Univerza v Mariboru
Ekonomsko-poslovna fakulteta
60 let

Letnik: 65 | Številka: 3 | 2019
Volume: 65 | Number: 3 | 2019

NG
OE

NAŠE GOSPODARSTVO
Revija za aktualna ekonomska in poslovna vprašanja

OUR ECONOMY
Journal of Contemporary Issues in Economics and Business

NAŠE GOSPODARSTVO

Revija za aktualna ekonomska in poslovna vprašanja

Letnik 65, št. 3, 2019

Izdajatelj:
Ekonomsko-poslovna fakulteta Maribor (EPF)

Naslov uredništva:
Maribor, Razlagova 14, Slovenija,
telefon: +386 2 22 90 112

Elektronska pošta:
nase.gospodarstvo@um.si

Spletna stran:
http://www.ng-epf.si

Revija je uvrščena v bibliografske baze podatkov EconLit, European Reference Index for the Humanities and the Social Sciences (ERIH PLUS), Directory of Open Access Journals (DOAJ), ProQuest, EBSCO, Ulrich's Periodicals Directory in številne druge.

OUR ECONOMY

Journal of Contemporary Issues in Economics and Business

Vol. 65, No. 3, 2019

Published by:
Faculty of Economics and Business, Maribor (FEB)

Editorial and administrative office address:
Maribor, Razlagova 14, Slovenia,
phone: +386 2 22 90 112

E-mail:
our.economy@um.si

WWW homepage:
http://www.ng-epf.si

The journal is indexed/abstracted in EconLit, European Reference Index for the Humanities and the Social Sciences (ERIH PLUS), Directory of Open Access Journals (DOAJ), ProQuest, EBSCO, Ulrich's Periodicals Directory and in a number of other bibliographic databases.

Lektorji: Alkemist d.o.o. in ServiceScape Incorporated

Dtp: NEBIA, d. o. o.

Letno izidejo 4 (štiri) številke. Letna naročnina: za pravne in fizične osebe 46 €, za tujino 57,5 €.

ISSN 0547-3101

Revijo sofinancira Javna agencija za raziskovalno dejavnost Republike Slovenije.

Vsebina / Contents

Labour Supply and Inequality Effects of In-Work Benefits: Evidence from Serbia

Saša Ranđelović
University of Belgrade, Faculty of Economics, Serbia
randjelovic@ekof.bg.ac.rs

Jelena Žarković Rakić
University of Belgrade, Faculty of Economics, Serbia
zarkovic@ekof.bg.ac.rs

Marko Vladisavljević
Institute of Economic Sciences, Belgrade, Serbia
marko.vladisavljevic@ien.bg.ac.rs

Sunčica Vujić[1]
University of Antwerp and University of Bath, Department of Economics, Belgium
suncica.vujic@uantwerpen.be

ORIGINAL SCIENTIFIC PAPER

RECEIVED: JULY 2019

REVISED: AUGUST 2019

ACCEPTED: SEPTEMBER 2019

DOI: 10.2478/ngoe-2019-0010

UDK: 004.775:339.137.2:005.412

JEL: J22, H24, D31, I32

Citation: Ranđelović, S., Žarković Rakić, J., Vladisavljević, M., & Vujić S. (2019). Labour Supply and Inequality Effects of In-Work Benefits: Evidence from Serbia. *Naše gospodarstvo/Our Economy*, 65(3), 1–22. DOI: 10.2478/ngoe-2019-0010

Abstract

Low labour market participation, together with the high effective tax wedge at low wage levels, create a fertile ground for the introduction of the in-work benefits (IWB) in Serbia. Our paper provides an ex-ante evaluation of the two IWB schemes, directed at stimulating the labour supply and more equal income distribution. The methodological approach combines the tax-and-benefit microsimulation model with the discrete labour supply model. Our results show that both individual and family-based IWB schemes would considerably boost labour market participation, although family-based benefits would have disincentivizing effects for the secondary earners in couples. Most of the behavioural changes take place among the poorest individuals, with significant redistributive effects.

Keywords: in-work benefits, labour supply, inequality, discrete choice model, microsimulation

Introduction

Low labour market participation, high informality, particularly at the bottom end of the earning distribution, and high formalization costs constitute theoretically a solid case for the introduction of making-work-pay policies, such as in-work benefits (IWB), which are means-tested benefits conditional on employment status. These policies have become popular in many European countries trying

[1] *Corresponding author*: Sunčica Vujić, Department of Economics, University of Antwerp, Prinsstraat 13, 2000 Antwerp, Belgium. Email: suncica.vujic@uantwerpen.be. Tel.: +32 32 654 902.

NG
OE

NAŠE GOSPODARSTVO
OUR ECONOMY

Vol. 65 No. 3 2019

pp. 1 – 22

to promote labour market participation and work formalization, particularly among low-paid workers. Empirical studies confirm that the IWB policies have been effective in tackling the above-mentioned labour market problems in developed countries, particularly in the United States (US) and the United Kingdom (UK) (Blundell et al., 2000; Blundell & Hoynes, 2004; Meyer & Rosenbaum, 2001; Orsini, 2006). However, the empirical literature on the effectiveness of these policies in the European developing and transition economies is scarce. Our paper attempts to fill this gap.

A high labour force participation rate is important for economic growth, competitiveness, poverty reduction, and the political and social stability of a country, especially with an aging population. These are some of the reasons why the European Union 2020 (EU 2020) strategy set the employment rate target for 20- to 64-year-olds at 75% (European Commission, 2010). According to the Statistical Office of the Republic of Serbia (SORS, 2016), the country's average (over four quarters) labour force participation rate of the working age population (15- to 64-year-olds) was 60.5% in 2016, while the employment rate was 45.2%; both of these indicators are far below the EU-28 average of 73% for the labour force participation rate, and 71% for the employment rate in 2016 (Eurostat, 2019a; OECD, 2019). Inactivity is particularly high among low-skilled, low-income earners. Serbia's active population will further decline in the current decade, due to the exit of baby boomers from the labour market, and the increasing outbound migration (Arandarenko et al., 2012). Since the onset of the global economic crisis, in addition to the declining labour market participation, the informality rate has been on the rise, being particularly high in the agriculture and self-employment sectors, thus further reducing the reservoir of formal labour market participation.

Following the well-established theoretical base and empirical framework for the evaluation of labour market effectiveness of the IWB policies (Bargain & Orsini, 2006; Blundell, 2000; Immervoll & Pearson, 2009; Saez, 2002), our research combines the EUROMOD-based tax-and-benefit microsimulation model for Serbia (SRMOD) with a structural labour supply model, in order to evaluate the effects of the IWB policies, as well as the interplay between the IWB policies and other tax-and-benefit policies, on labour supply and income distribution in Serbia.

The aim of this paper is to provide an empirical estimation of labour supply effects of in-work benefits for a transition country. These results will be benchmarked to the results on the effects of IWBs for countries that are similar to Serbia in terms of labour market performance (high unemployment and inactivity rates, particularly for young people and women) and features of tax and benefit systems (lacking social assistance benefits). The results will be compared with those for other Western Balkan countries, as well as Portugal, Spain, Italy and Greece (which have similar labour market characteristics as Serbia). In addition, the results on labour supply elasticities will be compared to those for developed and other transition countries.

We see a threefold contribution of our paper to the existing literature. First, bearing in mind that the effectiveness of the IWB policies depends on their design, as well as on the institutional characteristics of a targeted country, our paper constitutes a new methodological framework taking into account the characteristics of the labour market of a transition country. The existing literature has mostly focused on the developed economies, while the empirical literature for the European transition economies, to the best of our knowledge, is limited to the evidence for Slovenia (Kosi & Bojnec, 2009), Poland (Myck et al., 2013), Macedonia (Mojsoska et al., 2015) and Serbia (Clavet et al., 2019; Ranđelović & Žarković-Rakić, 2013; Žarković-Rakić et al., 2016). Second, since low labour market participation, high informality and high formal activation costs are common features of the Western Balkan economies, while the IWB policies are almost non-existent, the empirical results for Serbia may represent a considerable contribution not only to the existing empirical literature but also to a discussion on introducing making-work-pay policies in the region. Third, we provide evidence on the effectiveness of the IWB policies with respect to different family structures (singles and couples) and with respect to the position of women in the labour market. This is particularly important taking into account that inactivity rates of women in Serbia are considerably higher than those of men (76.6% and 63.8%, respectively, in the last quarter of 2016; SORS, 2016).

The results obtained in this paper suggest that both individual IWB (IIWB) and family IWB (FIWB) would trigger a decline in labour market non-participation: the effects of FIWB are larger for singles, while the IIWB would have higher impact on the labour supply of individuals in couples. At the same time, the FIWB would have somewhat larger effects for single women than for men, the effects of IIWB being the opposite, while no significant difference in terms of labour supply reaction to the IIWB and the FIWB by gender is found in the case of coupled individuals. The policy is expected to yield positive effects on inequality, since most of the labour activation would happen at the lower end of the income distribution. The difference in the size of the effects of IIWB and FIWB, depending on the income level and marital status, is the consequence of the difference in the design of the IIWB and FIWB policies but also the result of variation in labour supply elasticities by income levels and marital status.

The remainder of the paper is organised as follows. The next section provides an explanation of the participation and formalization disincentives coming from the tax-and-benefit system design. Section 3 deals with the analysis of the IWB design and the overview of empirical literature on the IWB policies. In section 4, the data and methodology are presented, while the results are presented and discussed in section 5. Section 6 concludes the paper.

Tax-and-benefit System in Serbia: Why Working at Low Wage Levels Does Not Pay?

In this section, we provide further information on the characteristics of the labour market in Serbia in general and the tax-and-benefit structures in particular. Serbia's labour market performs considerably worse when compared to most other European economies. The labour market participation rate currently stands at 63.4%, while the unemployment rate is 18.8%. Inactivity and unemployment rates are particularly high among low-educated individuals. Living Standards Measurement Survey (LSMS) 2007 data, used in this paper, show that non-participation rates for those with primary education (55.5%) are significantly higher than for those with secondary (30.0%) and tertiary education (18.7%). At the same time, women are in a particularly difficult labour market position. On average, they face 16.6 percentage point higher inactivity rates and 4.7 percentage point higher unemployment rates than men (Table 1).

Arandarenko and Vukojević (2008) show that the tax-benefit wedge in Serbia is rather regressive at the bottom of wage distribution, due to the high minimum social security contribution base, relatively high social contribution rates, low non-taxable threshold (for personal income taxation) and withdrawal of means-tested benefits. This has been confirmed by the World Bank study for Serbia (Koettl, 2010), which calculated the Implicit Costs of Formalization (ICF), defined as the share of income that an informal worker has to give up in order to formalize work, showing disincentives for formalization stemming from labour taxation and benefit withdrawal. The study shows that a single person with no children who earns less than the minimum wage in the informal sector has to give up between 40% and 75% of income in order to formalize work.

Labour market participation in Serbia is among the lowest in Central and Eastern Europe (CEE), being close to the activity rates in the Western Balkan countries, while the female participation rate is considerably lower than the male participation rate (Table 2). At the same time, income inequality in Serbia is among the highest in Europe (Davies, 2018).

Table 2. Labour market participation rates in the CEE (2014)

	Total	Women	Men
Czech Republic	73.3	65.6	80.9
EU-28	72.1	66.0	78.2
Slovenia	70.9	67.4	74.2
Slovakia	70.2	62.7	77.7
Bulgaria	68.1	64.2	72.0
CEE-average	67.8	61.3	74.3
Poland	67.3	60.5	74.2
Romania	65.0	57.3	72.8
FYR of Macedonia	64.6	51.5	77.3
Hungary	64.6	58.6	70.6
Croatia	64.1	58.6	69.7
Albania	63.0	51.7	74.2
Serbia	61.7	53.9	69.7
Montenegro	59.2	52.3	66.1
Bosnia and Herzegovina	54.5	42.1	67.1

Source: World Bank Database

Low-education attainment coupled with a lack of work experience generates low earning capacity in the labour market. When earnings or potential earnings are low, incentives to seek employment or stay in employment are usually limited. Incentive problems are aggravated by high tax burdens on labour income and by cuts in social benefits designed to provide at least some safety nets for those with no or very low income (Immervoll & Pearson, 2009).

Table 1. Non-participation and unemployment rates by level of education and gender (%)

	Total	Men	Women	Education level		
				Primary and less	Secondary	Higher
Unemployment rate	13.9	11.8	16.5	14.9	15.4	7.9
Inactivity rate	36.6	27.3	43.9	55.5	30	18.7

Notes: Working age population (15-64 years)
Source: Authors' calculations based on LSMS, 2007.

The labour tax wedge in Serbia for those with low earnings (67% of average wage) is among the largest in the CEE and is also higher than the EU-28 average (Figure 1). In addition, the degree of progressivity of labour taxation in Serbia is among the lowest in the CEE. When the wage increases from 67% of the average wage to 167% of the average wage, the labour tax wedge (as per cent of labour costs) in Serbia rises only by 1.3 percentage point, while in the CEE and the EU-28 the rise is considerably steeper — 6.4 percentage point and 8.1 percentage point, respectively (Figure 1).

The relatively high labour tax burden of low-paid jobs and low progressivity are the consequences of several factors, the most important being the mandatory minimum social security base and the sudden withdrawal of means-tested benefits upon formal employment.[2] The minimum base, which is mandatory for every worker, is set at 35% of the average wage, implying that when the actual wage is below the minimum base, the social contributions are calculated on the minimum base. Given that the base is effectively not adjusted for working hours, the low-paid part-time jobs are exposed to a high social contribution burden.

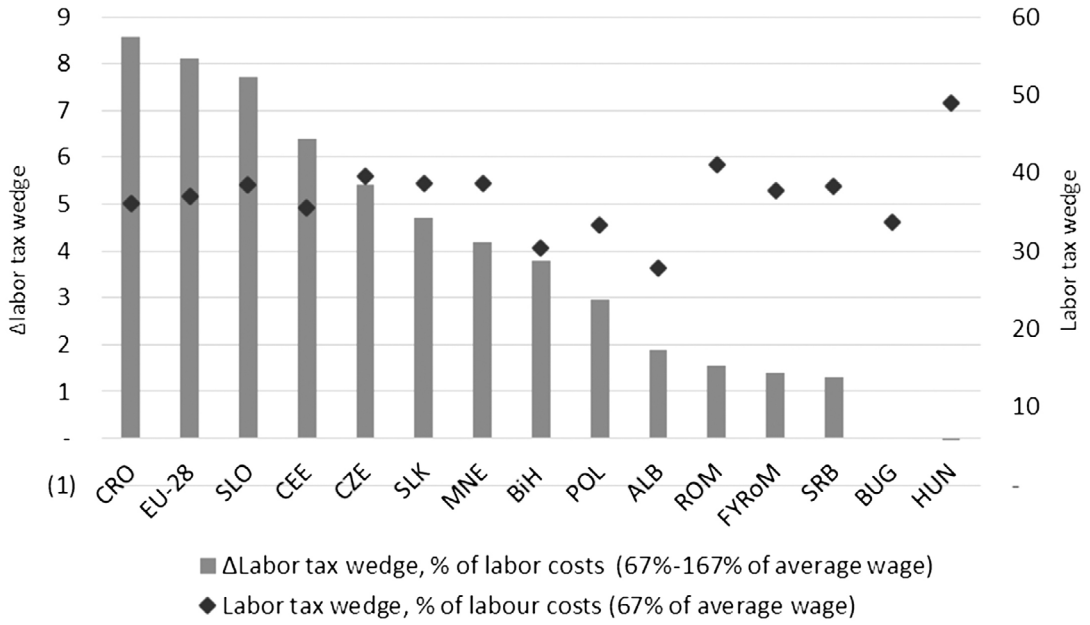
Additionally, the labour tax reform that was introduced in 2001 brought about the abolishment of fringe benefits. The two most important benefits of this kind were food allowances (paid monthly) and an annual leave benefit. Given that both fringe benefits were not taxed and were paid in equal amounts to each worker, the abolishment of these benefits contributed to the regressive character of the labour tax system, which was in effect until 2007 (Arandarenko & Vukojević, 2008). The changes to the labour tax system that took place in 2007 envisaged a cut in the wage tax rate between 12% and 14% and the introduction of the zero tax bracket (up to 5,000 Dinars (i.e., 63.1 Euro), or approximately 15% of the average wage). However, the tax burden on labour did not change considerably, given that the social security contributions dominated the tax wedge.[3]

Another peculiarity of the Serbian labour market relates to relatively high informality. As put forward by Krstić and Sanfey (2011), between 2002 and 2007 informal work rates in Serbia rose despite strong economic growth and the improved business climate in the country. The authors argue that one possible reason for this unexpected result

[2] This is a peculiar feature of the social security contribution systems in the Western Balkan region. The most drastic example is Macedonia, where the mandatory base is set as high as 50% of average wage.

[3] In 2001, contributions were set at 32.6% of the gross wage, equally split between employers and workers. The first increase in mandated contributions occurred in 2003, with an increase of 1 percentage point. The next modification was made in 2004, and currently the overall social security tax rate amounts to 35.8% of gross wage: 22% for old age, disability and survivors' pensions, 12.3% for health insurance, and 1.5% for unemployment insurance.

Figure 1. Labour tax wedge and progressivity of labour taxation in the CEE (2014)



Source: Authors' calculations based on the Eurostat Labour Force Survey (LFS) 2014 data and International Labour Organization (ILO) 2014 data

is the regressive character of the labour tax system that was introduced in 2001 and that was applied until January 2007. The incentives to join the formal economy were diminished for both workers and employers. However, it should be noted that the high informality rate in Serbia was to a large extent driven by informal work in agriculture and self-employment, where informal workers accounted for 87% and 53% of the total number of workers, respectively, while the average informal wage-employment was considerably lower, with a 10% share in the total number of wage-employees in 2007, thus being below the average for Southern Europe[4] (Hazans, 2011).

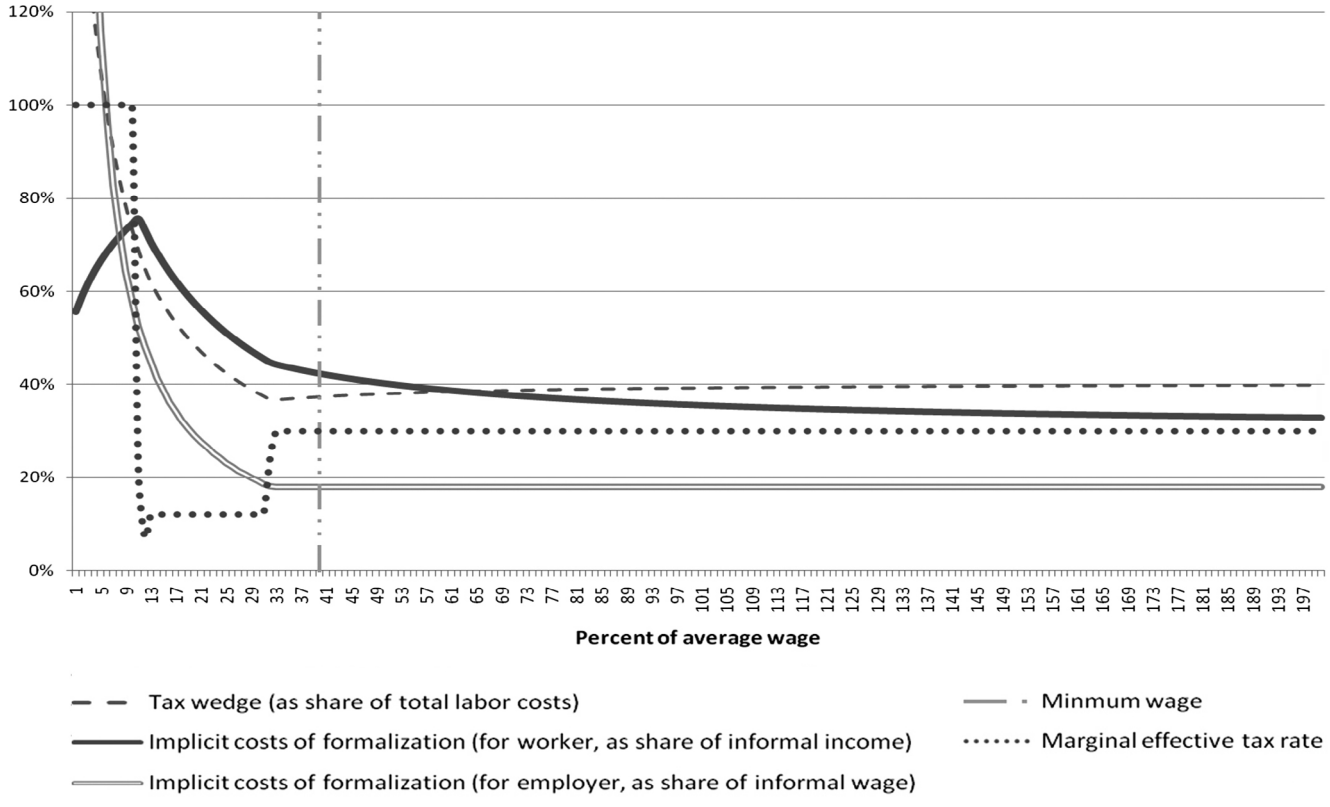
Besides labour taxation, the social benefits design is another piece of the puzzle necessary to explain the high levels of inactivity and informality among the working-age population in Serbia. Once a person has a formal income on her/his record, major income-tested benefits (social assistance and child allowance in particular) will be decreased by the total amount of earned income or completely withdrawn. In their study on inactivity in the Serbian labour market, Arandarenko et al. (2012) show that a person receiving social benefits does not have an incentive to search for a job offering a salary below 20% of the average gross wage, which is equivalent to a part-time job equalling 20 hours at the minimum hourly wage. Mainly due to the mandatory minimum social security contribution base, net income for this individual becomes equal to the amount of social assistance benefit. Therefore, the so-called mini-jobs and midi-jobs (mainly part-time jobs) are not economically attractive for low-wage earners.

As a result of the minimum social contribution base, sudden withdrawal of the means-tested benefits and other mentioned factors, the tax wedge distribution is regressive up to 33% of average wage, afterwards being only slightly progressive (Figure 2). At the same time, the implicit formalization costs are the highest at the very bottom of wage distribution.[5] Such design of the tax-benefit scheme creates considerable disincentives for labour market participation of low-skilled individuals.

[4] Southern Europe constitutes Italy, Spain, Greece, Portugal, and Cyprus.

[5] Implicit formalization costs are calculated as the percentage of initial income that a household has to give up in order to switch from the informal to the formal sector, assuming the gross wage offer is unchanged.

Figure 2. The tax wedge, implicit costs of formalization and the marginal effective tax rate for singles with no children in Serbia (2009)



Source: Koettl (2010)

In-Work Benefits Objective, Design and Labour Supply Effects: Literature Review

The intention of policymakers to address the issue of insufficient labour market participation and very low participation of low-skilled, low-paid workers (thus, at the same, time tackling inequality and poverty issues) has brought the design of tax-and-benefit policies and their interplay back into the focus of empirical literature and discussions. Measures directed at increasing the income of persons with a low earnings capacity have mostly centred on the introduction of the IWB policies. The IWB policies are designed to promote work and reduce poverty by generating a difference between the incomes of working people and the counterfactual situation, that is, the incomes they would have if they were out of work. Additionally, the IWB schemes contribute to higher formality by effectively reducing the labour tax wedge and thus encouraging wage formalization.

The introduction and expansion of the IWBs in the European countries has been inspired by the Earned Income Tax Credit (EITC), introduced first in the US, and the subsequent Working Family Tax Credit (WFTC) practice in the UK. The main motivations for the introduction of these policies in Europe and North America during the early 1990s were the low levels of labour force participation and employment experienced by certain specific demographic groups of working age (Blundell, 2006). In a theoretical framework, Kolm & Tonin (2011) show that IWBs can be extended to larger sections of the workforce and to other countries. Nowadays, most of the OECD countries apply some types of the IWB programs in order to boost labour market activity and employment (Immervoll, 2012; Immervoll & Pearson, 2009). Even though there are differences among the countries in terms of the design of the IWBs, all employment-conditional measures use at least one of the following criteria to assess eligibility and determine the amount of benefits: having children, working a minimum number of hours, and receiving income from work or entering into employment. Most of these benefits are proportional to gross income up to a maximum amount, afterwards being gradually withdrawn. In other words, they are characterised by the gradual phase-in and phase-out brackets, as a mean of targeting individuals with specific earnings levels or working hours.

An important aspect of the IWB design is the choice of the unit used to assess income (Orsini, 2006; Orsini & Bargain, 2006). In some countries, eligibility for benefits is assessed at the household level, while in other countries it is focused on individuals. Family IWBs are more effective in boosting the labour supply of single individuals, due to discouraging effects on the second earners in households, who in most cases are women (Eissa & Hoynes, 1998). However, in certain cases, family benefits can have both redistributive and incentive effects. This is the case with lone parents that constitute a large part of poor households (Orsini & Bargain, 2006). On the other hand, individual-level benefits have greater work-incentive effects than do family-based benefits, since they do not discourage the participation of second earners in a couple (Blundell et al., 2000; Orsini & Bargain, 2006).

Most evaluations of labour supply effects and distributional effects of the IWB policies in European countries are *ex ante* evaluations based on a behavioural microsimulation framework. For example, Blundell et al. (2000) have estimated the labour supply preferences on data not affected by the policy reforms, which were then used to simulate the impact of the introduction of the WFTC in the UK. The authors have found that the introduction of the WFTC leads to an increase in labour market participation rates for lone mothers and a small decline in labour market participation amongst women in couples, with no net effect on the labour market participation rates of men in couples.[6] The results are consistent with the findings of Brewer et al. (2006). Bell (2005) has found that the decline in child poverty between the fiscal years 2002 and 2004 can be attributed to the introduction of the WFTC program in the UK. Brewer (2006) also noted that the WFTC program reduced the number of families in poverty. St Martin & Whiteford (2003) have estimated that the WFTC program produced about 100,000 new jobs, while the cost of this policy was about 1% of GDP. Orsini & Bargain (2006) have simulated the British WFTC scheme and the individualized wage subsidy scheme for Finland, France, and Germany, countries which have experienced severe poverty traps. They have found that the participation of married women declined in all three countries after the introduction of the WFTC, the negative effect being only partially offset by the positive impact of the reform on single women's labour supply (in Finland and in Germany). On the other hand, they have found that individual IWB encouraged married women to take jobs. The effects in Finland were lower than in other countries, mainly due to the relatively small labour supply elasticity. Both programs were found to have had significant anti-poverty effects. Haan & Myck (2007) also find strong disincentivizing effects of the British style IWB on coupled individuals, if implemented in Germany. Myck et al. (2013) have found evidence on the IWB-related disincentives on the work of secondary earners in Poland and provide proposals to tackle this issue. Saez (2002) has evaluated the making-work-pay policies in the US and showed that the IWB policies provide an optimal income transfer program when the labour supply choice is

[6] For the evaluation of the EITC, see Scholtz (1994, 1996), Eissa and Hoynes (1998), Eissa and Liebman (1996), and Meyer and Rosenbaum (2000).

whether or not to work (extensive margin). On the other hand, if the labour supply choice is about intensity of work on the job (intensive margin), then the optimal transfer program is a classical Negative Income Tax program with a large guaranteed income-support schemes, which are taxed away at high rates.

The effectiveness of making-work-pay policies is fundamentally dependent on the labour market structure, inherent elasticities and the institutional set-up. Therefore, switching to an environment where participation is low, unemployment is high and institutions are weaker may change the expected outcomes of the IWB policies. With respect to this, several papers have emerged focusing on the southern European countries (particularly Italy), which share these features. Figari (2015) finds that the family IWB in Italy triggers an average increase of female labour supply by 3 percentage points, the individual IWB having stronger incentive effects on coupled women, since their labour supply increase is estimated at 5 percentage points. He also finds that most of the labour supply reactions induced by the IWB take place among the poorest individuals, with important redistributive effects. Similar results for Italy, especially for couples with children, are found in De Luca et al. (2013). Colonna & Marcassa (2013) show that the working tax credit in Italy boosts the labour force participation rate, particularly among unskilled and low-educated women.

Late transition economies of Southeastern Europe have even more unfavourable labour market features than the Southern European countries, while making-work-pay policies (and empirical literature on this topic) are largely absent. Mojsoska et al. (2015) use a microsimulation framework to assess the impact of the hypothetical IWB schemes in Macedonia and find that family IWBs are more effective in promoting the labour activation of singles, while individual benefits are more effective in the case of couples, with the effects in both cases being concentrated at the bottom of the income distribution with poverty reduction effects. Using the tax and benefit micro-simulation model for Serbia (SRMOD), Ranđelović and Žarković-Rakić (2013) provide empirical evidence on the incentive and distributional effects of the abolishment of the mandatory minimum social security contribution (SSC) base, showing that the reform would reduce effective average tax rates by more than it would reduce effective marginal tax rate, while the impact of the reform on the overall level of inequality, measured by the Gini coefficient, would be small. Žarković-Rakić et al. (2016) evaluates the impact of the minimum SSC base reform scenarios in Serbia on labour supply and employment formalization and conclude that the proposed reform would not significantly contribute to the transformation of informal full-time to formal full-time jobs. Clavet et al. (2019) evaluate the labour supply and distributive effects of several reform strategies concerning two major social transfers in Serbia: child allowance and social monetary assistance. The results show that, in a context of a low labour participation rate, and high unemployment and informality rates, a benefit strategy is by far the more cost-effective option for reducing child poverty than an employment strategy that aims to raise the work incentives for parents.

Methodology: Behavioural Microsimulation Model, Data and Policy Reform Design

Model and Data

In order to analyse the potential effects of policy measures on labour supply incentives and income redistribution, this paper combines the tax-and-benefit microsimulation model for Serbia (SRMOD), which is based on the EUROMOD platform (Sutherland & Figari, 2013), with a structural, discrete choice, labour supply model.[7] Similar to other microsimulation models, SRMOD is a tax-and-benefit calculator based on the micro-data on income, earnings, labour force participation and socio-demographic variables, allowing us to reproduce the budget constraint for each household (i.e., the latent set of working hours and household disposable income alternatives), while the labour supply model rationalizes observed behaviour.

The policies simulated in SRMOD refer to Living Standards Measurement Survey (LSMS) dataset in 2007 as the baseline year. The LSMS in 2007 is a nationally representative survey (on 17,735 individuals divided in 5,575 households) conducted by the Statistical Office of the Republic of Serbia in cooperation with the World Bank. We have opted to use the LSMS dataset because it was the only comprehensive survey in Serbia providing the amount of social and economic information required for tax-and-benefit microsimulation modelling. Although we use the data from 2007, labour market indicators are similar to 2015 not only in absolute but also in relative terms, across both gender and levels of educational attainment. According to the Labour Force Survey Data for Serbia in 2015, unemployment and inactivity rates for women were 4 and 15 percentage points higher than for men, respectively, which is comparable to the situation in 2007. Further, those having primary education or less still have significantly higher inactivity rates compared

[7] The main advantage of using discrete-choice instead of continuous labour supply models comes from the possibility of accounting for taxes and benefits (i.e., non-linear and non-convex budget sets; Van Soest, 1995), which is why these models have been extensively used for an ex-ante evaluation of hypothetical tax-and-benefit reforms.

to individuals with secondary or tertiary education. Since the main labour market indicators (participation, employment, unemployment) were almost unchanged in 2015 compared to 2007, the dataset may still be regarded as relevant. The LSMS dataset contains separate data on formal and informal income from employment, self-employment and agriculture. According to the macro-validation results, formal employment incomes are lower than the actual amounts by 7%, with the difference being attributed to informal salaries and wages. In the case of agricultural and self-employment earners, the share of informal income in the actual income is much larger – 56% and 22%, respectively. Taxes, social contributions and benefits in SRMOD are simulated using the data on formal income, since both taxes and benefits are determined based on the formal income.

Personal income tax, social security contributions and major means-tested benefits (monetary social assistance and child allowance) are the main tax-benefit programs simulated in SRMOD, while for most of the non-means-tested benefits (e.g., birth grant, old age pensions, unemployment benefits, caregiver allowance, maternity and childcare benefits) reported values are used, which is a common approach in other EUROMOD and related models, determined by the data availability.[8] Personal income tax is simulated using the rules applicable in a year of the given dataset, which means that incomes from various sources are taxed at different, but always flat, tax rates ranging between 10% and 20%. Wages, as the largest source of income in Serbia, are taxed at the flat rate of 12%, applied to the amount of gross wages exceeding non-taxable threshold, which in 2007 amounted to RSD 5,050 per month.. Social security contributions are calculated on all gross labour incomes, applying the rate of 22% for pension and disability insurance contributions, 12.3% for health insurance and 1.5% for unemployment insurance and the regulations on the minimum base (35% of the average wage) and the maximum base (five times average wage) for social contributions. All social contributions are equally split among employers and employees. Monetary social assistance is the last-resort financial assistance program, means-tested against the total income (per household member), as well the land and buildings area (per household member) owned by the household. Thus, individuals or families who pass the means test are entitled to the benefit calculated using the following scale: i) for the first adult person in a family, the basic amount (RSD 7,628 per month) multiplied by 1; ii) for each additional adult person in a family, the basic amount multiplied by 0.5; and iii) for each child up to the age of 18, the basic amount multiplied by 0.3. Individuals incapable of work, and families with all members incapable of work, as well as lone-parent families with one or two children (below the age of 18) are entitled to an increased amount of this benefit (by 20%). Child allowance is the means-tested benefit aimed at reducing poverty in families with children. Eligibility is limited to the households in which total monthly net income per family member does not exceed a certain threshold (RSD 4,705 per month), while the amount of the benefit is flat (RSD 1,490 per month), with only the first four children in the family being entitled to this benefit.

The results of macro-validation of SRMOD simulations are satisfactory, since the margin between the simulated income tax and social contributions compared to the administrative data ranges between 5% and 20%, a large share of discrepancy being attributed to the underreporting of income and sampling issues in the survey, since the average wage in the dataset is 8% lower than the one published by the Statistical Office (Ranđelović & Žarković-Rakić, 2013). The discrepancy between the simulated benefits and the amounts disclosed in administrative datasets is even lower, ranging from 5% to 15%. Using the data on market income, simulated taxes, social contributions and means-tested benefits, as well the reported (non-simulated) benefits, SRMOD provides calculations of the household disposable income, replacement rates, and effective marginal tax rates.

In this paper, we estimate two discrete choice labour supply models, thus specifying separately preferences of singles and couples. Labour supply model estimation is restricted to the 'labour market flexible' individuals whose labour supply behaviour can be captured by the econometric model. Therefore, disabled individuals, students, pensioners, and self-employed individuals are dropped, which is a common approach in the labour supply literature (Blundell et al., 2000; Figari, 2015; Haan & Myck, 2007). An additional reason to exclude the self-employed from the model is related to difficulties with measurement of their true hours and wages (Löfler et al., 2014). Descriptive statistics of the estimation sample are provided in the Appendix (Table A1). Since the model mostly deals with wage employment, similar to the literature on Southern European countries, it is focused on formal work, with the similar or slightly higher wage-employment informality (De Luca et al., 2013, Figari, 2015). Discrete choice labour supply models are based on the assumption that a household can choose among a finite number of J+1 working hours. Each hour j=0,...,J corresponds to a given level of disposable income of individual , and each discrete bundle of working hours and income provides a different level of utility. In other words, the utility of a household *i* making the choice j, V_{ij}, is given by:

$$V_{ij} = U(Hf_{ij}, Hm_{ij}, I_{ij}, Z_i) + \varepsilon_{ij}$$

[8] Detailed descriptions of the policies simulated in SRMOD are provided in Ranđelović and Žarković-Rakić (2013).

We use the quadratic specification for the deterministic part of the utility function, as in Blundell et al. (2000). The deterministic part of the utility function depends on the spouses' working hours (Hf_{ij},Hm_{ij}), disposable income (I_{ij}), and the vector Z_i of describing households' characteristics (age, gender, education level of the household members and parenthood). For a couple, choices j=0,...,J correspond to all combinations of the spouses' discrete working hours. Starting from the empirical distribution of the working hours, we assume that each partner may work 0, 20, or 40 hours, corresponding to non-participation, part-time, and full-time work. This implies that a couple can choose among nine alternative combinations of working hours. Each alternative is characterised by a triplet of disposable income and working hours of female and male partner.

Disposable income, I_{ij} is the tax-benefit function (G), which depends on female and male hourly wages (Wf_{ij},Wm_{ij}) and hours of work (Hf_{ij},Hm_{ij}), as well as on the non-labour income (Y_i) and households' characteristics (Z_i):

$$I_{ij} = G\,(Wf_{ij},Wm_{ij},Hf_{ij},Hm_{ij},Y_i,Z_i)$$

When estimating the discrete labour supply model, hourly wage is not observed for inactive and unemployed workers in the sample. Since their labour market status is correlated with the potential wage offer, dropping unemployed and inactive workers would trigger selection bias. In order to avoid this,, the Heckman selection model is used in order to impute hourly wages for males and females supplying zero hours (Heckman, 1976; 1979). We then use SRMOD to calculate their labour and disposable incomes corresponding to a discrete set of working time alternatives.

Once disposable income I_{ij} is obtained for all the choices *(j)* and all the individuals *(i)*, the conditional logit function is estimated by the maximum-likelihood estimation approach, in order to estimate preference parameters of the utility function. Labour supply effects are estimated by comparing the predicted probability of each choice under the pre-reform and post-reform conditions.

In countries with the constraint on the demand side of the labour market (which is the case in Serbia), the labour supply model is partial. Although this is a limit of the labour supply approach to evaluation of the labour market effects, most of the previously mentioned empirical studies on making-work-pay policy effects take into account only the labour supply response, even though the authors recognize the relevance of the demand constraint. There are also studies that implicitly encompass the labour demand effects by using involuntary unemployment to describe the labour demand reaction (Bargain et al. 2010). However, use of this approach is limited to the datasets that provide the information on involuntary unemployment, which is not the case with the LSMS for Serbia in 2007.

Policy Design

Although most OECD countries apply some sort of IWBs (OECD, 2009), the American EITC and the British WFTC are the most commonly analysed and discussed. The British scheme of IWBs has recently been considered as a potential model to be introduced in the Southern European countries (e.g., Italy, Spain, etc.), in order to support the labour market participation of women and poor households (Owens, 2006; Figari 2010).

Given the pioneering role of the British experience in these policies, we simulate the family based IWB using the British WFTC structure as an example. The ratio between the thresholds of eligibility and the maximum amounts of the benefit in this paper is calibrated, in order to get fiscal costs of 0.14% of Gross Domestic Product (GDP), in static terms, which is equivalent to half of the monetary social assistance program costs. Currently, a half of the total number of monetary social assistance beneficiaries are physically healthy individuals, which has urged the government to propose measures aimed at activating benefit recipients. Therefore, the government has recently introduced a wage subsidy equal to the minimum wage for part-time work, which is available to physically healthy social assistance recipients who accept work offered by the National Employment Bureau. Family IWB (FIWB2) and FIBW3 policies (defined later) proposed in this paper are, to a certain extent, similar to the proposed wage subsidy scheme, which was an additional reason to opt for the same budgetary costs. When deciding on the total budget, we have also taken into account the need to achieve a substantial increase in wages (of low-wage earners), thus creating the solid ground for considerable labour supply response, while at the same time taking into account the political and fiscal sustainability of the policy.

Depending on the structure of the family, there are three types of family IWB (FIWB), and one individual IWB (IIWB). FIWBs are differentiated by the family structure (single vs. lone parents and couples), as well as by the number of working hours, which is why there are three alternative FIWB schemes (Table 3). The amount of benefits is fixed, and the eligible family receives them until their labour incomes and pensions reach certain threshold, with the benefit being gradually phased out afterward (by 0.37 dinars for every additional dinar of income) and at some point reaching zero. In order to have working incentives not only for people with low earnings but also for people with low hourly wages, an individual-based benefit scheme

Table 3. Parameters of the family and individual in-work benefits (monthly amounts)

	FIWB1	FIWB2		FIWB3	IIWB
Type of tax unit	Single	Couples with children and lone parents	Couples without children	Lone parents and couples	All
Assessment unit	Family	Family	Family	Family	Individual
Minimum working hours per week	40	16	30	40	16
Amount of benefit	6,667	8,333		10,000	varying
Withdraw start threshold	15,000	17,500		19,167	14,333
Phase-in rate	-	-		-	0.36
Phase-out rate	0.37	0.37		0.37	0.37

Notes: FIWB refer to the Family IWB, IIWB refer to the individual IWB; 1, 2 and 3 refer to different parameterization of FIWB programs

IIWB is developed. IIWB treats all the workers in the same manner regardless of their family status, so all individuals who work at least 16 hours per week and whose income is below the stipulated threshold are entitled to the benefit, which is gradually phased in (0.36 dinars of benefits for every earned dinar). When income reaches certain threshold, gradual phase-out (at the rate of 0.37 dinars for every additional dinar of income) begins.

Although the total costs of both IIWB and FIWB are the same, the mean FIWB amounts to RSD 5,020 (approximately 14% of the average wage), while mean IIWB equals RSD 3,426 (approximately 9% of the average wage). The mean amount of IIWB is the same for singles and coupled individuals, while the average FIWB is somewhat lower for singles. The effects of the IWB schemes on disposable income of the typical (hypothetical) households are presented in Figures 3 and 4.

Figure 3. Effects of the IWB schemes on disposable income: singles with no children

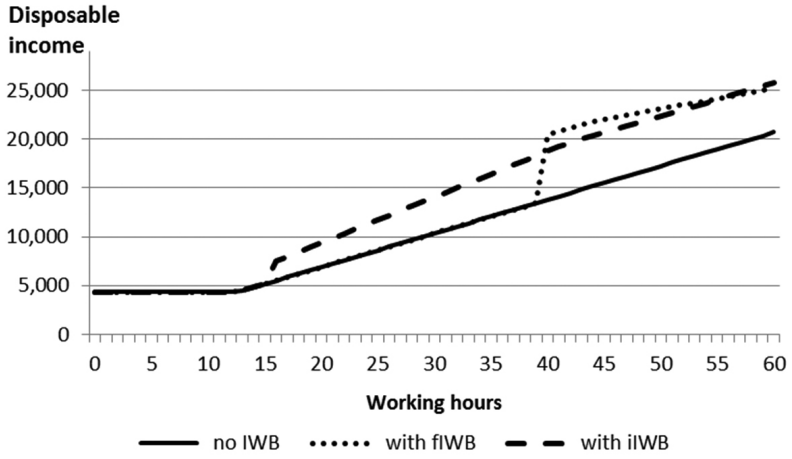
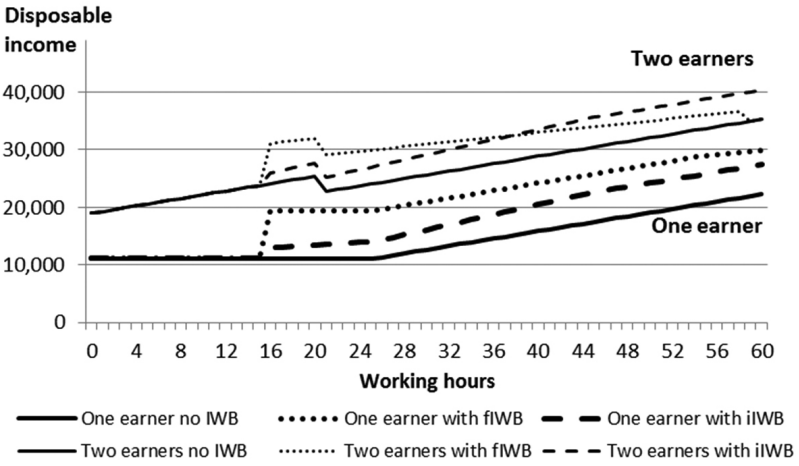


Figure 4. Effects of the IWB schemes on disposable income: couples with two children



Results

Heckman Wage Equation, Utility Function and Labour Supply Elasticities

The estimated coefficients of the Heckman wage and selection equations are presented in the Appendix (Table A2). The coefficients have the expected signs and magnitudes. The estimated parameters of the utility function are also presented in the Appendix (Tables A3a for singles and Table A3b for couples). Utility functions describe the marginal utility (disutility) of income and work, taking into account the heterogeneity of preferences captured by the demographic characteristics (age, education and parenthood) and the fixed costs of working. Our results on the utility function parameter estimation are in accordance with the expectations, indicating positive and diminishing marginal utility of income and increasing marginal disutility of working hours for both singles and couples. The results further show that the marginal utility of income decreases with age (at a diminishing rate) for singles and married men and with the level of education (except for single men). On the other hand, the marginal disutility of working hours increases with age and level of education for both singles and couples. Furthermore, parenthood has no significant impact on preferences of singles due to a small sample size of single mothers and fathers, while increasing the utility of income for couples. The results are robust to changes of the sample of the non-employed (unemployed versus inactive) and to the exclusion of informal employment.[9]

Starting from the estimated utility function parameters, we have calculated the labour supply elasticities at both extensive (labour force participation) and intensive margins (hours of work) (Table 4). Elasticities are obtained by increasing the gross hourly wage by 1% under the pre-reform tax-benefit system and estimating the changes in the participation rate and the average number of working hours after this change in policy. The results show that elasticities do not differ much between single men and single women, while the labour supply elasticity of married women is higher than that of married men.

Table 4. Hours of work and participation elasticity for singles and couples

	Singles			Couples		
	Total	Females	Males	Total	Females	Males
Total elasticity[10]	0.525	0.498	0.541	0.355	0.487	0.277
Participation elasticity	0.486	0.459	0.500	0.331	0.460	0.253

There are numerous studies estimating labour supply elasticities for developed countries. The survey articles of Blundell and MaCurdy (1999) and Meghir and Phillips (2010) report that the range of estimates is very wide: values typically range between zero and 0.12 for men and between 0.05 and 2 for women. A recent paper by Bargain et al. (2013) gives the first large-scale international comparison of elasticities (for 17 European countries and the US) and finds that wage elasticities are small and vary less across the countries than previously thought. For example, the paper finds that both hours of work and participation elasticities of married women range between 0.2 and 0.6, while for married men this range is even more compressed, between 0.05 and 0.15. They also point out that elasticities for married women (0.2-0.6) are higher in the countries with large non-participation (such as Greece, Spain and Ireland). Elasticities for single women range between 0.1 and 0.4, while for single men this range is further compressed, between zero and 0.3. Evidence on the labour supply behaviour in transition and post-transition countries is limited, and most deals with the early transition. For example, a recent paper by Bargain et al. (2013) finds very low male and female labour supply elasticity (0.1-0.2) in Estonia, Hungary and Poland, with the difference between coupled and single individuals being relatively small. However, the paper by Mojsoska et al. (2015) finds slightly higher elasticities in Macedonia for coupled men and women, between 0.6 and 0.8, as well as for single men (1.0-1.1), while the estimated elasticities for single women are somewhat lower (0.2-0.3). Comparison of our results with the results from other studies indicate that the estimated values of hours of work and participation elasticities in Serbia fall within the range reported in other

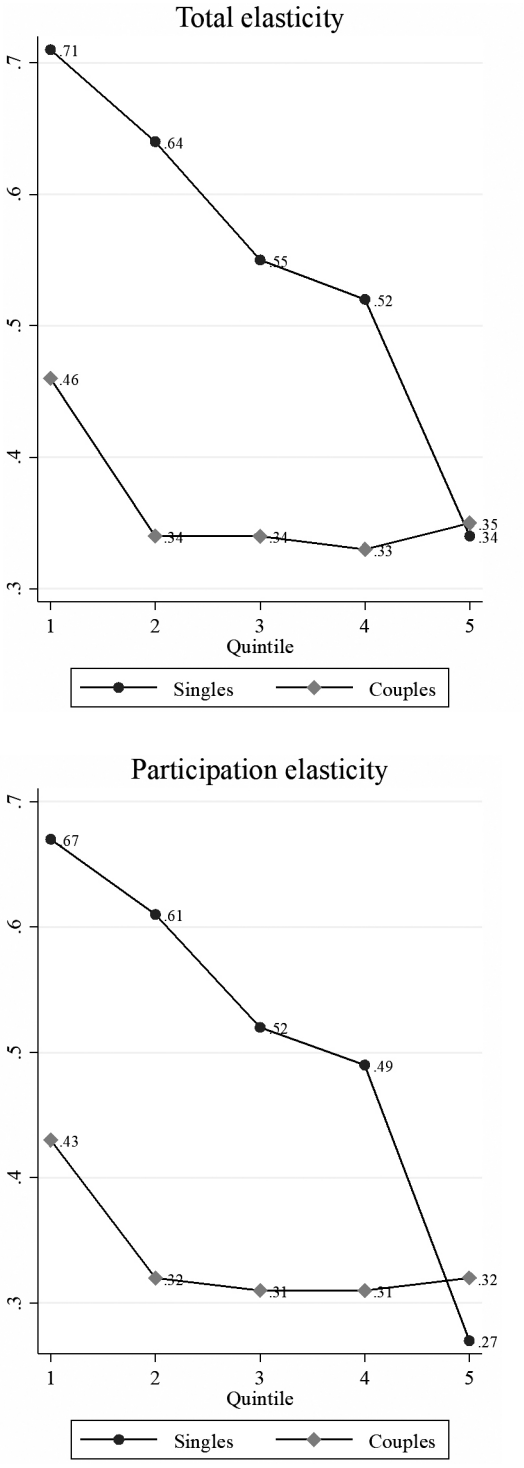
[9] For inactive and unemployed workers in the sample, hourly wage is not observed. In order to calculate disposable income for these workers, the hourly wage rate is estimated on the whole sample of working-age individuals (employed, unemployed or inactive) and imputed for males and females supplying zero hours. Inactivity is the extreme form of unemployment in the sense that inactive workers are unemployed, are not looking for a job, and are not immediately available for work when a job is offered to them. Classification into the inactive population is based on the self-evaluation of individuals about their efforts to search for a job. Therefore, persons with the same "unemployed" labour market status could be classified into two different groups depending on the variation in their answers. Thus, the boundary between these two groups is sometimes arbitrary. However, they are similar with respect to both not working and not having wages in the data; thus, from the perspective of estimating and imputing wages for inactive and unemployed workers, it is correct to treat them as a one group (this is a standard procedure in the Heckman model, see for example, Figari 2010; 2015). Nevertheless, in the robustness checks, we take into account the difference between unemployed and inactive workers, and we exclude those who are in informal employment, since the empirical literature suggests that labour supply decisions differ between formal and informal employment.

[10] Total elasticity accounts for hours and participation elasticity

countries, particularly being similar to those that experience low participations rate, like Spain, Greece and Macedonia.

According to the optimal taxation literature, IWBs can be considered as optimal transfers when labour supply elasticities are large (Brewer et al., 2010). Looking at the distribution of elasticities reveals considerable variation across the quintile groups (i.e., we find the evidence on labour supply elasticity declining with income; Figure 5). This fact is often ignored in the literature, with the exception of Aaberge et al. (1999) and Roed & Strom (2002), who point to the potential responsiveness of the individuals at the bottom of the income distribution. A pro-low-wage-earners bias in the design of the IWB schemes in our paper, together with the higher labour supply elasticities at the bottom of the income distribution, provide fertile ground for the effectiveness of IWBs in Serbia, since the conditions identified by Saez (2002) and Brewer et al. (2010) are met.

Figure 5. Labour supply elasticities by quintiles



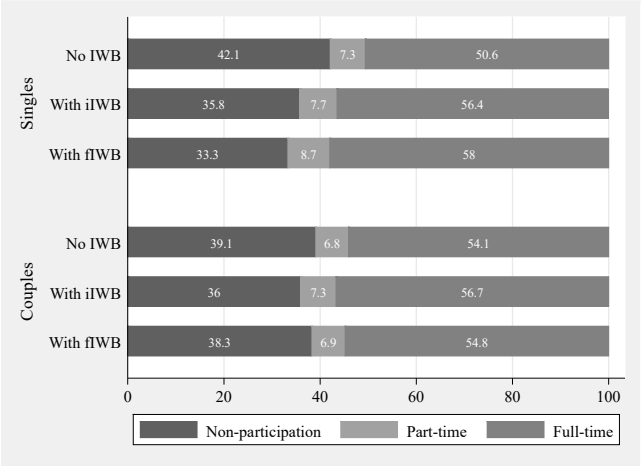
Labour Supply Effects

Starting from the estimated preferences in the utility function and the simulated changes in disposable income due to the introduction of in-work benefits, the changes in probabilities associated with different labour supply choices have been estimated (Figure 6).

Both IIWB and FIWB schemes would trigger a decline in the non-participation of single persons, with the effects being larger in the case of FIWB (non-participation would decline by 8.8 percentage points; i.e., 79,000 individuals would be activated) than in the case of IIWB (decrease in non-participation by 6.3 percentage points; i.e., equivalent to 56,000 individuals); this result is similar to the one presented in Mojsoska et al. (2015). Under both schemes, most of the activated individuals would opt for full-time employment, while only a limited number of them would switch from inactivity to part-time employment.

Although both IIWB and FIWB programs would also yield positive effects on the labour market participation of individuals in couples, the effects on the labour supply of this

Figure 6. Labour market participation choices without and with IWB (in %) – total



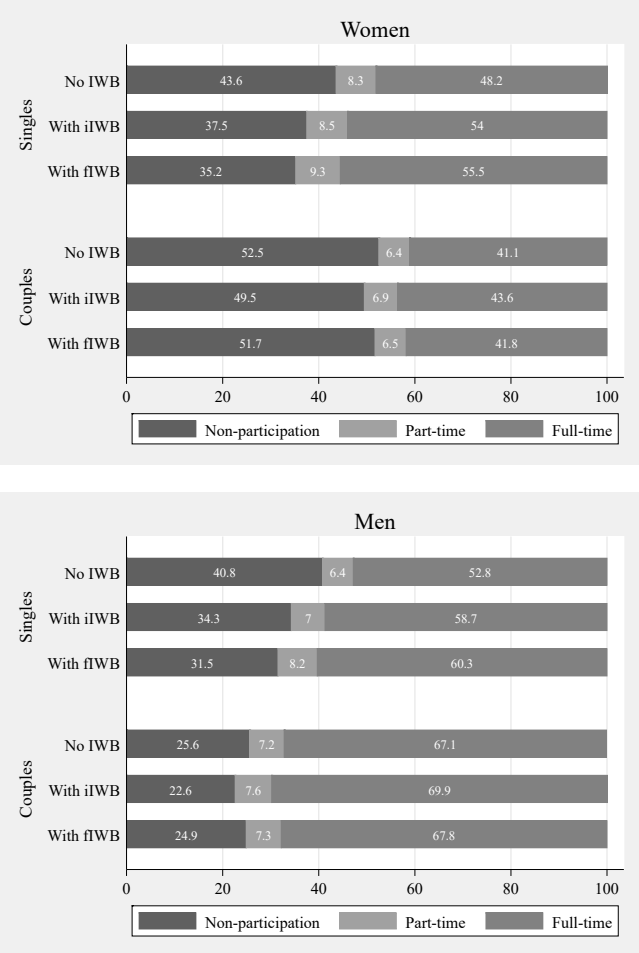
Note: Full tables of the effects are presented in the Tables A4a and A4b in the Appendix.

subgroup would be smaller than in case of single persons, mostly due to lower labour supply elasticity. Thus, the IIWB scheme would trigger a decline in the non-participation of coupled individuals by 3.1 percentage points (approximately 41,000 individuals), while the effects of FIWB are not statistically significant (Table A4b in the Appendix). These results imply that the IIWB scheme would be more efficient in reducing non-participation of persons in couples, while the FIWB scheme would be more useful in tackling the issue of inactivity of single individuals. This may be explained by the labour supply disincentives of the FIWB for secondary earners, as is also found in other papers (Orsini & Bargain, 2006; Haan & Myck 2007, Myck et al. 2013).

With respect to the labour supply effects by gender, we find that FIWB would yield slightly larger effects for single women than for single men, while the effects of IIWB would be the opposite (Figure 7). On the other hand, we find no statistically significant effects of either of the two IWB programs on the labour supply of coupled individuals when analysed by gender (Table A4b, in the Appendix).

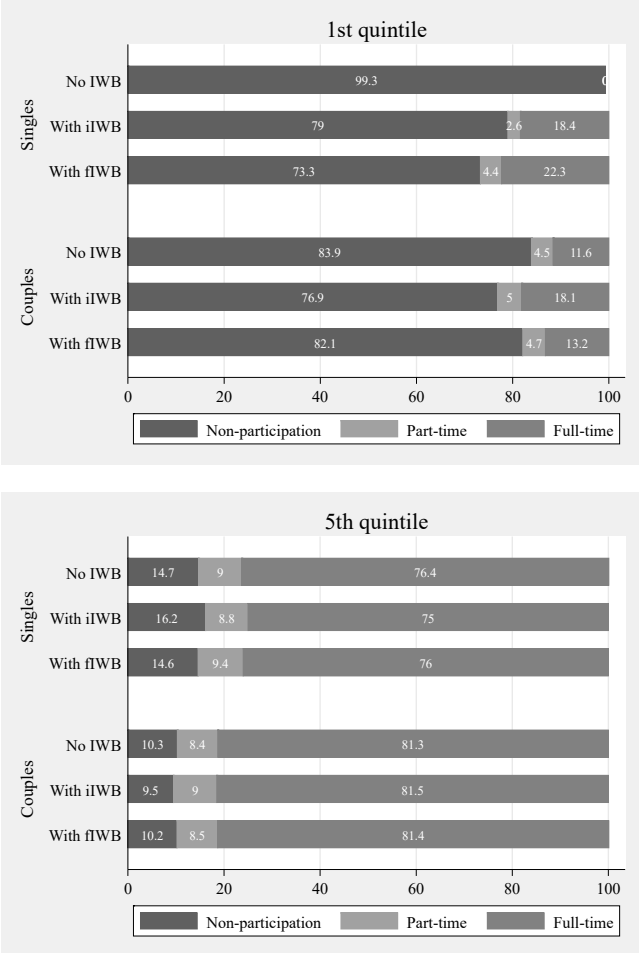
Since the IWB schemes are also aimed at reducing poverty, the effects of hypothetical IWB schemes in Serbia are observed separately for the low-income population (those in the first quintile) and for high-income individuals (those in the fifth quintile). The results presented in Figure 8 show that both IWB schemes would considerably boost the labour market participation of people in the first quintile. Before the introduction of the IIWB, only 0.7% of single individuals from the bottom quintile have participated in the labour market. This is often the case with families with only one working household member. After the introduction of the IIWB, 18.4% of bottom-quintile single individuals would switch from non-participation to full-time employment, while 2.6% of them would opt for part-time employment. In the case of the FIWB, the labour supply effects on the bottom quintile individuals would be even larger: 22.3% would switch to full-time employment and 4.4% to part-time employment. On the other hand, neither of the two IWB schemes would have statistically significant effects on the labour supply decision of singles from the top income quintile.

Figure 7. Labour market participation choices without and with IWB (in %) – by gender



Note: Full tables of the effects are presented in the tables A4a and A4b in the Appendix.

Figure 8. Labour market participation without and with IWB (in %) - the 1st and the 5th quintile



Note: Full tables of the effects (total and by gender) are presented in the tables A4a and A4b in the Appendix

In the case of individuals in couples, the IIWB would boost the probability of a shift from non-participation to full-time employment by 6.5 percentage points and to part-time employment by 0.5 percentage points, while the effects of FIWB would be significantly lower (1.6 percentage points and 0.2 percentage points, respectively). As in the case of single individuals, the labour supply effects of the FIWB and the IIWB on coupled individuals from the top quintile are not statistically significant. Large differences in terms of labour supply reaction to the IWB schemes at the bottom and the top quintile are the consequence of the design of the IWB schemes (pro-poor bias), as well of the higher labour supply elasticities at the lower end of the income distribution. The analysis of labour supply reactions by gender suggests that in the top and in the bottom quintile, a change in the non-participation rates due to the introduction of the IWB schemes, both for women and for men, would be consistent with the total effects (Tables A4a and A4b in the Appendix). The formal employment effects of the IWB schemes might be slightly larger if the formalization effects are accounted for. However, the results on the low formal–informal elasticity at extensive margin (labour force participation) may suggest these effects would be small.

Analysis of labour supply effects by income levels suggests that for both singles and couples, the IWB schemes would have larger labour supply effects in the case of low-wage earners than for those with high incomes, which implies that these schemes would be beneficial from poverty and inequality reduction perspectives as well. This is consistent with the findings in other studies (Colonna & Marcassa, 2013; Figari, 2015), and represents an important finding for Serbia, given that the country has one of the highest Gini coefficients in Europe (Eurostat 2019b). Since the FIWB would perform better in terms of the labour supply of low income singles, while the IIWB would perform better in terms of the labour supply of low income couples, the overall effect on the change in income distribution would be almost equal under both programs. The results show that after the introduction of the IIWB, the Gini coefficient would decline from 0.386 to 0.363, while in the case of the FIWB it would drop to 0.359. Slight differences in equalizing effects may arise from the fact that low earners receive the full amount of the benefit under the FIWB scheme, while in the case of the IIWB, the benefit is gradually phased in, reaching the full amount only when the threshold amount of earned income is generated. On the other hand, the fact that under the FIWB, a beneficiary is receiving the full amount of benefits even when earning low income could discourage low-paid earners to increase their labour supply above the minimum level necessary to qualify for this benefit. Although the equity-efficiency trade-off is common when introducing family and individual-based IWB, our results show that such a trade-off in Serbia would not be significant, since the differences in equalizing effects of the IIWB and the FIWB would be relatively small.

Conclusions

It is often argued that high inactivity and informality rates in Serbia are the consequence of the unfavourable design of the tax-and-benefit system, under which low-paid workers accepting a formal job (especially a part-time job), tend to lose more through withdrawal of benefits and increase in labour taxes then they get compensated through wages. This is particularly true for individuals with low earnings capacity (i.e., persons with low education attainment and little or no work experience), who constitute the majority of those who are inactive or who work in the informal sector.

Tax-and-benefit policy reforms in the OECD countries in recent years have been focused on solving the twin problem of in-work poverty and persistent labour market difficulties of low-skilled individuals. Employment-conditional cash transfers to individuals facing labour market challenges have been a core element of the IWB policies for some time and are in use in more than half of the OECD countries (OECD, 2009). In the meantime, plenty of empirical studies have emerged, showing significant positive employment effects among those primarily targeted by the payment of these benefits. Although many Central and Eastern European countries have started to experiment with the IWB policies, evidence on their effects is still scarce. For Poland, for example, Myck et al. (2013) propose several reforms to the current system of in-work benefits in order to reduce negative effects of the transfer to the second earner in couples, most of them being women. The evidence on the effects of these policies in Southeastern Europe is also limited: Kosi and Bojnec (2009) for Slovenia, Mojsoska et al. (2015) for Macedonia, and Ranđelović and Žarković-Rakić (2013), Žarković-Rakić et al. (2016) and Clavet et al. (2019) for Serbia.

Results obtained in this paper suggest that both IIWB and FIWB would trigger a decline in labour market non-participation, with the effects of FIWB being larger for singles, while IIWB would have a higher impact on the labour supply of individuals in couples. At the same time, FIWB would have somewhat larger effects for single women than for men, with the effects of IIWB being the opposite, while no significant difference in terms of labour supply reaction to IIWB and FIWB by gender is found in the case of coupled individuals. With regards to the distributional aspects, we find that both IWB schemes would have a larger impact on the stimulation of the labour supply of low-income individuals than the labour supply of those at the top of the income

distribution; this is important, since non-participation is extremely high among the low-income population. This means that IWB policies in Serbia would not only help reduce non-participation but also, to a certain degree, help reduce inequality, with net positive fiscal effects. The difference in the size of effects of IIWB and FIWB, depending on the income level and marital status, is not only the consequence of the difference in design of IIWB and FIWB policies but also the result of variation in labour supply elasticities by income levels and marital status.

The results of this paper would certainly be important for informing the policymaking process in Serbia, as the government has recently started experimenting with policies similar to the IWB schemes. Given that the labour market structure and the design of the tax-and-benefit system in Serbia are quite similar to those of neighbouring countries, we believe that the results of our analysis could also be of interest to a wider range of economies in the region.

The limitations of this paper, which also provide scope for further research, are as follows. First, this paper investigates the labour supply of IWB policy, while the labour demand analysis is beyond its scope. However, it is important to keep in mind that when there is involuntary unemployment, not all individuals who want to work are successful in finding a job. The employment effect of the IWB depends not only on the motivation of individuals to look for a job but also on the labour market capacity to accommodate them. In other words, the employment effects of IWB schemes would be also dependent on the state of the labour demand, suggesting that during times of economic prosperity there will be bigger employment gains after the introduction of the IWB than during crisis. There are studies that implicitly encompass the labour demand effects by using involuntary unemployment to describe the labour demand reaction (Bargain et al. 2010). However, use of this approach is limited to the datasets that provide the information on involuntary unemployment, which is not the case with the LSMS for Serbia in 2007. Second, the paper does not take into account general equilibrium effects. The paper by Kolm and Tonin (2011) does take such effects into account in a theoretical framework and shows how IWBs policies can be extended to larger sections of the workforce. Third, this type of analysis is inherently static; microsimulation was only used in an accounting manner (day after), and disposable income of a representative sample of the population was calculated before and after a reform using a tax-and-benefit calculator. Li and O'Donoghue (2013) provide an overview of the literature and the data requirements for the dynamic microsimulation models. Finally, although we justify in the paper why the policies simulated in SRMOD refer to the LSMS for Serbia in 2007 as the baseline year, the more recent SILC data for Serbia could be utilized, as in Žarković-Rakić et al. (2016) and Clavert et al. (2019).

Acknowledgments

This research has been generously funded by the Regional Research Promotion Program (RRPP) for the Western Balkans, supported by the University of Fribourg and the Swiss Development Agency, within the "Making work pay in the Western Balkans" project, conducted in cooperation between the Foundation for Advancement of Economics, Belgrade, Serbia and the University American College Skopje, Skopje, Macedonia.

References

Aaberge, R., Colombino, U., & Strøm, S. (1999). Labour supply in Italy: An empirical analysis of joint household decisions, with taxes and quantity constraints. *Journal of Applied Econometrics*, *14*, 403-422. https://doi.org/10.1002/(SICI)1099-1255(199907/08)14:4<403::AID-JAE520>3.0.CO;2-4

Arandarenko, M., & Vukojević, V. (2008). Labor costs and labor taxes in the Western Balkans. In C. Bredenkamp, M. Gragnolati & V. Ramljak (Eds.), *Enhancing efficiency and equity: Challenges and reform opportunities facing health and pension systems in the Western Balkans* (pp. 119-160). Washington, DC: The World Bank.

Arandarenko, M., Vladisavljević, M., & Žarković-Rakić, J. (2012). From inactivity to work: analysis of the public policies impact and factors affecting inactivity. In Cerović, et al. ed.: *From Global Crisis to Economic Growth. Which Way to Take? VOLUME I, ECONOMICS*. Faculty of Economics, University of Belgrade.

Baldini, M., Bosi, P., & Toso, S. (2002). Targeting welfare in Italy: Old problems and perspectives on reform. *Fiscal Studies*, *23*(1), 51–75. https://doi.org/10.1111/j.1475-5890.2002.tb00054.x

Bargain, O., Caliendo, M., Haan, P., & Orsini, K. (2015). 'Making work pay' in a rationed labour market. *Journal of Population Economics*, *23*, 323-351.

Bargain, O., Orsini, K., & Peichl, A. (2013). Comparing labour supply elasticities in Europe and the United States: New results. *Journal of Human Resources*, 49(3), 723-838. https://doi.org/10.3368/jhr.49.3.723

Saget, C. (1999). The determinants of female labour supply in Hungary. *Economics of Transition*, 7(3), 575–591. https://doi.org/10.1111/1468-0351.00026

Bell, K. (2005). Tackling poverty and making work pay: Can tax credits do better? Presentation given at Institute for Fiscal Studies, 15 September 2005. Retrieved from http://www.ifs.org.uk/docs/bell_taxcredits05.ppt#5

Blundell, R. W., & Macurdy, T. (1999). Labour supply: A review of alternative approaches. In O. Aschenfleter & D. Card (Eds). *Handbook of labour economics,* edition 1, volume 3, chapter 27, pages 1559-1695. Amsterdam: Elsevier Science. https://doi.org/10.1016/S1573-4463(99)03008-4

Blundell, R. W., Duncan A., McCrae J., & Meghir, C. (2000). The labour market impact of the working families tax credit. *Fiscal Studies*, *21*(1), 75-103. https://doi.org/10.1111/j.1475-5890.2000.tb00581.x

Blundell, R., & Hoynes, H. W. (2004). Has 'in-work' benefit reform helped the labor market? In *Seeking a premier economy: The economic effects of British economic reforms, 1980-2000* (pp. 411-460). The University of Chicago Press, Chicago. https://doi.org/10.7208/chicago/9780226092904.003.0011

Blundell, R. (2006). Earned Income Tax Credit policies: Impact and optimality. *Labour Economics*, *13*, 423–443. https://doi.org/10.1016/j.labeco.2006.04.001

Brewer, M. (2006). Tax credits: fixed or beyond repair? In: Chote, R. et al. (Eds.), *The IFS Green Budget*. London: Institute for Fiscal Studies.

Brewer, M., Duncan, A., Shephard, A., & Suarez, M. J. (2006). Did working families' tax credit work? The impact of in-work support on labour supply in Great Britain. *Labour Economics*, *13*, 699-720. https://doi.org/10.1016/j.labeco.2005.11.002

Clavet, N.-J., Tiberti, L., Vladisavljević, M., Žarković-Rakić, J., Anić, A., Krstić, G., & Ranđelović, S. (2019). Reduction of child poverty in Serbia: Benefit or employment strategy? *Economics of Transition and Institutional Change*, *27*, 615– 645. https://doi.org/10.1111/ecot.12197

Colonna, F., & Marcassa, S. (2013). *Taxation and labour force participation: The case of Italy*. Bank of Italy Occasional Paper No. 191. https://doi.org/10.2139/ssrn.2303708

Davies, P. (2018) Which countries have the worst income inequality in Europe?. *Euronews*. Retrieved from: https://www.euronews.com/2018/04/26/which-countries-have-the-worst-income-inequality-in-europe-.

De Luca, G., Rossetti, C., & Vuri, D. (2013). In-work benefits for married couples: An ex-ante evaluation of EITC and WTC policies in Italy. *IZA Journal of Labour Policy*, 3:23. https://doi.org/10.1186/2193-9004-3-23

European Commission (2010). *Europe 2020: A European strategy for smart, sustainable and inclusive growth*. Retrieved from: https://ec.europa.eu/eu2020/pdf/COMPLET%20EN%20BARROSO%20%20%20007%20-%20Europe%202020%20-%20EN%20version.pdf

Eissa, N., & Hoynes, H. (1998). The *Earned Income Tax Credit and the labour supply of married couples*. NBER Working paper No. 6856. https://doi.org/10.3386/w6856

Eissa, N., & Liebman J. B. (1996). Labour tax supply response to the Earned Income Tax Credit. *The Quarterly Journal of Economics*, *111*, 605-637. https://doi.org/10.2307/2946689

Eurostat (2019a). Employment Statistics. *Statistics Explained*. Retrieved from: https://ec.europa.eu/eurostat/statistics-explained/index.php/Employment_statistics

Eurostat (2019b). *Gini coefficient of equivalised disposable income-EU-SILC survey*. Retrieved from: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ilc_di12 .

Figari, F. (2010). Can in-work benefits improve social inclusion in the Southern European countries? *Journal of European Social Policy*, *20*(4), 301-315.

Figari, F. (2015). From housewives to independent earners: Can the tax system help Italian women to work? *Journal of Social Policy*, 44(1), 63-82. https://doi.org/10.1017/S0047279414000555

Haan, P., & Myck, M. (2007). Apply with caution: Introducing UK-style in-work support in Germany. *Fiscal Studies*, *28*, 43-72. https://doi.org/10.1111/j.1475-5890.2007.00047.x

Hazans, M. (2011). *Informal workers across Europe: Evidence from 30 countries*. IZA Discussion Paper 5871. https://doi.org/10.1596/1813-9450-5912

Heckman, J. (1976). The common structure of statistical models of truncation, sample selection and limited dependent variables and a simple estimator for such models. *Annals of Economic and Social Measurements*, 5, 475-492.

Heckman, J. (1979). Sample specification bias as a selection error. *Econometrica*, 47, 153-162. https://doi.org/10.2307/1912352

Immervoll, H., & O'Donoghue, C. (2001). *Welfare benefits and work incentives: An analysis of the distribution of net replacement rates in Europe using EUROMOD, a multi-country microsimulation model*. EUROMOD working paper EM4/01.

Immervoll, H., & Pearson, M. (2009). *A good time for making work pay? Taking stock of in-work benefits and related measures across the OECD*. IZA Policy Paper No 3.

Immervoll, H. (2012). *Activation policies in OECD countries – An overview of current approaches*. OECD Social Protection and Policy Note.

Koettl, J. (2010). *Does formal work pay in Serbia? The role of labour taxes and social benefit design in providing disincentives for formal work. A technical note prepared for the World Bank*. Working Paper. Washington, DC: World Bank.

Kolm, A. S., & Tonin, M. (2011). In-work benefits and unemployment. *International Tax and Public Finance*, *18*(1), 74-92. https://doi.org/10.1007/s10797-010-9148-6

Krstić, G., & Sanfey, P. (2011). Earnings inequality and informal economy: Evidence from Serbia. *Economics of Transition*, *19*(1), 179-199. https://doi.org/10.1111/j.1468-0351.2010.00400.x

Krstić, G., Arandarenko, M., Arsić, M., Radulović, B., Ranđelović, S., & Janković, I. (2015). Formalising the shadow economy in Serbia: Main findings and recommendations. In G. Krstić & F. Schneider (Eds.), *Formalising the shadow economy in Serbia* (pp. 123-158). Springer Open, New York. https://doi.org/10.1007/978-3-319-13437-6_9

Leibfritz, W. (2008). *Increasing employment in FYR Macedonia: The role of labour taxation.* A Policy Note prepared for the World Bank.

Leppik, L. (2006). *In-work benefits: Literature review*. Tallin: PRAXIS Center for Policy Studies.

Li, J., & O'Donoghue, C. (2013). A survey of dynamic microsimulation models: Uses, model structure and methodology. *International Journal of Microsimulation*, *6*(2), 3-55.

Löfller, M., Peichl, A., & Siegloch, S. (2014). *Structural labour supply models and wage exogeneity.* IZA Discussion Paper No. 8281. https://doi.org/10.2139/ssrn.2464472

McFadden, D. (1974). Conditional logit analysis of qualitative choice behaviour. In P. Zarembka (Ed.), *Frontiers in econometrics* (pp. 105-142). New York, NY: Academic Press.

Meghir, C., & Phillips, D. (2010). Labour supply and taxes. In J. Mirrlees (Ed.), *The Mirrlees review*. (pp. 202-274). Oxford: Oxford University Press.

Meyer, B., &Rosenbaum, D. (2000). Making single mothers work: Recent tax and welfare policy and its effects. *National Tax Journal*, *53*(4), 1027-1062. https://doi.org/10.17310/ntj.2000.4S1.02

Mojsoska-Blazevski, N. (2012). Taxation of labour: The effect of labour taxes and costs on employment in Macedonia. *Post-Communist Economies,* 24(2), 241-256. https://doi.org/10.1080/14631377.2012.675158

Mojsoska-Blazevski N., Petreski, M., &Petreska, D. (2015). Increasing the labour market activity of the poor, females, and informal workers: Let's make work pay in Macedonia. *Eastern European Economics*, *53*(6), 466-490. https://doi.org/10.1080/00128775.2015.1103656

Myck, M., Kurowska, A., & Kundera, M. (2013). Financial support for families with children and its trade-offs: Balancing redistribution and parental work incentives. *Baltic Journal of Economics*, *13*(2), 61-85. https://doi.org/10.1080/1406099X.2013.10840533

OECD (2009). *A good time for making work pay? Taking stock of in-work benefits and related measures across the OECD*. OECD Working Papers No. 81.

OECD (2019). *Labour force participation rate*. Retrieved from: https://data.oecd.org/emp/labour-force-participation-rate.htm.

Orsini, K. (2006). *Is Belgium making work pay?* KU Leuven Working Paper. https://doi.org/10.2139/ssrn.934317

Orsini, K., & Bargain, O. (2006). In-work policies in Europe: Killing two birds with one stone? *Labour Economics*, *13*(6), 667-693. https://doi.org/10.1016/j.labeco.2005.10.007

Owens, J. (2006). Fundamental tax reform: An international perspective. *National Tax Journal*, *59*(1), 131–64. https://doi.org/10.17310/ntj.2006.1.06

Ranđelović, S., & Žarković-Rakić, J. (2013). Improving working incentives: Evaluation of tax policy reform using SRMOD. *International Journal of Microsimulation*, *6*(1), 157-176.

St Martin, A., & Whiteford, P. (2003). *More jobs and better pay.* OECD Observer No. 239, September 2003. Retrieved from http://oecdobserver.org/news/archivestory.php/aid/1077/More_jobs_and_better_pay.html

Saez, E. (2002). Optimal income transfer programs: Intensive versus extensive labour supply responses. *The Quarterly Journal of Economics*, *117*. 1039–73. https://doi.org/10.1162/003355302760193959

Scholtz, J. K. (1994). The Earned Income Tax Credit: Participation, compliance, and anti-poverty effectiveness. *National Tax Journal*, *47*, 59–81.

Scholtz, J. K. (1996). In-work benefits in the United States: The Earned Income Tax Credit. *Economic Journal*, *106*, 156–69. https://doi.org/10.2307/2234939

SORS (Statistical Office of the Republic of Serbia) (2016). *Labour Force Survey in the Republic of Serbia*, 2015, Bulletin 608, Belgrade: SORS.

Sutherland, H., & Figari, F. (2013). EUROMOD: the European Union tax-benefit microsimulation model. *International Journal of Microsimulation*, 6(1), 4-26.

Van Soest, A. (1995). Structural models of family labour supply: A discrete choice approach. *Journal of Human Resources*, *30*, 63-88. https://doi.org/10.2307/146191

Žarković-Rakić, J., Ranđelović, S., & Vladisavljević, M. (2016). Labour market effects of Social Security contributions reform in Serbia. *Economic Annals*, *208*, 73–92. https://doi.org/10.2298/EKA1608073Z

APPENDIX

Table A1. Descriptive statistics for the labour supply estimation

	mean	std. dev.	min	max
Secondary education	0.604	0.489	0	1
Tertiary education	0.154	0.361	0	1
Working experience	13.171	11.867	0	48
Settlement (Urban==1)	0.575	0.494	0	1
Region Vojvodina	0.257	0.437	0	1
Region West Serbia	0.306	0.461	0	1
Region East Serbia	0.262	0.440	0	1
Children under 3 years	0.125	0.373	0	3
Single	0.330	0.470	0	1
Age	40.359	11.917	18	64
Non-work hh income per adult equivalent (in 1.000 RSD)	3.332	5.537	0	75.80175
Total sample	6,473			

Table A2. Wage equation for females and males, with Heckman correction

	Females		Males	
	Coef.	Std. Err.	Coef.	Std. Err.
Hourly wage rate (ln)				
Primary education (omitted)	-		-	
Secondary education	0.348***	(0.040)	0.207***	(0.035)
Tertiary education	0.894***	(0.049)	0.698***	(0.045)
Working experience	0.009***	(0.002)	0.003***	(0.001)
Settlement (Urban==1)	0.185***	(0.027)	0.178***	(0.025)
Region Belgrade (omitted)	-		-	
Region Vojvodina	-0.192***	(0.037)	-0.195***	(0.039)
Region West Serbia	-0.291***	(0.036)	-0.226***	(0.036)
Region East Serbia	-0.348***	(0.038)	-0.312***	(0.039)
Constant	4.341***	(0.071)	4.708***	(0.058)
Employment (1 = in employment)				
Primary education (omitted)	-		-	
Secondary education	0.323***	(0.070)	0.188***	(0.073)
Tertiary education	0.909***	(0.089)	0.812***	(0.108)
Working experience	0.096***	(0.006)	0.097***	(0.007)
Settlement (Urban==1)	0.021	(0.054)	-0.246***	(0.058)
Region Belgrade (omitted)	-		-	
Region Vojvodina	-0.145*	(0.081)	-0.030	(0.091)
Region West Serbia	-0.081	(0.077)	-0.040	(0.086)
Region East Serbia	-0.120	(0.079)	-0.035	(0.090)
Children under 3yoa	-0.528***	(0.078)	0.043	(0.076)
Single	0.251***	(0.063)	-0.130*	(0.071)
Age	0.173***	(0.021)	0.202***	(0.017)

Table A2. Wage equation for females and males, with Heckman correction (continued)

	Females		Males	
	Coef.	Std. Err.	Coef.	Std. Err.
Age squared	-0.003***	(0.000)	-0.004***	(0.000)
Non-work hh income per adult eq. (in 1.000 RSD)	-0.016***	(0.005)	-0.028***	(0.005)
Constant	-2.980***	(0.380)	-2.661***	(0.344)
Rho	0.33	(0.087)	-0.0049	(0.090)
Lambda	0.19	(0.046)	-0.0025	(0.050)
Sigma	0.57	(0.021)	0.51	(0.023)
Observations	3,430		3,043	
Censored N	1733		802	
Wald test: joint significance [Chi2 (5)]	549.61		506.93	
Prob > Chi2	0.000		0.000	
LR test of indep. eqns. (rho = 0):	15.7		0.0030	
Prob > chi2:	0.000		0.96	

Table A3a. Preference estimates for singles (Conditional Logit)

	Total		Females		Males	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Income	5.186***	(0.715)	5.145***	(0.966)	5.477***	(1.174)
*Age	-0.221***	(0.038)	-0.211***	(0.055)	-0.248***	(0.061)
*Age square (/100)	0.270***	(0.047)	0.271***	(0.073)	0.298***	(0.074)
*Secondary ed.[(a)]	-0.522***	(0.156)	-0.802***	(0.259)	-0.254	(0.247)
*Tertiary ed.	-0.461***	(0.130)	-0.751**	(0.382)	-0.035	(0.280)
* Children .[(b)]	0.112	(0.199)	-0.049	(0.241)	0.431	(0.467)
Square	-0.017***	(0.002)	-0.021***	(0.004)	-0.024***	(0.009)
Income* Hours of work	0.002*	(0.001)	0.002	(0.001)	0.003	(0.002)
Hours of work	-0.532***	(0.029)	-0.540***	(0.039)	-0.529***	(0.048)
*Age	0.017***	(0.002)	0.016***	(0.002)	0.019***	(0.003)
*Age square (/100)	-0.022***	(0.002)	-0.021***	(0.003)	-0.024***	(0.003)
*Secondary ed. .[(a)]	0.027***	(0.006)	0.037***	(0.010)	0.015	(0.010)
*Tertiary ed.	0.021***	(0.007)	0.021	(0.021)	0.008	(0.017)
* Children.[(b)]	-0.003	(0.022)	0.017	(0.030)	-0.048	(0.039)
Square	0.005***	(0.000)	0.005***	(0.000)	0.004***	(0.000)
Fixed costs	-		-		-	
* Children	-0.578	(0.758)	-0.586	(1.115)	-0.187	(1.130)
N (c)	1,992		3,231		2,745	
Pseudo R Square	0.303		0.312		0.312	
Log-likelihood	-1525		-814.6		-691.1	
Wald test: joint sig [Chi2 (16)]	**1327.35**		**628.13**		**737.24**	
Prob > Chi2	0.000		0.000		0.000	

Notes:
[(a)]Primary education omitted
.[(b)]Dummy variable for single family with child
.[(c)]Estimated on the total of 5,976 observations = number of singles in the sample (1,992) multiplied by number of choices in simulation (3)

Table A3b. Preference estimates for couples (Conditional logit)

	Total		Female		Male	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Income	**-0.358**	**(0.665)**				
*Age			0.045	(0.034)	-0.040	(0.035)
*Age square (/100)			-0.041	(0.040)	0.059	(0.040)
*Secondary ed.[(a)]			-0.120*	(0.069)	-0.120*	(0.069)
*Tertiary ed.			-0.057	(0.095)	-0.057	(0.095)
* Children .[(b)]	0.452***	(0.112)				
Square	-0.004***	(0.001)				
Income * Hours of work			0.001	(0.000)	0.000	(0.001)
Hours of work			**-0.388*** **	**(0.038)**	**-0.286*** **	**(0.040)**
*Age			0.009***	(0.002)	0.009***	(0.002)
*Age square (/100)			-0.013***	(0.002)	-0.013***	(0.002)
*Secondary ed. .[(a)]			0.028***	(0.005)	-0.007	(0.005)
*Tertiary ed.			0.039***	(0.009)	-0.021**	(0.009)
* Children.[(b)]			-0.037***	(0.006)	-0.021***	(0.006)
* Female and male hours Interaction (/100)	0.033***	(0.010)				
Square			0.005***	(0.000)	0.004***	(0.000)
Fixed costs			-		-	
* Children			-0.043	(0.247)	0.194	(0.213)
N [(c)]	1,543					
Pseudo R Square	0.346					
Log-likelihood	-2218					
Wald test: joint sig. [Chi2 (30)]	2343.89					
Prob > Chi2	0.000					

Notes:
[(a)]Primary education omitted
.[(b)]Dummy variable for single family with child
.[(c)]Estimated on the total of 13,887 observations = number of couples in the sample (1,543) multiplied by number of choices (9)

Table A4a. Effects of the reforms for singles - percentages and number of people for each choice, total, first and fifth quintile

		Share of the choices			Change (in pp)		Number of people per choice			Change	
		no IWB	with iIWB	with fIWB	iIWB	fIWB	no IWB	iIWB	fIWB	iIWB	fIWB
Total	Non-participation	42.1%	35.8%	33.3%	-6.3**	-8.8**	377,842	321,568	298,738	-56,274	-79,104
	Part-time	7.3%	7.7%	8.7%	0.4	1.4	65,666	69,464	78,144	3,798	12,478
	Full-time	50.6%	56.4%	58.0%	5.9**	7.4**	453,553	506,029	520,179	52,476	66,626
Female	Non-participation	43.6%	37.5%	35.2%	-6.0**	-8.3**	187,292	161,362	151,411	-25,930	-35,881
	Part-time	8.3%	8.5%	9.3%	0.2	1.0	35,632	36,565	39,987	933	4,355
	Full-time	48.2%	54.0%	55.5%	5.8*	7.3**	207,116	232,113	238,641	24,997	31,526
Male	Non-participation	40.8%	34.3%	31.5%	-6.5**	-9.3**	190,550	160,206	147,327	-30,344	-43,223
	Part-time	6.4%	7.0%	8.2%	0.6	1.7	30,034	32,899	38,157	2,865	8,123
	Full-time	52.8%	58.7%	60.3%	5.9**	7.5**	246,438	273,917	281,538	27,479	35,100

Table A4a. Effects of the reforms for singles - percentages and number of people for each choice, total, first and fifth quintile (continued)

		Share of the choices			Change (in pp)		Number of people per choice			Change	
		no IWB	with iIWB	with fIWB	iIWB	fIWB	no IWB	iIWB	fIWB	iIWB	fIWB
					The 1st quintile						
Total	Non-participation	99.3%	79.0%	73.3%	-20.2**	-26.0**	178,094	141,809	131,487	-36,286	-46,607
	Part-time	0.6%	2.6%	4.4%	2.0	3.9	1,019	4,618	7,950	3,599	6,931
	Full-time	0.2%	18.4%	22.3%	18.2**	22.1**	319	33,006	39,995	32,686	39,676
Female	Non-participation	98.8%	79.2%	74.3%	-19.6**	-24.5**	83,379	66,842	62,673	-16,538	-20,706
	Part-time	1.2%	3.1%	4.4%	1.9	3.2	1,019	2,625	3,680	1,605	2,661
	Full-time	0.0%	17.7%	21.4%	17.7**	21.4**	0	14,932	18,045	14,932	18,045
Male	Non-participation	99.7%	78.9%	72.4%	-20.8**	-27.3**	94,715	74,967	68,814	-19,748	-25,901
	Part-time	0.0%	2.1%	4.5%	2.1	4.5	0	1,994	4,270	1,994	4,270
	Full-time	0.3%	19.0%	23.1%	18.7**	22.8**	319	18,073	21,950	17,754	21,631
					The 5th quintile						
Total	Non-participation	14.7%	16.2%	14.6%	1.5	-0.1	26,254	28,882	26,048	2,628	-206
	Part-time	9.0%	8.8%	9.4%	-0.2	0.4	16,026	15,736	16,812	-290	786
	Full-time	76.4%	75.0%	76.0%	-1.3	-0.3	136,522	134,184	135,942	-2,338	-580
Female	Non-participation	16.3%	18.6%	16.5%	2.4	0.2	15,380	17,626	15,597	2,246	217
	Part-time	11.2%	11.0%	11.8%	-0.3	0.5	10,635	10,379	11,153	-256	518
	Full-time	72.5%	70.4%	71.7%	-2.1	-0.8	68,585	66,595	67,850	-1,989	-735
Male	Non-participation	12.9%	13.4%	12.4%	0.5	-0.5	10,874	11,256	10,451	382	-423
	Part-time	6.4%	6.4%	6.7%	0.0	0.3	5,390	5,357	5,659	-33	268
	Full-time	80.7%	80.3%	80.9%	-0.4	0.2	67,937	67,589	68,092	-349	155

Notes: Stars in the table denote significant effects (* p<0.1; ** p<0.05); t-tests available upon the request. Data weighted by the weights provided by RSO.

Table A4b. Effects of the reforms for couples - percentages and number of people for each choice, total, first and fifth quintiles

		Share of the choices			Change (in pp)		Number of people per choice			Change	
		no IWB	with iIWB	with fIWB	iIWB	fIWB	no IWB	iIWB	fIWB	iIWB	fIWB
Total	Non-participation	39.1%	36.0%	38.3%	-3.1*	-0.8	525,866	484,883	515,241	-40,983	-10,625
	Part-time	6.8%	7.3%	6.9%	0.4	0.1	91,751	97,687	92,754	5,935	1,003
	Full-time	54.1%	56.7%	-54.8%	2.7*	0.7	728,540	763,588	738,163	35,048	9,623
Female	Non-participation	52.5%	49.5%	51.7%	-3.0	-0.9	353,486	332,986	347,645	-20,500	-5,841
	Part-time	6.4%	6.9%	6.5%	0.6	0.1	43,016	46,762	43,848	3,746	832
	Full-time	41.1%	43.6%	41.8%	2.5	0.7	276,577	293,331	281,585	16,754	5,009
Male	Non-participation	25.6%	22.6%	24.9%	-3.0	-0.7	172,380	151,897	167,596	-20,483	-4,784
	Part-time	7.2%	7.6%	7.3%	0.3	0.0	48,735	50,925	48,906	2,190	170
	Full-time	67.1%	69.9%	67.8%	2.7	0.7	451,964	470,257	456,578	18,294	4,614
					The 1st quintile						
Total	Non-participation	83.9%	76.9%	82.1%	-6.9**	-1.8	228,222	209,333	223,433	-18,889	-4,789
	Part-time	4.5%	5.0%	4.7%	0.4	0.1	12,348	13,487	12,724	1,139	376
	Full-time	11.6%	18.1%	13.2%	6.5**	1.6	31,605	49,355	36,018	17,750	4,413
Female	Non-participation	94.0%	88.4%	92.3%	-5.6*	-1.7	127,927	120,307	125,556	-7,620	-2,370
	Part-time	1.2%	1.9%	1.5%	0.7	0.2	1,644	2,622	1,977	978	333
	Full-time	4.8%	9.7%	6.3%	4.9	1.5	6,516	13,158	8,554	6,642	2,037

Table A4b. Effects of the reforms for couples - percentages and number of people for each choice, total, first and fifth quintiles (continued)

		Share of the choices			Change (in pp)		Number of people per choice			Change	
		no IWB	with iIWB	with fIWB	iIWB	fIWB	no IWB	iIWB	fIWB	iIWB	fIWB
Male	Non-participation	73.7%	65.4%	71.9%	-8.3*	-1.8	100,295	89,026	97,876	-11,270	-2,419
	Part-time	7.9%	8.0%	7.9%	0.1	0.0	10,704	10,865	10,747	161	43
	Full-time	18.4%	26.6%	20.2%	8.2	1.7	25,088	36,197	27,464	11,108	2,376
					The 5th quintile						
Total	Non-participation	10.3%	9.5%	10.2%	-0.7	-0.1	27,582	25,642	27,392	-1,940	-190
	Part-time	8.4%	9.0%	8.5%	0.5	0.0	22,687	24,118	22,739	1,431	52
	Full-time	81.3%	81.5%	81.4%	0.2	0.1	218,571	219,081	218,710	510	139
Female	Non-participation	16.1%	15.0%	16.0%	-1.1	-0.1	21,591	20,123	21,452	-1,469	-139
	Part-time	10.5%	11.0%	10.5%	0.6	0.0	14,051	14,833	14,070	782	19
	Full-time	73.5%	74.0%	73.6%	0.5	0.1	98,777	99,464	98,898	687	121
Male	Non-participation	4.5%	4.1%	4.4%	-0.4	0.0	5,991	5,519	5,940	-472	-51
	Part-time	6.4%	6.9%	6.4%	0.5	0.0	8,636	9,285	8,669	649	33
	Full-time	89.1%	89.0%	89.1%	-0.1	0.0	119,794	119,616	119,812	-177	18

Notes: Stars in the table denote significant effects (* $p<0.1$; ** $p<0.05$); t-tests available upon the request. Data weighted by the weights provided by RSO.

Ponudba dela in učinki ugodnosti zaposlenih na neenakost: ugotovitve za Srbijo

Izvleček

Nizka udeležba na trgu dela skupaj z visokoučinkovito davčno obremenitvijo nizkih ravni plač ustvarja plodna tla za vpeljavo ugodnosti zaposlenih v Srbiji. Naš članek ponuja vnaprejšnjo oceno dveh shem ugodnosti zaposlenih, ki sta usmerjeni k spodbujanju ponudbe delovne sile in bolj enaki porazdelitvi dohodka. Metodološki pristop kombinira mikrosimulacijski model na osnovi davkov in koristi z diskretnim modelom ponudbe dela. Naši rezultati kažejo, da bi lahko tako individualne kot družinske sheme ugodnosti zaposlenih znatno okrepile sodelovanje na trgu dela, četudi bi lahko družinske ugodnosti imele nespodbudne učinke na drugega prejemnika dohodka. Večina vedenjskih sprememb se zgodi med najrevnejšimi posamezniki z znatnimi redistributivnimi učinki.

Ključne besede: ugodnosti iz naslova zaposlenosti, ponudba delovne sile, neenakost, model diskretne izbire, mikrosimulacija

Infrastructure Indices: Comparative Analysis of Performance, Risk and Representation of Global Listed Proxies

Dimitar Lambrev
PhD Student, International Joint Cross-Border PhD Program, University of Applied Science Burgenland, Austria
1519001016@fh-burgenland.at

ORIGINAL SCIENTIFIC PAPER

RECEIVED: AUGUST 2019

REVISED: SEPTEMBER 2019

ACCEPTED: SEPTEMBER 2019

DOI: 10.2478/ngoe-2019-0011

UDK: 338.49:311.141

JEL: G10, G11, G15, G23, H54

Citation: Lambrev, D. (2019). Infrastructure Indices: Comparative Analysis of Performance, Risk and Representation of Global Listed Proxies. *Naše gospodarstvo/Our Economy,* 65(3), 23–39. DOI: 10.2478/ngoe-2019-0011

Abstract

Faced with historically low interest rates, investors are looking further into illiquid assets such as infrastructure in search of alternative sources of income, better diversification and a long-term investment perspective. This paper analyzes the key performance and risk characteristics of the EDHEC*infra* global unlisted infrastructure equity index when compared to the main global listed infrastructure indices during the 2001-2018 period. The descriptive statistics method is applied to determine the representation of the benchmarks commonly used by investors considering infrastructure investments. For the purpose of the market beta analysis, the MSCI World index is also used as a global equities proxy in a linear regression model.

Listed infrastructure is often considered as an income-yielding and defensive equity strategy that provides a liquid proxy for alternative assets (e.g., infrastructure). However, the paper results indicate that the net effect of investing in listed infrastructure remains questionable, even unknown. Recent empirical findings demonstrate divergent stands on benchmarking infrastructure. The high correlation of the main listed infrastructure indices with the broad equity index MSCI World and the inconsistency of research results thus far suggest that infrastructure is an ill-defined investment category within the listed infrastructure space with lacking reliable and useful benchmarking. The commonly used and far-reaching classification of companies with broad industrial nature and business activities that are less relevant to infrastructure may affect the overall representation of the legitimate characteristics of the infrastructure asset class amid the growing enthusiasm among investors.

Keywords: infrastructure, index, benchmarking, listed equity, performance analysis

Introduction

Institutional investments in infrastructure have grown in popularity across the financing sector and have been a highly discussed topic in recent years. In terms of public policy, budget deficits have triggered governments to more frequently engage in cooperation with the private sector for the development and financing of infrastructure projects. The political willingness of many Western European countries has routinely created the demand for pension funds and insurers to invest in infrastructure in an effort to support the larger economy. Such investments are intended to help meet

NG
OE

**NAŠE GOSPODARSTVO
OUR ECONOMY**

Vol. 65 No. 3 2019

pp. 23 – 39

long-term investment needs and generate an attractive risk-return profile. This paper aims at capturing the key investment characteristics of infrastructure and answering the research question of whether the performance of global listed indices gives an adequate representation when compared with an unlisted infrastructure proxy.

Many investors have become interested in infrastructure as an 'asset class' due to its appealing characteristics (Inderst, 2010). Infrastructure investments potentially offer some useful characteristics for pension funds and insurance companies that have to match (often inflation-linked) annuity-type liabilities. Infrastructure assets are often expected to have long-term, predictable cash flows; low sensitivity to business cycles; low risk; and low correlations to other asset classes. Furthermore, project finance debt has exhibited relatively favorable default and recovery rates compared to corporate debt between 1983 and 2017 (Moody's, 2018). However, a recent review (Amenc et al., 2019) including documentation and performance data of 144 investment products indicates that listed infrastructure companies often can be risky and expensive while failing to deliver better value.

Infrastructure investments appear as an attractive investment opportunity not only from a risk-return point of view but also from a prudential perspective. Benefiting from lower capital requirements according to the Solvency II regulatory framework for investing in higher quality infrastructure opportunities (European Commission 2016, 2017) has also triggered a growing enthusiasm across investors. Asset owners are also re-discovering 'long-term investing', trying to capture an 'illiquidity risk premium' from infrastructure.

Following this introduction of the infrastructure asset class and motivation of investors when considering investment in infrastructure (section I), this paper outlines the methodological approach (sector II), namely a quantitative analysis used to determine and validate the representation and relevance of the broad listed infrastructure equity indices. The findings from previous studies (sector III) provide some empirical evidence of the importance and benefits of including infrastructure in the investment portfolio mix, as well as expressing some concerns around the foundation and validity of the asset class. However, recent academic research is based mostly on listed asset performance due to a lack of direct performance data. The research gap can be attributed to the data limitations concerning the direct infrastructure performance, which this paper aims to cover to a certain extent by using a private unlisted index. As a next step, a comparative analysis (section IV) of the methodology standards used in building the global indices is undertaken to outline the main characteristics and differences. In section V, the author measures the performance and risk of various global listed infrastructure indices relative to an unlisted infrastructure equity index recently published by the Ecole des Hautes Etudes Commerciales du Nord Infrastructure Institute (EDHEC). The comparison of the various industry-provided thematic indices aims at determining the degree of representation of the main listed infrastructure indices. For that purpose, the author uses quarterly return data for all indices for the period from 1st January 2007 to 31st December 2018 (excluding the Macquarie global index, which was discontinued at the end of 2016). The data used in this paper are based on availability as of 30th June 2019. The paper reports the findings from the underlying analysis and draws conclusion in section VI.

Methodological Approach

This paper is intended to provide a comprehensive review of the performance and key risk parameters of the main global listed infrastructure indices by using a descriptive statistics method. A quantitative analysis (including covariance, correlation, and linear regression analysis) of sample market index data has been performed to determine the representation, validity and relevance of the main listed infrastructure indices. The underlying risk and return analysis consists of measuring the risk-adjusted performance, downside protection, and diversification effect as well as equity market beta tests of listed infrastructure indices compared to the EDHEC*infra* unlisted global infrastructure index and the MSCI World as a global stock market proxy. Further, the paper seeks to provide a detailed description of the key elements in the methodology of those infrastructure indices and thus to enable an adequate comparison of the index building approaches.

Amid the growing popularity of the asset class among institutional investors, the results of this study are targeted to address the need for implementing better-defined benchmarks in the infrastructure space that can help investors in their investment, risk management and asset allocation decisions.

Literature Review

A recent Vanguard study of the listed infrastructure equity market (Geysen, 2018) demonstrated the reduced volatility and diversification effect of an overweight to infrastructure asset class by utilizing a mean-variance approach during the historical period of analysis. However, the paper concluded that the benefits of the enhanced portfolio's risk-adjusted returns need to be weighed against the concentration risk and arguably superior inflation hedge when considering an overweight allocation to infrastructure asset class.

Empirical findings challenge the relationship between listed and unlisted infrastructure investments. Based on an asset

pricing approach (Bianchi & Drew, 2014) on a sub-set of listed stocks in the utility sector derived from publicly listed global and regional infrastructure indices, infrastructure returns did not exhibit any additional premium compared to global stocks or global utilities industry indices, and thus infrastructure could not be defined as a separate asset class. A potential additional return from unlisted infrastructure was considered a function of idiosyncratic risk, infrastructure asset selection, liquidity risk, equity valuation risk or a combination of these. In contrast, Moss (2014) showed the benefit of including an unlisted portfolio consisting of a representative sample of listed infrastructure funds with a neutral to positive impact on the portfolio performance as well as liquidity and diversification effects when using the various databases.

The strong risk-adjusted performance and portfolio diversification benefits of unlisted infrastructure versus listed infrastructure and other listed assets (Newell et al., 2011) underline the increased importance of investing in infrastructure by pension's funds, sovereign wealth funds and insurance companies. The unlisted portfolio performed strongly during the global financial crisis (GFC), thereby activating some considerations regarding the development of an effective asset class.

In replicating an approach consisting of selecting stocks by sectors and levels of income generated from infrastructure activities (set at 90%) paired with testing the performance of various global industry-provided thematic stock indices (e.g. MSCI Infrastructure World), Blanc-Brude and Whittaker (2015) suggested that the infrastructure indices outperform the market benchmark MSCI, likely due to the implicit value factor represented by infrastructure firms; however, they exhibited drawdown risk and tail risk as well as high correlation with the broader stock market during the entire length of the business/credit cycles. Conversely, a pre-defined portfolio of five stocks (representing approximately 280 individual equity stakes) listed on the London Stock Exchange illustrated very little correlation with the market from a price-return perspective, and no correlation at all (i.e., market beta of zero) on a total return basis as a result of the high payout ratio and frequency of those payouts.

In a follow-up publication, EDHEC (Blanc-Brude et al., 2017) indicated the significant outperformance of a broad market index of private infrastructure when compared to the public equity market reference index over the 2000-2016 period, as it also did not suffer from any drawdowns during the market collapses in the 2007-2011 period. By using a bottom-up approach to compare the risk-adjusted performance, the authors showed that most segments of the private index universe, such as infrastructure projects and contracted infrastructure, exhibited an attractive risk-reward profile due to the greater return and lower value-at-risk (VaR); however, they noted the obstacle of having bulky and illiquid investments at the asset allocation level in the absence of well-diversified infrastructure products.

At the end of a series of scientific research papers on the listed infrastructure topic, EDHEC reported false claims and a misleading narrative on listed infrastructure, as most investments could not be considered infrastructure under any definition (Amenc et al., 2017). The reputation of the infrastructure asset class might be compromised due to the lack of transparency around the so-called asset class and the growing appetite of institutional investors (reported at USD 57bn in 2017). EDHEC labels the so-called asset class 'fake infra', as it arguably poses a threat to the infrastructure investment sector by not fulfilling the characteristics of infrastructure. The research on actual constituents of both passive and active listed infrastructure (often campaigned by managers under the broad infrastructure definition) indicates that listed infrastructure has failed to deliver the same performance as unlisted infrastructure investments, namely on key elements such as premium returns, reduced volatility, diversification, downside protection and inflation-linked predictable cash flows.

Controversially, previous academic studies (e.g., Oyedele et al., 2012) supported the inclusion of infrastructure in a broader multi-asset portfolio mix. The study compared global listed infrastructure performance with other asset classes such as stocks, bonds, real estate, hedge funds and private equity during the 2001-2010 period and found that a systematic allocation between 10% and 18% to infrastructure contributes more to risk reductions (i.e., improved diversification), instead of enhancing the return of the overall portfolio mix. Obviously, recent empirical findings show the imminent need to address the issue of treating listed infrastructure and finding an appropriate benchmarking tool as a venue for further research work and studies.

Overview of Global Infrastructure Indices

Infrastructure companies can be described as businesses with long-term, steady and predicable cash flows coming from providing essential services (Inderst, 2010). Investments in real assets like infrastructure companies benefit from very minimal price-elasticity of demand (due to the monopolistic nature of the business), often inflation hedge and little exposure to the business cycle. Institutional investors are continuing to look into infrastructure investments as part of their portfolio. As a result of the growing interest in the asset class, the need to determine the role of infrastructure in the multi-asset portfolio has become imminent.

Within the investment community, infrastructure has various definitions and views with respect to the relation to global indices. Even the listed infrastructure space offers no

universally agreed definition of infrastructure. Generally, infrastructure has a unique definition due to its characteristics and high degree of heterogeneity among sectors. Infrastructure can be defined as the basic facilities, service installations and physical assets needed for providing an essential service to a community or society, such as transportation and communication systems, water and power lines, schools, hospitals, renewable energy, and so on (Inderst, 2010).

In fact, the meaning of 'infrastructure' depends on the definition used for it. The definition of infrastructure by the World Bank (online) dictates the infrastructure services provided by a project, namely electricity generation, transmission and distribution, natural gas transmission and distribution, information and communication technologies (ICT) and transportation.

OECD (2002) defines infrastructure as the system of public works in a country, state or region, including roads, utility lines and public buildings. In the investment context, this usually translates into economic infrastructure (i.e. transport, utilities, communication, and renewable energy) as well as social infrastructure. Infrastructure assets are characterized by capital intensity, longevity, economies of scale, complexity and heterogeneity (Della Croce et al., (2015). The prudential framework of Solvency II (EC, 2016) specifies the definition of infrastructure as physical structures, facilities, systems and/or networks that are essential to the public and/or society, whereas infrastructure project entity or a special purpose vehicle (SPV) refers to a legal entity which does not perform any other functions than to own, finance, develop or operate infrastructure assets.

Defining the infrastructure asset class has been at the center of recent debates with respect to asset allocation strategies or prudential purposes. The EDHEC institute (Blanc-Brude et al., 2017) is believed to have addressed the multiple biases created by data collection from the infrastructure market and the potentially skewed representation of infrastructure as a result of larger investments in the investable market by using a sample universe of infrastructure investments.

Previous empirical works (Geysen, 2018) suggest that infrastructure investments create diversification benefits, improve the risk-return profile of the portfolio and certainly can be helpful in the asset management context. In this paper, the author searches for a meaningful evidence of those benefits, mainly by comparing the performance of the EDHEC private infrastructure equity index to the broader infrastructure benchmarks in the listed infrastructure space. For the purpose of this scientific analysis, the author initially examines the composition, structure, and methodology of eight global infrastructure indices, including one unlisted global private infrastructure equity index, six global listed infrastructure indices and one global listed equity index.

A. *Index Methodology Comparison*

1) EDHEC Global Unlisted Infrastructure Equity Index ('EDHEC*infra*')

The EDHEC global unlisted infrastructure equity index is a market value-weighted representation of the global private infrastructure equity market. The EDHEC*infra* private infrastructure equity investments index is a sample-based universe of investable private infrastructure companies spanning more than 25 countries (mostly OECD and some emerging markets) over 18 years, going back to the year 2000. The index may be argued to offer market-adequate representation of the preferences of buyers and sellers of unlisted infrastructure investments. Index constituents contain all business models including both infrastructure projects (SPVs) and infrastructure corporates.

The EDHEC*infra* index provides an alternative framework of reference relevant to the infrastructure asset class as opposed to the investment categories inherited from private equity and real estate universes. The index selects companies from the specific sub-industries of The Infrastructure Company Classification Standard (TICCS) designed to capture the characteristics of infrastructure investments. The TICCS (see Appendix A) is a four pillar multi-company classification system consisting of three business risk models, various industrial super-classes (corresponding to 30 industry classes and 68 individual asset-level subclasses), four geo-economic exposures and two corporate-governance forms. These filters correspond to the Global Industry Classification Standard (GICS) classification of infrastructure companies as described in Appendix B. In order to be included in the EDHEC*infra* broad market indices, an investable infrastructure company needs to qualify under TICCS classification as meeting one of the eligibility criteria (EDHEC, 2018).

2) Dow Jones Brookfield Global Infrastructure Index ('DJ Brookfield')

Dow Jones Brookfield Global Infrastructure index measures the performance of approximately 100 companies worldwide that are owners and operators of pure-play infrastructure assets with at least 70% of cash flows derived from infrastructure lines of business. The index is produced jointly by S&P Dow Jones Indices and Brookfield Asset Management and, based on GICS classification system (see Appendix B), covers primarily communication, energy, industrials, real estate, and utilities sectors. The index has a modified market capitalization weighting with a total market cap of USD 1.13 trillion, representing 101 firms as of 30th June 2019 (Standard and Poor's Dow Jones Indices, 2019).

3) MSCI Europe Infrastructure Index ('MSCI')

The MSCI Europe Infrastructure Index captures the global opportunity set of listed companies that are owners or operators of infrastructure assets. Constituents are selected from the equity universe of MSCI Europe, the parent index, which covers mid and large cap securities across the 15 developed market countries in Europe. All index constituents are categorized into 13 subindustries according to GICS standard, which MSCI then aggregates and groups into 5 infrastructure sectors: telecommunications, utilities, energy, transportation and social (MSCI defined infrastructure sectors not as official GICS sectors but as aggregated subsets of GICS sub-industries based on the MSCI Infrastructure Indexes Methodology). As of 30th June 2019, the total market capitalization was reported at EUR 637bn, consisting of 51 constituents (MSCI, 2017).

4) RARE Global Infrastructure Index ('RARE')

The RARE Global Infrastructure index tracks the performance of a portfolio of global infrastructure-related equities domiciled in domestic, developed and emerging international markets. This smart beta index seeks to provide focused exposure to infrastructure companies in the transportation, energy, utilities, communication and social services sectors according to GICS. Infrastructure assets include physical structures, networks, developments and projects that communities and economies require to function and grow. Weighting of the index is determined by free float market capitalization, infrastructure exposure and region. The market cap was reported at EUR 2.02tn across 120 constituents as of 28th June 2019 (Legg Mason, 2017).

5) S&P Global Infrastructure Total Return Index ('S&P')

The S&P Global Infrastructure Index, as part of the S&P thematic indices, is designed to track 75 listed infrastructure companies across three distinct infrastructure clusters: energy, transportation, and utilities (telecommunication infrastructure is excluded). The sectorial weighting is determined by the fixed number of constituents. First, 15 emerging market stocks are selected; then, the developed market is sorted out with 30 stocks in transportation (i.e., 40% weight), 30 stocks in utilities (i.e., 40% weight) and 15 energy infrastructure companies (i.e., 20% weight) based on a float-adjusted market capitalization. Stocks with lower market capitalization are allowed if the index provides less than 75 companies in total. Total market capitalization was USD 1.48tn as of 28th June 2019 (Standard & Poor's, 2019).

6) STOXX Global Broad Infrastructure Index Gross Return ('STOXX')

The STOXX Global Broad Infrastructure Index is derived from a portfolio of stocks that have at least 50% of the total most recent annual revenues coming from infrastructure business and/or supplying goods or services to companies from the infrastructure industry. The index includes all developed and emerging markets of the STOXX Global Total Market Index. Its universe is derived from all stocks across the communications, energy, government outsourcing/social, transportation and utilities sectors according to the GICS standard. The index is weighted according to free-float market capitalization with additional weighting cap factors (e.g. sector cap of 40%). Market capitalization was EUR 1.77bn as of 28th June 2019 STOXX, 2019).

7) Macquarie Global Infrastructure Total Return Index ('Macquarie')

The Macquarie Global Infrastructure index reflects the stock performance of companies engaged principally in the management, ownership and/or operation of infrastructure and utility assets. The inde x covers assets classified by GICS such as transportation, telecommunications, social infrastructure and utilities. The weighting is done using a free-float methodology. The index history goes back to July 2000; however, this index was discontinued in 2016 (Macquarie, 2005). The alternative index series to be used is FTSE Global Core Infrastructure Index (see below).

8) FTSE Global Core Infrastructure Index ('FTSE')

The FTSE Global Core Infrastructure Index reflects the performance of infrastructure and infrastructure-related listed securities worldwide, which are categorized in accordance with the Industry Classification Benchmark (ICB), the global standard for industry sector analysis. Constituents are screened according to ICB subsectors that meet FTSE's definition of core infrastructure, which is typically characterized as structures and networks with conveyance of goods, services, information/data, people, energy and necessities. Weights are capped as follows: transportation, 30%; utilities, 50%; and others (e.g., telecommunication, pipelines, REITs, etc.), 20%. The index has a free float-adjusted market capitalization, which was reported at EUR 2.75bn as of 30th June 2019 (FTSE Russell, 2019).

9) MSCI World Index ('MSCI World')

The MSCI World Index in EUR is a free-float weighted equity index that identifies eligible equity securities worldwide. This global benchmark measures and captures large-cap and mid-cap representatives across 23 developed markets. The index covers approximately 85% of the free float-adjusted market capitalization in each country (MSCI, 2019). The MSCI World index is used for comparison purposes only as a global stock market proxy.

Table 1. Global Infrastructure Indices Comparison (page 1 of 3)

Index	1) EDHEC Global Unlisted Infrastructure Equity Index	2) Dow Jones Brookfield Global Infrastructure Index	3) MSCI Europe Infrastructure Index
Description	market value-weighted representation of the global private infrastructure equity market, which represents the preferences of buyers and sellers of unlisted infrastructure investments.	measures the performance of companies worldwide that are owners and operators of pure-play infrastructure assets	captures the global opportunity set of listed companies that are owners or operators of infrastructure assets
Index Family	defined by using filters from the most relevant investors: broad market, market subindices, custom benchmarks	constructed based on Brookfield Asset Management's definition of infrastructure with direct subsets of regional and global infrastructure sectors; another main index is Dow Jones Brookfield Global Infrastructure Composite Index (including Master Limited Partnerships (MLPs))	headline index; part of broad subindices in power (e.g. generation, transmission and renewable), transport (incl. airports)
Usage	private benchmark	benchmarking	headline index/benchmarking
Index Universe	combination of four infrastructure clusters of TICCS classification classes (business risk, industrial, geoeconomic and corporate-governance)	The index is produced jointly by S&P Dow Jones Indices and Brookfield Asset Management and excludes Master Limited Partnerships (MLPs). The index is available in USD, AUD, CAD, and EUR.	Constituents are selected from the equity universe of MSCI Europe, the parent index, which covers mid and large cap securities across the 15 developed markets countries in Europe. MSCI defines infrastructure sectors as not official GICS sectors but aggregated subsets of GICS sub-industries.
Sectors	*business risk (3)* contracted, merchant, regulated *industrials (8)* power generation, environmental services, social infra, energy & water resources, data infra, transport, renewables, utilities *geoeconomic (4)* global, regional, national, subnational *governance (2)* infra project companies (SPV), corporates	*communication* communication (e.g. towers, broadband) *industrials* airports, toll roads, ports *energy* electricity transmission and distribution, *utilities* oil & gas storage, water and diversified sectors	*communication* alternative carriers; wireless tele services *transportation* airport services, roads, rail tracks, ports *energy* oil & gas storage and transportation *utilities* electricity, gas, water *social infra* education services, health care facilities
Number of Constituents	contain 581 companies incl. SPV and corporates	variable; 101 stocks as of 30 June 2018	variable; 51 stocks as of 30 June 2019
Size	USD 349bn representing 474 firms reported as of 31 March 2019	minimum float-adjusted market cap: USD 500mn; USD 1.13tn representing 101 firms reported as of 30 June 2018	free float-adjusted market capitalization EUR 637bn representing 51 firms reported as of 30 June 2019
Liquidity	n/a	threshold of 3-month Average Daily Value Traded: USD 1mn	n/a
Listing	n/a	developed market listing	developed market listing
Weighting	three alternative index-weighting schemes: value, capped value and equal weighting	modified market capitalization weighted	constituent weights within the respective sector are based on free float-adjusted market capitalization
Eligibility	cumulative primary and secondary deal flow since 2000 represents at least 0.5% of the total value of all identified markets; market turnover ratio min. 20% by number of transactions, min. 20% by transaction volume or country is part of the EU; basic procurement data and financial information incl. incorporation and financial close dates, book values	constituents have a developed market listing; and at least 70% of cash flows are derived from infrastructure lines of business	40% infrastructure 60% utilities 15% subindustry weight limits
Diversification	a sampled universe is used for defining the constituents of the global broad market index, which are further filtered according to minimum-size and time-to-maturity filters.	individual stock weights are capped at 10% country weights are capped at 50% industry weights are capped at 50%	telecommunication and utilities sectors are each fixed at 1/3* of the index, while the energy, transportation and social infrastructure sectors have a combined weight of the remaining 1/3
Rebalancing	Time series are adjusted on a quarterly basis	quarterly	quarterly
Launch Date	2019; historical data is backdated and available from 31 March 2001	2008; historical data available from December 2002; pricing adjusted in real time	1998; historical data available since 31 December 1998
Access/Source	Bloomberg ID: BBG00H6Y70L0 (EIPEE Index) EDHECinfra online platform: https://indices.edhecinfra.com/App	Bloomberg ID: BBG000R9S4K9 (DJBGIET Index) S&P Dow Jones Indices website: https://us.spindices.com/indices/equity/dow-jones-brookfield-global-infrastructure-local-currency-index-usd	Bloomberg ID: BBG001XVT251 (MXEU0INF Index) MSCI homepage: https://www.msci.com/documents/10199/bcdb0528-dc83-4be2-a166-27d859766914

*Note that the sector weights of the MSCI Europe Infrastructure Index in between two quarterly reviews may deviate from one-third due to price movement or on-going corporate events on existing constituents.

Table 1. Global Infrastructure Indices Comparison (page 2 of 3)

Index	4) RARE Global Infrastructure Index	5) S&P Global Infrastructure Index	6) STOXX Global Broad Infrastructure Index
Description	tracks a portfolio of global infrastructure-related equities including stocks domiciled in domestic, developed and emerging international markets	measures the performance of 75 of the largest publicly-listed global infrastructure companies from both developed and emerging markets	derived from all stocks that have at least 50% of the total most recent annual revenues from infrastructure business and/or supplying goods or services to companies from the
Index Family	defined by infrastructure assets including physical structures, networks, developments and projects that communities and economies require to function and grow	part of the S&P Thematic Indices; represents the listed infrastructure industry; an equal-weighted version (S&P Global Infrastructure Equal Weight Index) is also available.	derived from the STOXX Developed and Emerging Markets Total Market (all developed and emerging markets of the STOXX Global Total Market Index)
Usage	benchmarking	benchmarking/thematic index	blue chip/theme index
Index Universe	smart beta index seeks to provide focused exposure to infrastructure companies by analyzing the actual sources of corporate cash flows	Three infrastructure clusters (combination of GICS industries) from the S&P Global BMI. Calculation currencies are USD, AUD, EUR, GBP, JPY, KRW, LCL.	defined as all companies listed in developed or emerging markets which are part of the STOXX Global Total Market Index. Price-based, gross and net return in EUR and UDS available
Sectors	*communication* *transportation* *energy* *utilities* *real estate*	cable and satellite airport services, toll roads, rails, ports transmission and distribution, electric generation, oil & gas storage, renewable electricity, gas, water, multi-utilities REITs	*transportation* *energy* *utilities* *(*communication infrastructure excluded)*	airport services, highways, rail tracks, ports oil and gas storage, renewables electricity, gas, water, power producers and energy traders	*communication* *transportation* *energy* *utilities* *social infra*	cable, satellite, data center, tower, wireline airports, rail, roads, water transportation energy utilities, midstream energy waste management, water hospitals, correctional facilities, postal services
Number of Constituents	variable; 120 stocks as of 28 June 2019	75 companies	variable; max. 40 per sector
Size	minimum float-adjusted market cap: USD 500mn; EUR 2.02tn across 120 constituents reported as of 28 June 2019	minimum total market capitalization: USD 250mn; minimum float-adjusted market cap: USD 100mn; market capitalization of USD 1.48tn as of 28 June 2019	EUR 1.77bn market capitalization as of 28 June 2019
Liquidity	threshold of 3-month Average Daily Value Traded: USD 2mn	Thresholds of 3-month Average Daily Value Traded: USD 1mn for developed markets and USD 500,000 for emerging	threshold of 3-month Average Daily Value Traded: USD 1mn
Listing	developed market listing	developed market listing	developed market listing
Weighting	determined by market capitalization, free float, infrastructure exposure, price volatility and region	modified market capitalization weighted	free-float market capitalization with additional weighting cap factors
Eligibility	investments in companies of any size and in any country, including up to 80% foreign and up to 25% in developing or emerging markets; exposure to at least three foreign countries	Target number of stocks from the energy cluster is 15, with total weight capped at 20%; 30 stocks each from the transportation and utilities clusters, with total weight capped at 40% each	at least 50% of the company's revenue is generated in selected infrastructure sectors variable number of total constituents; a cap factor of 40% per sector; the maximum number of companies per sector is given by 40/n, with n = number of subsectors within each of the five
Diversification	leading economic indicators are used to establish weight between economically sensitive sectors and more regulated / defensive sectors on a quarterly basis	individual stock weights are capped at 5% 15 stocks from emerging markets and 60 from developed markets	individual stock weights are capped at 5% sector weights are capped at 30% country weights are capped at 40%
Rebalancing	quarterly	semi-annually	annually
Launch Date	2006; data is available since inception, i.e. 30 June 2006	2007; historical data available since 22 February 2007	2013; historical data available since 16 March 2007; pricing adjusted in real-time
Access/Source	Bloomberg ID: BBG00FF4F3L5 (INFRNR Index) RARE homepage: https://www.rareinfrastructure.com/strategies/rare-global-infrastructure-index/	Bloomberg ID: BBG0016VCZ65 (SPGTINTR Index) S&P indices homepage: https://us.spindices.com/indices/equity/sp-global-infrastructure-index	Bloomberg ID: BBG005815KJ7 (STXGBIGV Index) STOXX website: https://www.stoxx.com/index-details?symbol=STXGBIGV&stoxxindex=stxgbigv&searchTerm=STOXX%C2%AE+Global+Broad+Infrastructure

Table 1. Global Infrastructure Indices Comparison (page 3 of 3)

Index	7) Macquarie Global Infrastructure Index	8) FTSE Global Core Infrastructure Index	9) MSCI World Index
Description	reflects the stock performance of companies engaged principally in the management, ownership and/or operation of infrastructure and utility assets	reflects the performance of infrastructure and infrastructure-related listed securities worldwide	MSCI World Index in EUR is a free-float weighted equity index that identifies eligible equity securities
Index Family	based on FTSE Global Equity Index series. Index covers 48 markets broken down into five regional indices and eight industry/sector indices. For each of the indices a Price index and Total Return index are calculated in local currency, USD, GBP, EUR, JPY and AUD	FTSE Infrastructure Index Series is a comprehensive set of nine cap-weighted indexes, diversified across six FTSE-defined infrastructure subsectors; part of FTSE Global All Cap Index. Index also available in USD, EUR, GBP, JPY and AUD.	MXWO includes developed world markets, and does not include emerging markets. MXWD includes both emerging and developed markets.
Usage	represents trends in all eligible infrastructure stocks	benchmarking	global benchmarking (stocks)
Index Universe	constituent companies in the series are selected from oil & gas pipelines, transportation services, utilities and telecommunications equipment industries	further expands the definition of infrastructure from the structures and networks to include the conveyance of goods, services, information/data, people, energy and necessities; categorized in accordance with ICB	measures and captures equity markets worldwide; small, mid and large caps
Sectors	*communication* satellites, cable and transmission tower *transportation* toll roads, airport, rail tracks, shipping ports *utilities* electricity, water, oil and gas pipelines *social infra* schools, hospitals	*transportation* heavy construction, transportation services, railroads, travel & tourism *utilities* conventional electricity, gas distribution, water, multi-utilities *others* pipelines, fixed and mobile telecommunication, broadcasting, REITs	covers all segments, including GICS sectors
Number of Constituents	n/a; index discontinued in 2016	variable	variable; 1,655 constituents as of 28 June 2019
Size	minimum float-adjusted market cap: USD 250mn	free float-adjusted market capitalization EUR 2.75tn reported as of 30 June 2019	free float-adjusted market capitalizaion
Liquidity	threshold of 3-month Average Daily Value Traded: USD 1mn	individual stocks are screened to ensure that the index is tradable	annual traded value ratio (ATVR); 3 month of frequency trading
Listing	developed market listing	developed market listing	global listing
Weighting	free-float market capitalization, liquidity screens and GIIC	constituent weights within the respective sector are based on free float-adjusted market capitalization	free-float market capitalization
Eligibility	company's primary business is derived from infrastructure activities	constituents derive 65% or more of their revenue from core infrastructure activities	all listed equity securities (including REITs); a security must have a free float-adjusted market capitalization equal to or higher than 50% of the equity universe minimum size requirement
Diversification	n/a; index discontinued in 2016 The alternative index series is FTSE Global Core Infrastructure Index	individual stock weights are capped at 5% sector weights are capped at 50% utilities, 30% transportation, 20% others	Large Cap Index: 70% ± 5%. Standard Index: 85% ± 5%. Investable Market Index: 99%+1% or -0.5%.
Rebalancing	semi-annually	semi-annually	globally synchronized
Launch Date	data available from 1 July 2000; index was later discontinued on 21 November 2016	2011; historical data available from December 2005 with pricing calculated on an end-of-day basis	developed with a base value of 100 as of December 31, 1998
Access/Source	Bloomberg ID: BBG002SWRZ61 (MCGIIILT Index) Macquarie fact sheet: https://www.macquarie.com.au/dafiles/Internet/mgl/au/about-macquarie-group/news/newsitem/2005/docs/19_June_infrastructure_fact	Bloomberg ID: BBG001Y6XYN0 (TFGCIIU Index) FTSE Russell indices homepage: https://www.ftserussell.com/products/indices/infra	Bloomberg ID: BBG002SQLTX4 (MSDEWIN Index) MSCI homepage: https://www.msci.com/world

B. *Summary of index compositional breakdown – definition, scope, methodology, weighting, eligibility and classification*

A common consensus among the global infrastructure indices is that infrastructure is usually defined by assets representing physical structures, networks, developments and projects that communities and economies require to properly function and develop. FTSE further expands the definition in accordance with the ICB classification standard.

In terms of scope, all indices (except MSCI World, which is a pure global equity index used for comparison purposes) measure the performance of global infrastructure companies that are owners or operators of infrastructure assets. EDHEC*infra* further defines its investment universe to represent the preferences of buyers and sellers of the unlisted infrastructure investments. Each index is based on its own methodology in an effort to capture the stock performance of infrastructure companies. In this respect, constituents need to provide a meaningful portion of their cash flows to derive from infrastructure lines of business ranging from 50% (e.g., STOXX) to at least 70% of the company's cash flows (e.g., DJ Brookfield). On the other hand, EDHEC*infra* utilizes a sampled universe for defining the constituents of its global index, which include a large range of categories to ensure that any private infrastructure company worldwide can be included provided it fulfils the eligibility criteria.

The weight of developed markets (consisting predominantly of North America and Europe) appears consistent across the indices, with the exception of the S&P index carrying a minimum weight of 20% for constituents from emerging markets. A broad comparison of the main global listed indices indicates that a free-float market capitalization is the most common weighting method for the vast majority, and some indices provide scaled weightings to allow for a specific contribution from particular sectors (e.g. MSCI, S&P, STOXX, FTSE).

However, the subject indices methodology analysis also shows a fundamental difference in the classification of the infrastructure exposures within an index. A review of the classification standard maintained by the global listed indices, namely the GICS, has determined inconsistent categorization of some index constituents. For instance, many road operating companies are often categorized as construction firms, while airport operators and airline-catering firms are often not distinguished. Further, project finance vehicles (e.g. SPVs) are categorized as "financials" rather than as infrastructure companies with a specific sectorial exposure in developing or operating an infrastructure business. Such differences between the main global listed indices and the EDHEC*infra* index have a meaningful impact on performance, as discussed further in this paper. Nevertheless, the benefits that infrastructure investment delivers to investors can only be achieved by creating exposure to a broad base of assets or at least replicating the characteristics of the infrastructure market.

Return and Risk Analysis

In the subsequent analysis, the author used unhedged USD and EUR denominated data to facilitate an equitable comparison amongst index providers. (Please note that not all indices provide hedged versions of their indices or performance data on a local basis.) For the purpose of this study, the author uses quarterly data from the Bloomberg terminal to examine all indices based on availability as of 30th June 2019. The 3-month Euribor is used a risk-free interest rate benchmark, reported at -0.346% as of 1st July 2019 (Euribor, online).

A. *Performance*

Generally, listed infrastructure has indicated a steady outperformance relative to global equities over the last decade. The companies in those indices have delivered better returns despite major financial events such as GFC (with the exception of MSCI infrastructure index), whereas the global stocks (i.e., MSCI World) suffered higher drawdowns and lower returns during the same period, respectively. However, the EDHEC*infra* index has consistently delivered superior returns (between 11.9% and 16.4%) compared to the listed infrastructure indices (between -1.5% and 12.9% during the entire study period of 2001-2018).

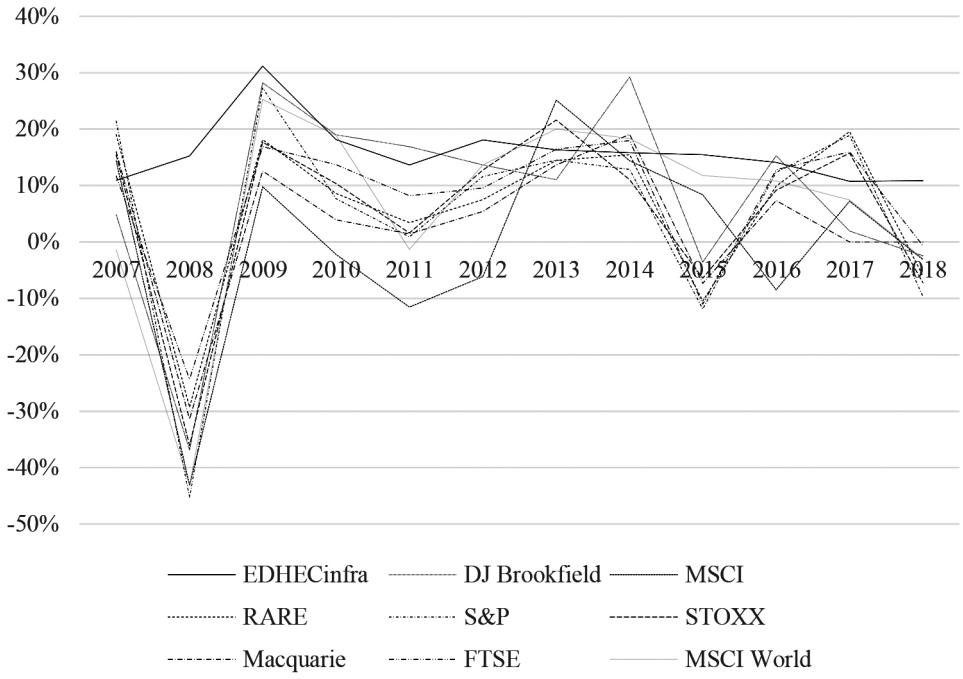
Table 2. Annualized Returns

	3 years	5 years	10 years	12 years	18 years
EDHEC*infra*	11.9%	13.4%	16.4%	15.9%	16.1%
DJ Brookfield	4.9%	8.1%	12.9%	8.1%	10.8%
MSCI	-1.5%	3.7%	3.3%	0.4%	1.2%
RARE	7.8%	5.7%	8.1%	5.9%	6.2%
S&P	7.2%	4.5%	8.5%	5.1%	10.2%
STOXX	5.9%	4.5%	8.6%	5.5%	5.5%
Macquarie	7.4%	6.4%	7.0%	4.1%	6.8%
FTSE	9.4%	7.0%	10.0%	7.3%	8.5%
MSCI World	5.1%	9.1%	12.2%	6.5%	5.0%

Source: Author's calculation baased on Bloomberg (2019).

A recent survey (Amenc et al., 2019) including more than 300 respondents, representing USD 10 trillion in assets

Figure 1. Cumulative Returns since 2007



Source: Author's calculation based on Bloomberg (2019).

under management (AuM), reveals that the initial allocation accounts for at least 90% of the variability in portfolio returns. Therefore, the outperformance of a portfolio as a result of using a certain benchmark may be subjective, as the use of inadequate or irrelevant benchmarks can lead to a false representation of the investor's performance.

Private infrastructure (i.e., EDHEC*infra*) delivers consistently higher returns compared to listed infrastructure (i.e., DJ Brookfield, MSCI, RARE, S&P, STOXX, Macquarie, FTSE) and global equities (i.e., MSCI World). A cumulative return analysis (see Figure 1) shows that private infrastructure was the only index that reported positive returns during the 2007-2008 period, while the EDHEC*infra* index's performance further improved in the aftermath of the GFC period. Even though the overall pattern of returns was relatively analogous in the period 2007-2018, the DJ Brookfield has delivered the most effective performance of the listed indices.

B. *Risk level*

Volatility is used as the primary measure of risk in the portfolio and is measured by the annualized standard deviation. Unlisted infrastructure has overall a lower volatility compared to listed infrastructure and global equities, as shown in Table 3. The risk level of the EDHEC*infra* universe contains standard deviations consistently around 1%, whereas the listed proxies report volatility levels between 4.8% and 11.4% and between 10.3% and 12% for listed infrastructure and global equities, respectively.

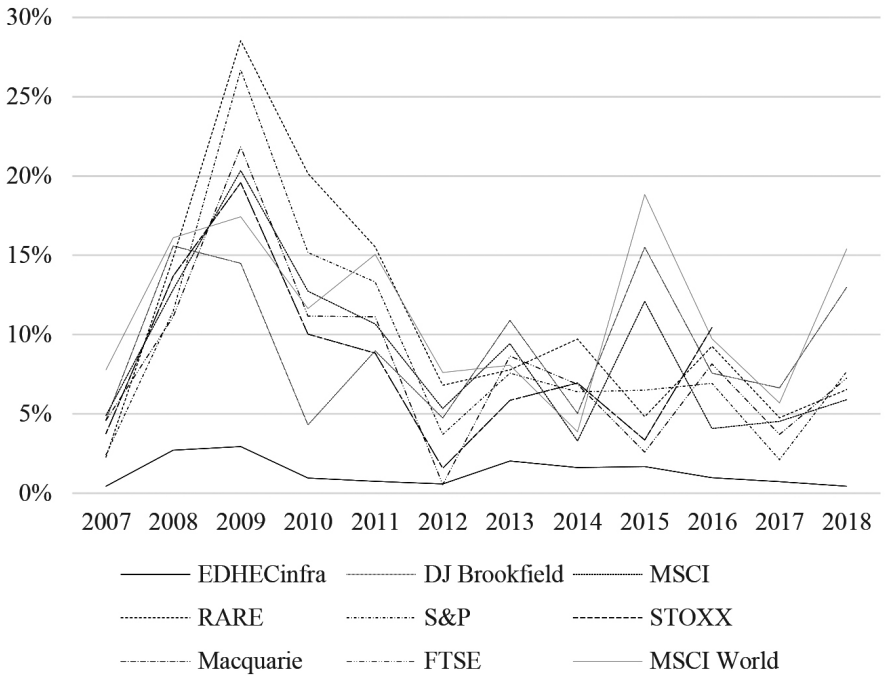
Table 3. Annualized Risk

	3 years	5 years	10 years	12 years	18 years
EDHEC*infra*	0.7%	1.1%	1.3%	1.3%	1.2%
DJ Brookfield	9.1%	9.5%	9.1%	9.3%	9.1%
MSCI	4.8%	6.0%	8.8%	8.8%	10.7%
RARE	6.2%	6.1%	9.2%	9.1%	9.1%
S&P	6.9%	7.0%	11.4%	10.9%	10.7%
STOXX	5.6%	5.9%	9.6%	9.2%	9.2%
Macquarie	10.4%	6.9%	8.3%	8.4%	9.0%
FTSE	6.4%	5.7%	8.2%	8.1%	8.0%
MSCI World	10.3%	10.7%	11.3%	11.4%	12.0%

Source: Author's calculation based on Bloomberg (2019).

The rolling 12-month annualized standard deviation in Figure 3 shows that both listed infrastructure and global equities (i.e., MSCI World) have been consistently riskier than the unlisted EDHEC*infra* infrastructure index. However, the volatility of the global listed infrastructure indices is not constant and has shown considerable variation since 2007, particularly during the height of GFC.

Figure 2. Rolling 12-Month Annualized Risk since 2007



Source: Author's calculation based on Bloomberg (2019).

C. *Risk-adjusted Performance*

Given the strong performance and lower volatility, EDHEC*infra* unlisted infrastructure has outperformed its listed proxies (both MSCI World and global infrastructure indices) on a risk-adjusted performance basis rated by the Sharpe ratio. Also known as the Sharpe index (named after William F. Sharpe), this ratio measures the excess return or risk premium per unit of deviation (Chan, 2009). It is a calculation of return simply divided by volatility and taking into account a risk-free rate of -0.346% as of 1st July 2019. Table 4 shows that EDHEC*infra* unlisted infrastructure delivers the highest risk-adjusted return ratios over all periods covered by this analysis. Looking further into the Sharpe ratio during the 2001-2018 period, the global stock index MSCI World achieves at times a better risk-adjusted performance comparted to listed infrastructure; global stocks tend to react positively in the short term to a rising rates environment, while listed infrastructure stocks have shown less resilience to rising rates.

Table 4. Risk-Adjusted Performance

	3 years	5 years	10 years	12 years	18 years
EDHEC*infra*	18.56	15.03	16.38	16.27	20.58
DJ Brookfield	0.75	1.59	2.03	1.59	1.98
MSCI	-0.27	0.88	0.53	0.42	0.54
RARE	1.51	0.70	0.94	1.16	1.16
S&P	1.33	0.59	0.81	1.22	1.65
STOXX	2.70	1.79	1.69	1.69	1.69
Macquarie	0.74	0.48	1.10	1.09	1.36
FTSE	1.99	0.90	2.73	2.32	2.44
MSCI World	0.78	1.56	1.52	1.04	1.14

Source: Author's calculation based on Bloomberg (2019).

D. *Downside Protection*

Investment's performance is often measured in down-markets. Table 5 indicates the downside capture ratios for infrastructure indices, measured against the MSCI World index.

The downside capture ratio measures the percentage of decline in the MSCI World index (using quarterly time series) compared to both listed and unlisted global indices. The ratio is calculated by dividing the returns by the returns of the market index (i.e., MSCI World in this paper) during the down-market periods (Cox & Goff, 2013). Over the study period (2001-2018), listed infrastructure indicated resilient returns to periods of downturns of the global MSCI equity index. On average, listed infrastructure reported a downside ratio of approx.

52% (average figure for listed data starting 2001), which indicates that those indices declined only 52% as much as the MSCI World index during the entire study period. These ratios further improve in the short term (e.g., 3-year period). Meanwhile, the EDHEC*infra* reported virtually no declines when the global equities experienced down-times.

Table 5. Downside Capture Ratio Against MSCI World

	3 years	5 years	10 years	12 years	18 years
EDHEC*infra*	-56%	-62%	-97%	-73%	-59%
DJ Brookfield	47%	73%	32%	52%	29%
MSCI	24%	34%	84%	77%	78%
RARE	-36%	-5%	45%	44%	26%
S&P	-25%	8%	69%	70%	36%
STOXX	-3%	17%	57%	55%	32%
Macquarie	-36%	-5%	34%	39%	38%
FTSE	-30%	1%	30%	32%	17%

Source: Author's calculation based on Bloomberg (2019).

The paper analysis uses another measure of downside risk, namely the maximum drawdown, as shown in Table 6, which captures the maximum loss from a peak to trough of the index. As expected, the biggest drawdowns were reported during the GFC period (i.e., 2007-2008) while most of the listed infrastructure and the global equities lost half of their value (S&P suffered the biggest drawdown, dropping 49% from its peak). Interestingly, all global listed indices encountered negative returns with fairly similar magnitude and recovery time. Meanwhile, the unlisted global infrastructure EDHEC*infra* index reported no drawdowns during the entire period of study.

Table 6. Maximum Drawdown

	3 years	5 years	10 years	12 years	18 years
EDHECinfra	0%	0%	0%	0%	0%
DJ Brookfield	-12%	-14%	-37%	-37%	-37%
MSCI	-21%	-28%	-46%	-46%	-46%
RARE	-6%	-10%	-38%	-38%	-38%
S&P	-10%	-14%	-49%	-49%	-49%
STOXX	-7%	-8%	-43%	-43%	-43%
Macquarie	-6%	-7%	-38%	-38%	-38%
FTSE	-4%	-11%	-34%	-34%	-34%
MSCI World	-12%	-12%	-47%	-47%	-47%

Source: Author's calculation *based on* Bloomberg (2019).

E. *Diversification*

Diversification is one of the key considerations for long-term investors when contemplating infrastructure investments. When sufficiently diversified from global equities, listed infrastructure can be used as a defensive equity strategy, targeted to provide strong returns and reduce overall portfolio risk. As illustrated in Table 7, listed infrastructure has shown less than perfect, but relatively high correlation to global equities (DJ Brookfield reports the highest correlation of 0.83 relative to MSCI World). This correlation further decreases to approx. 0.21 for unlisted infrastructure when compared to MSCI World global equities. In particular, the analysis reports that EDHEC*infra* has indicated a fairly similar correlation to other listed infrastructure proxies, varying between 0.06 and 0.19 for MSCI, RARE and DJ Brookfield indices, respectively.

Please note that all correlation coefficients are calculated based on quarterly total return data for the period from 30th June 2007 to 30th April 2019.

Table 7. Correlation Matrix (since 2007)

	EDHEC *infra*	DJ Brookfield	MSCI	RARE	S&P	STOXX	Macquarie	FTSE	MSCI World
EDHEC*infra*	1.00	0.19	0.06	0.06	0.12	0.10	0.11	0.09	0.21
DJ Brookfield	0.19	1.00	0.61	0.66	0.63	0.66	0.72	0.75	0.83
MSCI	0.06	0.61	1.00	0.72	0.75	0.78	0.77	0.66	0.70
RARE	0.06	0.66	0.72	1.00	0.98	0.96	0.94	0.96	0.63
S&P	0.12	0.63	0.75	0.98	1.00	0.97	0.92	0.92	0.65
STOXX	0.10	0.66	0.78	0.96	0.97	1.00	0.94	0.94	0.70
Macquarie	0.11	0.72	0.77	0.94	0.92	0.94	1.00	0.95	0.64
FTSE	0.09	0.75	0.66	0.96	0.92	0.94	0.95	1.00	0.67
MSCI World	0.21	0.83	0.70	0.63	0.65	0.70	0.64	0.67	1.00

Source: Author's calculation based on Bloomberg (2019).

Table 8. Beta and Systematic Risk Compared to MSCI World Index

	EDHEC *infra*	DJ Brookfield	MSCI	RARE	S&P	STOXX	Macquarie	FTSE	MSCI World
Return	15.9%	9.2%	1.0%	6.4%	5.7%	6.6%	3.6%	7.9%	7.5%
Volatility	3.0%	14.0%	13.3%	13.2%	16.5%	14.1%	12.1%	12.0%	15.6%
Sharpe ratio	5.33	0.68	0.10	0.51	0.37	0.49	0.33	0.69	0.51
Downside	0.5%	5.0%	5.2%	4.9%	5.9%	5.6%	4.8%	4.3%	5.5%
VaR	2.5%	-8.2%	-11.2%	-11.8%	-15%	-12.1%	-12%	-8.6%	-11.3%
Variance	0.0002	0.0049	0.0044	0.0044	0.0068	0.0050	0.0037	0.0036	0.0060
Beta	0.04	0.74	0.60	0.54	0.69	0.63	0.49	0.52	n/a
Unsystematic	1.50%	3.99%	4.79%	5.18%	6.35%	5.08%	4.74%	4.50%	n/a

Source: Author's calculation *based on* Bloomberg (2019).

F. *Equity Market Beta*

Usually, benchmarks are expected to represent the broad characteristics of individual asset classes over a certain period of time in order to determine the overall portfolio weights and the corresponding asset allocations. Beta represents the volatility of an investment to movements in equity markets. A beta of more than 1 represents greater volatility or sensitivity to the market investments; in other words, it means that if the market moves up or down by 1%, the investment will move by more than 1%, and vice versa. Calculating equity market beta is considered a valuable sensitivity of an investment shift within the equity market. The linear regression method helps determine the beta with the dependent variable performance and the performance of the index.

Using a regression model of the indices' data as of 30th July 2007, analysis shows that infrastructure stocks have consistently maintained a beta of less than 0.75, as indicated in Table 8. The calculation was done by computing the excess return of each index and the excess market return (i.e., MSCI World), and by subtracting the risk-free benchmark (i.e., 3-month Euribor of -0.346 as of 1st July 2019). Please note that approximately half of the calculated data as a percentage of variation in excess returns could be explained by the regression model. For investors seeking low-risk investment strategies, a beta of less than 1 would be highly advisable.

Following the logic of the capital asset pricing model (CAPM, see Milne, 1995), which provides a diversified portfolio in a perfect and efficient economic system solely based on the systematic risk of the return, the underlying analysis looks further into the measure of variation in risk index returns that are not explained by the beta calculation. As illustrated in Table 8, the EDHEC*infra* index has shown the lowest unsystematic risk of 1.50% when compared to the global listed proxies reported between 4% and 6.38%.

Conclusion

Listed infrastructure indices are often considered the preferred relative benchmarks for many investors (Amenc et al., 2019). Empirical findings struggle to support the definition of infrastructure as an asset class (Bianchi & Drew, 2014), while others go even further by calling investments in the listed infrastructure universe a 'fake' infrastructure (Amenc et al., 2017). This paper shows the misrepresentation of commonly used global listed infrastructure indices and the significance of implying proper benchmarking across the investment portfolio.

The comparison of global listed infrastructure indices with the unlisted EDHEC*infra* index has highlighted the importance of a multicriteria classification system, which is focused specifically on infrastructure-related industrial activities (including the various levels of complexity, size and scale). A review of listed infrastructure index constituents has indicated that the GICS standard industrial classification can be inferiorly positioned to represent the different types of infrastructure companies, often including companies with broad industrial nature and less relevant business activities to infrastructure. The newly introduced TICCS system used in the EDHEC*infra* index methodology allows for building more adequate benchmarks. A proper benchmark should warrant various industrial activities with individual classifications as the role of difference business models and types of regulation in the segmentation of the infrastructure sectors can be substantially different.

Pricing across illiquid asset classes such as infrastructure equity is often driven by systematic factors, including investors making choices based on perceived risk and the respective price in exchange for that risk. The paper indicates that listed infrastructure has a significantly higher correlation than EDHEC*infra* unlisted index relative to the broad market MSCI World index. The unlisted universe of stocks

in the EDHEC*infra* index has consistently delivered superior risk-adjusted returns and lower volatility when compared to the listed proxies.

Current listed benchmarks are flawed in their ability to identify the systematic rewarded risks, monitor the risk-adjusted performance or set risk budgets, as the unlisted benchmark has provided better downside protection in falling equity markets and better diversification to global equities. The performance of global listed indices has not delivered an adequate representation of the asset class when compared with an unlisted infrastructure proxy. Amid the growing popularity of infrastructure investments among investors, the overall representation of the asset class may be diminished in search of yield. This paper sets the groundwork for further research possibilities on benchmarking infrastructure investments by examining the unlisted investment space.

References

Amenc, N., Blanc-Brude, F., Chreng, A., & Tran, C. (2017). *The rise of "fake infra": The unregulated growth of listed infrastructure and the dangers it poses to the future of infrastructure investing*. Singapore: EDHEC Infrastructure Institute.

Amenc, N., Blanc-Brude, F., Gupta, A., & Yim, J. (2019). *Global infrastructure investor survey: Benchmarking trends and best practices*. Singapore: EDHEC Infrastructure Institute.

Bianchi, R., & Drew, M. (2014). *Is infrastructure an asset class? An asset pricing approach*. Queensland: Griffith Business School.

Blanc-Brude, F., & Whittaker, T. (2015). *Listed proxies of private infrastructure equity: Performance, risk measures and representativity*. Singapore: EDHEC Infrastructure Institute.

Blanc-Brude, F., Chreng, A., Hasan, M., Wang, Q., & Whittaker, T. (2017). *Private infrastructure broad market equity indices: Benchmarking Europe's private infrastructure equity investments 2000-2016*. EDHEC Singapore: EDHEC Infrastructure Institute.

Chan, E. (2009). *Quantitative trading: How to build your own algorithmic trading business*. New Jersey: John Wiley & Sons.

Cox, D. R., & Goff, D. C. (2013). *Capture ratios: A popular method of measuring portfolio performance in practice.* Appalachian State University. Departments of Finance, Banking and Insurance. *Journal of Economics and Finance Education,* 12(2).

Della Croce, R., Paula, J., & Laboul, A. (2015). *Infrastructure financing instruments and incentives*. Paris: OECD.

EDHEC (2018). *Infrastructure indices methodology standards: Unlisted equity & private infrastructure debt.* Singapore: EDHEC Infrastructure Institute.

Euribor (online). *3-Month Euribor rates*. Retrieved from: https://www.euribor-rates.eu/euribor-rate-3-months.asp

European Commission (EC) (2016). *Amendment Delegated Regulation (EU) 2015/35 concerning the calculation of regulatory capital requirements for several categories of assets held by insurance and reinsurance undertakings*. 2016/467.

European Commission (EC) (2017). *Amendment Delegated Regulation (EU) 2015/35 concerning the calculation of regulatory capital requirements for certain categories of assets held by insurance and reinsurance undertakings (infrastructure corporates)*. C(2017) 3673 final.

FTSE Russell (2019). *FTSE core infrastructure indexes – factsheet*. FTSE Russell.

Geysen, A. (2018). *The role of infrastructure in a portfolio*. Vanguard Research.

Inderst, G. (2010). *Infrastructure as an asset class*. European Investment Bank (EIB) Papers, 15(1).

Legg Mason (2017). *Infrastructure indices: A comparison of performance*. Legg Mason Global Asset Management Hong Kong Limited.

Macquarie (2005). *Macquarie global infrastructure index – fact sheet*. Macquarie Group.

Milne, F. (1995). *Finance theory and asset pricing*. Oxford: Claredon Press.

MSCI (2017). *MSCI infrastructure indexes methodology*. MSCI Indices.

MSCI (2019). *MSCI global investable market indexes methodology: Index construction objectives, guiding principles and methodology*. MSCI Indices.

Moody's (2018). *Default and recovery rates for project finance bank loans 1983-2017*. Moody's Investors Service.

Moss, A. (2014). *Infrastructure investment: Combining listed with unlisted*. Consilia Capital. https://doi.org/10.2139/ssrn.2616634

Newell, G., Peng, H., & De Francesco, A. (2011). *The Performance of unlisted infrastructure in investment portfolios*. Journal of Property Research. https://doi.org/10.1080/09599916.2011.544149

OECD (2002). *Glossary of statistical terms: Infrastructure*. Retrieved from https://stats.oecd.org/glossary/detail.asp?ID=4511

Oyedele, J., Adair, A., & McGreal, S. (2012). Performance of global listed infrastructure investment in a mixed asset portfolio. *Journal of Property Research,* 31(1). https://doi.org/10.1080/09599916.2013.832592

Standard and Poor's (2019). *S&P thematic indices methodology*. Standard and Poor's Dow Jones Indices: Index Methodology.

Standard and Poor's Dow Jones Indices (2019). *Dow Jones Brookfield infrastructure indices methodology*. S&P Dow Jones Indices.

STOXX (2019). *STOXX index methodology guide (portfolio based indices)*. STOXX Indices.

World Bank (online). *Private participation in infrastructure database: Methodology/glossary/segment.* Retrieved from: https://ppi.worldbank.org/methodology/glossary

Appendix A: TICCS Classification (EDHEC Institute)

Superclass	Class	Sub-Class	Example
Business risk (BR)	BR1 - contracted	BR10 - fully contracted	availability-based, take-or-pay offtake agreements, feed-in tariff
		BR11 - partially contracted	(shadow) toll, partial capacity, partial power purchase agreement
	BR2 - merchant	BR20 - variable	real toll roads, merchant power plants
	BR3 - regulated	BR30 - rate-of-return regulation	cost-of-service regulation, commission regulation (US)
		BR31 - price-cap regulation	incentive regulation
Industrial (IC)	IC10 - power generation	IC1010 - independent power	nuclear, gas, coal, combined heat and power generation
		IC1020 - independent water and power	power and water production
	IC20 - environmental services	IC2010 - solid waste treatment	(non)hazardous waste treatment, waste-to-power generation
		IC2020 - water treatment	potable & industrial water, sea water desalination, water supply dams
		IC2030 - wastewater treatment	residential & industrial wastewater and reuse
		IC2040 - environmental management	flood control, coastal and riverine locks, energy efficiency
	IC30 - social infrastructure	IC3010 - defence services	strategic transport and refueling, training facilities, barracks
		IC3020 - education services	schools, universities, student accommodation
		IC3030 - government services	police stations, courts of justice, prisons, street lighting, offices
		IC3040 - health 6 social care services	hospitals, clinics, residential and assisted living
		IC3050 - recreational facilities	stadiums, convention centers, public parks, libraries, museums
	IC40 - energy and water resources	IC4010 - pipeline	gas, oil, water, wastewater pipelines
		IC4020 - energy resource processing	liquefied natural gas (LNG) liquefaction and regasification
		IC4040 - energy resource storage	gas, liquid storage
	IC50 - data infrastructure	IC5010 - data transmission	telecom towers, long-distance cables, satellites
		IC5020 - data storage	data centers
	IC60 - transport	IC6010 - airport	airports
		IC6020 - car park	car parks
		IC6030 - port	tool ports, container ports
		IC6040 - rail	heavy rail lines
		IC6050 - road	motorways, roads, tunnels, bridges
		IC6060 - urban commuter	urban light-rail, bus, underground/overground mass transit
	IC70 - renewable power	IC7010 - wind power generation	on-shore, off-shore wind
		IC7020 - solar power generation	photovoltaic, thermal solar power
		IC7030 - hydroelectric power generation	dam, run-of-river power, pumped hydroelectric storage
		IC7040 - other renewable power	biomass, geothermal, wave power
		IC7050 - other renewable technologies	battery storage, off-shore transmission (OFTO)
	IC80 - network utilities	IC8010 - electricity distribution	electricity distribution networks
		IC8020 - electricity transmission	electricity transmission networks
		IC8030 - district cooling/heating	district cooling/heating networks
		IC8040 - water and sewerage	water and sewerage networks
		IC8050 - gas distribution	gas distribution networks
Geo-economic (GE)	GE1 - global infrastructure		major transportation hubs, exposure to global commodity prices
	GE2 - regional infrastructure		medium-size container ports, transborder road corridor
	GE3 - national infrastructure		large-scale road or telecommunication networks
	GE4 - subnational infrastructure		municipal or other subsovereign-entity social infrastructure
Corporate-governance (CG)	CG1 - infra project companies	CG10 - monitored project companies	special-purpose vehicle (SPV), single-project company
		CG11 - unmonitored project companies	less than 50% of debt provided by external senior creditors
	CG2 - infrastructure corporates	CG20 - monitored infra corporates	multi-project companies
		CG21 - unmonitored infra corporates	less than 50% of debt provided by external senior creditors

Appendix B: GICS Classification (infrastructure-relevant sectors only)

Sector	Industry Group	Industry	Sub-industry
10 - energy	1010 - energy	101010 - energy equipment & services	oil & gas drilling, equipment services
		101020 - oil, gas and consumable fuels	exploration, production, refining, storage and transportation
	1510 - materials	151010 - chemicals	commodity, agricultural, industrial gases
		151020 - construction materials	construction materials
		151030 - containers and packaging	metal & glass containers, paper packaging
		151040 - metals and mining	aluminum, copper, gold, silver, steel, etc.
		151050 - paper and forest	paper & forest products
20 - industrials	2010 - capital goods	201010 - aerospace & defense	
		201020 - building products	
		201030 - construction and engineering	
		201040 - electrical equipment	(heavy) electrical components and equipment
		201050 - industrial conglomerates	
		201060 - machinery	construction machinery and heavy trucks, industrial, agricultural
		201070 - trading companies & distribute	trading companies and distributors
	2020 - commercial and professional services	202010 - commercial services & supplies	
		202020 - professional services	
	2030 - transportation	203010 - airfreight and logistics	
		203020 - airlines	
		203030 - marine	
		203040 - road and rail	railroads, trucking
		203050 - transportation infrastructure	airport services, highway & railtracks, marine ports and services
25 - consumer discretionary	2510 - automobiles and components	251010 - auto components	auto parts and equipment
		251020 - automobiles	automobile/motorcycle manufacturers
	2520 - consumer durables and apparel	252010 - household durables	
		252020 - leisure products	
		252030 - textiles, apparel & luxury good	
	2530 - consumer services	253010 - hotels, restaurants and leisure	
		253020 - diversified consumer services	
	2550 - retailing	255010 - distributors	
		255020 - internet & direct marketing	
		255030 multiline retail	
		255040 - specialty retail	
30 - consumer staples	3010 - food and staples retailing	301010 - food and staples	drug retail, food distributors, hypermarkets
	3020 - food, beverage and tobacco	302010 - beverages	brewers, soft drinks, distillers and vintners
		302020 - food products	agricultural, packaged foods and meats
		302030 - tobacco	
	3030 - households and personal products	303010 - household products	
		303020 - personal products	
35 - health care	3510 - health care equipment and services	351010 - health care equipment/supply	
		351020 - health care providers/services	
		351030 - health care technology	
	3520 - pharmaceuticals, biotechnology and life sciences	352010 - biotechnology	
		352020 - pharmaceuticals	
		352030 - life science tools & services	
40 - financials	4010 - banks	401010 - banks	
		401020 - trusts and mortgage finance	
	4020 - diversified financials	402010 - diversified financial services	

Appendix B: GICS Classification (infrastructure-relevant sectors only) (continued)

Sector	Industry Group	Industry	Sub-industry
		402020 - consumer finance	
		402030 - capital markets	
		402040 - mortgage REITs	
	4030 - insurance	403010 - insurance	
45 - information technology (IT)	4510 - software and services	451020 - IT services	
		451030 - software	
	4520 - technology hardware	452010 - communication equipment	
		452020 - technology hardware	
		452030 - electronic equipment	
	4530 - semiconductors/equipment	453010 - semiconductors/equipment	
50 - communication services	5010 - telecommunication services	501010 - diversified telecom services	alternative carriers, integrated telecom services
		501020 - wireless telecom services	
	5020 - media and entertainment	502010 - media	advertising, broadcasting, cable and satellite
		502020 - entertainment	movies, entertainment
		502030 - interactive media and services	
55 - utilities	5510 - utilities	551010 - electric utilities	
		551020 - gas utilities	
		551030 - multi-utilities	
		551040 - water utilities	
		551050 - power & renewable producers	independent power producers and energy traders; renewable energy
60 - real estate	6010 - real estate	601010 - REITs	diversified, industrial, office, health care, residential, retail, etc.
		601020 - real estate management and development	RE operating companies, development, services

Indeksi infrastrukture: primerjalna analiza uspešnosti, tveganja in reprezentativnosti globalno objavljenih ocen

Izvleček

Soočeni z zgodovinsko nizkimi obrestnimi merami investitorji v iskanju alternativnih virov zaslužkov, boljše diverzifikacije in dolgoročne investicijske perspektive še nadalje raziskujejo nelikvidno premoženje, kot je infrastruktura. Ta članek analizira ključne značilnosti uspešnosti in tveganj globalno objavljenega infrastrukturnega indeksa EDHEC*infra* v primerjavi s ključnimi globalno objavljenimi infrastrukturnimi indeksi v obdobju 2001–2018. Za določitev reprezentativnosti običajno uporabljenih benchmarkingov infrastrukturnih investicij med investitorji smo uporabili deskriptivno statistiko. Z namenom tržne beta analize v linearnem regresijskem modelu uporabimo tudi MSCI World Index kot oceno globalnih delnic.

V indekse vključena infrastruktura je pogosto obravnavana kot dohodkovni donos in obrambna lastniška strategija, ki zagotavlja likvidno oceno za alternativno premoženje (npr. infrastrukturo). Vendar pa rezultati v članku nakazujejo, da neto učinek investiranja v objavljen infrastrukturni indeks ostaja vprašljiv, celo neznan. Nedavni empirični rezultati kažejo različne poglede na benchmarking infrastrukture. Visoka korelacija ključnih objavljenih indeksov infrastrukture s širokim indeksom lastniškega kapitala MSCI World in nekonsistentnost raziskovalnih rezultatov tako močno nakazujeta, da je infrastruktura šibko definirana investicijska kategorija z manjkajočimi zanesljivimi in uporabnimi benchmarkingi. Običajno uporabljena in daljnosežna razvrstitev podjetij s širokim industrijskim značajem in manj relevantnimi poslovnimi aktivnostmi za infrastrukturo lahko vpliva na splošen prikaz legitimnih značilnosti infrastrukturnega premoženja sredi naraščajočega navdušenja med investitorji.

Ključne besede: infrastruktura, indeks, benchmarking, kotirajoči lastniški kapital, analiza uspešnosti

ORIGINAL SCIENTIFIC PAPER

RECEIVED: JULY 2019

REVISED: JULY 2019

ACCEPTED: AUGUST 2019

DOI: 10.2478/ngoe-2019-0012

UDK: 339.56(497.6:497.4)

JEL: F10, F13, F14

Citation: Brkić, S. (2019). Development of Trade Relations of Bosnia and Hercegovina with Slovenia: Different Aspects and Characteristics. *Naše gospodarstvo/Our Economy,* 65(3), 40–49. DOI: 10.2478/ngoe-2019-0012

Development of Trade Relations of Bosnia and Hercegovina with Slovenia: Different Aspects and Characteristics

Snježana Brkić
University of Sarajevo, School of Economics and Business, Bosnia and Herzegovina
snjezana.brkic@efsa.unsa.ba

Abstract

The paper is aimed at identifying characteristics of trade relations of Bosnia and Herzegovina (BiH) with the Republic of Slovenia (Slovenia) in order to contribute to determining the position of BiH in its bilateral trade. The foreign trade analysis has been performed in the context of the changing trade regime between the two countries, thereby including both institutional and functional aspects of bilateral trade relations development. Different trade indicators have been calculated and interpreted for the period of 2003-2017 and/or for selected years which were identified by a change in the institutional regulations of mutual trade flows. The research results indicate increasing trade intensity between the two countries, with almost balanced export and import flows and with prevailing inter-industry trade. The trade performance of BiH has significantly improved, with increasing intra-industry specialization and trade. However, the export structure and comparative advantage pattern are not favourable toward BiH, which points to the need for improving the country's position in its trade with Slovenia.

Keywords: trade relations, trade regime, bilateral trade analysis, Bosnia and Herzegovina (BiH), the Republic of Slovenia (Slovenia)

Introduction

The geographical orientation of the foreign trade of Bosnia and Herzegovina (BiH) is mostly characterized by a high concentration on several countries' markets. Three of these are countries with which BiH shares a history of a common state and close economic relations – namely, Slovenia, Croatia and Serbia. Unlike the other two countries, Slovenia is not a BiH neighbouring country and has never had completely free trade with BiH. However, it has remained one of the most important BiH trading partners for years. The long-standing importance of Slovenia for BiH foreign trade points to a need to analyse institutional and functional aspects of the two countries' mutual trade relations and the resulting position of BiH.

This paper investigates what characterized trade between BiH and Slovenia in terms of export-import trends, structure and specialization during the period of 2003-2017. Additionally, trade characteristics are compared by years in order to identify any significant changes in trade patterns potentially caused by

NG OE

NAŠE GOSPODARSTVO
OUR ECONOMY

Vol. 65 No. 3 2019

pp. 40–49

changes in the countries' foreign trade regimes. Although trade patterns mostly depend on the sectorial structure, the evolution of which requires a longer period of time, some stimuli (e.g., a change in the foreign trade regime) could cause a rapid structural transformation. The experience of Central and Eastern European countries after the last EU enlargement proved to be such a case.

The structure of the paper is organized as follows. The first section after the introduction presents conceptual issues pertaining to dynamic comparative advantages and competitiveness and explains the methodological framework for bilateral trade analysis. Methodological remarks refer to the explanation of the trade indicators and data used. In order to obtain a comprehensive insight, the analysis has included different trade indicators – indicators of trade performance and indicators of international specialization and competitiveness. Trade indicators have been calculated at the annual level for the period of 2003-2017. The second section offers a short overview of the development of institutional trade relations between the given countries, from the negotiations over their first trade agreement to the present. The fourth part presents empirical results identifying relevant and specific features of the observed countries' mutual trade flows, with a special focus on BiH trade performance and specialization. The last part includes a discussion of the results and concluding remarks.

Conceptual and Methodological Framework

The theoretical explanation of a country's bilateral trade relations relies on an eclectic approach to international trade theory. "Pure" trade models claim that countries trade with each other because they are different (the traditional theories' view) and/or because they are similar (the modern theories' view). In traditional theories, differences between countries, expressed in terms of relative prices, are explained only by supply-side factors (as differences in relative costs), while in modern theories explanations stem both from supply-side and demand-side factors (Kenen, 1994, p. 38). Differences in relative costs caused by differences in relative productivity between countries (Ricardo's theory) or by differences in relative factor endowment (Heckscher-Ohlin theory) result in different comparative advantages and determine the trade structure which is more of inter-industry type. Specialization creates differences between export and import structure of a country. On the other hand, similarities (in terms of factor endowment, taste, income, etc.) lead to a trade structure which is mostly of an intra-industry character.

However, the widely recognised view among modern economists is that traditional and modern trade models do not entirely exclude each other; rather, they are complementary in explaining directions and patterns of international trade flows. The law of comparative advantages has been accepted in modern trade theories as well, though in a modified form – the comparative advantage has been considered to be a much more dynamic category. Comparative advantages could be created, changed or lost, depending on changes in factor endowment and technology or because of industrial policies. "Dynamic comparative advantage refers to the creation of comparative advantage through the mobilization of skilled labor, technology, and capital; it can be initiated by either the private or public sector" (Carbough, 2015, p. 105). In some new models, comparative advantages have been replaced with a much broader concept of the so-called competitive advantages. Porter (1991) developed a system involving the strong interaction of four basic determinants of competitive advantages: 1. production factor conditions; 2. demand conditions 3. related and supporting industries; 4. firm strategy, structure and rivalry. The described system is supported by two additional factors – government policy and chance. The concept of competitive advantages has much more in common with a contemporary concept of international competitiveness. Due to the multitude of definitions, measures and theoretical models, the economic literature describes international competitiveness as a multidimensional concept which requires an integrated and eclectic approach. However, international competitiveness is generally viewed as synonymous with success and economic strength in the global environment (Olczyk, 2016).

International competitiveness is no longer limited to a country's export ability.[1] Rather, it has been "transformed" by theoreticians of international trade into an ability to compete in both international and domestic markets. In modern trade theory international competitiveness is viewed as a national economy's ability to ensure economic growth without trade imbalance (i.e., to produce goods and services which will ensure the growth of real income in both the domestic and the international market) (Škuflić, 1999).

Foreign trade analysis has been developing in parallel with trade theory. As trade theory has become more complex in terms of explaining the trade basis and patterns of countries based on a number of different factors, so trade analysis has been enriched with a number of new trade indicators of differing levels of complexity.

[1] Export competitiveness is usually defined as a country's ability to sell commodities in foreign markets, at a price and quality that can be compared to competitors (US International Trade Commission, 2010).

For the purpose of this research, we will apply several indicators of trade performances and indicators of international specialization and diversification that point directly or indirectly to a country's competitive position in its trade relations. Trade performance indicators include the volume and trend of exports and imports, trade balance, export/import coverage, and product export share. Revealed comparative advantage index, intra-industry trade index and product concentration indices serve to identify the sectors in which a country specialises in a certain market.

The number of trading partners or trading goods reflects a country's dependence on foreign trade. Export diversification can be defined as a change in the mix of current export products of a country and a change in the mix of exporting country composition (Erkan and Sunay, 2018). In terms of export performances, a country can reach a better position by diversifying both its export goods and its export markets. The most often used indicators that express a degree of diversification are concentration ratio (CR) and the Herfindahl-Hirschman index (HHI). Concentration ratio is calculated using the following formula:

$$CR_{(4)} = \sum_{i=1}^{4} \frac{X_{ij}}{X_j} \quad (1)$$

Where $CR_{(4)}$ is the sum of market shares of the largest four exporter industries from the country *j* to the analysed market; X_{ij} is the exports of the industry *i* of the country *j*; and X_j is the total exports of the country *j*.

The Herfindahl-Hirschman index is expressed by the following formula (Juan Felipe Mejía, 2011):

$$HHI_j = \sum_i \left(\frac{X_{ij}}{X_j}\right)^2 \quad (2)$$

where X_{ij} is the exports of the industry *i* of the country *j*, and X_j is the total exports of the country *j*.

The lower HHI value indicates a higher degree of export diversification. Interpretation of the HHI value is based on the following three categories: diversified exports, HHI < 0.15; moderately concentrated exports, 0.15 ≤ HHI < 0.25; and highly concentrated exports, HHI ≥ 0.25 (Federal Trade Commission & U.S. Department of Justice, 2010).

Fully theoretically based measurement of comparative advantages has long been considered impossible. The most frequently used alternative is the concept of the so-called "revealed comparative advantages" (RCA) created by Balassa (1965). The concept is simple: if, according to Ricardian trade theory, differences in relative productivity determine the pattern of trade, then the pattern of trade can be used to infer differences in relative productivity (French, 2017). Balassa index (BI) reflects the relative export structure and is calculated as a ratio of the share of a given product's exports within the country's total exports to the share of the product's world exports within the total world exports (Balassa, 1989):

$$BI_{ij} = \frac{\frac{X_{ij}}{\sum_i X_{ij}}}{\frac{X_{iw}}{\sum_i X_{iw}}} \quad (3)$$

where X_{ij} is the exports of the product *i* of the country *j*; $\sum X_{ij}$ is the total exports of the country *j*; X_{iw} is the world exports of the product *i*; and $\sum X_{iw}$ is the total world exports.

For the purpose of this research, BI has been modified in order to express revealed comparative advantages in bilateral trade (i.e., in a certain market). A country has a comparative disadvantage in some industry for 0 < BI < 1, while it has a comparative advantage for BI > 1. The higher the value of the index, the stronger the comparative advantage, and vice versa.

It should be emphasized that, although the Balassa index is often used to approximate countries' sectorial specialization, the index is also often criticized for its lack of theoretical foundation and poor empirical distribution characteristics. Being computed directly on observed (ex-post) export flows, the index does not distinguish between exporter, importer and sector-specific factors affecting export flows (Leromain & Orefice, 2014).

The Grubel-Lloyd index is used for measuring IIT share in a certain industry, following the formula created by Grubel and Lloyd (1975, p. 21):

$$GL_{ij} = \frac{(X_{ij} + M_{ij}) - |X_{ij} - M_{ij}|}{X_{ij} + M_{ij}} \quad (4)$$

where GL_{ij} represents IIT share in the industry *i* of the country *j*; X_{ij} is exports of the industry *i* from the country *j*; and M_{ij} is imports of the industry *i* to the country *j*.

If the index value equals 1, then the foreign trade of an industry is of intra-industry type. If the value is 0, then the foreign trade of an industry is entirely inter-industry trade.

Besides the measurement of IIT intensity, the analysis also includes differentiation between its horizontal and vertical components, which arises from the existence of two types of product differentiation. Horizontally differentiated products are actually different varieties of a single product,

and vertically differentiated products reflect different qualities of the same variety (Greenaway & Milner, 2003). The methodology for making a distinction between horizontal and vertical IIT is based on the assumption that the relative gap between unit values of exports and imports reflects the difference in the quality of products traded between two countries (Greenaway, Hine, & Milner, 1995):

$$RUV_{ij} = \frac{UV_{ij}^{X}}{UV_{ij}^{M}} \quad (5)$$

where RUV_{ij} is the relative unit value; UV_{ij}^{X} is the unit value of exports; and UV_{ij}^{M} is the unit value of imports.

According to the mentioned GHM methodology, horizontal IIT exists if the relative unit value ranges in the interval from 0.85 to 1.15. If the relative unit value is beyond this interval, then the trade is vertical IIT (vertical IIT in higher-quality products when the ratio exceeds 1.15 or vertical IIT in lower-quality products when the ratio is below 0.85).[2]

All the described indicators have been calculated for every year and as an average for the observed period using trade data at two-digit level of Standard International Trade Classification (SITC Rev. 3) from the Agency for Statistics of BiH (BHAS).

Institutional Aspect of Trade Relations between BiH and Slovenia

In the second half of the 1990s, trade within the South East European region (SEE) was characterized by the revitalization of traditional trade links. The intra-regional trade increased mainly as the trade between former Yugoslav republics (Anastasakis & Bojčić-Dželilović, 2002).

Development of trade in the region was not accompanied by an appropriate institutional framework. One of the few trade agreements between countries of the SEE region at the time was the agreement on free trade between BiH and Croatia, signed on March 1995 but applied only in one part of the BiH territory.[3] BiH also started trade negotiations with some other countries during the war but most intensively with Slovenia. During 1995 and 1996, the two countries negotiated an agreement on trade and economic cooperation. According to several drafts of the agreement, it was planned to trade on the basis of the most-favoured-nation (MFN) principle.[4] At that time, Slovenia was in the process of opening its economy through bilateral and regional trade liberalization. The country signed bilateral free trade agreements (FTAs) with the Baltic countries, Israel and several countries of the SEE region (BiH, Croatia, FYR Macedonia and Turkey) in the period of 1996-2001; joined the Central European Free Trade Agreement (CEFTA) in January 1996; concluded FTA with the European Free Trade Association (EFTA) in June 1995; and signed the so-called European Agreement in June 1996, aimed at the association with the European Union (EU) (WITS, 2019).

On the other hand, considering its unfavourable position as a post-war, transition and aid-driven country, Bosnia and Herzegovina was not interested in free trade with its trading partners. Therefore, despite the fact that Slovenia expressed interest in signing an FTA with BiH, negotiations between the two countries ended on 7 November 1997 with only the signing of the Agreement on Economic Co-operation.[5]

In 1999, the EU created a new policy towards the SEE based on further development of the Regional Approach, establishment of the Stability Pact for Southeast Europe (the Stability Pact) for supporting regional cooperation in the Region, and the beginning of the Stabilization and Association Process (SAP). The Stability Pact offered an opportunity to create a free trade area with more than 60 million consumers, while SAP was the framework for the future EU membership. Both institutes also had a significant impact on trade relations between BiH and Slovenia.

On the basis of the Memorandum of Understanding on Trade Liberalization and Facilitation (MoU), signed in June 2001 within the Stability Pact, over only three years SEE countries created a network of 32 bilateral mutual free trade

[2] GHM decomposes IIT into horizontal IIT and vertical IIT based on a certain threshold value. Most of the literature, including GHM, uses a threshold level of 15%, while some researchers use 25%. However, Ito and Okubo (2016) argued that there is no theoretical support for either choice.

[3] Before the end of the war in BiH, the agreement with Croatia was applied only in the territory that was under the control of the BiH Army. After signing the Dayton Peace Agreement the agreement with Croatia was applied only in the territory of the Federation of BiH for years. In 2000, the Agreement was revised and harmonized with the WTO principles and applied in the whole territory of BiH.

[4] The author actively participated in those negotiations as a member of BiH government negotiation team.

[5] The Agreement on Economic Co-operation between Bosnia and Herzegovina and the Republic of Slovenia entered into force on 22nd November 1999. On 19th January 2009, it was replaced by a new agreement on economic cooperation.

agreements, of which BiH signed nine.[6] These agreements were based on GATT '94[7] principles and referred to free trade of goods only, covering all agricultural and industrial products with almost no exceptions.

A distinctive characteristic of FTAs concluded between BiH and most SEE countries (seven out of nine[8]) was the temporary asymmetry with regard to the benefits BiH received. One of those asymmetric FTAs was the Free Trade Agreement between the Republic of Slovenia and BiH, signed on 3rd October 2001. The countries agreed that quantitative restrictions on exports and imports of goods were to be immediately abolished on both sides. Customs duties on imports applicable in Slovenia to products originating in BiH would be abolished on 1st January 2002.[9] At the same time they also agreed that import duties and charges having equivalent effect applicable in BiH on 1st January 2002 to products originating in Slovenia would be progressively reduced in accordance with the following timetable:[10] on 1st January 2002 to 70% of their value, on 1st January 2003 to 50% of their value, on 1st January 2004 to 30% of their value, and on 1st January 2005 the remaining duties would be abolished. The process of eliminating the asymmetry in trade liberalization was never completed, however, because Slovenia joined the EU in 2004.

Only two years after signing the FTA, the foreign trade regime between two countries changed again, but this time towards a lower degree of trade liberalization. When Slovenia entered the EU, the country's trade policy was replaced by the EU's common trade policy, which led to a suspension of the free trade agreement with BiH. Trade relations between BiH and Slovenia were reduced to a more asymmetrical regime, according to which BH enjoyed a duty-free treatment unilaterally approved by the EU in 2000 (Autonomous Trade Measures – ATMs). (DEI, 2019). At the same time, BiH applied customs duties on the MFN principle for goods originating in Slovenia and other EU members.

Trade between BiH and EU members finally received its full institutional framework with the signing of the Stabilization and Association Agreement (SAA) on 16th June 2008. In order to allow the trade and trade-related provisions of the SAA to enter into force as soon as possible, the EU and BiH concluded the Interim Agreement on Trade and Trade-related Matters (IA), which entered into force immediately (1st July 2008). The trade regime introduced by this agreement continued to be asymmetric to the benefit of BiH. "According to the IA, all goods of BiH origin that fulfil EU technical standards and conditions could be imported to all EU countries without any quantitative restrictions and without paying customs or other similar duties. Only sugar, wine, fish, and baby beef were subject to specific quotas, beyond which duties were to be paid by BiH for export to the EU. Since 2009, import tariffs have been eliminated for more than 11,000 products that BiH imports from the EU" (ITA, 2019). The process of trade liberalization according to the SAA is aimed at the gradual establishment of the free trade area between BiH and the EU within five years of entry into force of the SAA.[11]

In December 2016, BiH and the EU signed the Protocol on Trade to the SAA, which was adapted to reflect Croatia's July 2013 accession to the EU and introduced some changes in foreign trade regime again, especially those regarding duty-free quotas of some agro-food products on both sides (ITA, 2019).

Bilateral Foreign Trade Analysis

Bosnia and Herzegovina and Slovenia have had an intensive mutual trade for years. Slovenia is among BiH's five most important trade partners, ranking fifth in exports and sixth in imports (MOFTER, 2018). The average export share of Slovenia amounts to 9.11% (varying between 8.04% and 10.87%), while the average import share amounts to 6.21%. Export share has been stable but import share has fallen by half since 2003 – from 10.18% in 2003 to 5.03% in 2017 (Table 1).

Foreign trade between the two countries slightly increased until 2008 and again after 2009 (it sharply fell between these dates because of the global financial crisis), with only negligible oscillations. However, there have been differences between trends of exports and imports, with a significant growth of BiH exports during the analysed period (except in 2008 and 2009) and relatively stagnant imports after 2009. (Figure 1). The result of different trends in exports and imports is a declining BiH trade deficit and its shift to trade surplus after 2016. Export/import coverage increased by more than threefold, from 29.3% in 2003 to 106.6% in 2017 (Table 1).

[6] BiH concluded FTAs with Albania, Bulgaria, Croatia, FR Yugoslavia, FYR Macedonia, Moldova, Romania, Slovenia and Turkey. Before the country's accession to the EU, Slovenia managed to conclude FTAs with the following SEE countries: BiH, Croatia, FYR Macedonia, and Turkey.

[7] Revised General Agreement on Tariffs and Trade (GATT) within the framework of World Trade Organization (WTO).

[8] Exceptions were FTAs with Albania and Moldova, with which BiH had insignificant trade.

[9] Free Trade Agreement between the Republic of Slovenia and Bosnia and Herzegovina, Article 4 (2).

[10] Free Trade Agreement between the Republic of Slovenia and Bosnia and Herzegovina, Article 4 (3).

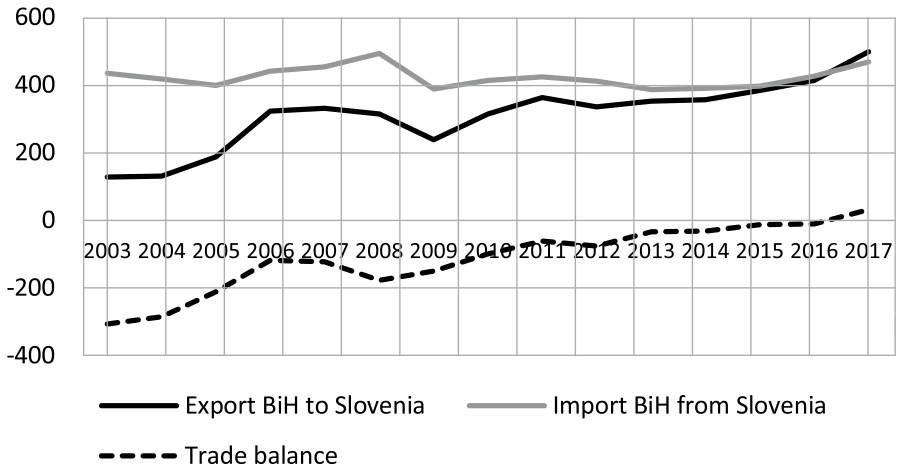
[11] SAA entered into force on 1st June 2015.

Table 1. Foreign Trade of BiH with Slovenia, 2003-2017

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Aver.
Export to Slovenia, mil EUR	127.2	131.0	186.7	321.9	330.0	314.4	236.8	312.8	361.4	334.0	351.0	356.8	382.9	412.7	497.6	310.5
Export to Slovenia, %	10.39	8.51	9.65	12.19	10.87	9.16	8.37	8.62	8.60	8.31	8.19	8.04	8.33	8.57	8.81	9.11
Import from Slovenia, mil EUR	434.3	417.3	398.8	440.1	452.3	492.6	388.1	413.6	423.6	410.8	385.7	390.2	395.5	425.1	466.7	422.3
Import from Slovenia, %	10.18	8.67	6.98	7.56	6.42	5.91	6.14	5.94	5.34	5.27	4.97	4.71	4.88	5.15	5.03	6.21
Trade balance, mil EUR	-307.1	-286.3	-212.1	-118.1	-122.3	-178.2	-151.3	-100.8	-62.3	-76.7	-34.7	-33.5	-12.6	-12.4	30.9	-111.8
Total bil. trade, mil EUR	561.5	548.3	585.5	762.0	782.3	806.9	624.8	726.3	785.0	744.8	736.7	747.0	778.4	837.8	964.2	732.8
Export/import coverage, %	29.28	31.40	46.82	73.15	72.96	63.83	61.02	75.63	85.31	81.32	91.01	91.42	96.81	97.09	106.6	73.52

Source: Author's own calculation based on trade data of BHAS

Figure 1. Trends of BiH Foreign Trade with Slovenia, in mil EUR (2003-2017)



Source: Author's own calculation based on trade data of BHAS

Exports of BiH to Slovenia increased faster than imports, reaching EUR 497,577,650 in 2017, three times more than in 2003. A sharp export growth occurred after 2004, again after 2008 and again after 2016. A common feature connecting those years is a change in trade regime between the two countries. In 2004, Slovenia joined the EU, and the FTA with BiH was suspended. BiH had duty-free exports to the EU member countries, but Slovenia lost the duty-free access to the BiH market. Another change in the trade regime between the two countries occurred when the IA entered into force in 2008, although the asymmetry in BiH's favour remained. It seemed that every change in trade regulations was to the benefit of BiH, resulting in increases in the country's exports.

The sectorial export pattern of BiH was relatively stable. Six groups appeared on the top 10 list of BiH export industries in all years of the given period and had significant export shares: power generating machinery and equipment (average share 18.41%); metalliferous ores and metal scrap (10.52%); electrical machinery, apparatus and appliances (8.48%); cork and wood; furniture and parts thereof; and manufactures of metals, while machinery specialized for particular industries and furniture and parts thereof appeared over ten years. In 2003, the total share of the top four export product groups (concentration ratio CR_4) amounted to 64%, while in 2017 it amounted to 48%. The indicator of sectorial export concentration (HHI) also revealed a lower degree of concentration (between 0.08 and 0.10) for all the observed years except for 2003, when it indicated moderately concentrated exports (HHI=0.20). (Table 2) Neither indicator changed significantly from year to year; however, the comparison of 2003 to 2017 reveals that both of them indicated a shift toward a higher level of diversification.

Contrary to exports, which increased during the given period, imports almost stagnated; in 2017, imports amounted only to 30 million EUR more than in 2003. Import sectorial structure was also relatively stable in the observed period. Seven product groups among the top 10 ranked by import share appeared in all years: electrical machinery, apparatus and appliances (the average share 10.33%); medical and pharmaceutical products (8.61%); manufactures of metals (5.75%); general industrial machinery and equipment (5.24%); iron and steel; beverages; and miscellaneous manufactured goods. The total import share of the top four product groups amounted to 29.06% in 2003 and 38.27% in 2017, indicating a significantly lower degree of product concentration in imports compared to exports, although with an increasing trend.

The number of product groups with BiH's comparative advantage (BI > 1) increased after 2003 (from only 13) and varied within the interval of 18-21 for most of the years of the analysed period. However, the number of items with BI >4[12] was extremely small, especially in the first five years (1 or 2 only), except in the period of 2008-2013, when it reached 6. The maximum value of BI was much lower before 2008 (4.0-5.8) than after 2008 (9.0-11.9) (Table 3). The highest average BI values were found in SITC groups 71 Power-generating machinery and equipment; 88 Photographic apparatus and equipment; 87 Professional, scientific and controlling instrument; 77 Electrical machinery, appliances, and parts; and 72 Machinery specialized for particular industries. At the same time, the export share of four product groups with the highest BI values was relatively low during most of the period – 25.5% on average (43% in 2003 but only 21% in 2017),[13] with a dominant share of only one product group (SITC 71).[14]

Comparison of the top 10 list by BI value in 2003 to those in 2008 and 2017 reveals a shift from natural-based and low-technology industries towards medium-technology industries[15] (Table 5).

[12] According to Hinloopen and van Marrewijk (2001), a country has a strong revealed comparative advantage in the given sector for BI > 4.

[13] Power-generating machinery and equipment had the highest export share, more than ¾ of top four export contribution.

[14] Author's own calculation.

[15] According to product classification by technology-intensiveness (Lall, 2000).

Table 2. Product Export Concentration (CR4 and HHI) of BiH in Trade with Slovenia

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Change 2003/2017
$CR_{(4)}$	64.07	53.37	51.42	54.37	50.78	46.98	44.75	53.94	50.37	47.73	51.43	50.63	49.25	49.13	47.95	↑ diversification
HHI	0.20	0.09	0.10	0.10	0.10	0.09	0.08	0.10	0.09	0.08	0.09	0.09	0.08	0.08	0.08	↑ diversification

Source: Author's own calculation based on trade data from BHAS

Table 3. Revealed Comparative Advantages (BI index) of BiH in Trade with Slovenia

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Max BI index	5.82	5.23	4.02	4.20	5.69	6.87	11.94	8.48	11.17	9.05	8.96	9.87	11.93	10.70	7.55
Number of BI > 1 items	13	20	20	19	18	21	21	20	24	21	22	20	20	16	18
Number of BI > 4 items	2	1	1	1	2	5	6	6	6	6	5	2	4	4	3
Export of top 4 (%)	42.95	18.44	29.67	24.90	29.72	32.12	24.16	20.10	21.60	19.88	23.96	18.98	33.35	21.26	20.81

Source: Author's own calculation based on trade data from BHAS

Table 4. Intra-Industry Trade (GL Index) of BiH in Trade with Slovenia

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Agg. GL index	0.19	0.24	0.30	0.33	0.44	0.44	0.44	0.43	0.45	0.44	0.43	0.47	0.46	0.44	0.46
Max GL index	0.96	0.97	0.98	0.99	0.97	0.99	0.97	0.99	0.99	0.97	0.99	0.99	0.99	0.95	0.99
Number of GL > 0.50 items	9	12	11	17	24	21	25	25	28	25	20	21	21	21	21
Number of GL > 0.75 items	5	8	8	8	11	13	8	14	12	11	12	12	11	12	4
Number of HIIT items	7	6	9	6	6	9	9	8	8	5	9	5	9	5	10
Number of VIITh items	17	13	11	16	18	14	13	15	14	14	14	16	14	16	14

Source: Author's own calculation based on trade data from BHAS; Legend: GL – Grubel-Lloyd index of intra-industry trade; Agg. GL – aggregate GL index (all industries); HIIT – horizontal intra-industry trade; VIITh – vertical intra-industry trade with higher quality export of BiH;

Table 5. Top 10 industries by BI values in Trade of BiH with Slovenia (2003, 2008 and 2017)

2003		2008		2017	
SITC	BI	SITC	BI	SITC	BI
25 Pulp and waste paper	5.82	87 Professional, scientific and controlling instrument	6.87	71 Power-generating machinery and equipment	7.55
82 Furniture and parts thereof	5.05	69 Manufactures of metals, n.e.s.	5.53	61 Leather, leather manufactures	6.51
61 Leather, leather manufactures	3.13	85 Footwear	4.71	88 Photographic apparatus and equipment	6.05
62 Rubber manufactures	3.10	71 Power-generating machinery and equipment	4.41	77 Electrical machinery, appliances, and parts	3.03
55 Essential oils and resinoids	2.35	75 Office machines and automatic data-processing machines	4.22	28 Metalliferous ores and metal scrap	2.90
21 Hides, skins and furskins, raw	1.99	59 Chemical materials and products	3.24	25 Pulp and waste paper	2.36
65 Textile yarn, fabrics	1.77	76 Telecommunications and sound-recording apparatus and equip.	2.83	72 Machinery specialized for particular industries	2.30
05 Vegetables and fruit	1.51	77 Electrical machinery, appliances, and parts	2.57	76 Telecommunications and sound-recording apparatus and equipment.	2. 17
83 Travel goods	1.47	25 Pulp and waste paper	2.55	57 Plastics in primary forms	1.49
77 Electrical machinery, appliances, and parts	1.31	22 Oil seeds and oleaginous fruits	2.29	58 Plastics in non-primary forms	1.37

Source: Author's own calculation based on trade data from BHAS

Table 6. Top 10 industries by GL values in Trade of BiH with Slovenia (2003, 2008 and 2017)

2003		2008		2017	
SITC	GL	SITC	GL	SITC	GL
27 Crude fertilizers and crude minerals	0.96	27 Crude fertilizers and crude minerals	0.99	88 Photographic apparatus and equipment,	0.99
71 Power-generating machinery and equipment	0.88	21 Hides, skins and furskins, raw	0.97	77 Electrical machinery, appliances, and parts	0.98
84 Wearing apparel	0.78	72 Machinery specialized for particular industries	0.94	56 Fertilizers (other than those of group 272)	0.79
05 Vegetables and fruit	0.77	25 Pulp and waste paper	0.88	27 Crude fertilizers and crude minerals	0.79
78 Road vehicles	0.77	61 Leather, leather manufactures	0.87	07 Coffee, tea, cocoa, spices	0.74
85 Footwear	0.70	04 Cereals and cereal preparations	0.87	63 Cork and wood manufactures	0.74
79 Other transport equipment	0.69	79 Other transport equipment	0.82	05 Vegetables and fruit	0.74
68 Non-ferrous metals	0.57	52 Inorganic chemicals	0.82	06 Sugars, sugar preparations and honey	0.73
99 Miscellaneous	0.56	82 Furniture and parts thereof	0.82	89 Miscellaneous manufact. goods n.e.s.	0.72
65 Textile yarn, fabrics	0.46	68 Non-ferrous metals	0.80	69 Manufactures of metals, n.e.s.	0.72

Source: Author's own calculation based on trade data from BHAS.

Although inter-industry trade still prevails in trade between BiH and Slovenia, the share of intra-industry trade (IIT) increased significantly (from 0.19 to 0.46) in the period of 2003-2017, resulting in the average IIT share of 0.40 for the given period. The analysis of IIT by sector revealed a significant growth in the number of product groups with dominant IIT (GL > 0.50) from 9 to 21,[16] especially of those with strong IIT (GL > 0.75), as well as a relatively high number of product groups with VIIT with higher quality of

[16] The highest number of product groups with dominant IIT (28) was recorded in 2011.

BiH exports. The number of industries with HIIT increased to 10. (Table 4). In the period after 2005/2006, 11 product groups with dominant IIT (SITC 04, 05, 07, 21, 51, 52, 63, 69, 72, 77, and 88) appeared consistently.

At present, IIT in some agricultural and resource-based product groups, such as cereals and cereal preparations, vegetables and fruit, sugar and sugar preparations, coffee and tea, hides and skins, and crude fertilizers and minerals, as well as in labour-intensive product groups,[17] is stronger than it was before 2003 (Table 6).

Concluding Remarks

Trade relations between BiH and Slovenia have been characterised by an intensive development in both their institutional and functional aspects. Trade agreements signed between the two countries in the period of 2003-2017 have brought about a significant liberalization of the trade regime (although never completely free trade), which has led to an intensive and increasing mutual trade. The fact that liberalization has been asymmetrical to the benefit of BiH for years seems to be one of the factors that enabled BiH to improve its trade performances in relation to Slovenia. The biggest change in trade regime between the two countries in the analysed period occurred when Slovenia joined the EU in 2004; this change was followed by noticeable changes in characteristics of BiH trade.

A significant growth in BiH exports over the years has resulted in a decreasing trend of trade deficit, with a final turn to trade surplus occurring in 2017. The research results also indicate an increase in the level of export product diversification and growth in the number of industries with a revealed comparative advantage of BiH. However, there has not been a radical structural shift either immediately after 2004 or later; rather, the export structure proved to be stable with the high shares of resource-based and labour-intensive industries, while the comparative advantages of BiH remained relatively weak. Although inter-industry trade has still prevailed, the share of IIT as well as the number of industries with dominant, and especially strong, IIT have significantly increased. In the last several years, the IIT pattern has been more stable than before. Improvement in intra-industry specialization and trade speaks in favour of an increasing convergence between the two economies.

In the last fifteen years, BiH has undoubtedly succeeded in improving its trade performance and competitiveness in relation to Slovenia. However, by identifying advantages and drawbacks of BiH position, the research points out the need for further improvement in the country's bilateral trade.

[17] According to the product classification by factor intensiveness, created by Yilmaz (2003).

References

Anastasakis, O., & Bojičić-Dželilović V. (2002). *Balkan regional cooperation & European integration*. London, England: The London School of Economics and Political Science & European Institute London.

Balassa, B. (1965). Trade liberalization and 'revealed' comparative advantages. *The Manchester School of Economic and Social Studies*, *32*(2), 99-123. https://doi.org/10.1111/j.1467-9957.1965.tb00050.x

Balassa, B. (1989). *Comparative advantage, trade policy and economic development*. Hertfordshire: Harvester Wheatscheaf, New York

Carbaugh, R. (2015). *International economics*. Fifteenth Edition. Boston, MA: Cengage Learning

Directorate for European Integration of Bosnia and Herzegovina (DEI). *Chronology of relations between BiH and the EU*. Retrieved from http://www.dei.gov.ba/dei/bih_eu/default.aspx?id=9808&langTag=en-US.

Erkan, B., & Sunay, Z. F. (2018). Russia's market and product-based export diversification. *Journal of Life Economics*, *5*(3), 43-60. https://doi.org/10.15637/jlecon.252

French, S. (2017). Revealed comparative advantage: What is it good for? Journal of International Economics, Elsevier, 106(C), 83-103. Greenaway, D., & Milner, C. (2003). What have we learned from a generation's research on intra-industry trade? *University of Nottingham Research Paper Series*, Research Paper 2003/44.

Greenaway, D., Hine, R., & Milner, C. (1995). Vertical and horizontal intra-industry trade: A Cross industry analysis for the United Kingdom. *The Economic Journal*, *105*(433), 1505-1518. https://doi.org/10.2307/2235113

Grubel, H., & Lloyd, P. J. (1975*). Intra-industry trade: The theory and measurement of international trade in differentiated products*. London, England: The Macmillan Press.

Hinloopen, J., & Van Marrewijk, C. (2001). On the empirical distribution of the Balassa index. *Weltwirtschaftliches Archiv*, *137*(1), 1-35. https://doi.org/10.1007/BF02707598

Ito, T., & Okubo, T. (2016). Product quality and intra-industry trade. *The Singapore Economic Review*, *61*(4), 1-22. https://doi.org/10.1142/S0217590815501064

Kenen, P. (1994). *The international economy*. Third Edition. Cambridge, UK: Cambridge University Press.

Lall, S. (2000). The technological structure and performance of developing country manufactured exports, 1985-98. *Oxford Development Studies*, *28*(3), 337-369. https://doi.org/10.1080/713688318

Leromain, E., & Orefice, G. (2014). New revealed comparative advantage index: Dataset and empirical distribution. *International Economics,* 139(October), 48-70. https://doi.org/10.1016/j.inteco.2014.03.003

Mejia, J. F. (2011) *Export diversification and economic growth: An analysis of Colombia's export competitiveness in the European Union's market.* Germany: Physica Verlag [Online]. Retrieved from:http://books.google.ba/books?id=D7ZkIi8-qF0C&pg=PA80&lpg=PA80&dq=Felipe+Mej%C3%ADa+herfindahl+hirschman+index&source=bl&ots=U0IyPqVA1i&sig=_tfYc25tVok3e0WwjVMHWhbkQwU&hl=bs&sa=X&ei=_6meU8y7CKqj0QW2qYCIBg&ved=0CBsQ6AEwAA#v=onepage&q=herfindahl&f=false.

Mikić, M., & Gilbert, G. (2009). *Trade statistics in policymaking: A handbook of commonly used trade indices and indicators*. Revised Edition. UN ESCAP. Retrieved from http://www.unescap.org/tid/publication/tipub2559.pdf.

Ministry of Foreign Trade and Economic Relations of BiH (MOFTER). (2018). *Analysis of foreign trade of BiH in 2017.* Sarajevo: MOFTER.

Olczyk, M. (2016). A systematic retrieval of international competitiveness Literature: A bibliometric study. *Euroasian Economic Review*, *6*(3), 429–457. https://doi.org/10.1007/s40822-016-0054-9

Porter, M. (1998). *The Competitive Advantage of Nations*. New York: Palgrave Macmillan.

Škuflić, L. (1999). International competitiveness of Croatian economy in the European Union's market. *Economic Review*, 50(10), 1310-1327.

United States Department of Commerce – International Trade Administration ITA. (2019). Bosnia Herzegovina Country Commercial Guide. Retrieved from https://www.export.gov/article?id=Bosnia-bilateral-investment-agreements-and-taxation-treaties.

United States International Trade Commission (2010). *ASEAN: Regional trends in economic integration, export competitiveness, and inbound investment for selected industries*. Washington, DC: USITC.

United States Department of Justice and Federal Trade Commission. (2010). *Horizontal merger guidelines*. Retrieved from https://www.ftc.gov/sites/default/files/attachments/merger-review/100819hmg.pdf.

World Integrated Trade Solution - WITS (2019). Global Preferential Trade Agreement Library. *The Agreement on Free Trade between Bosnia and Herzegovina and Republic of Slovenia*. Retrieved from https://wits.worldbank.org/GPTAD/PDF/archive/BosniaHerzegovina-Slovenia.pdf .

Yilmaz, B., & Ergun, S. J. (2003). *The foreign trade pattern and foreign trade specialisation of candidates of European Union*. Ezoneplus Working Paper, No. 19, Jean Monnet Centre of Excellence.

Razvoj trgovinskih odnosov Bosne in Hercegovine s Slovenijo: različni vidiki in značilnosti

Izvleček

Cilj članka je prepoznati značilnosti trgovinskih odnosov Bosne in Hercegovine (BiH) z Republiko Slovenijo (Slovenija), da bi prispevali k določitvi položaja BiH v njeni bilateralni trgovini. Zunanjetrgovinska analiza je izvedena v kontekstu spreminjajočega se trgovinskega režima med dvema državama in s tem vključuje tako institucionalne kot tudi funkcionalne vidike razvoja bilateralnih trgovinskih odnosov. Različni trgovinski kazalniki so izračunani in interpretirani za obdobje 2003–2017 in/ali za izbrana leta, ki so bila specifična zaradi sprememb v institucionalnih predpisih medsebojnih trgovinskih tokov. Raziskovalni rezultati nakazujejo naraščajočo trgovinsko intenzivnost med dvema državama s skoraj uravnoteženimi izvoznimi in uvoznimi tokovi ter s prevladujočo interindustrijsko trgovino. Trgovinski rezultati Bosne in Hercegovine so se znatno izboljšali z naraščajočo znotrajpanožno specializacijo in trgovino. Vendar pa izvozna struktura in vzorec primerjalnih prednosti ne govorita v korist BiH, kar nakazuje na potrebo po izboljšanju položaja države v njeni trgovini s Slovenijo.

Ključne besede: trgovinski odnosi, trgovinski režim, bilateralna trgovinska analiza, Bosna in Hercegovina (BiH), Republika Slovenija (Slovenija)

ORIGINAL SCIENTIFIC PAPER

RECEIVED: JUNE 2019

REVISED: JULY 2019

ACCEPTED: AUGUST 2019

DOI: 10.2478/ngoe-2019-0013

UDK: 339.138:7.012:005.311

JEL: M310

Citation: Rocco, S., & Selinšek, A. (2019). The Structure of Design Orientation and its Relationship with Market Orientation. *Naše gospodarstvo/Our Economy*, 65(3), 50–62. DOI: 10.2478/ngoe-2019-0013

The Structure of Design Orientation and its Relationship with Market Orientation

Sanja Rocco
Zagreb School of Business, Croatia
sanja.rocco@pvzg.hr

Aleksandra Selinšek
University of Maribor, Faculty of Economics and Business, Slovenia
aleksandra.selinsek1@um.si

Abstract

Although market orientation has been investigated in numerous studies, its complex relationship with design orientation lacks research attention, especially in countries with transitional economies. Therefore, existing models of market orientation (MO) and design orientation (DO) have been investigated. The research has been executed in several stages, combining qualitative and quantitative methods. In the first, qualitative stage, a series of face-to-face in-depth interviews were conducted. In the second, quantitative stage, an Internet survey was conducted among managers and CEOs from Croatian companies in different industries. Partial Least Square and Structural Equation Modelling analyses were conducted to examine the relationships between variables of MO and DO. Results confirm the positive relationship between design orientation and market orientation. Further, results also confirm sub-hypotheses that customer orientation and strategic marketing are positively related to all dimensions of design orientation. The model could have implications for marketers, designers and managers in practice. Both concepts, MO and DO, are very complex and multidimensional, so it was not possible to investigate all the aspects of the constructs. Another limitation of the study was the sample size, as a result of a low response rate as well as a relatively high drop-out rate. The research contributes to theory highlighting the role of design as an important element of market orientation.

Keywords: design orientation, market orientation, managers, relationship, transitional economies

Introduction

Concepts in marketing have been continuously developing throughout its history. Today, marketing engages an organization's resources, skills, products, services, and thinking to understand and meet consumers' conscious and latent needs (Bogozzi, 2011). Customers are looking for added value, while in most industries technical and functional qualities are taken for granted. With regard to responding to customer needs, some recent marketing literature mentions three crucial concepts: market orientation, customer orientation, and design orientation (Coley, Mentzer, & Cooper, 2010; Gummesson, 1991; Moll, Montana,

NG
OE

**NAŠE GOSPODARSTVO
OUR ECONOMY**

Vol. 65 | No. 3 | 2019

pp. 50–62

Guzman, & Praallada, 2007; Venkatesh, Digerfeld-Manson, Brunel, & Chen, 2012).

Comparison of the design-orientation literature (Chitturi, Raghunattan, & Mahajan, 2008; Moll et al., 2007; Srinivasan et al., 2006; Verizer et al., 2005) and market-orientation literature (Gummesson, 1991; Kohli, Jaworski, & Kumar, 1990, 1993) indicates that customer-centered product design strategies are critical to superior market performance and success. Many authors discuss the fact that market orientation has a positive impact on a company's economic result in the market (Bodlaj, 2010; Kahn, 2001; Kohli et al., 1993; Jaworski et al., 1993; Narver & Slater, 1990; Snoj, Milfelner, & Gabrijan, 2007).

Slater and Narver (2000) suggest that market orientation is one component in the architecture of a learning organization that leads to superior learning capability. They believe that this replication provides strong support for the existence of a positive relationship between market orientation and performance and that future research should focus on the processes for developing and reinforcing a market-oriented culture, as well as for implementing it through organizational structure, systems, capabilities, and strategies. According to Bodlaj (2010), existing empirical research adopting both forms of MO (responsive and proactive) and examining the impact on new-product performance (Atuahene-Gima, 2005; Narver et al., 2004, Tsai et al., 2008) or business performance (Voola & O'Cass, 2010) is still very limited and has mostly been conducted in non-European countries. Only a few studies have examined the entire chain of relationships between both market orientation types, innovation and business performance (e.g., Milfelner, 2009).

On the other hand, quite a similar situation can be seen in the case of design orientation. This is a concept that has been a subject of various studies in recent years, but mostly in developed countries. Additionally, various studies have shown evidence that there is a positive relationship between investing in design and improved business results (e.g. Black & Baker, 1987; Borja de Mozota, 2003b; Bruce, Potter, & Roy, 1995; Design Council, 2004-2014; Gemser & Leenders, 2001; Hertenstein, Platt, & Veryzer 2005; Kootstra 2009; Sisodia, 1992; Slater & Narver, 2000; Ulrich & Pearson, 1998;). Investigating the impact of design orientation in Croatian companies as well as the complex relation between design orientation and market orientation is the main purpose of this study. The paper begins with the theoretical background of the researched topic and continues with the development of the conceptual model and hypothesis. Next, the research methodology and results of the research are described. Finally, conclusions, implications and limitations of the study are presented.

Theoretical Background on Design and Market Orientation

Because of its complexity, companies and researchers take different approaches towards design and its meaning. Design can be observed as the process of designing products or as the result of this process – the final, tangible or intangible product that has been designed. Depending on the context, design implies an objective, the intention of designing, particularly in the analytical and creative phases, as well as a process, a drawing, a sketch or a model in the execution phase, to give form to an idea.

Recent years have seen a development in the use of design, from shaping and aesthetics to strategic design policies in business innovation processes, as well as in a number of societal development processes. Design, its methods and a design-oriented way of thinking have been emphasized by many researchers as resources for increasing a company's innovation capability (Beverland & Farrell, 2007; Ulrich & Eppinger, 2000; Veryzer and Borja de Mozota, 2005). Also, most design management research results indicate that design improves the performance of innovation, whether or not it is technological (Borja de Mozota, 2003b; Von Stamm, 2008).

Although the role of design within organizations can be difficult to define, it is clear that giving design a seat at the table adds significant value that helps differentiate and elevate companies beyond the norm and helps to deliver tangible business results (Rae, 2013, p. 37).

The importance of design as a key discipline for bringing new ideas to the market has also been recognised in commitment 19 of the Innovation Union, an initiative in the Europe 2020 Growth Strategy, as a result of different studies undertaken in the UK, Denmark, Finland and other developed countries. This consensus has resulted in the European Commission's Action Plan for Design-Driven Innovation (EC, 2013).

According to Venkatesh et al. (2012), design orientation (DO) involves a strategic way of employing a company-wide vision that integrates design into the creation of customer value. It has also been identified as a factor integrating decisions at different levels of an organization and involving customers as a key element (Bloch, Brunel, & Arnold, 2003; Moll et al., 2007).

Design orientation can also be described as a managerial strategic approach based on choosing design as a source of competitive advantage (Borja de Mozota, 2003a). Design-oriented companies are those that incorporate their design process into their business strategy (Moll et al., 2007). However,

design orientation and design implementation are also related to the environment in which a company operates, including social, political and economic circumstances; design tradition; education; and national design policy. From this perspective, it is clear that design should also be managed. Therefore, design management is directly concerned with the place of design within an organization, the identification of specific design disciplines that are relevant for key management issues, and the training of senior managers to use design effectively (Gorb, 1990). It can also be interpreted as the implementation of design within a corporation by communicating the relevance of design to long-term corporate goals and coordinating design resources at all levels of corporate activities to achieve the corporation's objectives. This includes contributing to corporate strategic goals by developing a design policy alongside corporate identity and strategy, managing design resources and building a design network of information and ideas (Blaich & Blaich, 1993).

Design management, according to Best (2006), is about managing design in every organization and can be implemented in three stages. Design strategy, as the first stage of design management, identifies opportunities and creates conditions in which design projects can be proposed. Managing the design process, as the second stage, focuses on developing design projects and agendas, thus making strategy visible through design. It develops a culture of collaboration, investigates the acquired skills and engages creative teams. Managing design implementation, as the third stage, is focused on delivery of design projects and outcomes in practice. It includes decision-making in the process of designing, as well as working relationships and responsibilities.

According to Buchannan (2015, p. 16), there are clear benefits that come from investment in design in various countries. The problem is that some of these studies have focused more on the traditional areas of industrial design and related tactical practices rather than on the overall benefit of making design a central feature of management that ranges from goods and services to operations to vision and strategy – that is, the uses of design in "design-centric" organizations.

Market orientation (MO) can be defined simply as the implementation of the marketing concept – that is, generating market information within the entire organization regarding the current and future needs of customers and clients (Kohli, Jaworski, & Kumar, 1990). The majority of studies from the 1990s suggest that MO is related to superior performance, sales growth and new product success (Atuahene-Gima, 1995; Desphande & Farley, 1998; Han, Yun, Kim, & Cho, 1998; Jaworski et al., 1993; Slater & Narver, 1994). MO can also be explained as the extent to which a firm engages in the generation, dissemination, and response to market intelligence pertaining to current and future customer needs, competitor strategies and actions, channel requirements and abilities, and the broader business environment (Morgan et al., 2009). MO and marketing capabilities are complementary to one another in ways that generate economic rents, and each may be viewed as an individual source of competitive advantage. The interaction between MO and marketing capabilities possesses the characteristic of 'asset interconnectedness' (Teece et al., 1997). For Grinstein (2008), market orientation is positively related to a number of strategic orientations. To be successfully implemented, all alternative orientations should be guided by the necessary underlying system of beliefs.

Studies about the influence of design on some parts of marketing like customer satisfaction, product development, and innovation or business performance also exist, but there is a lack of research about the relationship and possible role of design in strategic marketing, as well as of the possibilities and potential of the common platform for closer collaboration.

To be successful in the same way as marketing, design has to be integrated into all functional parts of an organization. Understanding design potentials and design implementation efficiency, when integrated at all levels of an organization, would allow marketers and managers to achieve better results. The new proposed conceptual model extends current thinking by integrating market and design orientation towards strategic competitive advantage.

The Conceptual Model and Hypothesis Development

After studying the existing literature, a new initial model of the relationship between design and market orientation has been proposed. The basis of the new design-market orientation conceptual model was the existing market orientation model in relation to new product (and service) success (Narver et al., 2004), combined with the managerial model of design (Moll et al., 2007), where market orientation and design orientation are put into a relationship. It is the result of an empirical qualitative study undertaken in three Spanish industries concerning design orientation, market orientation, and design management. However, the model does not show the precise correlation between different variables of design and market orientation.

Design orientation describes a strategic managerial approach based on choosing to use design as a source of competitive advantage (Best, 2006; Borja de Mozota, 2003b, 2009;

Brown, 2008; Buchanan, 2015, Design Council, 2015, 2018; DMI, 2015; European Commission, 2013; Gorb, 1990; Kootstra, 2009; Moll et al., 2007; Rae, 2013; Rau, 2017; Venkatesh et al., 2012; Von Stamm, 2008), which means that both concepts are oriented towards a higher value in the eyes of their customers on one hand and both represent a higher value for the company in today's competitive environment on the other hand. Based on this definition, we can conclude that design orientation has a positive relationship with market orientation. Therefore, we propose the main hypothesis:

H1: *Design orientation of a company is positively related to its market orientation.*

Moreover, in accordance with the above discussion, we further develop two sub-hypotheses:

H1a: Customer orientation is positively related to all dimensions of design orientation.

H1b: Strategic marketing is positively related to all dimensions of design orientation.

Research Methodology

The research was conducted combining qualitative and quantitative methods. The measurement instrument for empirical model verification was developed in several phases. After analyzing the literature, relevant items for the questionnaire were used from previous reliable research for two constructs: market orientation and design orientation (see Table 1). The first, qualitative stage of the research was focused on the design orientation of market-oriented companies. Two groups of respondents were interviewed (five managers and five designers) in a series of qualitative, face-to-face interviews, in order to design the questionnaire for quantitative research. The interviews lasted 45-60 minutes each. The sample of selected professionals was chosen, based on the assessment of the researcher, as typical representatives of the future respondents in the quantitative research.

In the second stage, the quantitative research was conducted using an Internet survey of managers and CEOs from Croatian companies in different industries, with at least three employees in each company. The testing phase with nine experts from the fields of marketing and design preceded the execution of the quantitative research, in order to determine the quality of the questionnaire. The experts answered the questionnaire but were also given the opportunity to comment on the questionnaire's clarity and length as well as any possible difficulties. Most of their comments were taken into account in preparing the final questionnaire, which consisted of 21 questions in six blocks: market orientation, design orientation, managerial approach, interfunctional coordination inside the company, business results and design environment.

Most of the questions were answered on a five-point Likert scale. An additional nine questions about general data were

Table 1. The basis for developing the questionnaire

Market orientation	Title	Variables
Lafferty B. A. and Hult G. T. M. (2001)	A synthesis of contemporary market orientation perspectives	Four variables of MO as basic approach: emphasis on clients, importance of information, inter-functional coordination and receptivity to change
Narver J.C., Slater F.S. and Mac Lachlan D. L. (2004)	Responsive and Proactive Market Orientation and New-Product Success	Variables for proactive market orientation
Marketing Department, Faculty of Economics and Business, University of Maribor with Marketing Institute (2008)	Marketing in the 21st Century	Variables of MO: marketing management, customer orientation.
Design orientation		
Venkatesh A., Digerfeld-Mansson T., Brunel F. F. and Chen S. (2012)	Design Orientation: a grounded theory analysis of design thinking and action	Key questions as basic subthemes of design orientation.
Centre for Design Innovation Ireland (2007)	Design Difference – Research Methodology with Questionnaire. Design Innovation Research	Variables of innovation by design, questions about design environment and design policy.
Design Management Institute (2013)	DMI Design Value Scorecard survey	Variables/levels of design implementation: Tactical, organisational value, strategic value of design
Borja de Mozota B. (1998/2003a)	A model for design management excellence in European SMEs	Variables of design – perception of design by managers

included at the end, for a total of 30 questions altogether. The pretesting exploratory factor analysis (EFA) was conducted on the sample of N = 95 consisting of 75.8% small and medium-sized enterprises and 24.2% large-sized enterprises. The SPSS statistical program was used for the analysis of the data.

All the scales were verified for construct validity in the pretesting EFA analysis, which indicates the extent to which the items on a scale measure the abstract or theoretical construct (Chandler, 1991). The EFA was conducted using IBM SPSS Amos 22 software. The results also confirmed a positive relationship between DO and MO. Finally, we applied the PLS SEM Partial Least Square / Structural Equation Modelling to present these relations between constructs in more detail, taking into account the factors of DO and MO. The PLS was conducted in Smart PLS 3 software.

Final Results and Hypothesis Testing

Sample

A list with 2,184 e-mail addresses of CEOs, general managers or marketing managers was compiled based on data provided from several reliable sources: the Croatian Chamber of Commerce; the Croatian Ministry of Entrepreneurship and Crafts (MINPRO); the Croatian Agency for SMEs, Innovation and Investments (HAMAG-BICRO); and the list of Croatian companies with the GREEN MARK Sign of Excellence 2016. Managers received an email explaining the general purpose of the study and a link to the Internet survey. The survey was created in Lime Survey software at the www.engeres.com domain. The electronic questionnaire was designed so that the respondents could not see all the questions at once and therefore could not alter their answers in light of additional information.

The survey was conducted from April to July 2017. A total of 397 undelivered e-mails were omitted from the list, and a follow-up email was sent to non-respondents in September. From the total number of sent emails, 233 clicks on the sent link were generated (click-through rate 13.04%). However, a significant number of respondents did not finish the questionnaire. A total number of usable questionnaires from 143 managers were received, yielding a 61 percent completion response rate. A total of 112 respondents were qualified for the research (i.e., CEOs or managers of companies with more than 3 employees), or 78% of the total number.

The study sample consisted of 40% product companies, 33% service companies and 27% combined industry sectors. The final sample of 112 CEOs/managers came from companies of different sizes: 27 with 3-10 10 employees (24%), 38 with 11-50 employees (34%), 17 with 51-100 employees (15%), 7 with 101-200 employees (6%), and 23 with more than 201 employees (21%). According to the European Commission recommendation of 6 May 2003 concerning the definition of micro (<10 employees), small (11-50 employees) and medium-sized (51-250 employees) enterprises (OJ L 124, 2003, p. 36), the sample consisted of approximately 80 % micro, small and medium-sized enterprises and approximately 20% large-sized enterprises, which is an acceptable ratio for the Croatian economy.

The general data show that the respondents were 42% female and 58% male. While 60.7% of managers were in various positions, ranging from executives to marketing and communcations, sales or design managers, many of the respondents were also owners or CEOs (39%), which is logical considering the large percentage of SMEs. With regard to age, most respondents were in the group between 40 and 49 years old (42.9%), followed by 30-39 and 50-59 (both 22.3%). Most of the respondents had a graduate degree (47.3%), followed by master degree (15.2%) and bachelor's degree (13.4%).

Testing the Hypothesis

To verify the main hypothesis (H1) regarding the relationship between market orientation and design orientation, we first used EFA on the final sample in order to identify the number of extracted factors of both constructs and to define the dimensions of each construct. After that, correlation analysis was conducted to determine whether intercorrelations exist between the factors of MO and DO.

Five significant factors for all the questions of market orientation and design orientation were extracted with EFA analysis, which account for 63.5% of variance. The first two factors each explain about 20% of the variance (21.9% and 19.6%, respectively), while the other three factors each explain less than 10% of the variance. According to the extracted factors and variables that saturate the individual factors to the greatest extent, a total of five measuring dimensions were constructed: two market orientation factors (consumer orientation and strategic marketing) and three design orientation factors (the role of design, design as competitive market advantage and design level).

After the construction of each factor, Cronbach's alpha coefficients for each of them were calculated to see if the factors obtained were consistent (i.e., whether each of them measures one dimension of market or design orientation). All Cronbach's alpha values are acceptable according to

Nunnally (1978), who offered a rule of thumb of 0.7. (More recently, scholars have cited 0.8 as a minimum alpha.)

Regarding the internal consistency, Cronbach's alpha coefficients results for each factor of both constructs show that all the variables of MO and DO initially used to calculate their factors remain in the analysis of the data. Table A1 in the Appendix shows MO and DO factors extracted on the final sample with Cronbach's alpha coefficients.

In the next step of the data analysis, we concentrate on the correlation between MO and DO in order to test the main hypothesis (Table 2). Moderate correlations in some pairs of factors are an additional indicator that exploratory factor analysis obtained relatively independent (but to some extent related) factors, which makes further analysis possible.

Partial Least Square / Structural Equation Modelling (PLS-SEM) analysis of the relationship between variables

In the final stage of testing H1, H1a and H1b, we used PLS-SEM analysis. PLS-SEM offers a good approximation of common factor models in situations where factor-based SEM cannot deliver results due to its methodological limitations in terms of model complexity, sample size requirements, or inclusion of composite variables in the model (Reinartz et al., 2009; Sarstedt et al., 2016; Willaby et al., 2015, Sarstedt et al. in Homburg et al. (Eds.), 2017, p. 33). One of the most important advantages in using SEM is that it provides two kinds of weights: one measuring the impact of each indicator on the corresponding composite indicator and the other measuring relations among the composite indicators in the system (Trinchera et al., 2008).

The PLS SEM model with factors of MO and DO is shown in Figure 1. The first step of analysis is the outer, measurement model. The construct of MO consists of two factors: strategic marketing (five indicators) and customer orientation (14 indicators). In strategic marketing, the indicator P2_3 (marketing communication activities planning) is the most influential (weight 0.764), the second is P2_5 (market research) and the third is P2_1 (long-term marketing plans). In customer orientation, the indicator P3_1 (Our commitment to serving customers is closely monitored) is the most influential, with a value of 0.903. The second most influential indicator is P4_9 (Our objectives and strategies are driven by increasing value for customers), while the indicators P4_1 (We systematically measure customer satisfaction) and P3_3 (We achieve rapid response to competitive actions) are the third most influential.

The construct of DO consists of three factors: design as competitive advantage, the role of design in communication and management, and the level of design implementation. In the first of these factors, the indicator P9_2 (Design contributes significantly to benefits perceived by consumers) is the

Table 2. Intercorrelations between factors of MO and DO

Correlations (N = 112)						
Factor of strategic marketing (**StraMarF**)	Pearson Correlation	1	.594	.336	.387	.526
	Sig. (2-tailed)		.000	.000	.000	.000
Factor of customer orientation (**MarCustF**)	Pearson Correlation	.594	1	.379	.469	.471
	Sig. (2-tailed)	.000		.000	.000	.000
Factor of design as competitive advantage (**DesCompF**)	Pearson Correlation	.336	.379	1	.622	.579
	Sig. (2-tailed)	.000	.000		.000	.000
Factor of the role of design (**DesRoleF**)	Pearson Correlation	.387	.469	.622	1	.581
	Sig. (2-tailed)	.000	.000	.000		.000
Factor of design levels (**DesLevF**)	Pearson Correlation	.526	.471	.579	.581	1
	Sig. (2-tailed)	.000	.000	.000	.000	

MARKET ORIENTATION (MO) **FACTORS**

StraMarF strategic marketing
MarCustF customer orientation

DESIGN ORIENTATION (DO) **FACTORS**

DesCompF design as competitive advantage
DesRoleF role of design (in Comm & Mngmnt)
DesLevF level of design (implementation)

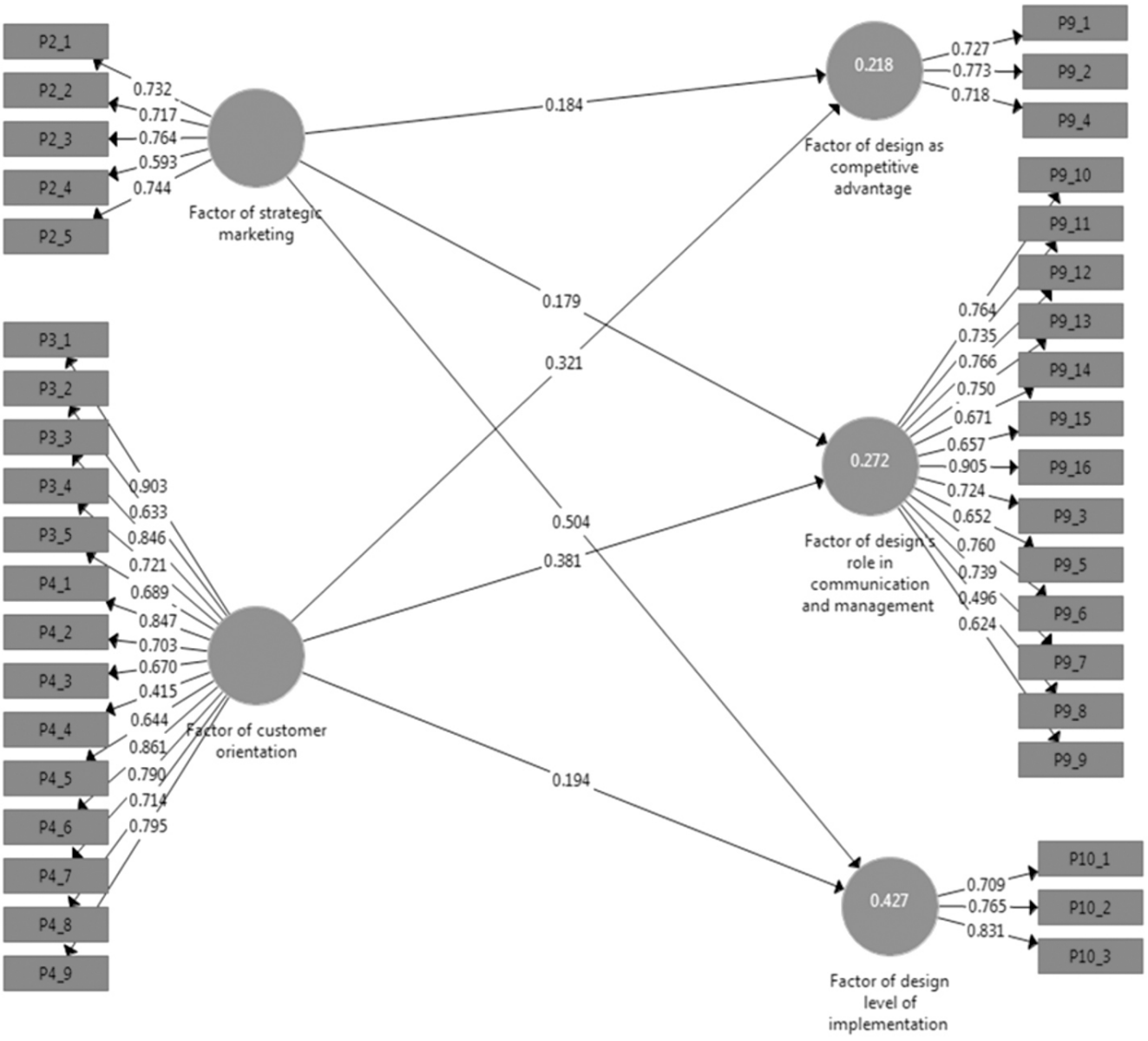
most influential of the three indicators (weight 0.785). The next most influential indicator is P9_1 (Design creates competitive advantage), and the third is indicator P9_4 (Design allows a company to sell at a higher price).

The factor of the role of design in communication and management of the company has 13 indicators. The most influential is P9_16 (Design improves our long-term goals / return-on-investment) (weight 0.905). The second most influential indicator is P9_12 (Design improves our internal and external communication) (0.767), and the third most influential indicator is P9_10 (Design creates new niche markets) (0.764). Next is P9_6 (Design is a know-how that transforms the processes) (0.759). The factor of design level of implementation has three indicators. The most influential is P10_3 (We use design as a strategic resource for new business models (for strategic investments in customer experience design, long-term return on investment)) (0.834).

The second step of analysis is the inner, structural model with path coefficients. These explain how strong the effect of one latent variable is on another latent variable. The weight of different path coefficients enables us to rank their relative statistical importance.

The factor of strategic marketing has a strong influence on the factor of design levels (path coefficient weight 0.504). However, strategic marketing has a moderate effect on the factor of design as competitive advantage (0.184), and similar effect (0.179) is also found between strategic marketing and the role of design in a company's communication and management.

Figure 1. The PLS SEM model with factors of MO and DO



The factor of customer orientation has a strong effect on design's role in the company (path coefficient 0.381) and has a relatively strong effect on the factor of design as competitive advantage (path coefficient 0.321). However, it has a moderate effect on the level of design implementation (0.194). The market orientation factors explain 22% of the variance of the design competitiveness factor, 27% of the role of design in management factor, and 43% of the variance of design as a level of implementation factor.

The factor of strategic marketing in the company has a strong impact on the level of design implementation factor (0.504), while the factor of customer orientation has a strong relationship with the factor of the role of design in communication and management of the company. Observing the data, we come to the conclusion that looking at design's role in communication and management, variable P9_16 (Design improves our long-term goals / return-on-investment) is the one with the strongest influence (0.905).

Table 3 above shows values of path coefficients for market orientation, which are all statistically significant. The factor of customer orientation has the strongest impact on the role of design in the company (0.382), the impact on design as competitive advantage is not as strong (0.328) and the impact on design implementation has the lowest value (0.201). The factor of strategic marketing has the strongest influence on the factor of design implementation, while it does not have much influence on the other two factors of design orientation.

As we can see in Table 4, the measurement of the variance inflation factor (VIF) shows that no collinearity measure exceeds the limit of 5.0, which makes the analysis acceptable (i.e., as mentioned before, there is no strong correlation between latent variables and factors). All the VIF values for measuring market and design orientation are acceptable (< 5.0), so there is no collinearity even when considering the variables in the model.

The SRMR measure of fit of data in the equation model is 0.065, which is an acceptable value (the limit value is 0.1), and thus it can be considered that the model describes well the data and relationships between the variables and factors.

At the end of the final stage, HTMT values were also calculated for the determination of discriminant validity in order to check whether constructs are sufficiently different to be acceptable as separate factors (Table 5). The values of the HTMT ratio should not exceed 0.9, which is also the case with this analysis.

According to the results of the analysis, the hypothesis H1, regarding the positive relationship of market and design orientation, has been confirmed. However, there are different influences (i.e., the influence intensity of different factors of market orientation on factors of design orientation varies).

Table 3. Path coefficient for market orientation

	Factor of design level	Factor of design as competitive advantage	Factor of the role of design
Factor of customer orientation	0.201	0.328	0.382
Factor of strategic marketing	0.499	0.177	0.178

Table 4. Measures of coexistence - Variance inflation factor (VIF)

	Factor of design level	Factor of design as competitive advantage	Factor of the role of design
Factor of customer orientation (MarCustF)	1.422	1.254	1.341
Factor of strategic marketing (StraMarF)	1.684	1.194	1.241

Table 5. Discriminant validity – HTMT

Discriminant validity – HTMT	Factor of design level	Factor of customer orientation	Factor of strategic marketing	Factor of design as competitive advantage
Factor of customer orientation (MarCustF)	0.536			
Factor of strategic marketing (StraMarF)	0.641	0.670		
Factor of design as competitive advantage (DesCompF)	0.729	0.440	0.413	
Factor of the role of design (DesRolF)	0.664	0.499	0.440	0.732

Conclusion

The research contributes to theory in several ways. Firstly, our research was undertaken in Croatia, a former socialist country recently integrated into the EU, which is experiencing a transitional economy. The majority of former studies about market orientation have focused on the practice of companies in Western, developed countries, and only a few have focused on the relationship between market orientation and design orientation. Secondly, the research highlights the role of design as one of the core elements of market orientation, its focus on customers and, indirectly, its influence on success in the market. The results demonstrate that the concept of design orientation is positively related to the concept of market orientation. Furthermore, results also support sub-hypotheses that two dimensions of market orientation, customer orientation and strategic marketing, are both positively related to all dimensions of design orientation.

The study extends the existing knowledge of effects among researched concepts when measuring the role of design orientation. Our results are consistent with most research findings reported in previous studies (i.e., Borja de Mozota, 2003b; British Design Council, 2006, 2015; Koostra, 2009; Moll et al., 2007; Venkatesh et al., 2012). Design orientation appears to indirectly impact the company performance and market success through customer orientation and by influencing the managerial approach.

The main hypothesis about the positive relationship between MO and DO has been supported. The construct of design orientation consists of three factors: design as competitive advantage, the role of design in communication and management, and the level of design implementation. The construct of market orientation consists of two factors: strategic marketing and customer orientation. According to the final results of our research, design orientation does not have a direct impact on business success, which can be understood and logically explained by many other relevant factors from the environment that influence the business results. However, the importance of design orientation and its indirect impact on market orientation and on business success proves that design, together with other important factors, leads towards customer satisfaction, good business performance and, ultimately, success, in the market as well as financially.

Implications and Limitations

There is a strong tendency in Croatian companies to maximize short-run profitability while neglecting long-term goals. Our findings demonstrate that companies with a higher level of market orientation and supported with design orientation also have the potential to achieve better results in the market which, consequently, results in better financial performance. The findings are especially important for Croatian SMEs, which make up the majority of the country's economy. In an effort to develop factors that can lead to competitive advantage, managers and CEOs should focus not only on individual design resources but also on their integration into different levels of the company. Results of the PLS-SEM analysis can help managers to better understand the importance of different variables of both constructs and their influence on each other and use this understanding for the benefit of their companies. The implementation of marketing activities, from basic marketing communication to marketing strategy, has a strong impact on the levels of design implementation in the company, while the factor of customer orientation is strongly related to the role design plays in the company, from basic design of products to design strategy. This is why managers should be well informed about design benefits.

The obtained research results should be interpreted while taking into account some limitations. First, concepts of market orientation and design orientation, as well as their relationships, are very complex and multidimensional, so it was not possible to investigate all the aspects of the constructs in this research (e.g., different industries, different organisational structures, the influence of the environment).

Second, another limitation of the study was the sample size, as a result of a low response rate as well as a relatively high drop-out rate of managers who participated in but did not fully complete the survey. There are several possible reasons for this. It may be that some of the managers were not familiar with the subject of design or with the data about investing in design, or the length of the questionnaire and/or respondents lack of free time and/or motivation may have had an effect on the outcome. These facts and possibilities should be taken into consideration in future research.

References

Atuahene-Gima, K., Slater, S. F., & Olson, E. M. (2005). The contingent value of responsive and proactive market orientations for new product program performance. *The Journal of Product Innovation Management*, *22*(6), 464–482. https://doi.org/10.1111/j.1540-5885.2005.00144.x

Bagozzi, R. P. (2012). The evolution of marketing thought: From economic to social exchange and beyond. In P. Maclaran, M. Saren, B. Stern, & M. Tadajewski (Eds.), *The SAGE handbook of marketing theory* (pp. 245-262). London, England: Sage.

Best, K. (2006). *Design management: Managing design strategy, process and implementation.* Worthing, Sussex, Ava Academia.

Black, C. D., & Baker, M. (1987). Success through design. *Design Studies*, *8*(4), 207-216. https://doi.org/10.1016/0142-694X(87)90017-2

Blaich, R., & Blaich, J. (1993). *Product design and corporate strategy – Managing the connection for competitive advantage*. New York, NY: McGraw Hill.

Bloch, P. H., Brunel, F. F., & Arnold, T. J. (2003). Individual differences in the centrality of visual product aesthetics: Concept and measurement. *Journal of Consumer Research*, 29(4), 551-565. https://doi.org/10.1086/346250

Bodlaj, M. (2010). The impact of a responsive and proactive market orientation on innovation and business performance. *Economic and Business Review*, *12*(4), 241–261.

Borja de Mozota, B. (2003a). *Design management: Using design to build brand value and corporate innovation*. New York, NY: DMI/Allworth Press.

Borja de Mozota, B. (2003b). Design and competitive edge: A model for design management excellence in European SMEs. *Design Management Journal Academic Review*, *2*(1), 88-103.

Brown, T. (2008). Design thinking. *Harvard Business Review*, June, 85-92.

Bruce, M., Potter, S., & Roy. (1995).The risks and rewards of design investment. *Journal of Marketing Management*, *11*(5), 403-17. https://doi.org/10.1080/0267257X.1995.9964356

Buchanan, R. (2015). Worlds in the making: Design, management, and the reform of organizational culture. *The Journal of Design, Economics, and Innovation*, *1*(1), 5-21. https://doi.org/10.1016/j.sheji.2015.09.003

Centre for Design Innovation Ireland. (2007). *Design difference - Design innovation research*. Retrieved from: www.designinnovation.ie/downloads/ResearchMethodology.pdf.

Chandler Jr., Alfred D. (1991). The functions of the HQ unit in the multibusiness firm. *Strategic Management Journal*, *12*(52), 31-50. https://doi.org/10.1002/smj.4250121004

Chitturi, R., Raghunattan, R., & Mahajan, V. (2008). Delight by design: The role of hedonic vs. utilitarian benefits. *Journal of Marketing*, *72*(3), 48-63. https://doi.org/10.1509/JMKG.72.3.048

Coley, L. S., Mentzer, J. T., & Coope, M. (2010). Is consumer orientation a dimension of market orientation in consumer markets? *Journal of Market Theory and Practice*, *18*(2), 141-154. https://doi.org/10.2753/MTP1069-6679180203

Design Council. (2015). *Innovation by design: How design enables science and technology research to achieve greater impact*. Retrieved from: https://www.designcouncil.org.uk/resources/report/innovation-design.

Design Council. (2018). The design economy 2018: The state of design in the UK. Retrieved from: https://www.designcouncil.org.uk/resources/report/design-economy-2018.

Deshpande, R., & Farley, J. (1998). Measuring market orientation: Generalization and synthesis. *Journal of Market-Focused Management*, *2*(3), 213-232. https://doi.org/10.1023/A:1009719615327

Design Management Institute. (2015). *Design Value Index results and commentary*. Retrieved from: https://www.dmi.org/page/2015DVI-andOTW.

European Commission. (2013). Implementing an action plan for design driven innovation. *EC Commission staff working document*, SWD (2013) 380 final, Brussels.

Gemser, G., & Leenders, MAAM. (2001). How integrating industrial design in the product development process impacts on company performance. *The Journal of Product Innovation Management*, *18*(1), 28-38. https://doi.org/10.1111/1540-5885.1810028

Gorb, P. (1990). *Design management: Papers from the London Business School*. London, Phaidon Press.

Grinstein, A. (2008) The relationships between market orientation and alternative strategic orientations: A meta-analysis. *European Journal of Marketing*, *42*(1/2), 115-134. https://doi.org/10.1108/03090560810840934

Gumesson, E. (1991). Marketing orientation revisited: The crucial role of the part-time marketer. *European Journal of Marketing*, *25*(2), 60-75. https://doi.org/10.1108/03090569110139166

Han, S. H., Yun, M. H., Kim, K., & Cho, S. (1998). *Development of a usability evaluation method. Technical Report (97-G-17-01-A-15)*. Ministry of Science and Technology of South Korea.

Hertenstein, J., Platt, M., & Veryzer, R. W. (2005). The impact of industrial design effectiveness on corporate financial performance. *The Journal of Product Innovation Management*, *22*(1), 3-21. https://doi.org/10.1111/j.0737-6782.2005.00100.x

Homburg, C. & Pflesser, C. (2000). A multiple-layer model of market-oriented organizational culture: measurement issues and performance outcomes. *Journal of Marketing Research*, *37*(4), 449-462. https://doi.org/10.1509/jmkr.37.4.449.18786

Jaworski, B. J, & Kohli, A. K. (1993). Market orientation: antecedents and consequences. *Journal of Marketing*, *57*(3), 53-70. https://doi.org/10.1177/002224299305700304

Kahn, K. B. (2001). Market orientation, interdepartmental integration, and product development performance. *Journal of Product Innovation Management*, *18*(5), 314-323. https://doi.org/10.1111/1540-5885.1850314

Kohli, A., Jaworski, B., Kumar, A. (1990). Market orientation: The construct, research propositions and managerial implementations. *Journal of Marketing*, *54*(2), 1-18. https://doi.org/10.1177/002224299005400201

Kohli, A., Jaworski, B., Kumar, A. (1993). MARKOR: A measure of market orientation. *Journal of Market Research*, 30(4), 467-477. https://doi.org/10.1177/002224379303000406

Jaworski, B., Kohli, A. & Sahay, A. (2000). Market-driven versus driving markets. *Journal of the Academy of Marketing Science*, *28*(1), 45–54. https://doi.org/10.1177/0092070300281005

Kootstra, G. L. (2009). *The incorporation of design management in today's business practices: An analysis of design management practices in Europe*. DME Survey, Inholland.

Marketing Department of the Faculty of Economics and Business and Marketing Institute. (2008). *Marketing in the 21st century/Marketing v 21. stoletju*. Maribor, University of Maribor.

Milfelner, B. (2009). The role of proactive and responsive market orientation in the development of a firm's innovation resources. *Naše gospodarstvo/Our economy*, 55(1/2), 51-58.

Moll, I., Montana, J., Guzman, F., & Praallada, F. S. (2007). Market orientation and design orientation: A management model. *Journal of Marketing Management*, *23*(9), 861-876. https://doi.org/10.1362/026725707X250368

Morgan, N. A., Vorhies, D. W., & Mason C. H. (2009). Market orientation, marketing capabilities, and firm performance. *Strategic Management Journal*, *30*(8), 909-920. https://doi.org/10.1002/smj.764

Narver, J., & Slater, S. (1990). The effect of a market orientation on business profitability. *Journal of Marketing*, *54*(4), 20-35. Doi: https://doi.org/10.2307/1251757

Narver, J. C., Slater, F. S., & MacLachlan, D. L. (2004). Responsive and proactive market orientation and new-product success. *The Journal of Product Innovation Management*, *21*(5), 334-347. https://doi.org/10.1111/j.0737-6782.2004.00086.x

Nunnally, J. C. (1978). *Psychometric theory* (2nd ed.). New York, NY: McGraw-Hill.

Rae, J. (2013). What is the real value of design? *DMI Review*, *24*(4), 30-37.

Rae, J. (2015). The power & value of design continues to grow across the S&P 500. *DMI Review*, *27*(4), 4-11.

Rau C., Zbiek, A., & Jonas J., M. (2017). Creating competitive advantage from services. *Research-Technology Management*, *60*(3), 48-56. https://doi.org/10.1080/08956308.2017.1301003

Sarstedt M., Ringle, C. M., & Hair, J. F. (2017). Partial Least Squares Structural Equation Modeling. In C. Homburg et al. (eds), *Handbook of Market Research* (3rd ed.). https://doi.org/10.1007/978-3-319-05542-8_15-1

Sisodia, R. S. (1992). Competitive advantage through design. *Journal of Business Strategy*, *13*(6), 33-40. https://doi.org/10.1108/eb039525

Slater F. S., & Narver, J. C. (2000). The positive effect of a market orientation on business profitability: A balanced replication. *Journal of Business Research*, *48*(1), 69–73. https://doi.org/10.1016/S0148-2963(98)00077-0

Snoj, B., Milfelner, B., &Gabrijan, V. (2007). An examination of the relationships among market orientation, innovation resources, reputational resources, and company performance in the transitional economy of Slovenia. *Canadian Journal of Administrative Sciences*, *24*(3), 151–164. DOI: https://doi.org/10.1002/cjas.22

Srinivasan, R., Lilien, G. L., & Rangaswami, A. (2006). The emergence of dominant designs. *Journal of Marketing*, *70*(2), 1-17. https://doi.org/10.1509/jmkg.70.2.001

Teece, D. J., Pisano, G., & Shuen A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, *18*(7), 509-535. https://doi.org/10.1002/(SICI)1097-0266(199708)18:7<509::AID-SMJ882>3.0.CO;2-Z

Trinchera, L., Russolillo, G., & Lauro, C. N. (2008). Using categorical variables in PLS path modelling to build system of composite indicators. *Statistica Applicata*, *20*(3-4), 309-330.

Tsai, K., Chou, C., & Kuo, J. (2008). The curvilinear relationships between responsive and proactive market orientations and new product performance: a contingent link. *Industrial Marketing Management*, *37*(8), 884-894. https://doi.org/10.1016/j.indmarman.2007.03.005

Ulrich, K. T., & Eppinger, S. D. (2003). *Product design and development*. New York, NY: McGrawHill/Irwin.

Venkatesh, A., Digerfeldt-Månsson, T., Brunel, F. F., & Chen, S. (2012). Design orientation: A grounded theory analysis of design thinking and action. *Marketing Theory*, *12*(3), 289-309. https://doi.org/10.1177/1470593112451388

Veryzer, R. W., & Borja de Mozota, B. (2005). The impact of user-oriented design on new product development: An examination of fundamentals relationship. *Journal of Product Innovation Management*, *22*(2), 128-143. https://doi.org/10.1111/j.0737-6782.2005.00110.x

Von Stamm, B. (2003). *Managing innovation, design and creativity*. London, England: John Wiley & Sons Ltd.

Voola, R., & O'Cass, A. (2010). Implementing competitive strategies: The role of responsive and proactive market orientations. *European Journal of Marketing*, *44*(1/2), 245-266. https://doi.org/10.1108/03090561011008691

APPENDIX

Table A1. MO and DO factors extraction (Rotated Component Matrix)a with Cronbach's alpha coefficients (N=112)

MARKET ORIENTATION FACTORS	**Component**				
	1	2	3	4	5
We do long-term marketing plans	.313	.185	.726	-.006	.087
We do short-term marketing plans	.336	.044	.499	.109	.388
We do marketing communication activities planning (ADs, promotion and PR)	.374	.074	.675	-.109	.416
We use media buying	.059	.141	.689	.177	.127
We do marketing research	.280	.148	.760	.209	-.054
Name of the MO factor / Number of **items** = **5**	**Strategic marketing (StraMarF)**				
Cronbach's Alpha	**.831**				
Our commitment to serving customers is closely monitored	.702	.227	.382	-.011	.072
Salespeople share information about our competitors	.573	.216	.141	-.059	.127
We achieve rapid responses to competitive actions	.629	.146	.343	.097	.148
Our functions are integrated to serve market needs	.688	.151	.266	-.039	.150
Close attention is given to after-sales services	.740	.085	.086	.164	.300
We measure customer satisfaction systematically	.719	.185	.365	.038	-.056
Our competitive strategy is based on understanding customer needs	.859	.088	.155	.039	.069
We observe how customers use our products	.825	.149	.021	.142	.075
We collaborate closely with key users to predict future customer needs before others	.838	.114	-.138	-.025	-.016
We collect information necessary for detecting the appearance of new market segments	.714	.140	.023	.092	.207
We have updated information on the image of our products/brands among current and potential customers	.684	.246	.354	.063	-.084
We measure levels of customer loyalty compared to last year and our competition	.631	.209	.319	.223	-.124
We explore key trends to gain insight into what users will need in future	.682	.166	.116	.274	.040
Our objectives and strategies are driven by increasing value for customers	.743	.145	.107	.279	.242
Name of the MO factor / Number of **items** = 14	**customer orientation (MarCustF)**				
Cronbach's Alpha	.946				
DESIGN ORIENTATION FACTORS					
Design creates competitive advantage	.127	.333	.066	.696	.169
Design contributes significantly to benefits perceived by consumers	.134	.331	.137	.661	.202
Design allows a company to sell at a higher price	.138	.336	.092	.756	.026
Name of the DO factor / Number of **items** = **3**	**design as competitive advantage (DesCompF)**				
Cronbach's Alpha	**.780**				
Design changes the spirit of the firm, which becomes more innovative	.142	.694	.189	.089	.159
Design improves coordination between marketing and R&D functions.	.153	.834	.062	.066	-.028
Design is a type of know-how that transforms processes	.135	.706	.130	.170	.184
Design gives access to a wide variety of markets	.303	.464	-.009	.168	.372
Design improves coordination between production and marketing	.216	.756	.036	-.079	-.127
Design develops project management of innovation	.141	.712	.185	-.026	.074
Design creates new niche markets	.107	.716	.061	.206	.219

Table A1. MO and DO factors extraction (Rotated Component Matrix)a with Cronbach's alpha coefficients (N=112) (continued)

MARKET ORIENTATION FACTORS	Component				
	1	2	3	4	5
Design improves the circulation of information	.023	.730	.148	.167	.248
Design improves our internal and external communication	.244	.652	.067	.209	.152
Design improves our services and working processes	.089	.724	.005	.355	.096
Design involves our customers in a co-creation process	.260	.654	.048	.197	-.104
Design provides sustainable development and benefits to the community	.131	.697	.039	.189	.087
Design improves our long-term goals / return-on-investment	.187	.658	.227	.449	-.019
Name of the DO factor / Number of **items** = **13**	**role of design (DesRoleF)**				
Cronbach's Alpha	**.933**				
We use design for the development and delivery of products, services and communications (for aesthetic value and functionality)	.128	.169	.168	.483	.591
We use design as a connector or integrator of business functions (for internal and external communications, as customer value, brand loyalty and market share)	.281	.316	.241	.112	.692
We use design as strategic resource for new business models (for strategic investments in customer experience design, long-term return on investment)	.186	.463	.222	.297	.486
Name of the DO factor / Number of **items** = **3**	**level of design (DesLevF)**				
Cronbach's Alpha	**.811**				

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization. Rotation converged in 6 iterations.*

Struktura naravnanosti na dizajn in njena povezanost s tržno naravnanostjo

Izvleček

Tržna naravnanost je koncept, ki je proučevan v številnih študijah, vendar ne v povezavi z naravnanostjo na dizajn, še posebej pa je to področje neraziskano v državah v tranziciji. Namen te raziskave in prispevka je predstaviti osnovne dimenzije oziroma strukturo naravnanosti na dizajn in prikazati njeno povezanost s tržno naravnanostjo. Raziskava je bila izvedena v več stopnjah s kombinacijo kvalitativnih in kvantitativnih metod. Izvedli smo serijo poglobljenih intervjujev ter nato nadaljevali z zbiranjem kvantitativnih podatkov prek spleta, pri čemer so bili glavni informanti vodilni menedžerji v hrvaških podjetjih iz različnih panog. Za testiranje raziskovalnega modela in povezav v modelu smo uporabili metodo delnih najmanjših kvadratov (PLS) in modeliranje strukturnih enačb (SEM). Rezultati potrjujejo osnovno hipotezo, da obstaja pozitivna povezanost med naravnanostjo na dizajn in tržno naravnanostjo. Nadalje rezultati potrjujejo tudi podhipotezi, da je naravnanost na odjemalce pozitivno povezana z vsemi dimenzijami naravnanosti na dizajn, kot tudi da je strateški marketing pozitivno povezan z vsemi dimenzijami naravnanosti na dizajn. Proučevana koncepta sta zelo kompleksna in večdimenzionalna, zato vseh vidikov oziroma dimenzij ni mogoče zajeti v eni raziskavi. Omejitev raziskave je tudi velikost vzorca kot posledica nizke odzivne stopnje anketiranih. Raziskava prispeva k razumevanju vloge dizajna v marketingu in poudarja neposredno povezanost s tržno naravnanostjo.

Ključne besede: naravnanost na dizajn, tržna naravnanost, gospodarstvo v tranziciji, odnosi, menedžerji

Demand and Characteristics of Customers of Reusable Products in Slovenia

Katja Zajko
Recosi d.o.o., so.p., Slovenska Bistrica, Slovenia
katja.zajko@recositech.si

Barbara Bradač Hojnik
University of Maribor, Faculty of Economics and Business, Slovenia
barbara.bradac@um.si

ORIGINAL SCIENTIFIC PAPER

RECEIVED: JULY 2019

REVISED: AUGUST 2019

ACCEPTED: SEPTEMBER 2019

DOI: 10.2478/ngoe-2019-0014

UDK: 366.12:339.162.3:005.311

JEL: Q21, L31

Citation: Zajko, K., & Bradač Hojnik, B. (2019). Demand and Characteristics of Customers of Reusable Products in Slovenia. *Naše gospodarstvo/Our Economy,* 65(3), 63–72. DOI: 10.2478/ngoe-2019-0014

Abstract

The main aim of the paper is to analyse whether a demand for reusable products in Slovenia exists and to identify customers' characteristics in terms of their gender, age, income, education and employment status. We used survey data to investigate what share of customers in Slovenia are buying and are willing to buy reusable products. Furthermore, we investigate whether there are differences between customers who are buying and who are not buying reusable products with regard to selected demographics (gender, age, income, education and employment status). The findings show that more than half of customers in Slovenia are already buying reusable products. The results of selected characteristics of individuals indicate that there are differences among buyers and non-buyers of reusable products only with regard to gender. The paper contributes to the literature on the demand for reusable products and gives better insights into the characteristics of customers buying reusable products.

Keywords: reusable products, demand, customer segmentation, Slovenia

Introduction

In the business environment, the concept of the circular economy is a relatively new and fast-developing topic, which is gathering researchers' attention because of its environmental impact. Consequently, new business models have emerged that have the potential to alter the ways in which we think about our role within economic systems. Prominent among these is the concept of reuse, which is an important part of the social movement that aims for ethical, responsible and sustainable consumption (Zajko & Bradač Hojnik, 2018). A vital part of any system that aims to achieve reuse is to generate and sustain markets for products that have been refurbished. Currently, the reuse market is mainly focused on online platforms (such as eBay), flea markets and second-hand dealers. What is meant by the term 'reusable product' is that the product can be used several times for an intended end use (Premm, 2012) before being discarded.

In order to reach the set targets of Directive 2008/98/EC (the Waste Framework Directive) to have the highest possible rates of reuse, it is necessary to boost the demand and encourage as many companies as possible to get active in the business

NG
OE

**NAŠE GOSPODARSTVO
OUR ECONOMY**

Vol. 65 No. 3 2019

pp. 63–72

field of reuse. The Waste Framework Directive sets the basic concepts and definitions related to waste management, including definitions of waste, recycling, reuse and recovery. It explains when waste ceases to be waste and becomes a secondary raw material (so called end-of-waste criteria), as well as how to distinguish between waste and by-products. Waste legislation and policy of the EU Member States shall apply the following waste management hierarchy (Premm, 2012): prevention, reuse, recycling, recovery and disposal.

While several prior studies (e.g., Flash Eurobarometer, 2011; Matos & Silvestre, 2013; Matsumoto, 2010) have investigated the reuse concept, there is still a lack of research that would explore demand and customer segmentation for reusable products. Additionally, customers' preferences are changing over time. Therefore, the purpose of this paper is to study the demand for reusable products in Slovenia. Furthermore, the aim is to empirically test whether differences exist between buyers and non-buyers of reusable products with regard to selected demographic characteristics.

The first part of the paper reviews the literature to provide an overview of the consumption of reusable products as a crucial factor to ensure the economical continuity and sustainability of reuse businesses. This is followed by a discussion of customers' buying behaviours and preferences. The theoretical framework concludes with market demand and customers' willingness to buy reusable products, which is indispensable to sustain reuse businesses. The empirical part of the paper first employs a binomial test, which provides evidence of existing demand for reusable products and evidence for willingness to buy reusable products in Slovenia. Further, the empirical part employs a nonparametric test and t-test, which provide details about differences between buyers and non-buyers of reusable products with regard to selected demographic characteristics (i.e., gender, age, income, education and employment status). The paper concludes by revealing the results of the empirical analysis in comparison to some other research results.

Literature Review

Throughout the last two decades, the rapid growth of reusable product consumption has gained the attention of researchers and raised the question of why customers purchase reusable products. One answer to this question is that, due to economic and ecological reasons, some customers are now more interested in reusable products rather than new products (Guiot & Roux, 2010). The longer product lifetime achieved through reuse gives an opportunity for recycling technologies to develop and for preserving a larger stock of resources for the future. The consumption of reusable products is also considered one of the best strategies to protect the environment, as it saves natural resources for making new products as well as protects the environment by preventing the used products from becoming waste (Yeh *et al.*, 2010). Reuse is the only way to conserve the many critical raw materials for which no recycling technologies exist. For example, the manufacturing of electrical and electronic equipment (e.g., flat televisions, desktop computers, laptops and smartphones) is dependent on the supply of several metals that are classified as critical. There is currently no recovery of the high-tech elements antimony, arsenic, beryllium, silicon, gallium, germanium, and rare earth elements, while there are close to zero recovery rates for tantalum, lithium, and magnesium. The longer lifetime achieved through reuse thus gives an opportunity for such recycling technologies to develop and keeps a larger stock of resources for the urban mine of the future (Chancerel et al., 2015).

However, many customers may feel uncertain about the quality of the reusable products and instead would rather purchase new products, especially when a warranty is provided (Yeh et al., 2010). Therefore, a clear signal of quality is crucial in instilling confidence in customers. Additionally, public awareness, branding and warranty options have to be developed to generate the right conditions for a market for reused equipment to flourish (O'Connell & Fitzpatrick, 2013). A public awareness campaign is also a crucial element, as final markets for the reusable products are essential for the on-going success of reusable products' companies. This campaign should focus on the job creation, value for money and environmental benefits that reuse brings and should be undertaken through the national and local media as well as on-line advertising and social networks. A reuse organisation should have its own unique brand and labelling scheme, with clearly visible labels on reusable product fit for resale. The unique brand and label will enable customers to identify the product they are purchasing as a reusable product that has been refurbished to a predefined standard, has a warranty of a definite duration and has aided in the provision of employment (O'Connell & Fitzpatrick, 2013). The warranty is a fundamental aspect of electrical and electronic equipment reuse for promoting customer confidence.

Customers sometimes exhibit a negative attitude towards used products; however, change is evident in their shopping habits and preferences. Nonetheless, although in recent years it has become increasingly common for customers to choose products that correspond with their ethics, such as those based on environmental issues, customers' negative attitudes toward reusable products often remain a major obstacle for reuse businesses. There could also be differences in customer preferences due to cultural differences. According to Sundin et al. (2008), the potential reasons why remanufacturing has more potential for success in the U.S.

compared to Sweden are cultural behaviour, customers' closeness to a reuse market, and higher focus on price. This illustrates that customers' preferences differ between countries, which leads to differences in reuse markets.

Customer behaviour is a key factor to consider in the reuse of products (e.g., Afroz et al., 2013; Dindarian et al., 2012; Gutiérrez et al., 2010). The progress of technology and short-term trends lead to more acquisitions, mainly of new products. Additionally, such progress cuts the usage time of products (Babbitt *et al.*, 2009), which are replaced by either new products or reused ones and are rarely repaired (e.g., Hennies & Stamminger, 2016; Sabbaghi et al., 2016; Scott & Weaver, 2014). Another study among 115 customers from the UK (Cox et al., 2013) revealed that they expect constant and rapid updating of products. In particular, having the latest versions of products is strongly associated with personal identity and feelings of success in life. Such customers do not prefer to buy reused or second-hand products.

The empirical evidence on reusable product demand reveals heterogeneous results regarding buying or willingness to buy reusable products. Regarding reusable product acquisition, some studies revealed that customers are against buying reusable products. Fisher et al. (2005) found that people are concerned about potential premature failure and hygiene of reusable products. Lyndhurst (2011) claimed that people are frightened of reusable products and that they generally want to obtain new products (Watson, 2008). A survey conducted by Flash Eurobarometer (2011) estimated EU citizens' perceptions, attitudes and practices concerning resource efficiency, waste management and recycling. A sample size of 1,000 individuals aged 15 and older was used for each country within the EU-27. EU Citizens' willingness to buy second-hand products and reasons for not buying second-hand products were two categories within the survey. Customers' willingness to buy furniture, electronic equipment and textiles were compared, as were the reasons negative respondents gave for not buying second-hand products. Almost 7 out of 10 (68%) EU citizens expressed willingness to buy second-hand furniture, electronic equipment or textiles. A majority (56%) of EU citizens said they would buy second-hand furniture, while less than half (45%) said they would buy electronic equipment, and a comparatively smaller proportion (36%) said they were willing to buy second-hand textiles (e.g., clothing, bedding or curtains). Furthermore, results for Slovenian customers were above the average, as 72% were willing to buy second-hand products. Specifically, respondents indicated they would be willing to buy used furniture (57%), electronic equipment (55%) and textiles (30%).

The latest study by Flash Eurobarometer (2014) about attitudes of Europeans towards waste management and resource efficiency revealed slightly different results in terms of willingness to buy particular types of reusable products. In this study, only 16% of EU citizens indicated that they would not buy any reusable products, while 84% expressed willingness to buy second-hand products. For example, 55% said they would buy second-hand furniture, 44% would buy second-hand electronic equipment, and 34% would be second-hand textiles, while more than seven out of ten people (72%) would purchase second-hand books, CDs, DVDs or video games. The same report revealed that the main factors that prevent people from buying second-hand goods are the perception of inferior quality and health and safety concerns. For Slovenia, the 2014 Flash Eurobarometer study found higher levels of willingness to buy reusable products than did the previous one in 2011. Almost 8 out of 10 respondents (79%) expressed willingness to buy any of the listed second-hand products. Specifically, respondents indicated their willingness to buy second-hand books, CDs, DVDs and video games (62%), furniture (47%), electronic equipment (43%), household electrical appliances (38%) and textiles (30%). However, the results for Slovene customers who expressed willingness to buy second-hand products were below the EU average.

Nevertheless, the willingness to buy is only an indicator, which does not show the real but only the potential purchase of reusable products. Studies measuring actual reusable product purchases revealed much lower shares of reusable product buyers. For example, a study conducted in Spain (Bovea et al., 2017) showed that less than 1% of participants has ever bought second-hand small household electrical and electronic equipment. The main reasons given for the low rate were the cost of second-hand products (similar to that of new equipment) and hygiene and cleaning concerns.

Although prior studies have been conducted regarding the willingness to buy and actual purchase of reusable products, results are divergent and consequently require additional insight into the topic. Therefore, we formulated two hypotheses, one dealing with the actual purchase and the other with willingness to purchase reusable products. Regarding the first hypothesis, where we will examine the actual buying of reusable products, we used the threshold of 50%, because previous studies (e.g., Bovea et al., 2017; Flash Eurobarometer, 2014) showed diversified results. However, this share is expected to be lower than the willingness to buy reusable products.

Regarding measuring the willingness to buy reusable products in the second hypothesis, we will test whether more than 70% of individuals are willing to buy reusable products. This proportion has been used because some previous studies (e.g., Flash Eurobarometer, 2011, 2014) showed similar shares, but there is a lack of evidence concerning the

time stability of the proportion. Therefore, this study aims to address this issue by investigating whether the proportion is changing over time. Regarding the above-discussed issues, the following two hypotheses are presented:

H1: More than 50% of individuals in Slovenia are actually buying reusable products.

H2: More than 70% of those who do not currently buy reusable products in Slovenia are willing to buy them.

Previous studies have revealed that consumers' buying behaviour is generally influenced by two important sets of factors (Solomon et al., 2013): individual factors (e.g., demographics, customer's perception, knowledge, inspiration, learning, personality, attitude, thoughts and lifestyle) and environmental factors (e.g., culture, the reference group, social class, family and household). For example, gender is an important variable used in marketing to segment customers (Meyers-Levy & Strenthal, 1991). The influence of gender upon decision-making and shopping behaviour has been a subject of special interest in the field of marketing (Hernandez et al., 2011). Generally speaking, shopping is stereotypically considered a female activity (Buttle, 2006). Research by Global Marketing Insight revealed that the channels and reasons for choosing reused items differ by age group and gender. Charity shops are the most popular offline destination for second-hand shopping. Almost seven out of 10 (67%) respondents in one study have bought items in a charity shop, and they are more popular with women than men. Furthermore, a third of customers are buying more second-hand items than they were 12 months ago, and more women than men are happy to rummage through vintage or used items (Chahal, 2013).

Additionally, there are some other factors (e.g., price, brand, risk and location) that customers consider while buying a product (Sata, 2013). Influential factors also differ based on the product category, customer personality and demographic characteristics (e.g., Fortuna & Diyamandoglu, 2017). For example, when customers choose an automobile brand, they consider quality and price as the most important factors. For sensitive electronic products like mobile phones, price and features become important factors for customers.

Some other circumstances also contribute to demand for reusable products. One of these is that some consumers may be in a relatively more challenging economic situation that impacts the demand for reusable products (Austin et al., 2006). Many people simply cannot afford classy and expensive products (e.g., clothes or furniture). This group of potential customers might encompass students, seasonal workers, immigrants, refugees and other disadvantaged people. According to Williams and Paddock (2003), disadvantaged people who are unable to buy new goods from formal retail outlets are the primary users of second-hand stores. As reported by Williams and Paddock (2003), even economically rational customers (those who like to take the best action for utility maximization to get the best payoffs) (Shugan, 2006) are involved in the reuse market. According to Guiot and Roux (2010), due to the economic crisis and the consequent drop in purchasing power, the middle class has become more involved within the reuse market and has begun purchasing more reusable products. However, an assumption that only the lower and middle classes are involved in the second-hand market would be incorrect. A study of Scitovsky (1994) showed that the upper class is also involved in the reuse market and how the reuse market is used by different economic classes of people.

Considering previous studies and their results from examining customers' behaviour from different perspectives, our third hypothesis refers to differences in demographic characteristics between individuals who are buying reusable products and those who are not. These are important aspects for reuse organisations to consider in order to address their selling efforts to the right groups of people to achieve the best results. Therefore, we will test differences between these two groups for several characteristics — gender, age, income, education and employment status — using our third hypothesis, with sub-hypotheses for each demographic characteristic:

H3: Differences exist in demographic characteristics between groups of individuals who do and do not buy reusable products. Specifically, such differences exist in terms of a) gender, b) age, c) income, d) education, and e) employment status.

Research Methodology and Data

The paper is based on empirical research using a survey, which included a convenience sample of 599 individuals in Slovenia, aged 15 years or older. This study was conducted generally for all types of reusable products. Data were collected from September till November 2015, using a structured questionnaire that consisted of 6 demographic questions and 13 closed-ended questions. Data were collected in two ways: using an online survey tool and from random visitors in front of the two biggest shopping centres in Slovenia, one in Maribor and one in Ljubljana. Email addresses were acquired from the conference of Integral Green Economy for Better World, and questionnaires were sent out to more than 400 recipients, 99 of whom responded. The face-to-face survey was carried out with 500 random visitors in front of shopping centres. The set of demographic

questions included questions about gender, age group, income level, educational level, employment status and region. We included dichotomous questions, questions with multiple answers, and questions for which respondents evaluated the importance of the argument based on a five-point Likert scale. Before the survey was conducted, the questionnaire was pilot tested on 10 people. Based on the results and comments from tested respondents, we adjusted the questions accordingly.

The collected data were processed using the program SPSS Statistics 21.0. For testing the hypotheses, we used a binomial test, Mann-Whitney test and t-test.

In the analysis, the following variables were used:

- Willingness to buy reusable products: Respondents were asked whether they were prepared to buy a reusable product in the future. Only individuals who answered that they had never bought a reusable product were asked this question.
- Actual buying of reusable products: Respondents were asked whether or not they currently buy reusable products.
- Respondents' gender: 1 = male, 2 = female.
- Respondents' age: Age was grouped into 4 categories: 1 = 15 to 30 years, 2 = 31 to 40 years, 3 = 41 to 50 years, and 4 = 51 years or older.
- Respondents' income: Income was grouped into 6 categories: 1 = 400 EUR or less, 2 = 401 to 600 EUR, 3 = 601 to 1000 EUR, 4 = 1001 to 1500 EUR, 5 = 1501 to 2000 EUR, and 6 = 2001 EUR or more.
- Respondents' education: Education was grouped into 4 groups according to their completed educational level: 1 = primary school, 2 = secondary education, 3 = post-secondary or bachelor's education, 4 = master's education or higher.
- Respondents' employment status: employment status was measured by 6 groups: 1 = unemployed, 2 = employed, 3 = company owner, 4 = farmer, 5 = retired, and 6 = student.

Data Analysis and Results

To test the first hypothesis, regarding whether more 50% of individuals in Slovenia are buying reusable products, we used the binomial test. The actual buying of reusable products was tested among 599 respondents who answered whether or not they were currently buying reusable products or not. In this case we also set a null hypothesis (H0) and alternative hypothesis (H1):

H0: $\pi \leq 0.5$ (The proportion of those who are buying reusable products is less than or equal to 50%).

H1: $\pi > 0.5$ (The proportion of those who are buying reusable products is higher than 50%).

The results of the binomial test (Table 1) indicate that the observed proportion of actual buyers of reusable products is 0.56 and is statistically significantly higher than the expected 0.5, p=0.005 (2-sided).

Table 1. Binomial test results for actual buying of reusable products in Slovenia

Actual buying of reusable products in Slovenia				
Category	N	Observed Proportion	Test Proportion	Exact Sig. (2-tailed)
Yes	334	0.56	0.50	0.005
No	265	0.44		
Total	599	1.00		

With a significance level of 0.005, we can conclude that more than 50% of customers do buy reusable products in Slovenia, supporting H1. Confirming this hypothesis means that in the Slovene market more than 50% of customers are already buying reusable products, and therefore a demand exists for these products. Our results indicate that the proportion of individuals in Slovenia who are already buying reusable products is higher compared to the findings of some other studies (e.g., Bovea et al., 2017; Flash Eurobarometer, 2011, 2014).

To test the second hypothesis, regarding whether more than 70% of individuals in Slovenia are willing to buy reusable products, we also used a binomial test. The willingness to buy reusable products was tested among respondents who answered that they had never bought a reusable product (n = 286). Respondents answered this question with "yes" or "no". In order to carry out the binomial test, we set a null hypothesis (H0) and alternative hypothesis (H1):

H0: $\pi \leq 0.7$ (The proportion of those who are willing to buy reusable products is less or equal to 70%).

H1: $\pi > 0.7$ (The proportion of those who are willing to buy reusable products is higher than 70%).

The results of the binomial test (Table 2) indicate that the observed proportion of individuals who are willing to buy reusable products in the future is 0.7, which is equal to the test proportion 0.7, p=0.512 (1-sided). Therefore, we cannot reject the null hypothesis and thus cannot confirm our second hypothesis that more than 70% of individuals in Slovenia are willing to buy reusable products in the future. Compared to previous studies (e.g., Flash Eurobarometer, 2011, 2014), our results indicate lower levels of willingness

to buy reusable products. This could be the result of the better economic situation of respondents, because unlike the earlier surveys, our survey was conducted well after the recent economic crisis.

Table 2. Binomial test results for willingness to buy reusable products in the future

Willingness to buy reusable products in the future		N	Observed Proportion	Test Proportion	Exact Sig. (1-tailed)
Valid	Yes	200	0.70	0.70	0.512[a]
	No	86	0.30		
	Total	286	1.00	0	

[a] Alternative hypothesis states that the proportion of cases in the first group < 0.70.

To test the third hypothesis, regarding whether differences exist in demographic characteristics between individuals who buy reusable products and individuals who do not buy reusable products, we used a Mann-Whitney non-parametric test and t-test. Differences in demographic characteristics were tested among respondents who answered that they buy reusable products (Group of buyers) and those who answered that they do not buy reusable products (Group of non-buyers). In Table 3, the descriptive statistics results of demographic characteristics for both groups (buyers and non-buyers) are presented.

Descriptive statistics results in Table 3 show the results of each of the five analysed demographic characteristics. We can see that in the Group of buyers is found a higher proportion of men (39.52%) than in the Group of non-buyers (26.42%). The proportion of men in the Group of buyers is also slightly higher than the proportion of men in the selected sample, where it is 33.72%. Further, results show that the Group of non-buyers has a higher proportion of women (73.58%) than the Group of buyers (60.56%). Considering the age of respondents, the share of the Group of buyers of reusable products (44.61%) is very similar to the share of non-buyers from 15 to 30 years of age (44.53%). It is also interesting that in the Group of non-buyers a higher proportion of people over 51 years of age (22.26%) is present than in the Group of buyers (17.66%). Regarding the income categories, the highest share of respondents belongs to the income category between 601 and 1000 euros in both groups. In the Group of buyers, we identified a higher proportion of respondents in the lowest income category — up

Table 3. Descriptive statistics results of demographic characteristics for Group of buyers and Group of non-buyers

		Group of buyers		Group of non-buyers		Total	
		Frequency	Percent	Frequency	Percent	Frequency	Percent
Gender	1. Men	132	39.52	70	26.42	202	33.72
	2. Women	202	60.48	195	73.58	397	66.28
	Total	*334*	*100.00*	*265*	*100.00*	*599*	*100.00*
Age	1. 15-30 years of age	149	44.61	118	44.53	267	44.57
	2. 31-40 years of age	86	25.75	55	20.75	141	23.54
	3. 41-50 years of age	40	11.98	33	12.45	73	12.19
	4. Above 51 years of age	59	17.66	59	22.26	118	19.70
	Total	*334*	*100.00*	*265*	*100.00*	*599*	*100.00*
Income	1. 400 EUR or less	47	14.11	33	12.60	80	13.45
	2. From 401 to 600 EUR	92	27.63	70	26.72	162	27.23
	3. From 601 to 1000 EUR	121	36.34	107	40.84	228	38.32
	4. From 1001 to 1500 EUR	52	15.62	42	16.03	94	15.80
	5. From 1501 to 2000 EUR	14	4.20	9	3.44	23	3.87
	6. 2001 EUR or more	7	2.10	1	0.38	8	1.34
	Total	*333*	*100*	*262*	*100*	*595*	*100*
Education	1. Primary school	10	2.99	8	3.04	18	3.02
	2. Secondary School	168	50.30	127	48.29	295	49.41
	3. Post-Secondary or Bachelor	128	38.32	114	43.35	242	40.54
	4. Master or more	28	8.38	14	5.32	42	7.04
	Total	*334*	*100.00*	*263*	*100.00*	*597*	*100.00*

to 400 euros (14.11%) — than in the Group of non-buyers (12.60%). Results show that there are more non-buyers in the category between 601 and 1000 euros (40.84%) than in the Group of buyers (36.34%). Regarding educational structure, in both groups (buyers and non-buyers of reusable products) the largest proportion of respondents has a secondary education. There are more non-buyers with completed primary education (3.04%) than buyers (2.99%). Additionally, there are more buyers with post-secondary education or a bachelor's degree (43.35%) than non-buyers (38.32%). Regarding employment status, the descriptive statistics results indicate that in both groups (buyers and non-buyers of reusable products), the highest proportion of respondents belong to the employed group. However, we can see that among students and retired persons, there are more non-buyers than buyers of reusable products.

Finally, we tested whether statistically significant differences exist between the two groups (buyers and non-buyers of reusable products) based on the demographic characteristics described above. To test the first sub-hypothesis H3a, regarding whether differences exist in gender between buyers and non-buyers of reusable products, we used the Mann-Whitney test (the Kolmogorov-Smirnov test indicates that the variable is not normally distributed, D(599)=0.131, p=0.012). The t-test was used for testing the four other demographic characteristics. Table 4 shows the results regarding gender between the Group of buyers and Group of non-buyers, and Table 5 shows the results of the Mann-Whitney test.

Table 4. Results regarding differences in gender between Group of buyers and Group of non-buyers of reusable products

Characteristic	Group	N	Mean Rank	Sum of Ranks
Gender	Buyers	334	282.63	94400.00
	Non-buyers	265	321.89	85300.00
	Total	599		

Table 5. Results of Mann-Whitney test regarding differences in gender between Group of buyers and Group of non-buyers of reusable products

	Gender
Mann-Whitney U	38455.000
Wilcoxon W	94400.000
Z	-3.367
Asymp. Sig. (2-tailed)	0.001
Exact Sig. (2-tailed)	0.001
Exact Sig. (1-tailed)	0.000
Point Probability	0.000

A Mann-Whitney test indicates that there are differences in gender between the Group of individuals who buy reusable products and Group of individuals who do not buy reusable products (U = 38455, p = 0.001). Therefore, the sub-hypothesis H3a is confirmed.

Based on the results of the t-test for the other demographic characteristics, we could not confirm differences in buying reusable products regarding respondents' age (t(549.038)=-1.012, p=0.312 (2-sided)), income (t(593)=0.261, p=0.794 (2-sided)), educational level (t(595)=0.207, p=0.836 (2-sided)) or employment status (t(597)=-1.044, p=0.297 (2-sided)), in contrast to some previous research (e.g., Fortuna and Diyamandoglu, 2017). Consequently, we could not confirm sub-hypotheses H3b-H3e regarding differences in age, income, education and employment status between Group of individuals who buy reusable products and Group of individuals who do not buy reusable products. Therefore, the results only partially support our third hypothesis, because we could confirm that differences exist in demographic characteristics based on gender between individuals who buy reusable products and individuals who do not buy reusable products. Our results indicate that the share of people buying reusable products is equally distributed in the age, education, income and employment status categories.

Conclusions and Discussion

The findings of this study provide evidence of the demand for reusable products in Slovenia regarding the selected demographic characteristics of buyers and non-buyers of reusable products. In particular, the findings support the existence of demand and existence of particular groups of customers of reusable products based on demographic characteristics.

Using a binomial test, we tested our first hypothesis that more than 50% of customers in Slovenia are buying reusable products. The results showed that 56% of customers in our sample are indeed buying reusable products in Slovenia. Therefore, we confirmed our first hypothesis. Additionally, this means that in Slovenia there exists a demand for reusable products. Our results are consistent with prior findings (Matsumoto, 2010), suggesting that for sustaining reuse business, sufficient market demand is essential.

Our results could not confirm that more than 70% of the participants in our sample are willing to buy reusable products, which could be the result of the improved economic situation in Slovenia since the recent economic crisis, as our survey was conducted later than previous ones (e.g., Flash Eurobarometer, 2011, 2014). Therefore, we could not confirm our second hypothesis. The results obtained in this

study contribute to the knowledge about the perceptions of reusable products and particularly the willingness to buy reusable products. However, despite the existence of the demand for reusable products in Slovenia, there is still a need for more promotion among enterprises operating as reuse organisations and a need to offer high-quality and safe products, as the success of reuse activities strongly depends on the trust of customers in the quality and safety of the reusable products.

The analysis of differences among selected demographic characteristics (gender, age, income, education and employment status) revealed that there are statistically significant differences between men and women with regard to buying reusable products. Namely, a significantly higher share of women than men are buying reusable products in Slovenia. Also other studies (e.g., Chahal, 2013) from different markets report differences in buyers' demographic characteristics.

Furthermore, the present study revealed that in the sample, results show significant differences between buyers and non-buyers of reusable products with regard to gender. However, significant differences could not be confirmed for the other demographic characteristics (age, income, education and employment status). This suggests that older or younger people that people who have often less income, or people with lower educational levels (who also have often lower income) do not buy reusable products more often than those of different ages, with higher incomes, or with higher educational levels. Therefore, the third hypothesis, that differences exist between buyers and non-buyers of reusable products based on demographic characteristics, can be only partially confirmed.

The results provide important information in several ways. Firstly, it is very important to understand the market and demand for reuse organisations to provide a continuous economic activity. Therefore, this paper contributes to the literature on the demand for reusable products and gives better insights into the demographic characteristics of customers of reusable products. This offers important directions for other researchers in the area of reuse industry. Secondly, this analysis provides detailed insight into characteristics of potential customers for reusable products. It is relevant for potential entrepreneurs in the reuse industry to use this analysis as an indicative tool for their market research on customers' behaviour. They can better understand and compare target groups of potential customers of reusable products and thereby the results may help them in decision-making about the reuse company establishment. The article has several limitations, among which are focusing on all reusable products and on sample in only one country. However, further research using different types of reusable products or reasons for buying reusable products could provide additional evidence, offering better insights into customers' behaviour patterns when buying reusable products. Moreover, an empirical analysis using a cluster analysis could be useful for reuse organisations to better understand customers' segmentation.

References

Afroz, R., Masud, M. M., Akhtar, R., & Duasa, J. B. (2013). Survey and analysis of public knowledge, awareness and willingness to pay in Kuala Lumpur, Malaysia – a case study on household WEEE management. *Journal of Cleaner Production*, *52*(1), 185–193. https://doi.org/10.1016/j.jclepro.2013.02.004

Austin, M. P., Belbin, L., Meyers, J. A., Doherty, M. D., & Luoto, M. (2006). Evaluation of statistical models used for predicting plant species distributions: Role of artificial data and theory. *Ecological Modelling*, *199*(2), 197–216. https://doi.org/10.1016/j.ecolmodel.2006.05.023

Babbitt, C., Ramzy, K., Williams, E., & Babbitt, G. (2009). Evolution of product lifespan and implications for environmental assessment and management: A case study of personal computers in higher education. *Environmental Science & Technology,* 43(13), 5106–5112. https://doi.org/10.1021/es803568p

Bovea, D. M., Pérez-Belis, V., & Quemades-Beltrán, P. (2017). Attitude of the stakeholders involved in the repair and second-hand sale of small household electrical and electronic equipment: Case study in Spain. *Journal of Environmental Management,* 1(196), 91–99. https://doi.org/10.1016/j.jenvman.2017.02.069

Buttle, F. (2006). Shopping motives constructionist perspective. *The Service Industries Journal,* 12(3), 349–367. https://doi.org/10.1080/02642069200000044

Chahal, M. (2013). *The second-hand market: What consumers really want to buy.* Retrieved from: https://www.marketingweek.com/2013/10/21/the-second-hand-market-what-consumers-really-want-to-buy/

Chancerel, P., Marwede, M., Nissen, N. F., & Lang, K. D. (2015). Estimating the quantities of critical metals embedded in ICT and consumer equipment. *Resources, Conservation and Recycling,* 98, 9–18. https://doi.org/10.1016/j.resconrec.2015.03.003

Cox, J., Griffith, S., Giorgi, S., & King, G. (2013). Consumer understanding of product lifetimes. *Resources, Conservation and Recycling,* 79, 21–29. https://doi.org/10.1016/j.resconrec.2013.05.003

Dindarian, A., Gibson, A. A. P., & Quariguasi-Frota-Neto, J. (2012). Electronic product returns and potential reuse opportunities: A microwave case study in the United Kingdom. *Journal of Cleaner Production,* 32, 22–31. https://doi.org/10.1016/j.jclepro.2012.03.015

Fisher, M. M., Mark, F. E., Kingsbury, T., Vehlow, J., & Yamawaki, T. (2005). Energy recovery in the sustainable recycling of plastic from end-of-life electrical and electronic products. In: *International Symposium on Electronics and the Environment* (2005 ISEE/Summit).

Flash Eurobarometer. (2011). *Attitudes of Europeans towards resource efficiency*. Analytical report, Flash EB Series No. 316. Brussels: European Commission.

Flash Eurobarometer. (2014). *Attitudes of Europeans towards waste management and resource efficiency*. Report, Flash EB Series No. 388. Brussels: European Commission.

Fortuna M. L., & Diyamandoglu, V. (2017). Disposal and acquisition trends in second-hand products. *Journal of Cleaner Production*, *142*(4), 2454–2462. https://doi.org/10.1016/j.jclepro.2016.11.030

Guiot, D., & Roux, D. (2010). Second-hand shoppers' motivation scale: Antecedents, consequences, and implications for retailers. *Journal of Retailing*, *86*(4), 383–399. https://doi.org/10.1016/j.jretai.2010.08.002

Gutiérrez, S. M., Camarero Izquierdo, C., & San José Cabezudo, R. (2010). Product and channel-related risk and involvement in online contexts. *Electronic Commerce Research and Applications*, *9*(3), 263–273. https://doi.org/10.1016/j.elerap.2009.09.005

Hennies, L., & Stamminger, R. (2016). An empirical survey on the obsolescence of appliances in German households. *Resources, Conservation and Recycling*, *112*, 73–82. https://doi.org/10.1016/j.resconrec.2016.04.013

Hernandez, B., Jimenez, J., & Martin, M.J. (2011). Age, gender and income: Do they really moderate online behaviour? *Online Information Review*, *35*(2), 144–126. https://doi.org/10.1108/14684521111113614

Lyndhurst, B. (2011). *Public understanding of product lifetimes and durability*. London, England: Defra.

Matos, S., & Silvestre, B. S. (2013). Managing stakeholder relations when developing sustainable business models: The case of the Brazilian energy sector. *Journal of Cleaner Production*, *45*, 61–73. https://doi.org/10.1016/j.jclepro.2012.04.023

Matsumoto, M. (2010). Development of a simulation model for reuse businesses and case studies in Japan. *Journal of Cleaner Production*, *18*(13), 1284–1299. https://doi.org/10.1016/j.jclepro.2010.04.008

Meyers-Levy, J., & Sternthal, B. (1991). Gender differences in the use of message cues and judgments. *Journal of Marketing Research*, *28*(1), 84–96. https://doi.org/10.2307/3172728

O'Connell, M., & Fitzpatrick, C. (2013). *Re-evaluate reuse of electrical and electronic equipment (evaluation and mainstreaming)*, *EPA STRIVE Report 2007–2013*. Ireland: Environmental Protection Agency

Premm, M. (2012). *Report on implementation models for repair and re-use networks*. (WP 4.1.). *CERREC – Central Europe Repair and Reuse Centres and Networks. Needs assessment and model development.* Retrieved from: http://www.central2013.eu/fileadmin/user_upload/Downloads/outputlib/CERREC_report_on_implementation_models.pdf

Sabbaghi, M., Behdad, S., & Zhuang, J. (2016). Managing consumer behaviour toward on-time return of the waste electrical and electronic equipment: A game theoretic approach. *International Journal of Production Economics*, *182*, 545–563. https://doi.org/10.1016/j.ijpe.2016.10.009

Sata, M. (2013). Factors affecting consumer buying behavior of mobile phone devices. *Mediterranean Journal of Social Sciences*, *4*(12), 103–112. https://doi.org/10.5901/mjss.2013.v4n12p103

Scitovsky, T. (1994). Towards a theory of second-hand markets. *Kyklos*, *47*, 33–52. https://doi.org/10.1111/j.1467-6435.1994.tb02247.x

Scott, K. A., & Weaver, S. T. (2014). To repair or not to repair: What is the motivation? *Journal for Research for Consumers*, *26*, 1–31.

Shugan, S. M. (2006). Are consumers rational? Experimental evidence? *Marketing Science*, 25(1), 1-7. https://doi.org/10.1287/mksc.1060.0196

Solomon, M. R., Bamossy, G., Askegaard, S., & Hogg, M. K. (2013). *Consumer behavior: A European perspective* (5th ed.). Harlow, England: Pearson Education Limited.

Sundin, E., Ostlin, J., & Bjorkman, M. (2008). Why is remanufacturing more successful in the United States than in Sweden? *Proceedings of 15th CIRP International Conference on Life Cycle Engineering*, Sydney.

Watson, M. (2008). *A review of literature and research on public attitudes, perceptions and behaviour relating to remanufactured, repaired and reusable products*. Report for the Centre for Remanufacturing and Reuse. Sheffield: The University of Sheffield.

Williams, C. C., & Paddock, C. (2003). The meanings of informal and second-hand retail channels: Some evidence from Leicester. *International Review of Retail, Distribution and Consumer Research*, *13*(3), 317–336. https://doi.org/10.1080/0959396032000101372

Yeh, R. H., Lo, H. C., & Yu, R. Y. (2010). A study of maintenance policies for second-hand products. *Computers & Industrial Engineering*, *60*(3), 438–444. https://doi.org/10.1016/j.cie.2010.07.033

Zajko, K., & Bradac, B. (2018). Social franchising model as a scaling strategy for ICT reuse: A case study of an international franchise. *Sustainability*, *10*(9), 1–28. https://doi.org/10.3390/su10093144

Povpraševanje in značilnosti kupcev izdelkov ponovne uporabe v Sloveniji

Izvleček

Glavni cilj prispevka je analizirati, ali v Sloveniji obstaja povpraševanje po izdelkih ponovne uporabe in kakšne so značilnosti kupcev glede na spol, starost, dohodek, izobrazbo in status zaposlitve. Uporabljeno je bilo anketiranje za proučevanje deleža kupcev v Sloveniji, ki kupujejo, in tistih, ki so pripravljeni kupiti izdelke ponovne uporabe. Poleg tega preučujemo, ali obstajajo razlike med izbranimi demografskimi podatki (spol, starost, prihodek, izobrazba in zaposlitveni status) med tistimi, ki kupujejo, in tistimi, ki ne kupujejo izdelkov ponovne uporabe. Ugotovitve kažejo, da več kot polovica kupcev v Sloveniji že kupuje izdelke ponovne uporabe. Med izbranimi demografskimi značilnostmi vzorca smo uspeli dokazati statistično značilne razlike le med spoloma. Članek prispeva k literaturi o povpraševanju po izdelkih ponovne uporabe in daje vpogled v lastnosti kupcev izdelkov ponovne uporabe.

Ključne besede: izdelki ponovne uporabe, povpraševanje, segmentacija kupcev, Slovenija

NAVODILA AVTORJEM

Revija **Naše gospodarstvo / Our Economy** objavlja znanstvene članke iz vseh področij ekonomije in poslovnih ved. Avtorje vabimo, da v uredništvo revije pošljejo originalne prispevke, ki še niso bili objavljeni oziroma poslani v objavo drugi reviji. Avtorji podeljujejo lastniku revije ekskluzivno pravico za komercialno uporabo članka, ki stopi v veljavo na osnovi sprejetja članka v objavo. Avtorji v celoti odgovarjajo za vsebino prispevka. Objavljamo samo članke, ki dobijo pozitivno oceno naših recenzentov. Revija avtorjem ne zaračunava stroškov objave.

Prispevki naj bodo napisani v angleškem jeziku. Na posebni strani navedite ime avtorja, njegov polni akademski ali strokovni naziv ter ustanovo, kjer je zaposlen. Prva stran naj vsebuje naslov, izvleček (maksimalno 250 besed) in ključne besede, vse troje v slovenskem in angleškem jeziku. Iz povzetka naj bodo razvidni namen, metodologija/pristop, ugotovitve, omejitve, implikacije in izvirnost/vrednost. Dodajte tudi ustrezne kode JEL klasifikacije, ki jih najdete na https://www.aeaweb.org/econlit/jelCodes.php?view=jel.

Prispevek naj bo v dolžini ene avtorske pole (30.000 znakov). Za poudarke v besedilu uporabljajte poševni tisk, ne krepkega ali podčrtanega tiska. Izpis naj bo enokolonski. Sprotne opombe naj bodo oštevilčene in navedene na dnu pripadajoče strani. Oštevilčite tudi enačbe.

Morebitne tabele in slike naj bodo črno-bele in oštevilčene ter naslovljene nad, opombe in viri pa pod tabelo oziroma sliko. Vse tabele in slike pošljite tudi v izvornih datotekah (.xls, .ppt in podobno).

Vire v tekstu in v seznamu virov je potrebno urediti skladno z APA standardom – navodila na http://www.apastyle.org/learn/tutorials/basics-tutorial.aspx.

Nekaj osnovnih napotkov:

Navedbe virov v tekstu

Primer 1a: Another graphic way of determining the stationarity of time series is correlogram of autocorrelation function (Gujarati, 1995).

Primer 1b: Another graphic way of determining the stationarity of time series is correlogram of autocorrelation function (Gujarati, 1995, p. 36).

Primer 2a: Engle and Granger (1987) present critical values also for other cointegration tests.

Primer 2b: Engle and Granger (1987, p. 89) present critical values also for other cointegration tests.

Navedbe virov v seznamu virov

Primer 1 – Knjiga: Gujarati, D. N. (1995). *Basic Econometrics*. New York: McGraw-Hill.

Primer 2 – Članek v reviji: Engle, R. F., & Granger, C. W. J. (1987). Co-integration and Error Correction: Representation, Estimation and Testing. *Econometrica*, 55(2), 251-276.

Primer 3 – Poglavje v knjigi, prispevek v zborniku: MacKinnon, J. (1991). Critical Values for Cointegration Tests. In R. F. Engle & C.W. J. Granger, (Eds.), *Long-Run Economic Relationships: Readings in Cointegration* (pp. 191-215). Oxford: University Press.

Primer 4 – Elektronski vir: Esteves, J., Pastor, J. A., & Casanovas, J. (2002). *Using the Partial Least Square (PLS): Method to Establish Critical Success Factors Interdependence in ERP Implementation Projects*. Retrieved from http://erp.ittoolbox.com/doc.asp?i=2321

Prispevek pošljite v MS Word datoteki na e-naslov nase.gospodarstvo@um.si ali our.economy@um.si. Dodajte še celotni poštni naslov in elektronski naslov vseh avtorjev, za korespondenčnega avtorja pa še telefonsko številko, preko katere je dosegljiv uredništvu.

INSTRUCTIONS FOR AUTHORS

The journal **Naše gospodarstvo / Our Economy** publishes scientific articles covering all areas of economics and business. Authors are invited to send original unpublished articles which have not been submitted for publication elsewhere. Authors are completely responsible for the contents of their articles. Only articles receiving a favorable review are published. The authors grant the Journal Owner the exclusive license for commercial use of the article throughout the world, in any form, in any language, for the full term of copyright, effective upon acceptance for publication. The journal does not have article processing charges (APC) nor article submission charges.

Please write your text in English. The cover page should include the author's name, academic title or profession, and affiliation. The first page must contain the title, an abstract of no more than 250 words, and key words. The purpose, methodology/approach, findings, limitations, implications and originality/value should be evident from the abstract. Add also appropriate codes of JEL classification that can be found at https://www.aeaweb.org/econlit/jelCodes.php?view=jel.

The length of the manuscript should be composed of 30.000 characters. Emphasized parts of the text should be in italics, not bold or underlined. The text should be in single column layout. Footnotes should be numbered consecutively and placed at the bottom of the relevant page. Equations should be numbered.

Tables and figures should be in black and white colour, numbered with a title above and notes and sources below. All tables and figures should be sent also in original files (.xls, .ppt and similar).

References in the text and in the list of references should be arranged according to APA style – see http://www.apastyle.org/learn/tutorials/basics-tutorial.aspx.

Some elementary directions:

References in the text

Example 1a: Another graphic way of determining the stationarity of time series is correlogram of autocorrelation function (Gujarati, 1995).

Example 1b: Another graphic way of determining the stationarity of time series is correlogram of autocorrelation function (Gujarati, 1995, p. 36).

Example 2a: Engle and Granger (1987) present critical values also for other cointegration tests.

Example 2b: Engle and Granger (1987, p. 89) present critical values also for other cointegration tests.

References in the list of references

Example 1 – Book: Gujarati, D. N. (1995). *Basic Econometrics*. New York: McGraw-Hill.

Example 2 – Journal article: Engle, R. F., & Granger, C. W. J. (1987). Co-integration and Error Correction: Representation, Estimation and Testing. *Econometrica*, 55(2), 251-276.

Example 3 – Book chapter or article from conference proceedings: MacKinnon, J. (1991). Critical Values for Cointegration Tests. In R. F. Engle & C.W. J. Granger, (Eds.), *Long-Run Economic Relationships: Readings in Cointegration* (pp. 191-215). Oxford: University Press.

Example 4 – Web source: Esteves, J., Pastor, J. A., & Casanovas, J. (2002). *Using the Partial Least Square (PLS): Method to Establish Critical Success Factors Interdependence in ERP Implementation Projects*. Retrieved from http://erp.ittoolbox.com/doc.asp?i=2321

Send the manuscript in MS Word file to nase.gospodarstvo@um.si or our.economy@um.si. Add also postal address and e-mail address of all authors, while for the corresponding author, please, add also a phone number.

NG
OE

LETNIK 65
VOLUME