86	0.89	0.30	0.35	0.31	0.35	0.38	0.47	**0.62**	0.17
8	Corporate Image (5 items)	0.67-0.90	0.89	0.47	0.45	0.43	0.50	0.51	0.41	0.42	**0.63**
Model fit: df = 637; χ2 = 1,1711; χ2/df = 2.69; RMSEA = 0.06; NNFI = 0.98; CFI = 0.98; SRMR = 0.05											

Notes: FQ = functional quality; TQ = technical quality; CR = composite reliability; Average variances extracted are shown bold on the diagonal, correlations are below the diagonal and squared correlations above the diagonal;

Table 2: Hypothesis test

Relationships	β (S.E.)	R2	Hypothesis test
FQ: Tangibles → Corporate Image	**0.478*** (0.124)**	0.69	H1a – partially confirmed
FQ: Reliability → Corporate Image	0.034^{ns} (0.123)		
FQ: Responsiveness → Corporate Image	-0.075^{ns} (0.135)		
FQ: Assurance → Corporate Image	**0.247** (0.161)**		
FQ: Empathy → Corporate Image	0.111^{ns} (0.201)		
TQ:Network → Corporate Image	**0.272*** (0.069)**		H1b - confirmed
TQ: Augmented → Corporate Image	**0.102** (0.053)**		
FQ: Tangibles → Overall quality	0.099^{ns} (0.106)	0.85	
FQ: Reliability → Overall quality	0.046^{ns} (0.103)		
FQ: Responsiveness → Overall quality	0.110^{ns} (0.113)		
FQ: Assurance → Overall quality	-0.021^{ns} (0.135)		
FQ: Empathy → Overall quality	-0.002^{ns} (0.167)		
TQ: Network → Overall quality	**0.130*** (0.060)**		
TQ: Augmented → Overall quality	0.054^{ns} (0.044)		
Corporate Image → Overall quality	**0.636*** (0.067)**		H2 - confirmed
Model fit: df = 667; $\chi 2$=1,777.506; $\chi 2$/df = 2.665; RMSEA = 0.066; NNFI = 0.977; CFI = 0.979; SRMR = 0.050			

Notes: B – unstandardized coefficient; S.E. – standard error; ** - $p < 0.05$, *** - $p < 0.001$; NS – not significant; FQ = functional quality; TQ = technical quality;

5. DISCUSSION AND CONCLUSIONS

Our study examined functional and technical service quality and their relations with perceived corporate image and overall quality assessment. The main contributions of the study are: (1) the definition, operationalization and empirical testing of a technical (output) quality dimension in mobile services as network (core) and augmented (additional) technical quality service dimensions, which extends earlier research discussion (e.g. Nimako et al. 2012; Kang and James 2004), and (2) the empirical testing of an adapted Grönroos model (1984), with a focus on the role of corporate image for the effects of perceived functional (SERVPERF) and the technical quality of services on overall service quality assessment.

The results of our analysis show that corporate image serves as a filter for the process of overall quality assessment, since none of the functional quality sub-dimensions has a direct effect on overall quality assessment, while the effect of two dimensions (tangibles and assurance) is fully mediated by image, which in line with the propositions of Grönroos (1984) and Andreassen and Lindestad (1998). On the other hand, technical quality has both a direct and indirect effect on overall quality assessment, with the network dimension strongly impacting both image and overall

quality directly, while augmented technical elements impact overall quality only indirectly.

It is interesting to note that SERVPERF (Cronin and Taylor 1994), when analyzed through its sub-dimensions, is not fully efficient for explaining corporate image or overall quality evaluations. In their work, Kang and James (2004) have taken functional quality to be reflected through five SERVPERF dimensions, but did not analyze the role of each of the dimensions. We see now that the dimensionality of SERVPERF is important but not all dimensions contribute equally – only two out of five matter in the context of mobile services. For mobile services that belong to the group of low-contact services functional quality might be less important (Mittal, 2016).

Furthermore, this fact underlines the importance of technical quality, which is supposed to have a stronger role for overall service quality perception. This finding points to the general importance of including technical quality perception (Kang 2006) in service quality analyses; without it, an important piece of the evaluation is missing and ignored. Finally, our empirical results further show that corporate image is partially a mediator for the effect of functional and technical quality perceptions on overall quality (Nguyen and LeBlanc 2001) and that this fact holds true in the example of a developing country.

When it comes to the managerial implications of this study, managers of telecommunication firms should note that the most important role for overall quality assessment is taken by the core service – the technical quality network dimension. It has both a direct and indirect effect on overall quality assessment. As previous research also shows (Kang 2006), this dimension has been usually disregarded by managers. Furthermore, it should be taken into account that the new dimension of technical quality – augmented technical quality – also plays a significant role for the assessment. Hence, managers in the mobile services industry, as well as managers of other low-contact services, should focus their efforts on improving core and augmented technical services, since they will result in shaping superior quality perception of customers. In terms of functional quality, tangibles and assurance should be taken seriously into account when developing a value proposition towards customers. Finally, telecommunication firms should acknowledge the role of corporate image, since it drives customer quality evaluations. Image seems to be particularly important for driving the functional quality assessment towards the overall quality assessment. Building corporate image should represent an imperative for these firms.

Our study is not without limitations. Namely, within the telecommunication services, the focus of the study was only on basic types of services, not on additional ones such as content diversity and quality, which will become increasingly significant for mobile Internet users. This study could be generalized at the level of mobile and telecommunication services, as well as at the level of low-contact and technology intensive services. However, further research should engage in operationalizing the technical quality dimension in different service industries so that more generalizable evidence of the process can be found.

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PORTFOLIO DIVERSIFICATION IN THE SOUTH-EAST EUROPEAN EQUITY MARKETS

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Abstract

Diversification potential enables investors to manage their risk and decrease risk exposure. Good diversification policy is a safety net that prevents a portfolio from losing its value. A well-diversified portfolio consists of different categories of property with low correlations, while highly correlated markets have the feature of low possibilities for diversification. The biggest riddle in the world of investments is to find the optimal portfolio within a set of available assets with limited capital. There are numerous studies and mathematical models that deal with portfolio investment strategies. These strategies take advantage of diversification by spreading risk over several financial assets. Modern portfolio theory seeks to find the optimal model with the best results. This paper tries to identify relationships between returns of companies traded in South-East European equity markets. A Markowitz mean-variance (MV) portfolio optimization method is used to identify possibilities for diversification among these markets and world leading capital markets. This research also offers insight into to the level of integration of South-East European equity markets. Principal component analysis (PCA) is used to determine components that describe the strong patterns and co-movements of the dataset. Finally, we combined MV efficient frontier and equity, which represent PCA components, to draw conclusions. Our findings show that PC analysis substantially simplifies asset selection process in portfolio management. The results of the paper have practical applications for portfolio investors.

Keywords: *Diversification, Stock Markets, Markowitz portfolio optimization theory, Principal component analysis*

JEL classification: *G11, G32*

1. INTRODUCTION

Diversification possibilities have always been interesting to investors, because diversification decreases risk exposure and protects investors. Hedging is also an option for protection against risk exposure, but it can be costly. Market correlations affect the possibilities of diversification; more correlated markets lower diversification possibilities.

In this paper we will investigate the integration and correlation of South-East European equity markets and their neighbouring markets. We will try to identify if there is potential for diversification, and to

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what extent. More specifically, we shall focus our attention on addressing the following questions: Does it make sense to diversify portfolio a in the markets in question? How can we select stocks that create a diversified portfolio, and how many stocks are needed for efficient diversification? Do efficient portfolios outperform world leading stock market indices?

For the purpose of the analysis we use two methodological approaches: Principal Component Analysis and the Markowitz portfolio optimization method.

The paper is divided into five parts. The Section 2 literature review provides an overview of the theoretical background of the research on the potential gains from diversification, and shows the results of previously conducted research. Section 3 explains the methodology used for the analysis. Section 4 explains the data, gives the results of principal component analysis and identifies the diversification possibilities using the Markowitz portfolio optimization method. Finally, a brief summary and concluding remarks are given in Section 5.

2. LITERATURE REVIEW

Diversification has long been known to mankind, as reflected in the idiom: *"Never put all of your eggs in one basket"*. Lowenfeld (1909) is considered the first academic to introduce discussion on the topic of diversification. Diversification was a known subject among market practitioners. The modern understanding of diversification goes back to the work of Markowitz (1952). With his work "Portfolio Selection" in 1952, the author set the foundations for Modern Portfolio Theory and gave direction on how to distinguish between effective from ineffective portfolios. For the first time, Markowitz introduces the efficient frontier, or as the author referred to it, a set of efficient mean-variance combinations, where return is represented by the mean return of investment, and risk is represented by the square root of variance of returns. Markowitz thereby explains portfolio space as space defined by the return and risk, where efficient portfolios are those that have the highest returns for a given risk, and the lowest risk for a given return. The total risk of an asset is divided into idiosyncratic risk and systematic risk. Idiosyncratic risk is that which can be diversified, while systematic cannot be diversified. Therefore, diversification would represent a combination of assets that reduces idiosyncratic risk and leaves the group (portfolio of assets) only with, in an ideal case, systematic risk. Markowitz diversification is defined as a strategy that combines those portfolios that have correlation less than 1 (that are not perfectly correlated) with the goal of minimizing risk while not decreasing return.

After the emergence of Modern Portfolio Theory researchers investigated the possibilities of diversification in the market. Two opposite lines of thoughts emerged, one in favour and the other against diversification theory. Shawky, Kuenzel and Mikhail (1997) synthesized research in this field and argued that when looking at ex-post data, there is a potential for international diversification. On the other side, the results for ex-ante data are questionable because of changes in correlations through time. In their paper they also refer to authors who have investigated the importance and rapid growth of emerging markets and the possibilities for diversification in those markets (Claessens et al., 1995; Tesar and Werner, 1995). Finally, they conclude that it is difficult to determine an optimal investment strategy ex-ante. Unstable correlation structures and stronger co-movements among international capital markets lead to reduced possibilities for international diversification. However, they did find strong evidence supporting international portfolio diversification as a method to reduce portfolio risk without negative effects on expected return.

Analyses of South-East European (SEE) stock markets have been reported by several papers with conflicting findings, which makes this field of research interesting and challenging. Guidi and Ugur (2014) identify three reasons for increased interest in this investment region. First, both the European Bank for Reconstruction and Development (EBRD) and the European Union (EU) are encouraging financial reforms in these countries in order to enable an inflow of FDI. Second, significant integration with EU markets has been reported as a result of increased trade and direct investment flows. Finally, the market capitalization of these markets doubled as a percentage of GDP from 2000 to 2010. The authors analysed the stock markets of Bulgaria, Croatia and whether they are integrated with developed counterparts in Germany, the UK and the USA. Static cointegration analysis showed the existence of relations with German and UK markets over the period 2000-2013, but not with the US market. Further, they investigated diversification possibilities in these markets and concluded that potential exists. Diversification benefits did exist from September 2007 to June 2013 despite evidence of dynamic cointegration during most of the crisis period from September 2008 to May 2010. Syriopoulos (2011) investigated the short- and long-run behaviour of major Balkan equity markets (Romania, Bulgaria, Croatia, Turkey, Cyprus and Greece), and developed (Germany, US) stock markets and the impact of the EMU on stock market linkages, and Syriopoulos and Roumpis (2009) analyse time-varying comovements,

volatility implications and dynamic correlations.

They found that correlations between Balkan and developed stock markets are modest and stable over time. In contrast, Guidi and Ugur (2014) report that Syllignakis and Kouretas (2011) show that correlations between Central and South-Eastern European markets and the USA and German markets vary over time, with a tendency to increase during periods of financial turmoil. Horvath and Petrovski (2013) compared Central and South Eastern Europe stock market integration. As countries of Central Europe they included the Czech Republic, Hungary and Poland, while the analysis of South Eastern Europe included Croatia, Macedonia and Serbia. For the analysis they used GARCH models for the period from 2006 until 2011. The analysis was divided according to these groups. As a final conclusion they reported that the correlation is much higher for Central European than for South Eastern European stock markets. The correlation is essentially zero for South Eastern European stock markets with developed markets, with the exception of Croatia, which has a slightly higher integration with Western Europe, but lower than those of Central European stock markets. Zaimović and Arnaut-Berilo (2015) conducted unique research on the subject of diversification possibilities between stock markets in Bosnia and Herzegovina and Germany. The trade of Bosnia and Herzegovina with Germany in 2015 amounted to 15.7% of total exports and 12% of total imports, implying the importance of trade with Germany for Bosnia and Herzegovina. Zaimović and Arnaut-Berilo (2015) reported that the German equity market is more mean variance efficient than the Bosnian equity market. They conclude that investment spreading among these markets can decrease portfolio risk in the pre-crisis and post-crisis periods.

Several papers refer also to the diversification possibilities in a single market. Benaković and Posedel (2010) use a factor model approach to analyse the movement of returns on fourteen stocks from the Croatian capital market in the period from 2004 to 2009. Kovačić (2007) investigated the behavior of stock returns in the Macedonian Stock Exchange. Bogdan, Bareša and Ivanović (2010) analysed portfolio consisted of stocks from Zagreb Stock Exchange and questioned whether there are any diversification possibilities within this market for the chosen securities. They identify correlation coefficients among chosen stocks but were careful with reporting their results because of problems with low turnover and the liquidity of stocks in question for the analysed period.

3. METHODS AND DATA

3.1 Methods

For analysis of diversification possibilities in this paper we will use two approaches: Principal Component Analysis (PCA) and the Markowitz Mean Variance portfolio optimization method (MV). Markowitz's methodology is used to demonstrate the diversification possibilities on the selected capital markets, but also to examine mean – variance (MV) efficiency for all and selected equities. As a result of MV analysis we get a set of efficient portfolios composed of a large number of shares. Choosing a subset among a large number of shares in analysis is quite important when it comes to practical application. PCA analysis is used to identify the set of equities that best describe the variability of a selected equity market. It is an alternative for reduction in complexity and identifying uncorrelated components without losing the variation given by variances and correlations or covariance.

The classical Markowitz portfolio model is used to determine the efficient return-risk combination, i.e. the efficient frontier (EF)[1]. The efficient frontier is convex curve and lies between the portfolio with minimal standard deviation and the portfolio with a maximum rate of return (mean). The model includes portfolio expected return $\overline{R}_p = \sum_{i=1}^{n} \overline{R}_i x_i$ and portfolio variances $\sigma_p^{\,2} = \sum_{j=1}^{n}\sum_{i=1}^{n} x_j x_i Cov(R_i, R_j)$, where investments satisfy the investment constraints: $\sum_{i=1}^{n} x_i = 1$ and no negativity conditions $x_i \geq 0, \;\; i = \overline{1,n}$.

The square root of portfolio variance is used as a measure of portfolio risk and includes correlations between equity returns. Markowitz argued that low or negative correlations will eliminate portfolio risk, measured by $\sigma_p^{\,2}$. In determining the efficient combination of a set of securities, several optimization problems are detected. First, the model must identify the portfolio with the lowest possible variance (the starting point of EF); second, the model must identify the portfolio with the highest return possible (the ending point of EF). In addition, for every rate of return the lowest variance portfolio must be determined, and for every variance the highest return portfolio must be determined.

If the investor considers investing in a portfolio, with a pre-determined value of expected return on investment E, we have an additional constraint:

1 The mean-variance combination of a portfolio is efficient if there are no other combinations with the same return, and a lower variance, or the same variance and higher return.

$\sum_{i=1}^{n} \overline{R}_i \cdot x_i = E$. As a result, the model represents the investment vectors that provide the absolutely minimum portfolio return variance $\sigma^2_{\min}$ with the pre-set return E. By choosing randomly expected return of investment in the range $\overline{R}_{\min} \le E \le \overline{R}_{\max}$ [2] we can determine the efficient set of the observed security (Arnaut-Berilo and Zaimović, 2012).

PCA has the ability to decompose interrelated variables into uncorrelated components. The idea then is to observe correlations in the structure of equity, identify uncorrelated risk sources in the market and chose the equity from a different risk source. We used the Kaiser – Meyer – Olkin (KMO) measure of sampling adequacy and Bartlett's Test of Sphericity.

The KMO statistic compares the value of correlation between stock returns to those of the partial correlations. If stocks share more common, variations in the KMO will be close to 1, while a KMO close to 0 indicates that PCA will not extract much useful information.

$$KMO = \frac{\sum_{i=1}^{n}\sum_{\substack{j=1 \\ j\neq i}}^{n} r_{ij}^2}{\sum_{i=1}^{n}\sum_{\substack{j=1 \\ j\neq i}}^{n} r_{ij}^2 + \sum_{i=1}^{n}\sum_{\substack{j=1 \\ j\neq i}}^{n} a_{ij}^2},$$

where r^{ij} is correlation between stock returns and $a_{ij} = r_{ij \cdot \{1,2,\ldots,n\} \setminus \{i,j\}}$ are partial correlations.

Bartlett's test of sphericity tests the null hypothesis that the correlation matrix is equal to the unit matrix. If we accept the null hypothesis, this means that there is no intercorrelation between variables. The Bartlett Test is given by:

$$b = -\left(m - 1 - \frac{2n+5}{6}\right) \ln |\boldsymbol{R}|$$

and follows χ^2 distributions with $df = \frac{(p-1)(p-2)}{2}$ degrees of freedom.

For the purpose of this paper we will use the principal component approach, which follows the Jolliffe (2002) variable selection method and Kaiser's rule (Kaiser, 1960).

3.2 Data

Our starting sample consisted of 47 stocks and 23 indices observed over the period from 1st January 2006 until 1st April 2016. List of stocks and indices used is provided in Table 1 and 2.

We selected stocks with sufficient liquidity, namely for a minimum of 440 trading days during the observed period. Most liquid stocks and wide indices from the analysed markets are included in the sample.

The selected stocks were being traded in the five SEE capital markets (those of Croatia, Serbia, Montenegro, Macedonia and Bosnia-Herzegovina[3]), while the analysed stock market indices covered in addition to these five SEE capital markets the capital markets of Romania and Bulgaria. Moreover, some world leading market indices were also included (representing the US, the UK, German, Austrian, Italian and Japanese capital markets).

The analysis was conducted using monthly logarithmic returns calculated based on stock prices (and in the case of indices, index values) at the beginning of each month. The price on the first trading day of each month during the analysed period was used, and if that was not available, the first prices prior to the first trading day of each month. Due to missing data, and nonsynchronous trading problems, we have excluded 10 stocks and indices from further analysis.

Table 1: List of stocks

Stock exchange	Stocks
Banja Luka SE	HETR-R-A; NOVB-R-E; TLKM-R-A; KRIP-R-A; ZPTP-R-A; BVRU-R-A
Belgrade SE	AERO; AIKB; ENHL; FITO; KMBN; NIIS; SJPT
Podgorica SE	PLAP; ATBN; PREN; PREN
Sarajevo SE	BHTSR; JPEMR; BSNLR; ENISR; ENPSR; FDSSR; HDGSR; HRBFRK2; MIGFRK2; PRPFRK2; BIGFRK3
Skoplje SE	ALK; GRNT; MTUR; TEL; MPT; TNB; PPIV; STB; TTK
Zagreb SE	ADRS-R-A; ATGR-R-A; DLKV-R-A; DDJH-R-A; ERNT-R-A; HT-R-A; LEDO-R-A; PODR-R-A; PRFC-R-A; RIVP-R-A

2 If the following is true $E > \overline{R}_{\max}$ the model would be unsolvable, and if $E < \overline{R}_{\min}$ then the solution to the system (1- 4) would not be an element of the efficient set, where $\overline{R}_{\min}$ a n d $\overline{R}_{\max}$ corresponds to the efficient portfolio with the lowest variance and maximum return, respectively

3 Bosnia – Herzegovina's capital market consist of two stock exchanges, Sarajevo Stock Exchange and Banja Luka stock exchange.

Table 2: List of indices

Stock exchange	Indices
Banja Luka SE	BIRS
Belgrade SE	BELEX15
Bucharest SE	BET; BET-BK; BET-C; BET-FI; BET-NG; BET-XT; ROTX
Frankfurt SE	DAX
London SE	FTSE 100
Milano SE	FTSE MIB
Podgorica SE	MNSE10
Sarajevo SE	SASX-10; SASX-30
Sofia SE	SOFIX
Tokyo SE	NIKKEI 225
Vienna SE	ATX
Zagreb SE	CROBEX; CROBEX10
Other	NASDAQ; DJIA; S&P500

4. RESULTS AND DISCUSSION

4.1 Diversifications possibilities on SEE equity markets

In order to examine the possibilities for diversification in SEE equity markets, we have used an MV efficient set, i.e. an efficient frontier. Notice, once again, that the efficient frontier is a convex curve in a mean-variance coordinate system and that every dot (representing a portfolio of stocks) inside this convex set is less efficient than portfolios on the efficient frontier.

Figure 1 shows the MV efficient frontier formed by sample stocks from six stock exchanges (Sarajevo, Banja Luka, Belgrade, Zagreb, Skopje, Podgorica) and two stock exchange indices from Romanian and Bulgarian capital markets (the Bucharest and Sofia stock exchanges). The effects of diversification with a lower standard deviation for the given level of expected return, or a higher expected return for the given level of standard deviation, are visible along the whole efficient frontier.

SEE markets portfolios outperform every stock exchange efficient portfolios. Stocks on the Macedonian stock exchange were the best performing, while the Sarajevo Stock Exchange stocks were the worst performing over the observed period. The effects of diversification in terms of the value of the standard deviation on different efficient frontiers can be seen in

Figure 1: Portfolio diversification potential on SEE markets.

Source: Authors

Table 3: Diversification effects on SEE markets for pre-given level of return.

Pre-given return (%)	Risk (standard deviation as a %) of efficient portfolio from selected equity market						Risk SEE (%)	Investment weights (%)						
	Sarajevo	Zagreb	Belgrade	Podgorica	Banja Luka	Skopje		Bucharest	Sarajevo	Zagreb	Belgrade	Podgorica	Banja Luka	Skopje
0.484	19.93	11.67	9.61	7.29	6.84	5.98	4.66	8.2	6.74	23.5	0	8.4	32.54	20.63

Source: Authors

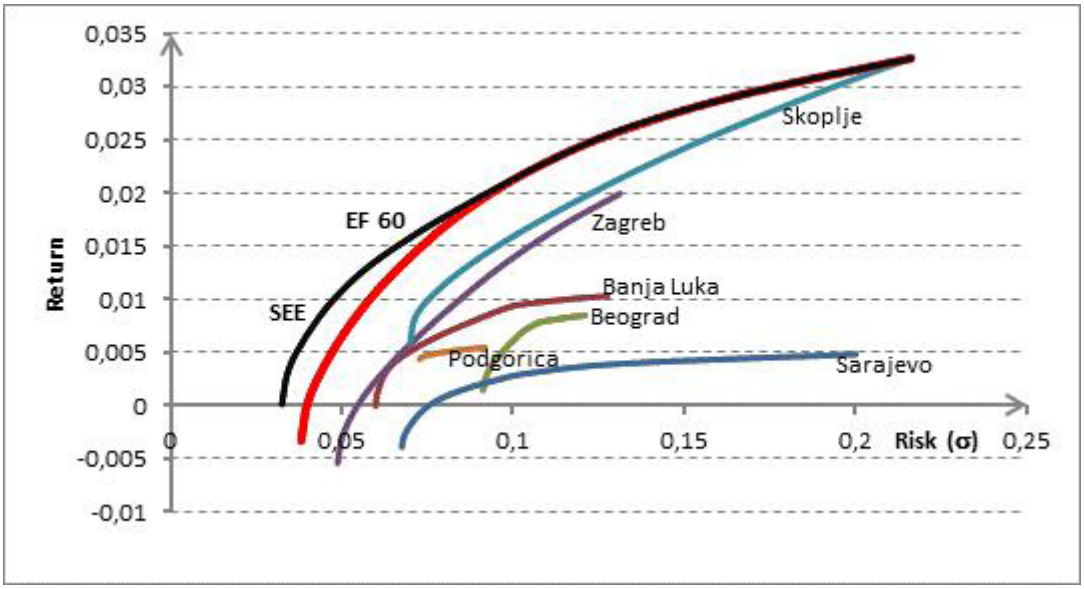
the following table. Table 3 shows efficient portfolios' standard deviations for the pre-given level of return, observed individually for every stock exchange, and combined for the whole SEE market. Risk diversification is achieved by combining stocks from different SEE markets. Table 3 also shows the investment weights for every market in the SEE efficient portfolio with the expected return of 0.484% and a standard deviation of 4.66%. Regardless of the expected high integration and low diversification possibilities of SEE equity markets, due to the increased returns correlations during and after the recent global financial crisis, we find a substantial benefit from spreading out the investments in the whole SEE region, rather than investing in one market only. As we can see form Table 3, five out of six stock exchanges take part in this efficient portfolio, i.e. Belgrade Stock Exchange is left out of the selected mean-variance efficient portfolio.

In addition, we created a mean-variance efficient frontier from all sample stocks and indices (in total 60). Besides the above SEE market stocks and indices we added the following indices: S&P, DJIA, NASDAQ, DAX, FTSE 100, Nikkei, ATX and FTSE MIB. The effects of diversification are visible in the "lower" part of the efficient frontier, i.e. in achieving lower standard deviation, Figure 2.

It is interesting to notice that the efficient frontier derived from world leading indices and stocks and indices from SEE markets together overlaps the efficient frontier of the SEE market in the "upper" part of the curve. These findings enable us to conclude that investors with low risk aversion, (investors with a flatter indifference curve), will have no benefit from spreading out their investments from SEE to the world's leading markets, and vice versa. On the other hand, investors with high risk aversion and a steep indifference curve have an additional benefit from wider diversification.

The question is whether we can choose a subset

Figure 2: Diversification potential – world indices and SEE markets.



Source: Authors

of the dataset stocks that would be simple in terms of portfolio management selection, and yet good enough to explain the previously defined efficient frontiers. We find this answer by using principal component analysis.

4.2 Results of principal component analysis

Conducting principal component analysis removes highly correlated investments in the sample and identifies correlated assets that have the same high numbered PC, each with a high loading. The procedure eliminates these highly correlated investments. In the diversification context, this elimination will result only in a small decrease in diversification potential.

In our analysis of 60 stocks and indices, four iterations have been conducted with a deletion criteria of 1 and a stopping criteria of 0.7. Principal component analysis conducted on 60 assets extracted 60 components, among which 45 components had eigenvalues lower than 1. Those 45 components with eigenvalues lower than 1 were included in further analysis, while components with eigenvalues higher than 1 were excluded. The Component Matrix was used to select which stocks or indices among the 60 should be excluded. Those components with eigenvalues lower than 1 are further analysed in the Component Matrix. Stocks and indices with extremes within the component are excluded from the next iteration. Out of 60 assets included, 36 unique stocks and indices were excluded in the first iteration of the analysis. The dimension reduction process was repeated a second time. In the second iteration 24 components were identified, among which 18 had eigenvalues lower than 1. Out of 24 investments included, 14 unique stocks and indices were excluded in the second iteration of the analysis.

The dimension reduction process was repeated a third time. In the third iteration 10 components were identified, among which 6 had eigenvalues lower than 1. Out of 10 investments included, 6 unique stocks and indices were excluded in the third iteration of the analysis. A final forth iteration resulted in 4 components and 4 assets. The last eigenvalue was 0.717, higher than the 0.7 stop criteria, and the process was finished. The results are presented in Table 4.

For all iterations a Kaiser-Meyer-Olkin Measure of Sampling Adequacy and Bartlett's Test of Sphericity allowed the conduction of PCA. See Table 5.

The principal components obtained from the selected four stocks and indices were approximately the same as the original 4 assets. When there is a low correlation among the original investments a PCA extracts little useful information. Table 6 shows the reduction of correlation among remaining assets in four iterations in PC analysis.

We further investigate the differences in the mean-variance efficiency of 4 asset portfolios obtained in the fourth iteration. The selected four PCA assets consist of Sojaprotein, Dow Jones, Telekom Srpske and ZTC Banja Vrućica.

With the selected 4 PCA assets we formed an MV efficient frontier and checked how many randomly

Table 4: Total variance explained after fourth iteration.

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.677	41.919	41.919	1.677	41.919	41.919
2	.876	21.898	63.818	.876	21.898	63.818
3	.730	18.250	82.068	.730	18.250	82.068
4	.717	17.932	100.000	.717	17.932	100.000

Source: Authors

Table 5: KMO and Bartlett's Test.

Iteration		1	2	3	4
Kaiser-Meyer-Olkin		.645	.830	.732	.667
Bartlett's Test	Chi-Square	4831.334	1173.614	248.811	31.465
	df	1770	276	45	6
	Sig.	.000	.000	.000	.000

Source: Authors

Table 6. Maximum correlation depending on the number of stocks retained.

No. Stocks and Indices Retained	Maximum Correlation
60	0.979
24	0.735
10	0.592
4	0.281

Source: Authors

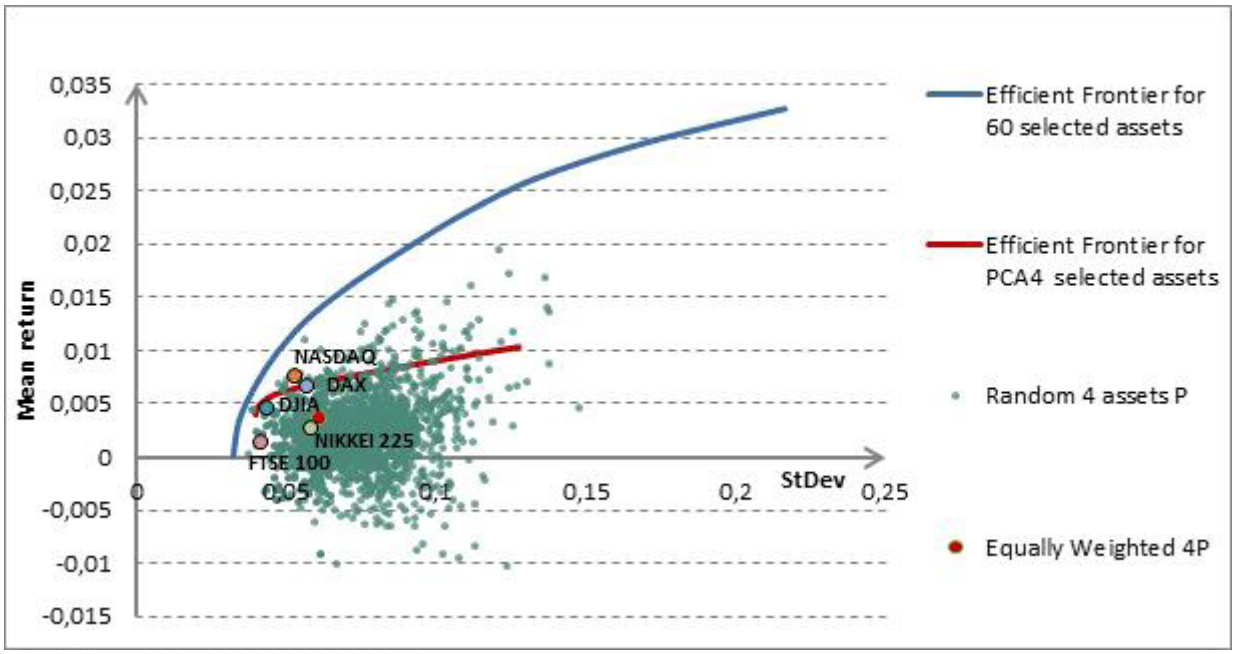
selected portfolios made up of any 4 assets were contained within this convex set. In total, we created 3000 portfolios formed from 4 randomly selected investments. The results show that only 138 portfolios could be found outside the convex region bounded by PCA 4 assets' efficient frontier. Based on these results we can conclude that efficient portfolios composed of these four assets dominate over 95% of all portfolios composed of any 4 assets in terms of the Markowitz definition of dominancy. We checked the domination of efficient sets over the randomly selected portfolio consisting of more than 4 equities and we concluded that these MV portfolios are far more homogeneous, so that this percentage is only higher. These results are not present in the paper but are available on request.

Figure 3 shows two lines, the red representing the efficient frontier derived from PCA selected assets (PCA4) and the blue representing the efficient frontier derived from all observed equities (EF 60). The green dots in the figure represent 3,000 randomly selected portfolios formed from 4 randomly selected equities. The red dot represents an equally weighted PCA 4 asset portfolio.

We find that this small number of asset portfolios (PCA 4) outperforms some of the world leading indices, i.e. DJIA, DAX, FTSE 100 and NIKKEI 225. The only index that performs better than the 4 PCA assets' portfolios in the observed period is the NASDAQ index. Also, substantial additional diversification still can be achieved by including all 60 assets in the portfolio selection process.

Note that PCA 4 stocks and indices are from three different markets. Although the Minimum Variance portfolio of PCA 4 assets does not match the Minimum Variance portfolio of 60 assets, Figure 3 shows that the efficient frontier of PCA 4 assets is very close to the efficient frontier of 60 assets in the "lower" part. From our analysis it can be concluded that PCA 4 asset-efficient frontier portfolios achieved by applying the PCA method offer a good risk reduction effect.

Figure 3: Diversification possibilities of four (PCA) asset portfolios.



Source: Authors

5. CONCLUSION

In this paper we tested portfolio diversification possibilities in South-East European equity markets. Our sample consists of stocks from capital markets in the following SEE countries: Croatia, Serbia, Montenegro, Macedonia and Bosnia and Herzegovina. In addition, we included indices from Bulgarian and Romanian capital markets and also 9 indices from capital markets in developed countries: USA, Germany, United Kingdom, Japan, Italy and Austria. The analysis was conducted with monthly stock and indices returns.

We find that national capital markets itself are quite inefficient from the mean-variance standing point of view, while the Macedonian capital market was the best performing in the observed period. Our research offers evidence that there is a benefit from spreading out portfolio investments from the abovementioned five national stock markets to the SEE region, i.e., regional capital markets offer substantial diversification opportunities. Integration among these markets is obviously not high and the SEE market efficient frontier performs much better than any national capital market efficient frontier.

We also find that there is a rather limited diversification benefit from spreading out the investments from the SEE markets to the world leading capital markets, or vice versa. The SEE market offers diversification possibilities that are similar to those of leading world capital markets, represented by the leading world indices, at least for those investors with low risk aversion. Only international investors with high risk aversion could gain some benefit by including SEE market stocks in their portfolios only. We can conclude that there is a limited diversification benefit from spreading out the investments from the SEE market to the leading world capital markets, and vice versa, due to the high integration of the SEE market with leading world markets. The high integration of international capital markets and fewer diversification possibilities are a consequence of the financial crisis, so our results are in line with most studies on this topic. It is important to keep in mind that within the analysed period, 1st January 2006 until 1st April 2016, a financial and economic crisis occurred (the period form 2008 - 2010). Financial and economic crises could have an impact on the obtained results, since PCA could have excluded stocks that were highly correlated in this period. On the other hand, investors are searching for stocks that will provide the best diversification possibilities also in periods of financial and economic crisis; therefore this argument is strong enough to exclude those correlated stocks.

The second objective of our research was to determine the subset of the observed set of investments, which is the best represented of the returns' variability. Markowitz modern portfolio theory states that portfolio risk is reduced by combining assets with low or negative correlations. That was the reason why we decided to apply the principal component analysis as criteria for asset selection. The idea then was to observe correlations in the structure of assets, identify uncorrelated risk sources in the market and choose assets from different risk sources.

The results and conclusions of this analysis rely on efficient frontier construction for the beginning set of assets as well for the selected subset of assets. We tested the selection quality by comparison with the mean-variance characteristics of randomly selected portfolios and the efficient portfolios of assets derived from PCA analysis. Based on the results of our analysis, we conclude that 4 PCA selected asset portfolios dominate over 95% of all potential portfolios composed of any 4 assets in terms of Markowitz definition of dominancy. For further analysis we recommend formulation of an efficient frontier, with 10 PCA selected assets (iteration three in the PCA analysis) and its comparison with the opportunity set of all possible portfolios of sample stocks and developed capital market indices, since 60 asset portfolios are still better performing than 4 PCA asset portfolios.

The main conclusion of our analysis is that PC analysis substantially simplifies the asset selection process in portfolio management. PCA-selected asset portfolios dominate over 95% of all potential portfolios with the same number of assets included. We hope that PCA might reduce the numerous calculations and estimations currently involved in efficient portfolio investing.

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