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Regional Science Inquiry, Vol. X, (1), 2018– Editorial

The current issue of the Regional Science Inquiry Journal, Issue June 2018 provides a range of approaches towards current issues concerning the world's economic system: from financial crisis to income inequality, the pressures in productivity and efficiency, changing technologies, as well as geographic shifts in production, among others, pursuing dramatic changes in modern world economic system. Economies and organization worldwide are increasingly called upon to redefine their productivity and efficiency role in this evolving social and economic landscape.

The current issue of the Regional Science Inquiry Journal, Issue June 2018 is based on selected reviewed papers regarding current socio-economic topics covering a wide range of agenda.

More specifically, this issue includes the following reviewed papers:

1. Evaluation Of Economic Structure Development Of Kupang City, Ntt Province, Indonesia To Meet National GHG Emission Target (by Amheka, A.). This paper focuses on Indonesian government through RAN/RAD-GRK program set target to reduce GHG emission between 26%~41% by 2020 based on 2005 emissions under BAU and identifies and evaluates current socio-economic structure condition to achieve Indonesia's GHG emission reduction target.
2. Investigating the Impact of Financial Innovation on the Volatility of the Demand for Money in the United Stated in the Context of an ARCH/GARCH Model (by Aliha, Sarmidi And Faizah Said). This paper investigates the effect of financial innovation on real money demand in the United States using GARCH estimation technique between 1990 and 2016.
3. Analysis of Growth and Convergence of CO2 Emissions in BRICS Nations (by Ramesh Chandra Das). The present study endeavors to test whether the BRICS nations are converging in terms of per capita CO2 emission over time for the period 1992-2014.
4. Effects of Fiscal Consolidation On Regional Economics Resilience: Institutional Design Metters? (By Feder and Muštra). The paper uses the EUROSTAT database of EU-27 at NUTS 2 level over the period 2000-2009 to test how fiscal consolidation affects the regional economics resilience.
5. Investigating the Effect of Financial Innovations on the Demand for Money in Australia Using DOLS and FMOLS and Comparing Their Predictive Powers (by Mohammad Aliha, Sarmidi And Faizah Said). This paper applies two different estimation methods, namely DOLS and FMOLS to estimate real demand for money in Australia with the inclusion of financial innovations.
6. Efficiency Measurement of 6 Major Container Ports in the West Africa Region (by Konstantinidis and Pelagidis). This paper applies the DEA and SFA methods to evaluate efficiency of 6 major ports in the West Africa region to investigate whether these ports can become the main hubs of container transport to African inland in the future.
7. Visual Communication and ICTS for The Application of Value Co-Creation Strategies In Hotels' Websites In Athens, Greece (By Katsoni and Dionysopoulou). The purpose of this paper is to provide an understanding of the way principals for tourism development could incorporate Information and Communication Technologies (ICT) into their models, addressing such issues as new visual communication technologies and value co-creation, based on a survey in the city of Athens, Greece.
8. Trends and Prospective Models For The Formation Of Innovative Clusters In The Russian Federation (By Larionova, Yalyalieva and Napolskikh). This paper deals with the dynamics of clusterization of the Russian economic space, reveals the main stages and prospects for the generation of the "fourth wave" of clustering. The purpose of this research is to offer a quantitative approach to identify regional clusters and their further parametrization within the framework of an integrated model of clustering the region's economic space.
9. Public Participation In Urban Heritage Promotion: Residents', Visitors', And Students' Contributions (By Joukes, Costa And Diniz). This article presents the residents', students', and visitors' perspectives on the subject of monumental heritage protection, conservation and enhancement. Results show that protection, conservation, and enhancement of cultural heritage still matters for the population segments whose opinions were taken into

consideration, who acknowledge its value as a solid resource for the town's and the region's development.

10. Regional Economic Disparities In Eastern Indonesia And Determinants: Comparative Analysis Of Origin District And New District (By Lukis Panjawa, Rizky Samudro and Maqnus Soesilo). The objective of this research is to know specifically the difference of regional economic disparity and expansion in districts / cities in eastern Indonesia, as well as determinant of disparity base on development indicators covering economic growth, decentralization policy and quality of human resources.

11. The Role Of Social Capital In Regional Development (By Papadaskalopoulos and Nikolopoulos). The aim of this paper is to examine the relation between endogenous growth and social capital in the configuration

12. Innovation Policy in European Union from a supply chain perspective (by Kokkinou, Ladias, Papanis and Dionysopoulou). This paper focuses on the analysis of implemented instruments of research, technology and innovation policy in European Union, reflecting the scope of institutions and interests involved, stretching from public funding of research institutions over various forms of financial incentives to the conducting of research and experimental development, including the institutions and mechanisms of technology transfer.

13. Portfolio Optimization in Selected Tehran Stock Exchange Companies (Symbiotic Organisms Search Aad Memetic Algorithms) (By Feshari and Nazari). This paper shows that how an investment with n risky share can achieve the certain profits with less risk that spread between stocks. Such a portfolio, it is called an optimal portfolio and it is necessary to find solving the optimization problem. Hence, meta-heuristic algorithms such as Symbiotic Organism Search (SOS) and the Memetic Algorithm which is combination of the Genetic and SOS algorithms have been utilized to solve portfolio optimization in 23 selected Tehran stock exchange market during the period of 2009-2017.

14. Methodological and practical aspects of human potential management in the region (by Fedotova, Zhiglyaeva and Stolyarova). The article presents a systematic approach to the management of the human potential of the region, which is distinguished by its novelty and based on modern methods of system analysis, management and regional economy. In the course of the study, a model for managing the human potential of the region is formed, based on a system with a closed loop, consisting of a number of simpler functional subsystems.

15. Exploring determinants and relations between nature-based ("eco"-) tourism and agro-tourism (by Hasanagas, Pousini and Goula). This article is based on the results of the study "The relation between Eco- and Agrotourism. A regional dimension of Forest Policy", 2015 (ISBN: 978-960-7284-36-5, Athens, p.66, orig. in Greek) of the Ministry of Environment and Energy of Greece.

This issue also includes academic profiles, book presentation, as well as conference review, providing information to academics and interested readers, alike.

Assoc. Prof. Aikaterini Kokkinou, RSI J

Articles

EVALUATION OF ECONOMIC STRUCTURE DEVELOPMENT OF KUPANG CITY, NTT PROVINCE, INDONESIA TO MEET NATIONAL GHG EMISSION TARGET

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Abstract

Indonesian government through RAN/RAD-GRK program set target to reduce GHG emission between 26%~41% by 2020 based on 2005 emissions under BAU. Study begins by simple identify and evaluate current socio-economic structure condition to achieve Indonesia's GHG emission reduction target. We assume optimal GHG reduction rate (n) between 0%~20% then investigate its impacts to related sectors. As result, found 0.015Gt is estimated amount of GHG emission in Kupang before optimized (or about 0. 47% of total GHG emission in Indonesia) and 0.012Gt after optimized. The optimal n is around 15%~17% with Kupang GRP (1,656.86~1,371.51) Trillion IDR. The result indicated that Kupang economic cannot attain n more than 17%~20% without any conflict among stakeholders and current gross regional product (GRP) is not optimal to control GHG emission but has a space for making a higher GRP by keeping the same amount of GRP as before optimized. Relation between n and GRP called the trade-off and it is allowed can be raised up by introducing renewable energy technology for future research. In Indonesia, this study becomes the first study dealt with GHG emission reduction in the city level focused on economic activities.

Keywords: Kupang economic, GHG emission, reduction rate
JEL classification: O21, O25, O44, R50, R58

1. Introduction

Kupang city is located between Australia and Timor Leste and become heart of economic activities in Nusa Tenggara Timur (NTT) province which contribute in supply greenhouse gases (GHG) emissions through its activities. In 2010 the GRP of Kupang 2,296,924 Trillion IDR with population around 336,239 souls and estimate growth 3.6% per year consisted of 82,139 households that spread on a wide area 165.3km2 within 6 districts. In 2007~2010, Kupang economic growth significant namely 8.23% and in 2010 highest compared to the national level that is 6.2% (Kupang in Figure 2011).

Indonesia government has efforts to reduce GHG emission 26% from business as usual (BAU) and 41% if assist from abroad and constitute an integral part of the national and regional planning (Bappenas 2011) through distribution responsible to regional agent called BAPPEDA Kupang in conjunction with NTT province government is efforts by conducted a number of environment programs aims to achieve global GHG emission reduction by 2020 (Amheka and Higano 2015; Amheka 2014). To make sure the GHG emission assessment on national and regional level accurately, it needs by conducting a comprehensive evaluation associated with related sectors.

This study uses Kupang input-output (IO) table that describes interdependence of industries in an economy (Miller and Blair 2009) along with their 28 sectors GHG emission factor including assumptions. The table is constructed by Amheka et al. 2014; 2015; Amheka 2014. The IO analysis was used to assume the energy use of a country for household and industries (Duchin and Lange 1992; Sasai et al. 2012), investment activities affecting to production change regardless of the impact on the environment such as the supply of GHG emission (Meng et al. 2012). Another way is reduced fossil consumption by introduce new energy industries (Uchida et al. 2008) where have positive impact to industrial structure under GHG emission constraints. Thus, this paper we using different model structures parameters in the city scale which giving effect of originality that never been introduced before.

1.1. GHG emission in regional Indonesian

Indonesia is the world's third largest emitter of CO2e after the USA in the amount 2.183Gt and projected rise to almost 2.95Gt CO2e by 2020 under a BAU scenario (MoE 2010; Tedjakusuma 2013; Thamrin 2011). Since 2011 Indonesia government has been introducing a program called National/Regional action plan for reducing GHG emissions (RAN/RAD-GRK) conducted preventative measures in reducing national emissions between 26% up to 41% from the BAU by 2020 up to (Amheka and Higano 2015; Amheka et al. 2015a,b). Trends of GHG emission per province in Indonesia have reorganized its data by 2015, reviewing composition of the sector after aggregated and show only about 25% of Indonesia's total emissions for each province where data has been tabulated from various references and has yet to provide comprehensive data on the city level. Therefore, Kupang government as part of regional focal point has committed to reduce GHG emission while keeping economic growth. So, this study will focus on evaluate GHG emission in Kupang city which mainly by industrial sectors as indicated in Kupang IO model by taking into account the amount of GHG emission coefficients every sector calculated by (Amheka et al. 2015). Furthermore, Amheka et al. (2014) reported a study focuses on pollutant counts and emission coefficients emitted by activity economy in Kupang city and became the frontier study in city level in Indonesia.

Objective of the study in the national level is to meet agreement COP-15 Copenhagen to reduce the emissions between 26% and 41% with a range between 0.767Gt CO2e and 1.189 Gt under BAU by 2020 base year 2005 and taking part in support Sustainable Development Goals. In terms of regional level to produce an evaluation framework to succeed RAD-GRK program in Kupang and improve regional competitiveness relating to the joint efforts among ASEAN countries.

2. Material and Method

2.1. Objective Function

In order to drive the Kupang City's market-oriented economic system, we construct a comprehensive model where the Kupang GRP must be set maximized and the economic status after policies introduction have a significant impact by taking into account the control variables include added value rate and total output production of usual sectors as showed in the formula:

$$MAXGRP = vv\_r * X$$

where, *MAXGRP* is maximize GRP*; vv_r* is added value ratio; X is production vector of usual sectors (en) which representing demand and supply for goods and services in a market condition. The production sectors are depending on the total supply of commodities that must meet total demand which defined as the sum of intermediate demand and final demand. The final demand is composed of household and local government consumption, capital formation, change in stock, and net export. The formula is:

$$X \geq AA * X + CP + CG + INV + ST + EX - IM$$

where, AA: IO coefficient matrix of usual sector (ex); CP: consumption vector demand by household (en); CG: consumption vector of local government (en); INV: private and government capital formation vector (en); ST: changes in stock vector (en); EX: export vector (en); IM: import vector (en), both EX and IM confined within an interval.

The consumption vector of household itself is endogenously determined for the income and distribution the consumption. The total payment to labor becomes wages of household is sourced from total business profit. It is assumed that 90% accrues to households as dividend to shareholders and remaining 10% is taxed by the government as direct tax. For household consumption, the formula is used:

$$TCP = \sum CP(i)$$

$$p(i) * CP(i) = \alpha(i) * YD \qquad (i = 1,2,3,\ldots,27),$$

where, $p(i)$: product price of i-th industry (commodity i) (en); $\alpha(i)$: propensity to consumption of i-th commodity (ex) and *YD* is total disposable income of household after reduction of income tax (en).

The general account revenue of Kupang government (Tg) is dependent on the sum of indirect, corporation, and income tax revenue or in the other hand is equated with expenditure by the government which is composed of government consumption, government saving, and income subsidy for households:

$$Tg = TCG + SSG + SBD_{incm} + NTX,$$
$$NTX \leq |NTX|,$$

where, TCG: total government consumption (en); SSG: (gross) government saving (en); NTX: transfer (if it is positive) to or special grant (if it is negative) by the central government (en); $|NTX|$: data of NTX (ex). The government consumption demand for each sector is determined proportionally to total government consumption, using the formula:

$$CG(i) = cg_{r(i)} \cdot TCG\ (i = 1,2,3, \ldots,27)$$

where, $CG(i)$: government consumption demand for the product of i-th industry (en); $cg_{r(i)}$: constants which proportionally allocate TCG among $CG(i)$ (ex).

For government saving and investment $(TINVG)$ (en):

$$CG(i) = cg_{r(i)} * TCG \qquad i = 1,2,3,\ldots 27$$
$$TINVG = 0.3 * TINV$$

where, D_g: depreciation cost of social infrastructures (en), is given $D_g = 1.2 \cdot D$ (assumed depreciation cost of social infrastructures is 120% of the depreciation cost of industrial sectors; $TINV$: Total investment (en).

2.2. The constraint of GHG emission reduction

Expected current industrial structure has a space for making a higher GRP by keeping the same amount of GRP as before optimization. The formula is:

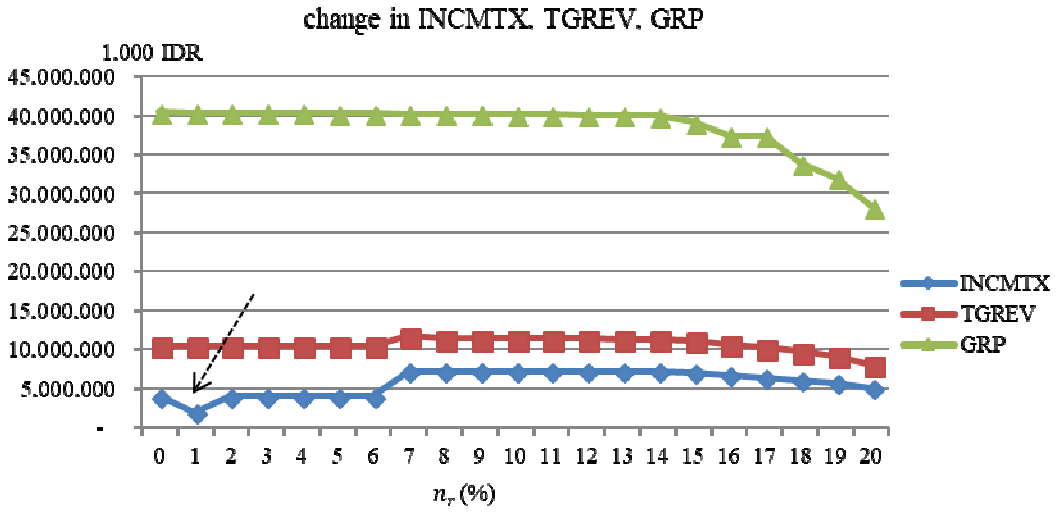
$$ZZ = coef_c * X \leq (1 - \frac{n_r}{100}) ZZ_{bar}$$

where, *ZZ bar*: total CO_2 emission in Kupang in 2010 (ex) (Amheka, 2014); n_r: GHG reduction rate (ex); $coef_c$ is GHG emission coefficient. It is assumed that each sector cannot change it production more than or less than 20% of the current amount data; ZZ: GHG emission after introduction of GHG constraint (en).

3. Results and Discussion

After optimisation the government financial sourced from the tax is getting down significantly on the n_r = 1%, then stabile on nr = 2%~6% as indicated in Figure 1, but the tax itself does not much effect as also mentioned in the previous study reported by Mizonoya and Higano (1997), the total government revenue (GRP) which stabile on 10.47 Million IDR upward.

Figure 1: change in income tax, total government revenue and GRP



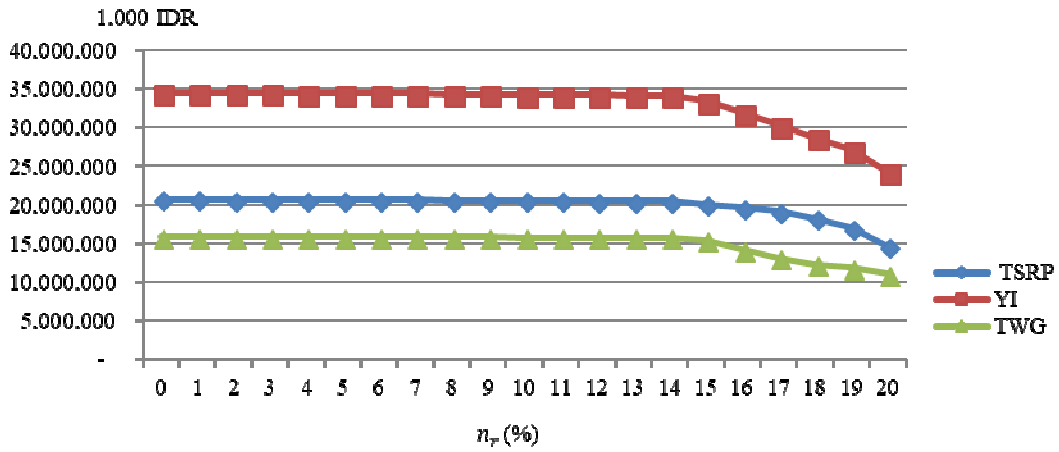
note: 1 USD = 12,500 IDR

It is expected no influence for Kupang GRP at the reduction rate level. Further, the revenue from tax (INCMTX) is raise and stabile on the n_r = 7%~16%, and small effect will influence to total government revenue (TGREV) at the n_r = 7% is rose up to 12.22%. The income tax continues decrease after n_r =20%.

The GRP seems to be stable from n_r = 1%~14%, the drastically decrease on the n_r = 1% due to sensitizing policy applied and 15%~20%, although the n_r = 16% and 17% did not change significantly. Thus, according to the figure explained that the economic cannot support the income of government both from the tax and other resources after n_r = 20% which implies to the Kupang GRP due to economic structure will be influenced perhaps by depreciation from production sector which mainly from productive sectors such as industry, transportation and government including institutional. In this situation an environmental regulation need to be considered in relation to the locations of the GHG emission contributor sectors (Shimamoto, 2016). This optimization is expected livestock and agriculture sectors are also contributed due to using the GHG emission coefficient from NTT economic sectors (55 sectors) were adjusted and adopted from Japan GHG emission coefficient (128 sectors) and in this sense needs to be assessed for further research.

Total surplus (TSRP) of sectors are depends on total output of the related sectors. The Figure 2 is representative described how significant interrelation among economic structure of surplus, household revenue (YI) and their salary (TWG).

Figure 2: change in surplus, household income and wage/salary

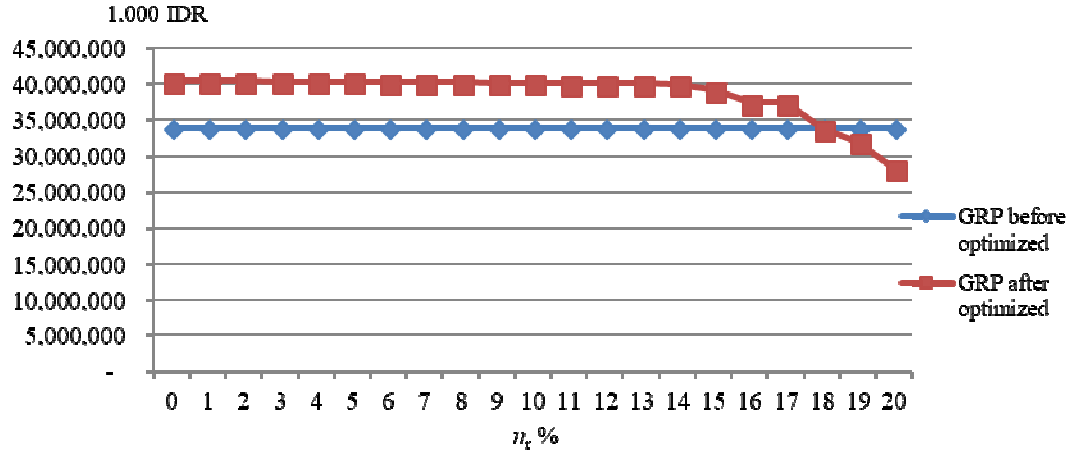


note: 1 USD = 12,500 IDR

There are no significant changes after optimization between n_r = 0%~14%, unless from n_r = 15% and upward. In such situation, can conclude the three variables of the economic as identified in the Figure 2, are directly proportional to each other, hence the reduction rate is a most critical to the impact of economic improvement in Kupang in terms of control environment.

Controlling the GHG emission through reduction rate system as reported in the Table 1 and the Figure 3, covered most effective when the reduction rate between 14% and 17% and convince that the current industrial structure in Kupang is not optimal in terms of GHG emission control.

Figure 3: change in GRP



note: 1 USD = 12,500 IDR

After n_r = 20% the economy cannot attain the reduction of GHG without any conflicts among stakeholders. This is because the current government is more focused on improving the sustainability of GDP regardless of the environment, but with the current government's commitment through the rules to reduce emissions is expected to create a green economic growth in the near future

If government willing to obtain nr = 14% then the GRP would be down up to 1.1% before introducing reduction rate system (nr = 0%) follow by controlled GHG decreased up to 0.42% of 2.95Gt (current GHG emission in Indonesia 2005). In this sense, the government for carefully choosing the GHG reduction rate 17% which applicable to consistently keep the economic rather stable or not really a shift away from GRP that expected around 37.43 Million IDR and GHG reduction still controlled properly below 0.42% of total GHG emission in Indonesia.

Table 1: change in GRP

n (%)	Total GRP (1000 IDR)	ZZbar (Gton)	ZZ (Gton)
0	40,442,260	0.01451977	0.01437458
1	40,419,440	0.01451977	0.01437458
2	40,396,610	0.01451977	0.01422938
3	40,373,790	0.01451977	0.01408418
4	40,350,970	0.01451977	0.01393898
5	40,327,840	0.01451977	0.01379378
6	40,292,430	0.01451977	0.01364859
7	40,257,040	0.01451977	0.01350345
8	40,221,170	0.01451977	0.01335827
9	40,185,260	0.01451977	0.01321308
10	40,149,340	0.01451977	0.01306787
11	40,113,430	0.01451977	0.01292267
12	40,077,500	0.01451977	0.0127775
13	40,041,590	0.01451977	0.0126323
14	39,982,170	0.01451977	0.01248701
15	39,168,220	0.01451977	0.01234189
16	37,430,350	0.01451977	0.01219661
17	37,430,350	0.01451977	0.01205151
18	33,884,140	0.01451977	0.0119063
19	31,985,980	0.01451977	0.01176102
20	28,285,410	0.01451977	0.01161582

note: 1 US$ = 12,500 IDR

Source: Author calculation

4. Conclusion

The implementation of GHG emission reduction rate in Kupang will effective along with keep economic level as high as possible as before introduce the reduction rate but on the other hands the Kupang economic cannot attain reduction more than 20% due to will cause conflict among stakeholders and governments should pay special attention and strategic action through policy interventions that favor significant economic growth in which GHG emissions remain controlled and measurable. This research become the first study in count GHG emission in the level of city through assess comprehensively in terms of economic activity in a region in Indonesia. The model enables implemented in any region including regional level. Expected the trade of between GHG emissions reduction rate and GRP (see Figure 3) will be raised up by introduction renewable energy technology (RET) and at this point a creativity region has space to analyse including its impact to global warming (Batabyal and Beladi, 2016; Shimamoto, 2017). This suggested for further research linked with a framework scenario introducing RET and waste treatment plant (Amheka et al. 2015) to support a challenge of a sustainable development more deeply analysed (Almeida, et al. 2017).

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INVESTIGATING THE IMPACT OF FINANCIAL INNOVATION ON THE VOLATILITY OF THE DEMAND FOR MONEY IN THE UNITED STATED IN THE CONTEXT OF AN ARCH/GARCH MODEL

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Abstract
This paper investigates the effect of financial innovation on real money demand in the United States using GARCH estimation technique between 1990 and 2016. Ratios of broad money stock to GDP and growth in net domestic credit to GDP were included in a conventional money demand function to account for the financial innovation. The results indicate that neither external shocks (financial innovation) nor internal shocks (previous years' information) influence the volatility of the money demand.

Keywords: money demand, ARCH/GARCH, financial innovation, internal/external shock
JEL classification: C13, C40, C51, E40, E44

1. Introduction

Understanding the relationship between money demand and its determinants has always been vital for monetary policy and therefore, has been a focal point for many researchers all over the world. A stable and predictable money demand is a requirement for monetary policy to be effective. Since the introducing of new payment technologies, this traditional money demand relationships have changed making traditional money demand function instable. High auto correlated errors, implausible parameter estimates and persistent over prediction can also be attributed to the ignorance of the rapid growth in financial innovation (Arrau et al., 1995; Judd and Scadding, 1982; Lieberman, 1977). The impact of financial innovation has been very obvious in developing countries (Lieberman, 1977 and Arrau and De Gregorio, 1991). The effect of financial innovation on the demand for money in some developed countries has been attested in studies such as Lippi and Secchi (2009), Attanasio et al. (2002) Arrau and De Gregorio (1993) and Alvarez and Lippi (2009).

This paper investigates the effect of financial innovation on money demand in the United States, using for the period 1990 to 2016 using a totally different approached. It specifies a money demand equation that takes account of financial innovation and estimates it using ARCH/CARCH estimation techniques to evaluate the likely impact of the innovations. Section 2 provides a review of the literature, followed by the model specification and estimation method in section 3. Section 4 presents the results and conclusions are considered in sections 5.

2. Literature review

The quantity of money demanded is linked to the real sector of the economy which is backed by a range of theories (Sriram, 2000). The quantity theory of money, which sees income as the primary determinant of money (Serletis 2007) is the basis for classical economists who claim that money is a medium of exchange and is used primarily for transactions. It is also referred to as transactions theories that include the Baumol-Tobin model, the shopping time model and the cash in advance models. However, Keynes and the

Keynesians argue that money is also used for speculation and therefore, include interest rate in the money demand function to reflect the role of money as a store of value. This view of money is referred to portfolio theories that include the overlapping generation models and the Tobin's theory of liquidity preference.

In empirical work however, income and interest rates both are considered as the main determinants of money demand. In recent years, researchers started to include financial innovation in the money demand function due to its role in in reducing transaction costs. Excluding financial innovation could lead to serious misspecification and an unstable money demand (Arrau et al., 1995; Goldfeld and Sichel, 1990).

Melnik and Yashiv (1994) describe financial innovation as the "introduction of new liquid assets that partially replace traditional money in agent's portfolios, technological progress in banking services that reduces the costs of transactions and changes in the regulatory environment that facilitate transactions." Frame and White (2004) express financial innovation as something new that fulfils participant's demands through reduced costs, reduced risks and improved products. Arrau et al. (1995) see financial innovation as a permanent change to the money demand that is caused by technological processes and not by interest rates and GDP) and Arrau and De Gregorio (1991) describe it to include deregulation as well.

Financial innovations can have either positive impact or negative impact on the money demand depending on the payment instruments. While ATMS/ Debit cards could lead to a decline in demand for cash through reduced transaction costs, the use of cell phone technology does not necessarily reduce cash demand. ATM concentration, bank concentration, M2/M1 and M3/M1 and dummy variables capturing periods of innovation, growth rate in private sector credit are examples of the proxies that have been used by researchers to measure financial innovation indirectly.

Researchers have to use various proxies to measure financial innovation as it is difficult to measure it directly. Lippi and Secchi (2009), Fischer (2007), Sichei and Kamau (2012) and Attanansio et al. (2002) are among those who used ATM concentration as proxy. In order to take shifts in money demand into account, dummy variable was used by Hafer and Kutan (2003). Bank concentration was considered by Nagayasu (2012) while growth in private sector credit as a percent of GDP was used by Michalopoulos et al. (2009). Arrau et al. (1995) used a time trend and a stochastic trend that follows a random walk and Hye (2009) and Mannah-Blankson and Belyne (2004) used M2/M1 for capturing financial innovation. Most of these studies however, indicate that financial innovation has had a negative effect on the demand for money justifying the importance of inclusion of this factor in the money demand specification.

3. Methodology

3.1. Background

3.1.1. ARCH(q) model specification

We suppose the error terms is denoted by ε_t (return residuals, with respect to a mean process) in order to use an ARCH process for modelling a time series. A stochastic piece z_t and a time-dependent standard deviation σ_t are the two components of these ε_t which illustrate the typical size of the terms so that:

$$\varepsilon_t = \sigma_t z_t \quad (1)$$

z_t is in fact arandom variable z_t with a strong white noise process. We may model the series σ_t^2 by:

$$\sigma_t^2 = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \ldots + \alpha_q \varepsilon_{t-q}^2 = \alpha_0 + \sum_{i=1}^{q} \alpha_i \varepsilon_{t-i}^2 \quad (2)$$

Where $\alpha_0 > 0$ and $\alpha_i \geq 0$, $i > 0$

Engle (1982) suggested a methodology based on the Lagrange multiplier test to obtain the lag length of ARCH errors as below:

First, we need to estimate the best fitting autoregressive model AR(q).

$$y_t = \alpha_0 + \alpha_1 y_{t-1} + \ldots + \alpha_q y_{t-q} + \varepsilon_t = \alpha_0 + \sum_{i=1}^{q} \alpha_i y_{t-i} + \varepsilon_t (3)$$

Second, the squares of the error $\hat{\varepsilon}^2$ should be obtained and needs to be regressed on a constant and q lagged values:

$$\hat{\varepsilon}^2 = \hat{\alpha}_0 + \sum_{i=1}^{q} \hat{\alpha}_i \hat{\varepsilon}_{t-i}^2 \qquad (4)$$

Where q is the length of ARCH lags.

Third, $\alpha_i = 0$ for all $i = 1, \ldots, q$ when there are no ARCH components which is the null hypothesis. Alternatively, where there are ARCH components, at least one of the estimated α_i coefficients have to be significant. In case of the null hypothesis of no ARCH errors with a sample of T residuals, the test statistic $T'R^2$ follows χ^2 distribution with q degrees of freedom. Here, the number of equations in the model is denoted by T' which fits the residuals versus the lags (i.e. $T' = T - q$). Next, we have to compare $T'R^2$ with the Chi-square table value. There is an ARCH effect in the ARMA model if $T'R^2$ is greater than the Chi-square table value.

3.1.2. GARCH

If we assume an autoregressive moving average model (ARMA) model for the error variance, then it will be a generalized autoregressive conditional heteroskedasticity GARCH (p, q) model (where p is the order of the GARCH terms σ^2 and q is the order of the ARCH terms ε^2):

$$y_t = x_t' b + \varepsilon_t \qquad (5)$$

$$\varepsilon_t | \psi_t \sim N(0, \sigma_t^2)$$

$$\sigma_t^2 = \omega + \alpha_1 \varepsilon_{t-1}^2 + \ldots + \alpha_q \varepsilon_{t-q}^2 + \beta_1 \sigma_{t-1}^2 + \ldots + \beta_p \sigma_{t-p}^2 = \omega + \sum_{i=1}^{q} \alpha_i \varepsilon_{t-i}^2 + \sum_{i=1}^{p} \beta_i \sigma_{t-i}^2 \qquad (6)$$

Generally, the White test is the best for heteroskedasticity. However, when it comes to time series data, it can be interpreted as testing ARCH and GARCH errors.

3.1.3. GARCH (p, q) model specification

We establish the lag length p of a GARCH(p, q) process as follow: First, the best fitting AR(q) model has to be estimated:

$$y_t = \alpha_0 + \alpha_1 y_{t-1} + \ldots + \alpha_q y_{t-q} + \varepsilon_t = \alpha_0 + \sum_{i=1}^{q} \alpha_i y_{t-i} + \varepsilon_t \qquad (7)$$

Second, we need to compute and plot the autocorrelations of ε^2 by:

$$\rho = \frac{\sum_{t=i+1}^{T} (\hat{\varepsilon}_t^2 - \hat{\sigma}_t^2)(\hat{\varepsilon}_{t-1}^2 - \hat{\sigma}_{t-1}^2)}{\sum_{t=1}^{T} (\hat{\varepsilon}_t^2 - \hat{\sigma}_t^2)^2} \qquad (8)$$

Third, the standard deviation of $\rho(i)$ for large samples is $1/\sqrt{T}$. GARCH errors are distinguished when Individual values are larger than the standard deviation of $\rho(i)$. We use the Ljung-Box Q-statistic (which follows χ^2 distribution with n degrees of freedom) up to T/4 values of n to estimate the total number of lags. Rejecting the null of no ARCH or GARCH errors means that such errors exist in the conditional variance.

3.2. Model specification

The general form of the theory of money demand can be represented as below:

$$\frac{M_t}{P_t} = \Phi(R_t, Y_t) \qquad (9)$$

where M_t is the demand of nominal money balances, P_t is the price index that is used to convert nominal balances to real balances, Y_t is the scale variable relating to activity in the real sector of the economy (here, GDP as the best proxy for such a variable), and R_t is the opportunity cost of holding money (here, the interest rate or IR as the best proxy).

We start the empirical estimation of money demand functions with introducing the long-run, linear function that is of the form

$$LMD_t = \alpha + \beta_1 LGDP_t + \beta_2 IR_t + \varepsilon_t \qquad (10)$$

Where LMD is the logarithm of real money, LGDP is the logarithm of GDP (scale variable) , and IR is the opportunity cost variable (Serletis, 2007). The expected signs of the coefficients in Equation (13) are positive for GDP and negative for interest rate (i.e. $\beta_1 > 0$, and $\beta_2 < 0$). In addition, the properties of the error sequence (ε_t) are an integral part of the theory. If (ϵ) has a stochastic trend, then the deviation from the money market equilibrium will not be eliminated (Enders, p. 357). This theory assumes that the ε_t sequence is stationary.

The data are annually, from 1960 to 2016. The official website of the World Bank was used as the source of data.

GDP (at purchaser's prices) is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. GDP is in constant 2011 international dollars (PPP, purchasing power parity). Dollar figures for GDP are converted from domestic currencies using 2010 official exchange rates.

Real interest rate (expressed as percent) is the lending interest rate adjusted for inflation as measured by the GDP deflator.

Broad money (in constant 2011 international dollars ,PPP) is the sum of currency outside banks; demand deposits other than those of the central government; the time, savings, and foreign currency deposits of resident sectors other than the central government; bank and traveler's checks; and other securities such as certificates of deposit and commercial paper.

Growth in domestic credit provided by financial sector (% of GDP) and Broad money (% of GDP) are not explicitly included in the money demand function. In the context of an ARCH/GARCH model, we consider them as external shocks to the system. Domestic credit provided by the financial sector is denoted by DC and Broad money (% of GDP) is denoted by MDR in the estimation results.

Domestic credit provided by the financial sector includes all credit to various sectors on a gross basis, with the exception of credit to the central government, which is net. The financial sector includes monetary authorities and deposit money banks, as well as other financial corporations where data are available (including corporations that do not accept transferable deposits but do incur such liabilities as time and savings deposits). Examples of other financial corporations are finance and leasing companies, money lenders, insurance corporations, pension funds, and foreign exchange companies.

4. Estimation

Here, we shall develop a GARCH (2,0) model meaning that there is 2 arch but no garch. The variables are all stationary. However, there are two more conditions for developing such a model. First, there should be clustering volatility and second, there should be arch effect. We investigate these two conditions one by one. In order to do that, first we need to estimate the model.

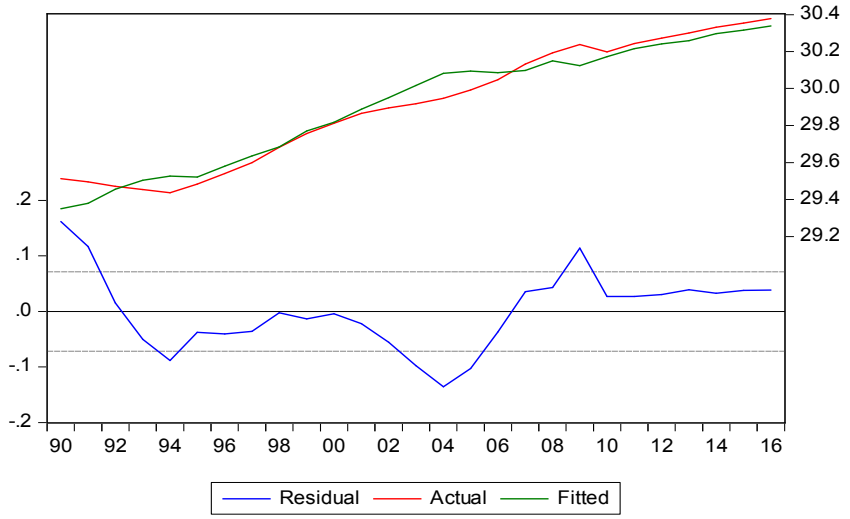
Table 1: Estimation results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-13.14791	2.821708	-4.659556	0.0001
LGDP	1.428682	0.092634	15.42289	0.0000
IR	-0.025469	0.009229	-2.759584	0.0109

R-squared	0.956079	Mean dependent var	29.90944
Adjusted R-squared	0.952419	S.D. dependent var	0.327430
S.E. of regression	0.071423	Akaike info criterion	-2.335957
Sum squared resid	0.122430	Schwarz criterion	-2.191976
Log likelihood	34.53543	Hannan-Quinn criter.	-2.293144
F-statistic	261.2164	Durbin-Watson stat	0.410448
Prob(F-statistic)	0.000000		

Estimated coefficients are all significant and bear the expected signs. Addusted R-squared is high and Prob (F-statistic) indicate that the regression is overall significant. Now, we check the residuals of the model.

Figure 1: Residuals of the estimated model



Here, we note that a period of high volatility (1990-1994) is followed by a period of low volatility (1994-2000) then comes another period of high volatility (2000-2010) followed by the second period of low volatility (2011-2016). It justifies the clustering volatility meaning that the first requirement to run a garch model is met. We double check this result by using ARCH test to find out whether or not there is arch effect.

Table 2: Heteroskedasticity Test: ARCH

F-statistic	7.268462	Prob. F(1,24)	0.0126
Obs*R-squared	6.043790	Prob. Chi-Square(1)	0.0140

Prob. Chi-Square of 0.0140 which is less than 0.05 indicates that there is arch effect as we can reject the null hypothesis that states there is no arch effect. Now that the requirements are met, we can run the ARCH/GARCH model.

Table 3: Estimation of GARCH model

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-13.12007	0.150310	-87.28664	0.0000
LGDP	1.429726	0.004524	316.0348	0.0000
IR	-0.036322	0.007224	-5.028028	0.0000
Variance Equation				
C	0.002990	0.005611	0.532931	0.5941
RESID(-1)^2	0.689508	0.756346	0.911631	0.3620
RESID(-2)^2	0.012504	0.182861	0.068382	0.9455
MDR	-2.80E-05	6.56E-05	-0.426450	0.6698
DC	9.88E-05	0.000110	0.901900	0.3671
T-DIST. DOF	127.0292	9000.025	0.014114	0.9887

R-squared	0.948770	Mean dependent var	29.90944
Adjusted R-squared	0.944501	S.D. dependent var	0.327430
S.E. of regression	0.077137	Akaike info criterion	-2.568863
Sum squared resid	0.142801	Schwarz criterion	-2.136917
Log likelihood	43.67965	Hannan-Quinn criter.	-2.440423
Durbin-Watson stat	0.466585		

The upper section of the table above id the mean model and the lower section concludes the variance model which is the GARCH model that can be expressed as:

GARCH = C(4) + C(5)*RESID(-1)^2 + C(6)*RESID(-2)^2 + C(7)*MDR + C(8)*DC

This GARCH is in fact the variance of the residuals of the money demand which has been derived from the mean model. RESID(-1)^2 and RESID(-2)^2 indicate arch(1) and arch(2) effects, respectively. However, there is no garch effect. That is because, it is basically a GARCH (2,0) as mentioned before. As we see from table 3, neither RESID(-1)^2 nor RESID(-2)^2 are significant meaning that previous years' information (information in t-1 and t-2 perods) about money demand volatility cannot influence it. In other words, RESID(-1)^2 and RESID(-2)^2 which represent internal causes do not affect the volatility of the demand for money.

Now, we check if external volatilities can influence the volatility of the money demand. MDR (Broad money expressed as % of GDP) and DC (Domestic credit provided by financial sector expressed as % of GDP) are external or outside shocks. From table 3, we note that none of these external shocks have impacted the volatility of the money demand either.

Nest, we check if internal shocks (RESID(-1)^2 and RESID(-2)^2) jointly can influence the volatility of the money demand. In order to do so, we use Wald test as below.

Table 4: Wald test

Test Statistic	Value	df	Probability
F-statistic	0.444215	(2, 18)	0.6482
Chi-square	0.888430	2	0.6413

Chi-square probability of 0.6413 which is greater than 0.05 indicate that we cannot reject the Null Hypothesis: C(5)=C(6)=0 meaning that internal shocks jointly do not affect the volatility of the money demand. In other words, arch(1) and arch(2) jointly cannot influence the volatility of the money demand.

Now, we have to check whether our GARCH(2,0) model that we have estimated, has ARCH affect and serial correlation or not. First, we check for the arch affect.

Table 5: Heteroskedasticity Test: ARCH

F-statistic	0.744719	Prob. F(1,24)	0.3967
Obs*R-squared	0.782498	Prob. Chi-Square(1)	0.3764

Prob. Chi-Square above indicate that we cannot reject the null hypothesis of no heteroskedasticity meaning that there is no arch affect. Fortunately, this outcome is in line with the result that internal shocks do not affect the volatility of the money demand meaning that there is no arch affect. Now we check the serial correlation to make sure that our estimated model is free from this statistical issue. This rest us assured that the results are valid.

Table 6: Serial correlation detection

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
. |* . |	. |* . |	1	0.164	0.164	0.8120	0.368
. | . |	. *| . |	2	-0.056	-0.085	0.9107	0.634
. *| . |	. *| . |	3	-0.130	-0.110	1.4622	0.691
. *| . |	. *| . |	4	-0.204	-0.176	2.8791	0.578
. *| . |	. *| . |	5	-0.140	-0.103	3.5761	0.612
. | . |	. | . |	6	-0.021	-0.026	3.5922	0.732
. | . |	. | . |	7	0.070	0.021	3.7845	0.804
. | . |	. *| . |	8	-0.058	-0.144	3.9254	0.864
. | . |	. | . |	9	0.055	0.045	4.0589	0.907
. *| . |	. *| . |	10	-0.128	-0.190	4.8167	0.903
. *| . |	. *| . |	11	-0.144	-0.122	5.8350	0.884
. | . |	. | . |	12	-0.016	-0.033	5.8483	0.924

The p-values are all more than %5 meaning that we cannot reject null hypothesis (stating that there is no serial correlation). In other words, we conclude that there is no serial correlations.

5. Conclusion

This paper investigates the effect of financial innovation on money demand in the United States using GARCH estimation techniques between 1990 and 2016. We use a conventional money demand function with real GDP (gross domestic product as the scale variable) and real IR (interest rate as the opportunity cost of money). Ratios of broad money stock to GDP and growth in net domestic credit to GDP were included in the money demand function in the context of a GARCH model to account for the financial innovation (external shocks). Internal shocks conclude the previous years' information (information in period t-1 and period t-2) about the volatility of the real demand for money. The results indicate that while estimated coefficients of GDP and IR are all significant and bear the expected signs, neither external shocks (financial innovation) nor internal shocks (previous years' information) influence the volatility of the money demand in the United States during 1990-2016.

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ANALYSIS OF GROWTH AND CONVERGENCE OF CO2 EMISSIONS IN BRICS NATIONS

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Abstract

The developmental gap among the countries or regions sometimes depends on the narrowing of the gap between carbon emissions as the latter leads to more industrial growth. The present study endeavors to test whether the BRICS nations are converging in terms of per capita CO2 emission over time for the period 1992-2014. We have applied the Barro and Sala-i-Martin's (2004) unconditional and conditional β convergence definitions, and σ convergence definition on the data of the World Bank for the said period. The results show that there were no signs of cross country convergence in terms of β convergence definition (or the catching up process) but the countries were converging in line with the σ convergence definition for three different time durations indicating pre entry to and post entry of the BRICS Group. Attempting to a set of conditional variables like fuel consumption, energy intensity, per capita growth rate, FDI flow, trade openness, population, import share to GDP, etc. we did not find any such variable explaining whether there were any sort of conditional convergence. The cross country convergence in income in the group can also be attributable to this CO2 convergence.

Keywords: Per capita CO2 emission, β convergence, σ convergence, BRICS
JEL classification:

1. Introduction

Before to the commencement of the 9th BRICS Summit scheduled for September 3-5, 2017 in Southeast China's Xiamen city, Brazilian President Michel Temer said that his country would seek real convergence among the bloc members on economic and financial issues and common challenges (China Daily, 29.08.2017). As the group consists mainly of the highly emerging countries of the world, besides economic challenges, there is also a tough challenge regarding the emission levels of CO2. The Kyoto Protocol has put deadlines of the carbon emission, a major part of greenhouse gases, for all the countries with different status of development. Based on the EDGAR database created by European Commission and Netherlands Environmental Assessment Agency released in 2015 that China leads the list of countries with 10,641,789 kt of CO2 followed by USA with 5,172,336 kt, European Union with 3,469,671 kt, India with 2,454,968 and Russia with 1,760,895 kt. The striking fact for the BRICS nations is that out of top five countries/regions in the list of CO2 emitter, three are belonging to the group with about 40 per cent of world CO2 emissions. The developed countries always blame that the growth and progress of the emerging countries like China is due to the destruction of the global environmental quality which put a cost to the global community. It is further that, being CO2 emission as one of the important determinants of industrial production and GDP of the countries, the progress of BRICS nation is subject to divergence or convergence. The Brazillian President's urge towards real convergence among the group nations, thus, carries a valuable point.

Besides technological and natural factors, there are several economic factors behind the increase in the CO2 emission level irrespective of the status of developments of the countries. There is a long list of studies available in the literature on the determinants of CO2 emissions in countries and regions of the world. For instance, the study of Friedl and Getzner (2003) on a small open and industrialized country like Austria explored that import shares reflecting the well-known pollution haven hypothesis and the share of the tertiary sector of total production are the significant factors on determining CO2 emission of the country. In another study, Cerdeira Bento (2014) points out that there are the factors like trade openness and energy consumption are responsible for CO2 emission in a small open economy, Italy. In their study, Morales-Lage, Bengochea-Morancho & Martínez-Zarzoso (2016) have identified three

factors, namely, population, industry and energy use having role in making CO2 emissions in the 28 European countries. The study by Jawara (2016) on the Gambia economy has shown that GDP per capita, population density and trade balance have significant role on CO2 emission of the country. There may be a list of remaining factors that can be responsible for carbon emission in some countries. The socio-economic factors responsible in determining the volume of CO2 emission, as mentioned in the above studies, sometimes work as conditional variables in explaining the growth and divergence of CO2 emission across the countries.

The countries in the BRICS groups are among the highly emerging economies in the world for the last two to three decades in terms of their volume of GDP and industrial production. But, according to the data by World Bank, China and India are among the vibrant economies in recent times in the group. Hence, there is the possibility that there is divergence among the member nations. Also, it is that, diverging tendency among them is not the expected outcome of the member countries; it can destabilize the core of the group. Under this backdrop, the present study examines whether the BRICS nations are converging in terms of CO2 emissions for the period 1992-2014 as carbon emission is an important determinant of GDP of the countries.

2. Review of Relevant Literature

In carrying out the above study, we point out here the extant studies on carbon emission in particular and income convergence in general across the countries and regions. In a front line study, Strazicich and List (2003) tested for convergence of per capita CO2 emissions in 21 OECD countries over the time period 1960-1997. They observed strong sign of convergence and also that gasoline prices and temperature had significant roles behind conditional convergence. Stegman and McKibbin (2005) attempted to examine whether there was any evidence of convergence with respect to per capita carbon emissions from fossil fuel for 26 OECD countries and 97 countries in total for different periods of the twentieth century. The observed strong evidence of convergence for the OECD countries but the there was little evidence of convergence for the 97 countries as a whole. In a similar type of study, Aldy (2006) showed that the high income countries were converging in per capita emission while the entire set of countries did not show any sign of convergence. In a further study at some micro levels, Aldy (2007) tried to show whether income convergence is sufficient for convergence in per capita carbon dioxide emissions on a set of the U.S. states for the period 1960-1999. The findings showed that, although incomes continue to converge, there were severe divergence in production CO2 per capita and no evidence of convergence for consumption CO2 per capita. In a different methodological approach, Panopoulou & Pantelidis (2009) examined convergence in carbon dioxide emissions among 128 countries out of OECD, EMU and other regions for the period 1960–2003 and the results suggested convergence in per capita CO2 emissions among all the countries. Vargas-Hernandez (2009) focused on the environmental and economic shrinkage impact it has had the transfer of ownership from state owned Paper Mill Company to a corporate private ownership as an effect of the ongoing economic process of globalization, after the industrial boom of the paper mill during the second half of the last Century. It observed that the impact on the environmental and economic development had initiated the shrinking and declining of Atenquique but also of the surrounding cities and towns. Brock & Taylor (2010) investigated unconditional and conditional β-convergence through a cross-sectional approach for 22 OECD countries for the time period 1960-1999 and observed the evidence of both unconditional and conditional β-convergence for the club of countries. Differences in countries arose from savings rates, pollution abatement intensities and effective depreciation rates. Hossain and Miyata (2012) have attempted to study the growth of Toyohashi city over time and resultant increase in consumption of electricity and gas. The results of the study show that manufacturing and trading sector of the economy are causing expansionary pressure on use of combustion energy leading to imbalanced environment. In their study, Camarero et al. (2013a) analyzed convergence in CO2 emission intensity for 23 OECD countries over the period 1960-2008 based on its determinants such as energy intensity and the carbonization index and showed that the differences in emission intensity convergence are more determined by differences in convergence of the carbonization index. Yavuz and Yilanci (2013) have

tested the convergence of per capita carbon dioxide emissions of the G7 countries during 1960–2005. Using the threshold autoregressive panel unit root test, data are decomposed into two regimes, and the results showed that convergence existed in the first regime and divergence, in the second. In its attempt for micro levels, the study of Das (2013) tried to examine whether the Indian states are converging in CO2 emissions for the period 1980-2000. The study observes that the states are insignificantly β converging and significantly σ converging for the period 1980-2000. Segregating the data for pre reform (1980-91) and post reform (1992-2000) periods, the study observes that the states are unambiguously converging in the former period but diverging in the later period at least by the definitions of σ convergence. There is an extensive review of literature on convergence of carbon dioxide emissions by Petterson et al (2014) and its extract shows that the developed countries under the banner of OECD are converging in terms of per capita emission while the countries at the global level are not converging. The study of Pourmohammadi, Valibeigi and Sadrmousavi (2014) investigated the situation and tendencies in the field of quality of life in Iran based on comparison, convergence and investigated whether there were convergences in human development indicators. The results of this study revealed that the order of provinces in terms of quality of life had not changed, but HDI, access to clean water and average income levels had been increased and the relative convergence with both in unconditional β-convergence and σ-convergence analyses had been occurred. In a study related to different regions of Turkey, Duran (2015) analyzed regional income convergence in 67 provinces for the period 1975-2000 by using nonparametric convergence regressions. The result obtained was that the relationship between initial income and growth took an inverted-U shape which meant that the very low-income and high-income group of provinces experienced a slow growth pattern compared to middle-income group. The study by Tiwari and Mishra (2016) examined the convergence in CO2 emissions across 18 Asian countries over the period of 1972–2010. The results showed that there were significant beta and sigma convergence of the group countries. In a recent study, Akar and Lindmark (2017) have analyzed convergence in CO2 emissions in the OECD countries with respect to oil and coal sources of emissions for the period 1973-2010. The study also decomposed the total time period into 1973–1991 for oil price shock and 1992–2010 for Cold War strategic considerations. The study revealed stronger convergence with respect to oil-related emissions until 1991 conditional on gross domestic product per capita is compatible with a situation where the rising oil prices led to a strong transformation in the countries of interest. In a bit different study, Batabyal (2017) highlighted on some measurement issues while analyzing the long run behavior of the creative region's output per creative class member by applying the unconditional and conditional convergence, and sigma convergence. It studied how to estimate the regression coefficient from the knowledge of the coefficients of a related cross region growth regression.

2.1. Lacuna of the previous studies

The survey of existing literature so far did not disclose any study on carbon convergence or divergence for the BRICS nations and hence our proposed study has potential to make some additional value to the existing literature on this particular area.

3. Data and Methodology

We have used the data for CO2 emissions, GDP, GDP growth rates, population, energy consumption, trade openness, industrial value added, and electricity production published by the World Bank for the time period 1992-2014 for the BRICS members namely Brazil, Russia, India, China and South Africa. The total data set has also been bifurcated in to 1992-2005 which is the pre BRICS phase and 2006-2014 as the post BRICS phase. The choice of 1992 as the initial time point since World Bank published data for Russia from this year on CO2 emission.

At first we have divided the total CO2 emission (in kilo tone units) by population figure and derived the per capita CO2 emissions for all the five countries. Then we have applied the unconditional or absolute β convergence, conditional β convergence and σ convergence principles in line with Barro and Sala-i- Martin (1992 & 2004) to test whether the BRICS nations are converging in terms of per capita CO2 emissions.

We can now derive the expression for β in the form of cross section regression. Let us suppose that there are n numbers (here n = 5) of countries within a geographical boundary with k_{it} being the per capita CO2 emission quantity of the i^{th} country. Consider the following regression model

$$log\left(k_{it}\right) = \alpha + (1-\beta)\, log\left(k_{i,t-1}\right) + u_{it} \ldots\ldots\ldots\ldots\ldots..(1)$$

It can be rewritten as

$$log\left(k_{it} / k_{i,t-1}\right) = \alpha - \beta log\left(k_{i,t-1}\right) + u_{it} \ldots\ldots\ldots\ldots\ldots\ldots(2)$$

where α and β are constants respectively for intercept and slope with β>0 and u_{it} is a regular disturbance term following properties of normal distribution. In this equation a positive sign of β means absolute convergence. That is, growth rate of per capita CO2 emission [= log (k_{it}/ $k_{i,t-1}$)] is inversely related to the initial per capita quantity of emission (= $k_{i,t-1}$). It is also to note that β is nothing but the slope of the per capita emission growth function. In other words β = - dlog (k_t/k_{t-1})/dlog (k_{t-1}). Here β also plays the role of speed of convergence. More specifically the speed of convergence depends on different structural factors like the base level of the concerned variable. Rassekh (1998) provides one possible derivation of computing speed of convergence by the help of the slope factor β. Since the rate or speed of convergence depends on the gap between the initial value and the steady state value of the variable so it can be determined by the reorientation of the growth equation (Equation 2) in the following form:

$$1/T\left[log\left(k_{it} / k_{i,t-1}\right)\right] = \alpha - \left[\left(1-e^{-\lambda t}\right)/T\right].log\left(k_{i,t-1}\right) + \varepsilon_{it} \ldots\ldots\ldots\ldots\ldots..(3)$$

where λ stands for the speed of convergence and T stands for total period of time under observation. According to the study λ can be simplified by the following relation

$$\lambda = -log\left(1 + \beta\right) \ldots\ldots\ldots..(4)$$

The estimated value of speed of convergence λ determines the time required for all countries to reach the steady state point in the long run. Since the value of the variable at steady state depends on so many parameters appearing in the future sometimes it is estimated the time to cross the half line of the steady state value. Battisti and Di Vaio (2006) has shown in their study that the time to cross the half of the value is 35 years with the value of speed of convergence 0.02 by using the formula $e^{-\lambda t} = 1/2$ or $t = \log(2)/\lambda$.

If we plot the data of each country's growth rate and initial value of per capita CO2 emission in a scatter diagram and fit a linear trend through these points then a downward trend will imply convergence of this region. On the contrary, if the fitted line is upward sloping then there is divergence, which means the richer zones become more and more rich and the poorer zones become more and more poor. The hypothesis of Absolute β Convergence works well when the group of economies is homogeneous in character with similar values of the parameters. This condition is more likely to be satisfied for different regions of the same country or same geography. But under heterogeneous nature of the regions there should be difference in the steady state levels. Each economy has a separate steady state of per capita CO2 emission but at the steady state, growth rate of per capita CO2 emission will be zero. We then have to modify the theory of absolute convergence to accommodate the concept of conditional convergence. This theory of convergence is developed by the endogenous growth theory. *Conditional* β *Convergence* can be presented by the following equation

$$log\left(k_{it}\right) = \alpha + (1-\beta)\, log\left(k_{i,t-1}\right) + \eta W_t + u_{it} \ldots\ldots\ldots\ldots\ldots..(5)$$

where 'W' is the vector of other variables (also known as conditional variables) that affect consumption expenditure such as per capita GDP, emission intensity, trade openness, population, electricity production, industrial output growth, carbonization index, carbon intensity, etc. relevant for CO2 emission and η captures the effects of these vector of conditional variables upon per capita CO2 emission. Conditional convergence occurs when the partial correlation between the growth rate of CO2 emission and the initial level of emission per capita is negative and significant along with the significant signs and values of the coefficients of the conditional variables. The essence of the conditional convergence is that an economy grows faster the further it is from its own steady state values of the variables.

The methodology of absolute β convergence by means of Barro regressions has been criticized by Friedman (1992) and Quah (1993). They point out that these regressions are liable to produce biased estimates of β convergence. The insight of Friedman's (1992) work suggests that the simple trend in the *coefficient of variation* of *per capita* GDP provides an unbiased estimate of β convergence which is known as σ convergence. We can express the concept of σ Convergence by means of the following regression equation

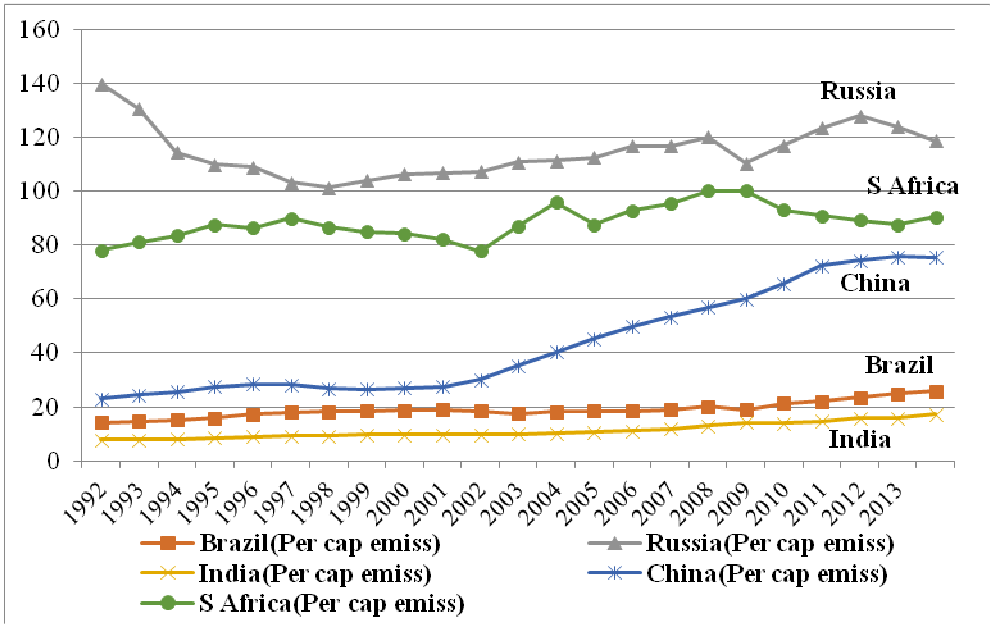
$$CV = a + bt + u_t \ldots\ldots\ldots\ldots (6)$$

where 'a' is intercept constant, 'b' is the slope constant signifying the changes of CV over time and u is the random disturbance term. If the sign of 'b' is found to be negative and significant then we can say that the trend of CV is downward and that there is convergence among the countries by the criterion of σ convergence.

4. Results and Discussion

Before going into the analytical part of the study, we present the graphical view of the trends in the per capita CO2 emissions and base values of per capita CO2 emission quantity for the BRICS nations. Figure 1, 2 and 3 present them.

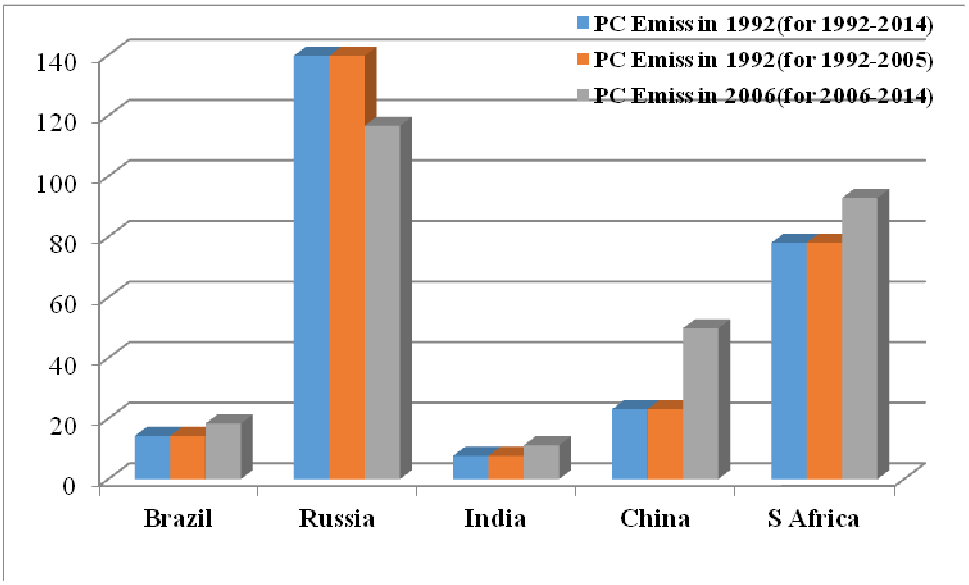
Figure 1. Trends of per capita CO2 emissions (in quintals) of countries



It is observed from Figure 1 that Russia and South Africa are the leaders in the group in terms of per capita CO2 emissions and India is at the trough throughout the entire period, and China is at the third position followed by Brazil. But the striking result is that China has maintained increasing trends in per capita emission. On the other hand, China, Russia and India maintained rising emission after the joining of BRICS whereas South Africa maintained falling trend in emission position after her joining in 2009.

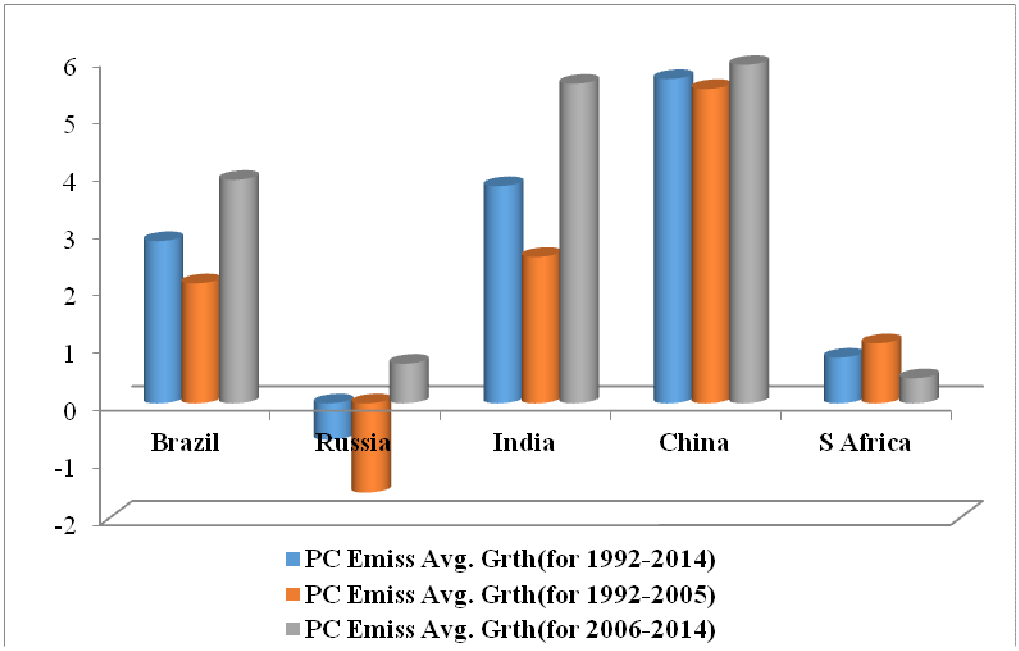
Figure 2 presents the base values of per capita CO2 emission for all the five countries in the group for the first year of three different time periods: entire period (1992-2014), pre BRICS period (1992-2005) and post BRICS period (2006-2014). Although South Africa joined the Group in 2009, we have counted its entry from the year 2006 to make parity in the analysis of convergence.

Figure 2. Base values (in 1992) of per capita emission during 1992-2014 across the countries



We observe from Figure 2 that Russia and South Africa top the list in the year 1992 and 2006 for all the three time phases in per capita CO2 emission but the remarkable result is that the values for per capita CO2 emissions for Russia has fallen in 2006 compared to that in 1992 whereas the values for all the remaining countries have increased in 2006 vis-à-vis 1992. Hence, the possibility of convergence may arise in the post BRICS phase. To supplement our idea we need to observe the status of average growth rates of per capita CO2 emissions for all the three phases (Figure 3).

Figure 3. Average growth rates of per capita emissions for different phases across the countries



It is observed from the figure that Russia and South Africa have maintained lower average growth rates in the post BRICS period compared to the other three member countries and China, India and Brazil with very high average growth rates. That means, combining Figure 2 and 3, we may get the convergence result in the post BRICS phase. But for the entire period

and pre-BRICS phases, average growth rates of Brazil, India and China are not too high like that of the post-BRICS phase and hence there may not be the possibility of convergence. To get concrete results we need to make the quantification of convergence by means of the β (absolute and conditional) and σ convergence.

4.1. Absolute β convergence test

At first we plot the annual average growth rate of per capita CO2 emission and the initial logarithmic values of per capita CO2 emission corresponding to the year 1992 for the entire period of study and draw the trend line along the five coordinating points of the scatter diagram. Figure 4 depicts this. There are five scattered coordinates for five countries and the trend line shows signs of convergence among the countries which means the country with relatively higher initial values of per capita CO2 emissions may have relatively lesser growth rates in per capita CO2 emissions and conversely the country with relatively lower initial values of per capita CO2 emissions may have relatively higher growth rates in per capita CO2 emissions. But the actual sign and magnitudes of the β coefficient cannot be derived from the diagram and we can do it by estimating regression equation (2).

Figure 4. Scatter diagram for 1992-2014

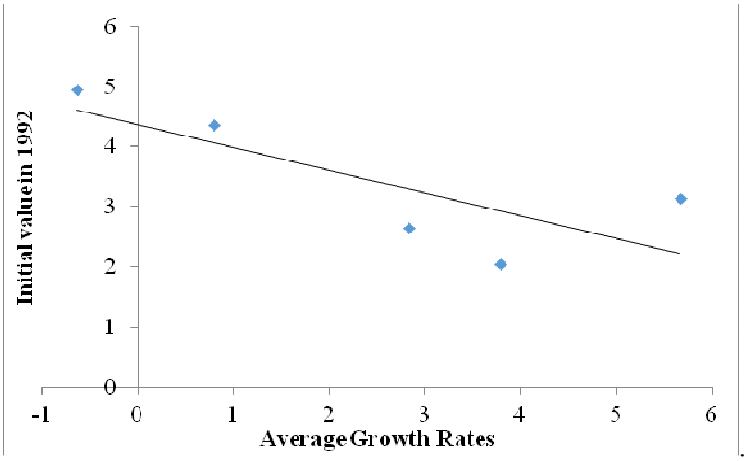


Table 1 depicts the estimated sign and value of the β coefficient using equation (2). The sign and value of the β for 1992-2014 phase is (-) 1.61 which is not significant at least at 5% level of significance. That means, the BRICS nations have not converged to a common steady state value in terms of per capita CO2 emissions so far as the definition of unconditional β convergence is concerned.

Table 1. Absolute β convergence and σ convergence results

Periods	Absolute β Convergence Results				σ Convergence Results		
	Constant	β (p)	λ(speed)	R^2	Constant	b (p)	R^2
1992-2014	**8.03**	-1.61 (0.11)	-	0.61	**1.01**	**-0.015(0.00)**	0.94
1992-2005	**6.77**	-1.41(0.22)	-	0.44	**1.012**	**-0.015(0.00)**	0.78
2006-2014	**10.49**	-1.93(0.14)	-	0.56	**0.80**	**-0.016(0.00)**	0.96

Source: Computed by the author

Let us analyze for the breakup of the total period. The scatter diagram for the pre-BRICS phase has been given in Figure 5. The trend line shows negatively sloped. The estimated sign and value of β coefficient is (-) 1.41 (refer to Table 1) which shows

insignificant absolute convergence. That means, the countries prior to entering into the group were not converging in terms of per capita CO2 emissions.

Figure 5. Scatter diagram for 1992-2005

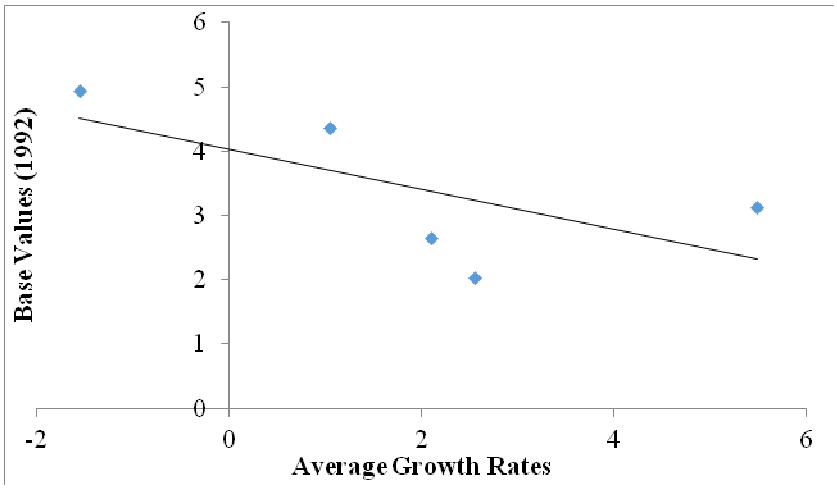
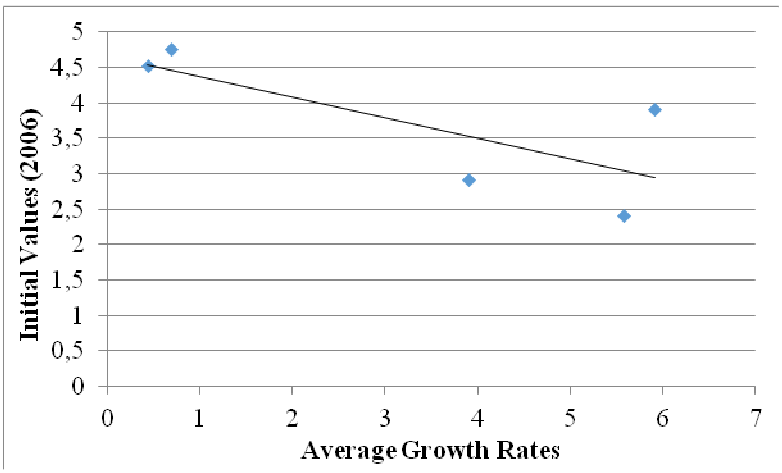


Figure 6. Scatter diagram for 2006-2014



Finally, the sign and value of β for the post BRICS phase is (-) 1.93 but still insignificant (refer to Table 1 and Figure 6). Hence, so far as the definition of unconditional β convergence is concerned, the countries are not converging significantly, although there are signs of convergence.

4.2. Conditional β convergence test

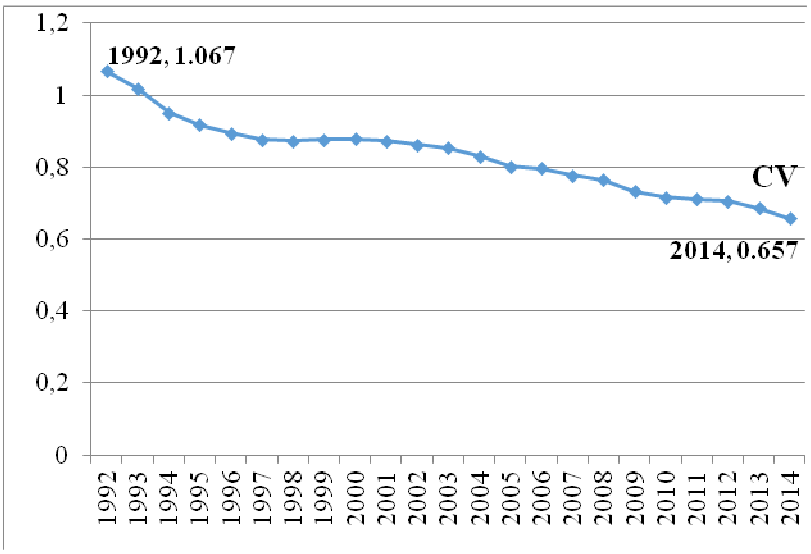
The existing literature shows that there are the variables like fuel consumption, energy intensity, per capita growth rate, FDI flow, trade openness, population, import share to GDP, etc. which affect CO2 emission (Friedl & Getzner, 2003; Cerdeira Bento, 2014; Morales-Lage, Bengochea-Morancho & Martínez-Zarzoso, 2016; Jawara, 2016). In the present study we have tried to test the roles of different pairs of variables for identifying possible conditional variable to explain the per capita CO2 emission in the BRICS nations. But, we did not find any one or any pair of variables capable of explaining the conditional β convergence in per capita emission. Hence, there is no conditional convergence in per capita CO2 emissions in the member countries.

4.3. σ convergence test

We have already stated in the methodology section that convergence or divergence as par the β convergence (both unconditional and conditional) does not necessarily mean that the cross country dispersion as measured by coefficient of variation (CV) will not decline over

time. If we get the declining trend of CV then we can say that there is the prevalence of σ convergence among the countries. Figure 7 presents the trend of CV for the entire period.

Figure 7. Trend of CV in per capita CO2 emission



It is observed from the figure that the values of CV are continuously declining except some stagnancy for the period 1998-2001. Starting from the value of 1.067 in the year 1992, it turns down to 0.657 in the year 2014. But the quantification of the gradient is not clear from the figure.

Using Equation (6), we estimate the signs and values of regression coefficient, b, for all the three different phases. The results are given in Table 1. We observe from the table that the member countries have converged over time in respect of per capita CO2 emissions. The estimated signs of the regression coefficient, b, for all the three different time phases are negative and the values are statistically highly significant. The post BRICS convergence is little bit stronger as the magnitude of the regression coefficient is relatively higher than all the values (0.016 > 0.015) corresponding to the entire period and pre-BRICS period.

Therefore, we can conclude that the BRICS nations are not converging in any phase in terms of per capita CO2 emissions so far as the definitions of β convergence is concerned but they are converging in terms of σ convergence definition.

5. Conclusion

In our endeavor to test whether the BRICS nations are converging in terms of per capita CO2 emission over time for the period 1992-2014, we are now in a position to conclude the entire study. Applying the unconditional and conditional β convergence definitions, and σ convergence definition, we saw that there were no signs of cross country convergence in terms of β convergence definition (or the catching up process) but the countries were converging in line with the σ convergence definition for three different time durations indicating pre entry to and post entry of the BRICS Group. Attempting to a lot of conditional variables like fuel consumption, energy intensity, per capita growth rate, FDI flow, trade openness, population, import share to GDP, etc. to justify whether there were conditional convergences in the countries, we did not find any such variable explaining whether there were any sort of conditional convergence. Hence, the relative dispersions among the member countries are falling with respect to carbon emission in per capita terms but no catching up process has worked. The cross country convergence in income in the group can also be attributable to this CO2 convergence.

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EFFECTS OF FISCAL CONSOLIDATION ON REGIONAL ECONOMICS RESILIENCE: INSTITUTIONAL DESIGN METTERS?

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Abstract
After the Great Recession, in the European Union (EU) emerges an heterogenous level of both national fiscal consolidation and regional economics resilience. The paper uses the EUROSTAT database of EU-27 at NUTS 2 level over the period 2000-2009 to test how fiscal consolidation affects the regional economics resilience. We find that the fiscal consolidation and regional economic resilience are negatively correlated. Moreover, we show that the negative effect of taxation is higher than the positive effect of public spending.

Keywords: Regional economic resilience, Fiscal consolidation, Institutions, European Union
JEL classification: R12, E62, H23, H72

1. Introduction

The recent crisis, called Great Recession, has led to two major novelties in the academic debate. The first novelty is the reconsideration of economic policies (e.g. Stilianos and Ladias, 2011; Duran, 2015). Monetary policies in the countries affected by the crisis have mainly differed on their times of application. Instead, fiscal policies have diverged a lot by countries from heterogeneity of budget and institutional constraints (Afonso and Jalles, 2011; Karjoo and Sameti, 2015). The second novelty in the academic debate is the use of new theoretical categories of analysis. In particular, the concept of resilience has also been adapted to the economy literature (Bailey and Turok, 2016). The paper tries to fit in both debates using the concept of resilience to assess different fiscal policies.

Literature offers different approaches for analyzing regional economic cycles (Partdrige and Rickman, 2005; Fingleton et al., 2012; 2015). Special attention has been dedicated to the concept of regional economic resilience to increased sense of risk and from perception that this phenomenon has made regions more permeable to the effects of what were once thought to be external processes (Christopherson et al., 2010). In this paper, we focused on the effects of fiscal consolidation on regional economic resilience.

Like Matin and Sunley (2015), we define the regional economic resilience as the capacity of regional economy to withstand or recover from market competitive and environmental shocks to its developmental growth path, if necessary by undergoing adaptive changes to its economic structures and its social and institutional arrangements, so as to maintain or restore its previous developmental path, or transit to a new sustainable path characterized by a fuller and more productive use of its physical, human and environmental resources.

Although regional resilience concept has been applied in a broader set of fields, it still represents a fuzzy concept (Gong and Hassink, 2017). The economics literature on resilience principally is focused on firm or regional level by using a private sector analysis probably because the firms are the main actors that react to shocks and hence the characteristics of the firms and the market where they operate is the crucial aspect to understand the level of resilience (Christopherson et al., 2010; Martin et al., 2016; Nyström and Viklund Ros, 2016; Rocchetta and Mina, 2017; Nyström, 2018). Few exceptions are Fingleton et al. (2015) that is focused on the monetary policy and Muštra et al. (2017) that is focused on the smart specialization strategy. In this paper, we analysis the specific actions by public sector just to

point out that also it can play a role to explore the level of regional resilience and above all in limiting the potential for response to shock by the private sector.

One of the most important shortcomings of the exiting concepts is neglecting the institutional design and the public policy on different spatial levels, especially not taking into consideration the decentralization framework (Swanstrom, 2008; Bristow, 2010). This issue has been especially raised due to concerns about the long-term (un)sustainability of public finances that has supported the implementation of budgetary consolidation measures, affecting governments on different institutional level in many countries.

Therefore, this paper represents the first attempt of investigating the role of institutional design of fiscal consolidation on regional economic resilience. More precisely, the paper tries to identify both the possible channels of influence of fiscal consolidations on regional economic resilience and the effects of these channels in different institutional designs.

During the last crisis, fiscal consolidation included rises in taxation, penalties for early retirement and pension cuts, reductions in the length and the size of unemployment benefits and other welfare payments, wage cuts in the public sector, reduction in the public expenditure on education and health and wealth reallocation from taxpayers to banks and debtors (Agnello et al., 2016). With all these measures, prominent not only because of their size but also because of the associated perception of unfairness, fiscal consolidation does not have only influence on the public debt levels, but also on the different aspects of economy.

These issues have been recognized by researchers that have published large number of papers looking at the potential impact on economic activity and lately on different distributional issues (among others Castro 2007; Heim 2010a; 2010b; Afonso and Jalles, 2011; Agnello and Sousa, 2014). In first place, they analyzed the individual (income) distributional effects but the spatial dimension has been mainly unexplored. At the best of our knowledge, the exception is the paper of Agnello et al. (2016) that investigates the influence of the national fiscal consolidation on regional inequalities.

The European Union (EU) is a great case studies. Indeed, during the Great Regression the EU adopted different fiscal policies to react at the same crises. The implementation of the fiscal consolidation measures has been the result of the last crisis, when many governments attempted to implement large fiscal stimulus programs, which, coupled with revenue falls. In the paper, we explore the impact of fiscal consolidation on regional economic resilience under different institutional designs among the EU member countries for period 2000-2009.

The results of the paper highlight that fiscal consolidation is not only the matter of the public debt levels or economic growth, but also an important regional issue. Indeed, we show that the fiscal consolidation and regional economic resilience are negatively correlated. Moreover, we show that the negative effect of taxation is higher than the positive effect of public spending. Finally, the paper provides the evidence of different effects of fiscal consolidation on regional economic resilience, emphasizing the relevance of the study of the economic cycle. Indeed, we observe that the economic cycle considerately affects the effect of the level of public spending on regional economic resilience.

The paper is structured as follows. Section 2 develops a set of testable hypotheses. Section 3, presents the data, the estimation strategy and the results. Section 4 concludes.

2. Regional implication of the fiscal consolidation

To study the effects of fiscal consolidation and resilience we followed two steps. First of all, we analyze separately the effects of a decrease in public spending and an increase in taxation on the degree of regional resilience. Second, we analyze the total effect as a sum of the two previous effects.

During the crisis periods, the private sector receives less demand on the market and therefore focuses its attention on corporate restructuring and in particular on long-term innovations (Slavtchev and Wiederhold, 2016). Given the level of taxation, when the public spending decreases, we probably observe a reduction of the share of public sector on the economy and an increase of the share of the private sector.

In other words, reducing the relevance of public sector on the economy, raises the relevance of the private sector and then, during the crisis periods, this should have an anti-cyclical effect, or in other words, it has a positive effect on resilience. Vice versa, if the

government increases the level of taxation, the private sector reduces its tools to positively affect the resilience and then we probably observe a reduction of level of regional resilience.

Assuming that both sentences hold, the total effect of fiscal consolidation depends on what of the two previous effects dominate. When the main public tool is the public spending, then the fiscal consolidation increases the resilience. Vice versa, when the main public tool is the taxation, then the fiscal consolidation decreases the resilience.

Although the debate is still open (Martinez-Vazquez and McNab, 2003; Sacchi and Salotti, 2014; 2016; Agnello et al., 2016), some scholars argue that greater decentralization increases regional inequality (Rodríguez-Pose and Gill, 2004; Lessmann, 2009). The explanation for this phenomenon is that greater institutional heterogeneity differentiates the effects on external shocks. However, other scholars find the opposite empirical evidence (Ezcurra and Pascual, 2008; Freedman, 2012), arguing that policy tailored allows regions to better respond to external shocks. Indeed, each region can find its best answer without mimic other regional strategies. It follows that probably the financial crisis has led to more diversified effects in more decentralized countries, but then the individual regions could better respond to the crisis, thus leading to greater regional resilience.

3. Empirical implementation

3.1. Dataset

Before explaining the methodology, we will first describe the data set. Data has been collected for selected number of the EU NUTS 2regions. It covers regions in the 13 EU member countries from Eurostat database, QoG EU Regional dataset (Charron et al., 2016), World Bank dataset, World Development indicators and new dataset of fiscal consolidation (Devries et al., 2011) in the period 2000-2009.

3.2. Variables

Since the aim of the paper is to investigate the effects of fiscal consolidation on regional economic resilience under different institutional framework, three variables are of particular importance for study: fiscal consolidation, regional economic resilience and institutional framework measured by fiscal and political decentralization. In the process of choosing proxies for these three variables the papers by Devries et al. (2011), Martin and Sunley (2015), Moddica and Reggiani (2015), Sensier et al. (2016), Hooghe et al. (2016), Rodriguez-Pose and Kroier (2009) and Rodriguez-Pose and Ezcurra (2010) have been considered.

For measuring the fiscal consolidation, the standard concepts available in literature like the statistical concept that measures the increase in the cyclically-adjusted primary budget balance (CAPB) have been used. Scholars highlight that the CAPB approach has some limits. Firstly, it fails to remove the impact of sharp swings in economic activity and assets prices from fiscal data resulting that CAPB is correlated with economic activity but not necessarily linked to policy actions (Devries et al., 2011; Agnello and Sousa, 2012). Second, even if the change in the CAPB accurately reflects discretionary changes in fiscal policy, those can be motivated by a desire to respond to cyclical fluctuations, raising reverse causality concerns (p. 3, Devries et al., 2011). Third, there is uncertainty about the cyclical adjustment procedure, or to be more precisely, there is certain degree of arbitrariness in the selection of the statistical smoothing technique that is used to net out the automatic impact of the cycle on the headline fiscal figures (Darby et al., 2008; Agnello and Sousa, 2012). Last but not the least, the empirical evidence suggests that elasticizes of budgetary components with respect to output can vary over time, the standard methods imply that these elasticizes are treated as constant (Jaeger and Schuknecht, 2007; Agnello and Sousa, 2012).

To deal with all these issues, we will implement the approach introduced by Devries et al. (2011). The authors define the fiscal consolidation as a policymakers' intentions to reduce the budget deficit and not as a response to prospective economic conditions which allows them to construct a narrative approach that identifies episodes of fiscal consolidation based on policy actions motivated by deficit reduction and not looking at fiscal outcomes. Therefore, the data has been constructed by examining accounts and records of what countries were intending to do at the time of publications by recording the budgetary effect of the fiscal consolidation

measures in the year in which they come into effect (the concept of government corresponds to the general government and budgetary impact has been scaled in the percent of GDP). By doing so, this approach eliminates the endogeneity of the response of fiscal policy to the economy, as it captures policymakers' decisions. Also, it allows for a quantification of the size and the composition of fiscal consolidation programs based on the fact that it notes is the fiscal consolidation based on tax hikes and/or spending cuts (p. 7, Agnello and Sousa, 2012). However, the limitation of this approach is the availability of data. For the purposes of our paper, only 13 of the EU countries up to 2009 can be available to use the Devries et al. (2011)'s approach.

Thus, we will use the approach introduced by Devries et al. (2011) to deal challenging issue of fiscal consolidation measure.

The second key variable is regional economic resilience that is also quite difficult to measure. The literature offers several different ways to proxy the variable for its measurement (e.g. Simmie and Martin, 2010; Martin, 2012; Fingleton et al., 2012; Sensier et al., 2016). Each of these methods and approaches has certain limitations (Martin and Sunley, 2015). Considering that in our paper we use panel data model, we find the most appropriate econometric approach that uses quantitative data. More precisely, we use the sensitivity index (RES) as an indicator for regional economic resilience. The sensitivity index has been usually calculated based on employment data or GDP data (Martin, 2012; Finleton et al., 2012). For sensitivity index calculation, the current literature indicates that employment is a more appropriate measure than GDP since employment data are less prone to revision (Sensier et al., 2016). Thus, sensitivity index in this paper gauges the percentage change in employment in the region (Ei) compared with the EU average change in employment (EEU). The formula used for its calculation is presented in following paragraph:

$$RES = \frac{\Delta E_i / E_i}{\Delta E_{EU} / E_{EU}} \qquad (1)$$

In equation (1) ΔE_i stands for employment change in region i in period t compared to period t-1 while E_i is employment in region i in period t. The symbol ΔE_{EU} stands for employment change in the EU in period t compared to period t-1, while E_{EU} represents employment in period t.

The assumption that regional economic resilience is influenced only by the fiscal consolidation is rather restrictive and results could potentially suffer from the omission of other (possibly) significant determinants. Hence, this paper analyses whether the relationship between regional economic resilience and fiscal consolidation holds when additional explanatory variables are included in the model.

Before indicating other important determinants, it should be emphasized that understanding the determinants of regional economic resilience is a complex process, with many factors being simultaneously important. Martin and Sunley (2015) indicate five basic groups of regional economic resilience determinants: (i) industrial and business structure, (ii) labor market conditions, (iii) agency and decision-making, (iv) financial arrangements and (v) governance arrangements. Sedita et al. (2016) recognize related and unrelated varieties, population density, macro-geographical area, industrial districts and degree of exporting as relevant determinants. Finally, Nystrom (2017) underlines five areas of determinants of regional resilience: (i) regional closures, (ii) individuals in the region, (iii) regional industry, (iv) regional economy and (v) regional attractiveness. The inclusion of all potential determinants indicated in the above-mentioned literature in this paper could be ultimate. But it is not straightforward task since the regional data on stated aspects (determinants) are rarely available and/or of poor quality. Therefore, the focus of this paper has been on a limited number of available variables.

The special attention in the paper is dedicated to the institutional framework of the country. More precisely, we focus on decentralization issues. To do so, we introduce two variables: fiscal decentralization and political decentralization. For the fiscal decentralization, we use subnational (state and local government) expenditures as a percentage of total public expenditures (GEXP) and subnational public revenue (state and local) as a percentage of total public revenues (GREV). As a proxy for political decentralization, we use Regional Authority Index (RAI). It is a measure of the authority of regional governments measured along ten dimensions: institutional depth, policy scope, fiscal autonomy, borrowing autonomy,

representation, law making, executive control, fiscal control, borrowing control, and constitutional reform (Hooghe et al., 2016).

Other control variables are being used in the paper and chosen in line with relevant development literature (e.g. Li and Westlund, 2013, Pedrana, 2013) We use the gross domestic product per capita at current market prices (GDP) and the PPS per inhabitant (GDPpppc) as proxies for the stage of development. Moreover, we use the labor force participation rate (Labor) or economic activity rate - population from 15 to 64 years as proxies for the labor force participation. Finally, we use the percentage of people with tertiary education in population between 25 and 64 years (EDU) as proxy of the level of education.

Data for GDP and education have been collected from QoG EU Regional dataset (Charron et al., 2016), while data for labor force participation and for fiscal decentralization are collected from Eurostat database. Data for political aspects of decentralization (RAI) have been collected from dataset established by Hooghe et al. (2016).

3.3. Econometrics analysis and results

The first model is formed to test the direct influence of government sector on regional economic resilience and is given by:

$$RES_{it} = \mu + \gamma RES_{i,t-1} + \beta_1 GOVERNMENT + \beta_2 GDPpc_{it} + \beta_3 EDU_{it} + \beta_4 LABOR_{it} + \alpha_i + \varepsilon_{it} \quad (2)$$

where RES represent regional economic resilience, GOVERNMENT stands for different aspects of government sector, i.e. total government expenditure (GEXP) and revenue (GREV) as a percentage of GDP, PPS per capita (GDPpc) measures initial level of development, EDU measures the percentage of people with tertiary education in population between 25 and 64 years, LABOR measures labor force participation (population from 15 to 64 years), i stands for NUTS 2 regions and t is the one-year period, μ is the intercept, γ is the parameter of lagged dependent variable and $\beta_1,\ldots,\beta_4$ are the parameters of exogenous variables. It is assumed that ε_{it} are IID$(0,\sigma_\varepsilon^2)$. α_i is unobservable individual-specific effect that is time invariant and it accounts for any individuals. The model presented in equation (2) postures several advantages. According to Pablo-Romero and Molina (2013) panel data methodology allows larger number of explanatory variables, larger sample of countries, longer time periods under analysis and greater depth in the relationships between variables. Furthermore, Seetaram and Petit (2012) specify that one of the most important advantages is that panel data modelling allows for the control of heterogeneity in the sample.

The model in equation (2) was tested for several different scenarios. In all scenarios, all previous mentioned control variables are included (level of GDP -GDPpc, labor force participation -LABOR, education -EDU). Differences between the four scenarios are in measuring government sector and period coverage. In scenario 1 (2) government sector is represent by government expenditure (revenue) and we test does higher government expenditure (revenue) as a percentage of GDP decreases regional economic resilience. In scenario 3 (4) we test does higher government expenditure (revenue) decreases regional economic resilience in periods when fiscal consolidation has been implemented.

Table 1. Estimation Results for model of regional resilience
(Arellano and Bond GMM System Estimator)

Variable	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Const.	-550.9375***	-696.607***	-1106.465***	-1055.271***
Lagged RES	-.0245959***	-.0256984***	-.0356818***	-.0369242***
GEXP	-.5388723***		2.331823***	
GREV		3.382322***		3.165607***
GDPpc	.3068291**	.7122969***	.57735**	.905235***
LABOR	7.959331***	7.330582***	13.638***	12.5796***
EDU	-.9656198***	-1.680847***	-.9924893*	2.407067***
Number of observations	2921	2921	1847	1847

*, **, *** indicates significance at 10%, 5% and 1% level, respectively. Source: Calculation by authors

Taking into consideration the empirical results presented in Table 1, it is firstly possible to notice that all independent variables have significant impact on regional resilience as all variables are statistically significant with significance level of at least 10%. Higher level of initial GDPpppc and labor force participation increase the value of the sensitivity index. Considering that higher value of the sensitivity index stands for lower level of regional economic resilience, higher level of development and labor force participation have negative impact on regional economic resilience. However, higher share of human capital (EDU) has negative effect on the sensitivity index and therefore positive impact on regional economic resilience.

Regarding the relationship between the government sector share and regional resilience, the results in scenario 1 show that government expenditure (GEXP) has negative effect on the sensitivity index (RES). In other words, higher level of government expenditure decreases sensitivity of regional economy and therefore increases regional economic resilience. However, in case that we analyze this relationship only in periods of fiscal consolidation than the results are completely different. More precisely, higher level of government expenditure during fiscal consolidation periods has a negative effect on regional economic resilience.

In the next step, we test direct influence of the fiscal consolidation under different institutional framework by following:

$$RES_{it} = \mu + \gamma RES_{i,t-1} + \beta_1 DECfiscal + \beta_2 FC + \beta_3 GDPpc_{it} + \beta_4 EDU_{it} + \beta_5 LABOR_{it} + \beta_6 RAIcountry_t + \alpha_i + \varepsilon_{it} \quad (3)$$

where RES represent regional economic resilience, DECfiscal stands for fiscal decentralization (measured as a percentage of state and local government expenditures in total public expenditures), FC measures different aspects of fiscal consolidation (measured as a percentage of the GDP – FCtotal, but also as fiscal adjustments led by tax hikes (FCtax) and led by spending cuts (FCspend), EDU percentage of people with tertiary education in population between 25 and 64 years, LABOR measures labor force participation (population from 15 to 64 years) and RAIcountry represents proxy for political decentralization that measures the regional authority on country level, i stands for NUTS 2 level and t is one-year period. μ is an intercept, γ is a parameter of lagged dependent variable and $\beta_1,\ldots,\beta_6$ are the parameters of exogenous variables. It is assumed that ε_{it} are IID$(0,\sigma_\varepsilon^2)$. α_i is unobservable individual-specific effect that is time invariant and it accounts for any individuals.

The model in equation (3) was tested in several different scenarios. In all scenarios 5-7 control variables from scenarios 1-4 are included (level of GDPpppc -GDPpc, labor force participation -LABOR, education -EDU). The new variables are for decentralization and fiscal consolidation. Thus, decentralization is presented by proxies for fiscal (percentage of state and local government expenditures in total public expenditures (DECfiscal), and political decentralization (RAIcountry). Fiscal consolidation is presented by total fiscal consolidation (FCtotal) in scenario 5, but also with fiscal adjustments led by tax hikes (FCtax) in scenario 6 and by fiscal adjustments led by spending cuts (FCspend) in Scenario 7.

Table 2: Estimation Results for model of regional resilience
(Arellano and Bond GMM System Estimator)

Variable	Scenario 4	Scenario 5	Scenario 6
Const.	-123.8384***	-117.6741***	-122.4525***
Lagged RES	-.0889991***	-.0827532***	-.0864431***
GEXP	27.41116*	30.59933**	33.59417**
GREV	.5163353	.2833551	.2578491
GDPpc	.8518647***		
LABOR		1.775029***	
EDU			-.9583947***
Number of observations	-.0003882***	-.0003976***	-.0003512***

*, **, *** indicates significance at 10%, 5% and 1% level, respectively.

Source: Calculation by authors

The results in Table 2 indicate that fiscal consolidation increases regional sensitivity index and therefore it has a negative impact on regional economic resilience (scenario 5). This has been especially case if the fiscal consolidation led by tax hikes (scenario 6). However, in case that fiscal consolidation is led by spending cuts that fiscal consolidation increases regional economic resilience (scenario 7). At same time, results in all scenarios indicate that fiscal decentralization (measured as local and state expenditure as percentage of total public expenditures) increases regional sensitivity index and therefore has negative impact on regional economic resilience. At same time, it seems that political decentralization does not have significant effects on regional economic resilience.

4. Conclusion

The literature of regional economics offers different approaches for analyzing regional economic fluctuations (Partdrige and Rickman, 2005; Fingleton et al., 2012; 2015). One of the goal of this field is to understand why some regional economies manage to renew themselves, whereas others remain locked in decline (Martin and Sunley, 2015; Gong and Hassink, 2017). After the Great Recession, special attention by scholars has been dedicated to the concept of the regional resilience (Martin, 2012; Bristow and Healy, 2014; Martin and Sunley, 2015; Modica and Reggiani, 2015). In this paper, we focused on the effects of fiscal consolidation on regional economic resilience.

The main result of the paper is that fiscal consolidation and regional economic resilience are negatively correlated. Moreover, we observe that the negative effect of taxation is higher than the positive effect of public spending. However, the effect of the level of government expenditure on regional economic resilience depends on the economic cycle. Intuitively, this happens because higher share of government expenditure means higher dependency on public sector and thus, when government adopt a fiscal consolidation, it is not possible to be compensated by private sector in the short period.

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INVESTIGATING THE EFFECT OF FINANCIAL INNOVATIONS ON THE DEMAND FOR MONEY IN AUSTRALIA USING DOLS AND FMOLS AND COMPARING THEIR PREDICTIVE POWERS

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Abstract

In this paper we apply two different estimation methods, namely DOLS and FMOLS to estimate real demand for money in Australia with the inclusion of financial innovations. We use a conventional money demand function that was enriched with a proxy for financial innovations. This sum of the number of cheques, credit cards, charge cards, ATM and direct entry payment was included in the regression model to proxy the effect of financial innovations on the money demand. The results indicate that the estimated coefficient of TPI using DOLS is not significant yet it is highly significant using FMOLS and it bears positive sign so that 1 percent increase in TPI leads to the increase of money demand by 0.24 percent. Also, using "Root Mean Squared Error" as the benchmark for predictive power, we conclude that FMOLS is superior to DOLD when it comes to forecasting.

Keywords: financial innovations, money demand, dynamic OLS, fully modified OLS, forecast

JEL classification: E41, E42, E52

1. Introduction

It is the payments mechanism of an economy that allows smooth functioning of its financial and real sectors. An efficient payments system is the one that offers real time settlement of financial transactions and facilitate the exchange of goods and services in a speedy, secure and reliable manner.

Huge cost savings can be achieved by migrating from paper-based payments to electronic payments. Improved efficiency of the payment system due to these innovations will enhance the efficiency to the entire economy. Manual processing of cash and cheques requires a huge amount of resources while electronic payments does not. Electronic payment help improve productivity levels and lower the cost of doing business. Moreover, extended financial services to the unbanked communities as a result of using electronic payments will enable them to benefit from lower cost of financial services. More intensive use of electronic payments plays a vital role in achieving higher economic growth and improving the competitiveness of the economy.

Several empirical studies have included financial innovation in the money demand specification due to the growth in financial innovation over the last few years. A money demand function that does not include financial innovation will face the misspecification of the money demand through over estimation, commonly referred to as "missing money" (Arrau and De Gregorio, 1991). Some of the issues such as autocorrelated errors, persistent over prediction and implausible parameter estimates can be solved by including financial innovation in the money demand specification which is all backed by empirical evidence (Arrau et al, 1995). Furthermore, the failure of cointegration of the money demand could be explained by non-stationary processes such as financial innovation, so that accounting for financial innovation will eliminate the periods of "missing money" (Arrau and De Gregorio,

1991). Arrau and De Gregorio (1993), Ireland (1995), Attanasio et al (2002), Alvarez and Lippi (2009) and Nagayasu (2012) are examples of the studies that have accounted for financial innovation in the money demand specification.

The objectives of the current paper is to estimate the demand for money in the presence of financial innovations using annual data from Australia for the period 1995 to 2016. We shall use Dynamic OLS (DOLS) and Fully Modified OLS (FMOLS) as superior methods to the OLS for many reasons. Then, we do forecasts based on these two methods and finally, we compare these two forecast to find out which of them outperform the other.

Plan of the paper is to provide a review of literature in section 2. An overview of financial innovations in Australia is given in section 3. Theoretical background and measurement of variables is mentioned in section 4. Results and discussion of results are reported in section 5. Lastly section 6 is reserved for the main conclusions.

2. Literature review

There are numerous studies that have examined the cointegration property of money demand. Some of the studies that investigated the long run relationship between money demand and its determinants as follow.

Halicioglu and Ugur (2005) examine the stability of the narrow M1 (money demand function) in Turkey. In doing so, they use annual data from 1950 to 2002. They conduct stability test of M1 for Turkish by applying a cointegration procedure. They demonstrate that there is a long-run relationship between the narrow M1 money aggregate and its determinants: national income, interest rate and exchange rates.

Using quarterly data for the period 1973-2000, Bahmani & Oskooee and Rehman (2005) estimate money demand for seven Asian countries including India, Indonesia, Malaysia, Pakistan, Philippines, Singapore and Thailand. The results indicated that real M1 or M2 are cointegrated with their determinants in some Asian countries.

Akinlo (2006) use quarterly data (1970:1–2002:4). They apply ARDL approach to investigate if money demand (M2) for Nigeria is cointegrated and stable. The results indicate that M2 is cointegrated with income, interest rate and exchange rate.

Using monthly data over the period 1994:12-2006:12, Samreth (2008) estimate the money demand function for Cambodia. They apply ARDL approach to analyse cointegration property. They show that there is a cointegrating relationship between M1, Industrial Production Index, Consumer Price Index, and Nominal Exchange Rate in money demand function. Using ARDL approach, Long and Samreth (2008) examine if short and long run monetary models of exchange rate is valid for monetary exchange rate model of the Philippines. The results confirm that there is both short and long run relationships between variables in the monetary exchange rate model of the Philippines.

Baharumshah, et al. (2009) study M2 (the demand for broad money) in China. They apply ARDL approach to cointegration and use quarterly data over the period 1990:4 &2007:2. Bounds test indicate that there is a stable, long-run relationship between M2 and real income, inflation, foreign interest rates and stock prices.

However, most of these studies failed to account for financial innovation in the money demand specification except for Ndirangu and Nyamongo (2015) who employ the ARDL approach to cointegration for Kenya and use the currency outside banks/time deposit ratio as a proxy for financial development. The results also suggest that there is a long run relationship between money demand and its determinants with inclusion of mobile money.

3. Payment system in Australia

The ‘payments system’ refers to arrangements which allow consumers, businesses and other organisations to transfer funds usually held in an account at a financial institution to one another. It includes the payment instruments – cash, cards, cheques and electronic funds transfers which customers use to make payments – and the usually unseen arrangements that ensure that funds move from accounts at one financial institution to another. Types of retail payment instruments include:

Cheques: A cheque is a paper based payment instrument. It is a form of written order directing a bank to pay money to the beneficiary.

Credit Cards: A credit card enables its holder to buy goods and services with a credit line given by credit card issuer and the amount will be settled at a later date.

Charge Cards: The functionality of a charge card is similar to a credit card. However, charge card holders must settle their outstanding amount in full by the due date every month.

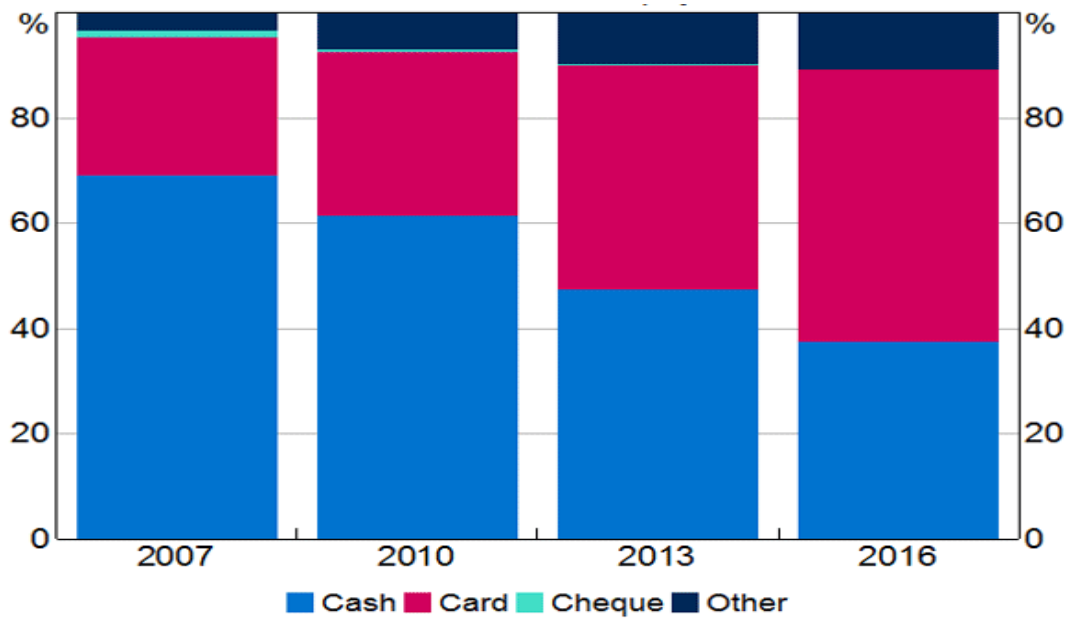
Debit Cards: A debit card (such as those used at ATMs) is a payment card where the transaction amount is deducted directly from the cardholder's bank account upon authorisation.

Direct entry: It is a convenient, safe and reliable way to send and receive payments. It is an electronic payment system typically used by businesses to send or collect regular payments from large numbers of their employees or customers.

3.1. Cash

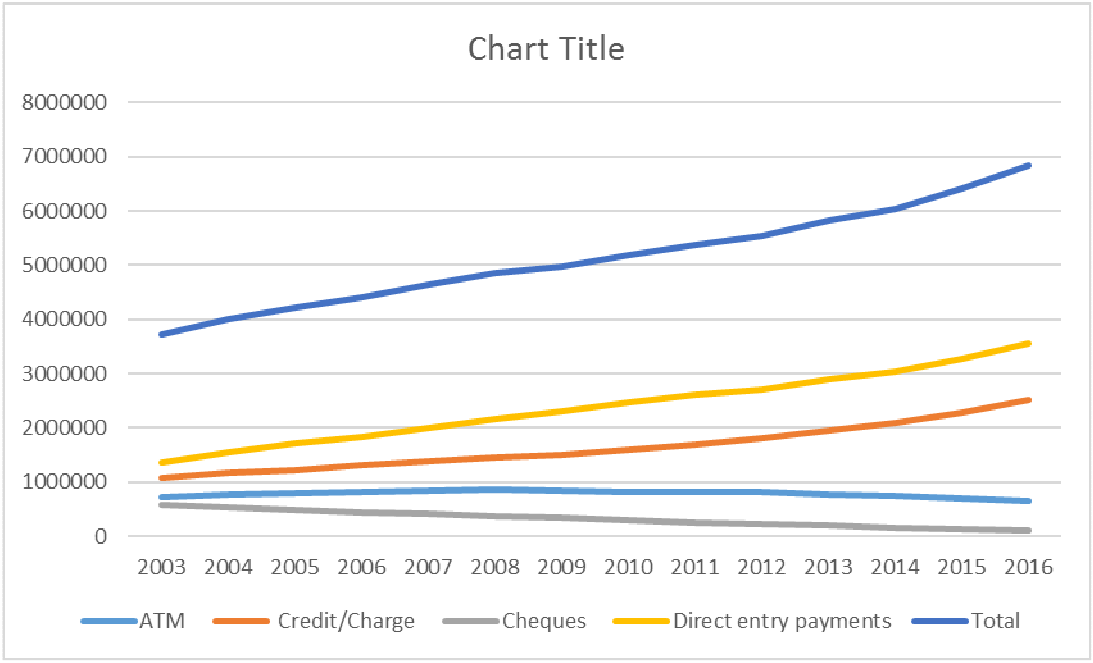
The use of cash as a payment method remains widespread. One of the most comprehensive sources of data on individual cash payments is the Reserve Bank's Consumer Payments Survey. This study was first undertaken in 2007 and was repeated in 2010, 2013 and 2016. The results indicate that consumers used cash for most of their low-value transactions, and overall, cash payments accounted for 37 per cent of the number and 18 per cent of the value of all consumer payments in 2016. The latest survey shows continued substitution away from cash use and towards electronic methods. The most common way consumers withdraw cash is through ATMs, which accounted for 69 per cent of the total number of cash withdrawals and 55 per cent of the value of withdrawals in 2016.

Figure 1: Consumer payment methods (percent of number of payments)



Source: RBA calculations, based on data from Colmar Brunton, Ipsos and Roy Morgan Research

Figure 2: Trend of the number of transactions by financial payment instruments in Australia



Source: Reserve Bank of Australia

In figure 2, from bottom to the top are cheques, ATM, credit/charge card, direct entry payments and the total. It can be easily seen from the above figure that the number of transactions for cheques and ATM slightly declines while that of credit/charge cards and direct entry payments increases over time. However, the total number of transactions is on the rise.

3.2. Non-cash payments

Non-cash payments account for most of the value of payments in the Australian economy. On average, in 2016 non-cash payments worth around $230 billion were made each business day, equivalent to around 14 per cent of annual GDP.

Over 70 per cent of the value of non-cash transactions is accounted for by a small number of high-value payments made through Australia's real-time gross settlement (RTGS) system. Most of the value of these payments relates to the settlement of foreign exchange and securities markets transactions.

The migration of large business payments to the RTGS system saw a decline in the importance of the cheque as a payment instrument. In 2016, around 5 cheques were written per person in Australia, down from 22 cheques per person 10 years earlier. A significant share of cheque use is related to commercial payments, and financial institution ('bank') cheques for certain transactions such as property settlements.

In contrast to the declining importance of cheques, the use of electronic payment instruments at the retail level has been growing rapidly. In 2016, transactions (both purchases and cash withdrawals) undertaken using either credit or debit cards averaged about 305 per person, an increase of 59 per cent on the level of five years earlier.

For many years, Australian governments and businesses have made extensive use of Direct Entry credits for social security and salary payments. Consumers and businesses also establish direct debits for bill payments. Direct Entry payments are an important part of the payments landscape. These payments continue to account for the bulk of the value of non-cash retail payments (i.e. non-RTGS transactions).

3.3. Role of the Reserve Bank

A safe and efficient payments system is essential to support the day-to-day business of the Australian economy and to settle transactions in its financial markets. Accordingly, the Reserve Bank of Australia has important regulatory responsibilities for the payments system and plays a key role in its operations.

The Payments System Board (PSB) of the Reserve Bank oversees the payments system in Australia. It is responsible for promoting the safety and efficiency of the payments system and through the Payment Systems (Regulation) Act 1998 and the Payment Systems and Netting Act 1998, the Reserve Bank has one of the clearest and strongest mandates in the world in relation to payments systems.

The Bank consults closely with participants in the payments industry. The Bank is represented on a number of industry committees responsible for the day-to-day management of payments clearing systems and Bank staff regularly meet with industry representatives and other regulators.

3.4. Efficiency of the payments system

Australia was among the first countries in the world to make efficiency of payment systems a statutory objective of the central bank. In pursuit of this mandate, the Reserve Bank has encouraged a reduction in cheque-clearing times and the take-up of direct debits as a means of bill payment, and taken a number of steps to improve the competitiveness and efficiency of card systems. Initially the latter focus was on credit card systems. In 2001, the Bank designated the Bankcard, MasterCard and Visa credit card systems as payment systems under the Payment Systems (Regulation) Act. Designation is the first step in the possible establishment of standards and/or an access regime for a payment system. After extensive consultation, the Bank determined Standards for the designated schemes which lowered interchange fees and removed restrictions on merchants charging customers for the use of credit cards, and imposed an Access Regime which facilitates entry by new players (Reserve Bank of Australia).

4. Methodology

4.1. Background

4.1.1. Unit root

The theory behind ARMA estimation is based on stationary time series. A series is said to be (weakly or covariance) stationary if the mean and autocovariances of the series do not depend on time. Any series that is not stationary is said to be nonstationary. A common example of a nonstationary series is the random walk:

$$y_t = y_{t-1} + \varepsilon_t \quad (1)$$

Where ε is a stationary random disturbance term. The series y has a constant forecast value, conditional on t, and the variance is increasing over time. The random walk is a difference stationary series since the first difference of y is stationary:

$$y_t - y_{t-1} = (1\text{-}L)\, y_t = \varepsilon_t \quad (2)$$

A difference stationary series is said to be integrated and is denoted as I(d) where d is the order of integration. The order of integration is the number of unit roots contained in the series, or the number of differencing operations it takes to make the series stationary. For the random walk above, there is one unit root, so it is an I(1) series. Similarly, a stationary series is I(0). Standard inference procedures do not apply to regressions which contain an integrated dependent variable or integrated regressors. Therefore, it is important to check whether a series is stationary or not before using it in a regression. The formal method to test the stationarity of a series is the unit root test.

There is a variety of powerful tools for testing a series (or the first or second difference of the series) for the presence of a unit root. In addition to Augmented Dickey-Fuller (1979) and Phillips-Perron (1988) tests, the GLS-detrended Dickey-Fuller (Elliot, Rothenberg, and Stock, 1996), Kwiatkowski, Phillips, Schmidt, and Shin (KPSS, 1992), Elliott, Rothenberg, and Stock Point Optimal (ERS, 1996), and Ng and Perron (NP, 2001) unit root tests are available as a view of a series. In this paper, however, we use Augmented Dickey-Fuller test for this purpose. The following discussion outlines the basics features of unit root tests. Consider a simple AR(1) process:

$$y_t = \rho y_{t-1} + x_t'\delta + \varepsilon_t \quad (3)$$

Where x_t are optional exogenous regressors which may consist of constant, or a constant and trend, ρ and δ are parameters to be estimated, and the ε_t are assumed to be white noise. If $|\rho| \geq 1$, y is a nonstationary series and the variance of y increases with time and approaches infinity. If $|\rho| < 1$, y is a (trend-)stationary series. Thus, the hypothesis of (trend-)stationarity can be evaluated by testing whether the absolute value of ρ is strictly less than one.

The unit root tests use the null hypothesis H_0: ρ = 1 against the one-sided alternative H_1: ρ < 1. In some cases, the null is tested against a point alternative. In contrast, the KPSS Lagrange Multiplier test evaluates the null of H_0: ρ < 1 against the alternative H_1: ρ = 1.

4.1.2. The Augmented Dickey-Fuller (ADF) test

The standard DF test is carried out by estimating Equation (3) after subtracting y_{t-1} from both sides of the equation:

$$\Delta y_t = \alpha y_{t-1} + x_t'\delta + \varepsilon_t \quad (4)$$

Where α = ρ -1. The null and alternative hypotheses may be written as,

$$H_0: \alpha = 0$$
$$H_1: \alpha < 0 \quad (5)$$

and evaluated using the conventional t-ratio for α:

$$t_\alpha = \hat{\alpha} / (\text{se}(\hat{\alpha})) \quad (6)$$

where $\hat{\alpha}$ is the estimate of α , and se($\hat{\alpha}$)is the coefficient standard error.

Dickey and Fuller (1979) show that under the null hypothesis of a unit root, this statistic does not follow the conventional Student's t-distribution, and they derive asymptotic results and simulate critical values for various test and sample sizes. More recently, MacKinnon (1991, 1996) implements a much larger set of simulations than those tabulated by Dickey and Fuller. In addition, MacKinnon estimates response surfaces for the simulation results, permitting the calculation of Dickey-Fuller critical values and p-values for arbitrary sample sizes. The more recent MacKinnon critical value calculations are used in constructing test output.

The simple Dickey-Fuller unit root test described above is valid only if the series is an AR(1) process. If the series is correlated at higher order lags, the assumption of white noise disturbances ε_t is violated. The Augmented Dickey-Fuller (ADF) test constructs a parametric correction for higher-order correlation by assuming that the y series follows an AR(p) process and adding p lagged difference terms of the dependent variable y to the right-hand side of the test regression:

$$\Delta y_t = \alpha y_{t-1} + x_t'\delta + \beta_1 \Delta y_{t-1} + \beta_2 \Delta y_{t-2} + \ldots + \beta_p \Delta y_{t-p} + v_t \quad (7)$$

This augmented specification is then used to test (5) using the t-ratio (6). An important result obtained by Fuller is that the asymptotic distribution of the t-ratio for α is independent of the number of lagged first differences included in the ADF regression. Moreover, while the assumption that y follows an autoregressive (AR) process may seem restrictive, Said and Dickey (1984) demonstrate that the ADF test is asymptotically valid in the presence of a moving average (MA) component, provided that sufficient lagged difference terms are included in the test regression.

One will face two practical issues in performing an ADF test. First, you must choose whether to include exogenous variables in the test regression. You have the choice of including a constant, a constant and a linear time trend, or neither in the test regression. One approach would be to run the test with both a constant and a linear trend since the other two cases are just special cases of this more general specification. However, including irrelevant regressors in the regression will reduce the power of the test to reject the null of a unit root. The standard recommendation is to choose a specification that is a plausible description of the data under both the null and alternative hypotheses. See Hamilton (1994, p. 501) for discussion. However, we chose to include only constant.

Second, you will have to specify the number of lagged difference terms (which we will term the "lag length") to be added to the test regression (0 yields the standard DF test; integers greater than 0 correspond to ADF tests). The usual (though not particularly useful) advice is to include a number of lags sufficient to remove serial correlation in the residuals.

EViews provides both automatic and manual lag length selection options. Here, we selected automatic lag length.

4.1.3. Cointegration

Cointegration is statistical property of a collection of time series variables ($X_1, X_2, \ldots, X_k$). First of all, these series have to be integrated of order 1. Next, if a linear combination of these series is integrated of order zero, then the collection is cointegrated. If X,Y,Z are integrated of order 1, and there exist coefficients a,b,c such that aX+bY+cZ is integrated of order 0, then X,Y, and Z are cointegrated. Cointegration is an important property in time-series analysis. Time series are characterised by having trends either deterministic or stochastic that are also called unit root processes, or processes integrated of order 1 or I(1). Unit root processes have non-standard statistical properties. Therefore, conventional econometric theory methods cannot be used in these cases. In other words, the series are cointegrated if they are individually integrated but linear combination of them has a lower order of integration. In general, it is the case where the individual series are first-order integrated (I(1)) but a vector of coefficients exists to form a stationary linear combination of them (I(0)). We use cointegration test in order to test if there is a statistically significant connection between two series. This cointegration test is called the Johansen test that allows for more than one cointegrating relationship, while the Engle–Granger method allows for only one cointegrating relationship.

4.1.4. Johansen cointegration test

VAR-based cointegration tests use the methodology developed in Johansen (1991, 1995). Consider a VAR of order p:

$$y_t = A_1 y_{t-1} + \ldots + A_p y_{t-p} + Bx_t + \varepsilon_t \quad (8)$$

Where y_t is a k-vector of non-stationary I(1) variables, x_t is a d-vector of deterministic variables, and ε_t is a vector of innovations. We may rewrite this VAR as,

$$\Delta y_t = \Pi y_{t-1} + \sum_{i=1}^{p-1} \Gamma \Delta y_{t-i} + Bx_t + \varepsilon_t \, (9)$$

where:

$$\Pi = \sum_{i=1}^{p} A_i - I, \quad \Gamma_i = -\sum_{j=i+1}^{p} A_j \quad (10)$$

Granger's representation theorem asserts that if the coefficient matrix Π has reduced rank r < k, then there exist k * r matrices α and β each with rank r such that $\Pi = \alpha\beta'$ and $\beta' y_t$ is I(0). r is the number of cointegrating relations (the cointegrating rank) and each column of β is the cointegrating vector. As explained below, the elements of α are known as the adjustment parameters in the VEC model. Johansen's method is to estimate the Π matrix from an unrestricted VAR and to test whether we can reject the restrictions implied by the reduced rank of Π.

Phillips and Hansen (1990) propose an estimator which employs a semi-parametric correction to eliminate the problems caused by the long run correlation between the cointegrating equation and stochastic regressors innovations. The resulting Fully Modified OLS (FMOLS) estimator is asymptotically unbiased and has fully efficient mixture normal asymptotics allowing for standard Wald tests using asymptotic Chi-square statistical inference.

4.1.5. Fully Modified OLS

The FMOLS estimator proposed by Phillips and Hansen (1990) employs preliminary estimates of the symmetric and one-sided long-run covariance matrices of the residuals.

Let α_{1t} be the residuals obtained after estimating Equation ($y_t = X_t'\beta + D_{1t}'\gamma_1 + u_{1t}$). The α_{2t} may be obtained indirectly as $\alpha_{2t} = \Delta\varepsilon_{2t}$ from the levels regressions

$$x_t = \Gamma_{21}' D_{1t} + \Gamma_{22}' D_{2t} + \varepsilon_{2t} \quad (11)$$

or directly from the difference regressions

$$\Delta x_t = \Gamma_{21}' \Delta D_{1t} + \Gamma_{22}' \Delta D_{2t} + \alpha_{2t} \, (12)$$

Let Ω and Λ be the long-run covariance matrices computed using the residuals $\alpha_t = (\alpha_{1t}, \alpha_{21}')'$. Then we may define the modified data

$$y_t^{\dagger} = y_t - \hat{\omega}_{12} \Omega_{22}^{-1} \alpha_2 \quad (13)$$

and an estimated bias correction term

$$\hat{\lambda}_{12}^{\dagger} = \hat{\lambda}_{12} - \hat{\omega}_{12}\,\Omega_{22}^{-1}\Lambda_{22} \qquad (14)$$

The FMOLS estimator is given by

$$\theta = \begin{bmatrix} \beta \\ \gamma_1 \end{bmatrix} = (\sum_{t=2}^{T} Z_t Z_t')^{-1}(\sum_{t=2}^{T} Z_t y_t^{\dagger} - T \begin{bmatrix} \hat{\lambda}_{12}^{\dagger} \\ 0 \end{bmatrix}) \qquad (15)$$

where $Z_t = (X_t', D_t')'$. The key to FMOLS estimation is the construction of long-run covariance matrix estimators Ω and Λ. Before describing the options available for computing Ω and Λ, it will be useful to define the scalar estimator

$$\hat{\omega}_{1.2} = \hat{\omega}_{11} - \hat{\omega}_{12}\Omega_{22}^{-1}\hat{\omega}_{21} \qquad (16)$$

which may be interpreted as the estimated long-run variance of u_{1t} conditional on u_{2t}. We may, if desired, apply a degree-of-freedom correction to $\hat{\omega}_{1.2}$. Hansen (1992) shows that the Wald statistic for the null hypothesis $R\theta = r$

$$W = (R\theta = r)'(RV(\theta)R')^{-1}(R\theta = r) \qquad (17)$$

With

$$V(\theta) = \hat{\omega}_{1.2}(\sum_{t=2}^{T} Z_t Z_t')^{-1} \qquad (18)$$

has an asymptotic χ_g^2-distribution, where g is the number of restrictions imposed by R.

4.1.6. Dynamic OLS

A simple approach to constructing an asymptotically efficient estimator that eliminates the feedback in the cointegrating system has been advocated by Saikkonen (1992) and Stock and Watson (1993). Termed Dynamic OLS (DOLS), the method involves augmenting the cointegrating regression with lags and leads of ΔX_t so that the resulting cointegrating equation error term is orthogonal to the entire history of the stochastic regressor innovations:

$$y_t = x_t'\beta + D_{1t}'\gamma_1 + \sum_{j=-q}^{r} \Delta x_{t+j}'\delta + v_{1t} \qquad (19)$$

Under the assumption that adding q lags and r leads of the differenced regressors soaks up all of the long-run correlation between u_{1t} and u_{2t}, least-squares estimates of $\theta = (\beta', \gamma')'$. Using Equation (19) have the same asymptotic distribution as those obtained from FMOLS. An estimator of the asymptotic variance matrix of θ may be computed by computing the usual OLS coefficient covariance, but replacing the usual estimator for the residual variance of v_{1t} with an estimator of the long-run variance of the residuals.

4.1.7. Forecast evaluation

When constructing a forecast of future values of a variable, economic decision makers often have access to different forecasts; perhaps from different models they have created themselves or from forecasts obtained from external sources. When faced with competing forecasts of a single variable, it can be difficult to decide which single or composite forecast is "best". Fortunately, there are some tools for evaluating the quality of a forecast which can help one determine which single forecast to use, or whether constructing a composite forecast by averaging would be more appropriate.

Evaluation of the quality of a forecast requires comparing the forecast values to actual values of the target value over a forecast period. A standard procedure is to set aside some history of actual data for use as a comparison sample in which one will compare of the true and forecasted values. It is possible to use the comparison sample to: (1) construct a forecast evaluation statistic to provide a measure of forecast accuracy, and (2) perform Combination testing to determine whether a composite average of forecasts outperforms single forecasts.

There are four different measures of forecast accuracy; RMSE (Root Mean Squared Error), MAE (Mean Absolute Error), MAPE (Mean Absolute Percentage Error), and the Theil Inequality Coefficient. These statistics all provide a measure of the distance of the true from the forecasted values. Suppose the forecast sample is j = T+1, T+2,…, T+h, and denote the actual and forecasted value in period t as y_t and y_t, respectively (Eviews help). The forecast evaluation measures are defined as table below.

Table 1: The forecast evaluation measures

Measure	Statistics
Root Mean Squared Error	$\sqrt{\sum_{t=T+1}^{T+h}(\mathcal{y}_t - y_t)^2 / h}$
Mean Absolute Error	$\sum_{t=T+1}^{T+h}\lvert\mathcal{y}_t - y_t\rvert / h$
Mean Absolute Percentage Error	$100 \sum_{t=T+1}^{T+h}\left\lvert\frac{\mathcal{y}_t - y_t}{y_t}\right\rvert / h$
Theil Inequality Coefficient	$\frac{\sqrt{\sum_{t=T+1}^{T+h}(\mathcal{y}_t - y_t)^2 / h}}{\sqrt{\sum_{t=T+1}^{T+h}(\mathcal{y}_t)^2 / h} + \sqrt{\sum_{t=T+1}^{T+h}(y_t)^2 / h}}$

4.2. Empirical model

The general form of the theory of money demand can be represented as below:

$$\frac{M_t}{P_t} = \Phi(R_t, Y_t) \quad (20)$$

where M_t is the demand of nominal money balances, P_t is the price index that is used to convert nominal balances to real balances, Y_t is the scale variable relating to activity in the real sector of the economy (here, GDP as the best proxy for such a variable), and R_t is the opportunity cost of holding money (here, the interest rate or IR as the best proxy).

We start the empirical estimation of money demand functions with introducing the long-run, log linear function that is of the form

$$\text{Log}\left(\frac{MD_t^*}{P_t}\right) = \alpha + \beta_1 \log GDP_t + \beta_2 IR_t + \varepsilon_t \quad (21)$$

Desired stock of nominal money is denoted by MD^*, P is the price index that we use to convert nominal balances to real balances, GDP is the scale variable, and IR is the opportunity cost variable.

The conventional money demand $M^d = (Y_t, R_t)$ is misspecified and leads to the bias that gets into the estimated coefficients. Therefore, it has to be enriched with financial innovation (TPI) so that it can be represented implicitly as $M^d = (Y_t, R_t, r^*)$, (Serletis, 2007) that is:

$$\text{Log}\left(\frac{MD_t^*}{P_t}\right) = \alpha + \beta_1 \log GDP_t + \beta_2 IR_t + \beta_3 TPI_t + \varepsilon_t \quad (22)$$

TPI which stand for the total number of payment instruments is the sum of the number of cheques, credit cards, charge cards, ATMs and direct entry payments. The data are annually, from 1995 to 2016. The official website of the World Bank and the official website of Reserve Bank of Australia were used as the source of data.

GDP (at purchaser's prices) is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in constant 2010 U.S. dollars. Dollar figures for GDP are converted from domestic currencies using 2010 official exchange rates.

Real interest rate (expressed as percent) is the lending interest rate adjusted for inflation as measured by the GDP deflator.

Broad money (in constant 2010 U.S. dollars) is the sum of currency outside banks; demand deposits other than those of the central government; the time, savings, and foreign

currency deposits of resident sectors other than the central government; bank and traveler's checks; and other securities such as certificates of deposit and commercial paper.

5. Estimation results

Given the data set, unit root ADF test was applied to determine the order of integration of the variables included in the model. The ADF test statistics reported in Table 1 indicate that the variables are integrated of order I(1) at level and of order I(0) at first-differenced. Therefore, the requirements is met and we can proceed to the cointegration test.

Table 2: Augmented Dickey-Fuller test statistic

Level	Prob.	First Differenced	Prob
LMD	0.8669	D(LMD)	0.0004
LGDP	0.0609	D(LGDP)	0.0147
IR	0.0801	D(IR)	0.0004
LTPI	0.4232	D(LTPI)	0.0203

The cointegration test is applied to identify the number of cointegrating vectors using the likelihood ratio test. From the test results reported in Table 2 the null hypothesis of no cointegrating relationship is rejected at 5 percent significance level. The likelihood ratio statistics identified all the three cointegrating vectors at 5 percent significance level and confirm the presence of relationship among the variables specified in the model.

Table 3: The cointegration test

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.961946	107.4673	47.85613	0.0000
At most 1 *	0.762914	45.36133	29.79707	0.0004
At most 2 *	0.607027	18.01403	15.49471	0.0204
At most 3	0.013994	0.267774	3.841466	0.6048

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.961946	62.10600	27.58434	0.0000
At most 1 *	0.762914	27.34730	21.13162	0.0059
At most 2 *	0.607027	17.74626	14.26460	0.0135
At most 3	0.013994	0.267774	3.841466	0.6048

Max-eigenvalue test indicates 3 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Nest, we proceed to the estimation of the regression model using DOLS.

Table 4: DOLS estimation output

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGDP	1.108354	0.043518	25.46887	0.0000
IR	-0.085649	0.027634	-3.099471	0.0362
LTPI	-0.147428	0.069665	-2.116245	0.1018
R-squared	0.995556	Mean dependent var		27.38284
Adjusted R-squared	0.983336	S.D. dependent var		0.319389
S.E. of regression	0.041230	Sum squared resid		0.006800
Long-run variance	0.000556			

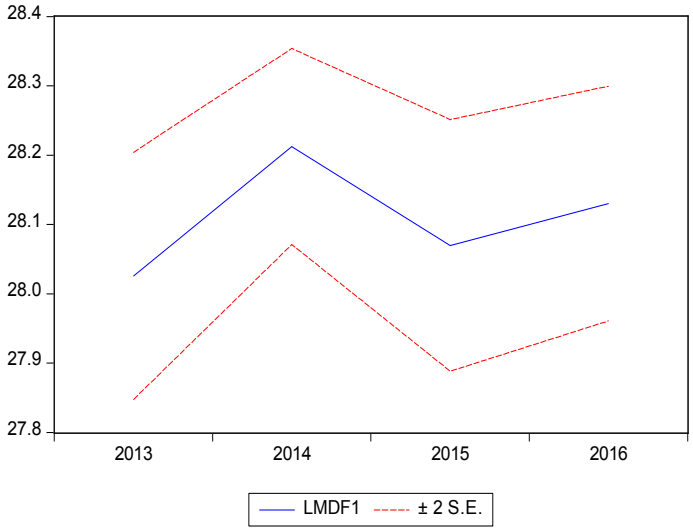
For the purpose of forecast evaluation, we use data from 1995 to 2012 as our sample for estimation and use the estimated regression to do forecast for the period 2013 to 2016. It is obvious from table 4 that the estimated coefficients of GDP and IR (interest rate) are significant, meaning that these two variables can influence the dependent variable (money demand). The signs of the confidents are in line with underlying theory. For example, 1 percent increase in GDP leads to 1.10 percent increase in the demand for money. However, TPI (total number of payment instruments) does not have impact on money demand as the estimated coefficient of TPI is not significant. Then, we turn our attention to FMOLS estimation.

Table 5: FMOLS estimation output

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGDP	0.861118	0.024015	35.85730	0.0000
IR	0.016756	0.017444	0.960555	0.3531
LTPI	0.240176	0.042061	5.710248	0.0001
R-squared	0.947189	Mean dependent var		27.35024
Adjusted R-squared	0.939645	S.D. dependent var		0.337204
S.E. of regression	0.082842	Sum squared resid		0.096079
Long-run variance	0.010104			

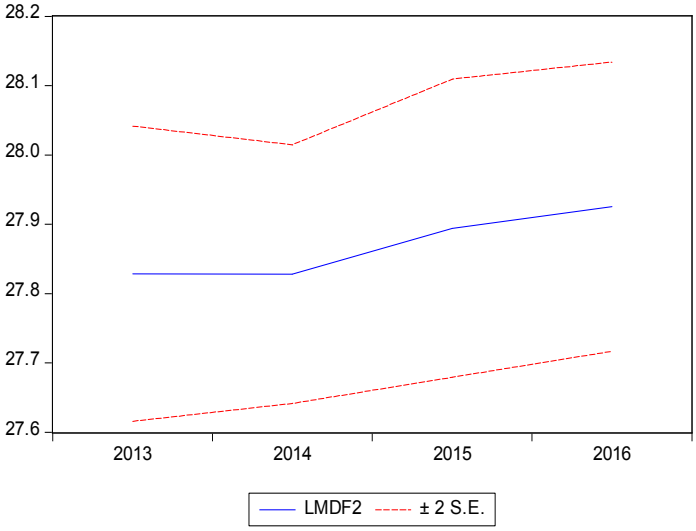
Again, for the same reason, data from 1995 to 2012 was used for estimation so that we can use the estimation result for forecasting dependent variable for the period 2013-2016. Here, the estimated coefficients of GDP and TPI are significant while that of IR is not. This is because, the sign of the coefficient of IR is positive (0.0167) which is not according to our expectation. In fact, it should be negative. That is why, it is not significant. In other words, it does not affect money demand. For TPI, for instance, 1 percent increase in TPI causes money demand to increase by 0.24 percent. For GDP, the magnitude is almost three times higher meaning that 1 percent increase in GDP will increase money demand by 0.86 percent. The sign of the estimated coefficient of GDP is also according to the economic theory. Now, it is time to do forecasts based on these two different estimation methods.

Figure 3: Forecasting dependent variable based on DOLS estimation



Forecast: LMDF1	
Actual: LMD	
Forecast sample: 2013 2016	
Included observations: 4	
Root Mean Squared Error	0.140721
Mean Absolute Error	0.110484
Mean Abs. Percent Error	0.395094
Theil Inequality Coefficient	0.002508
Bias Proportion	0.616430
Variance Proportion	0.000059
Covariance Proportion	0.383511
Theil U2 Coefficient	2.325548
Symmetric MAPE	0.393832

Figure 4: Forecasting dependent variable based on FMOLS estimation

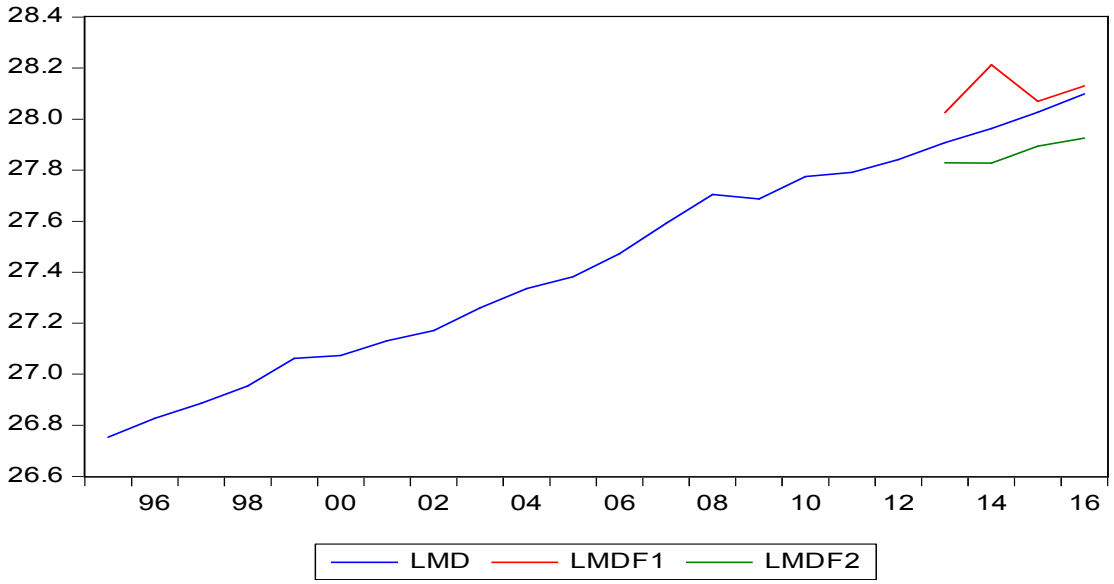


Forecast: LMDF2	
Actual: LMD	
Forecast sample: 2013 2016	
Included observations: 4	
Root Mean Squared Error	0.134223
Mean Absolute Error	0.130063
Mean Abs. Percent Error	0.464250
Theil Inequality Coefficient	0.002402
Bias Proportion	0.938979
Variance Proportion	0.046402
Covariance Proportion	0.014619
Theil U2 Coefficient	2.324901
Symmetric MAPE	0.465399

As can be seen, the forecasted dependent variable in both figures is passing through 95 percent confidence intervals or between two standard deviations. Now, we can compare the predictive power of these two estimation methods. Because all of data is known, we call it ex-post forecasting. Here, we focus on static forecasting, that is, a sequence of one-step ahead forecasts using the actual values not forecasted values of lagged dependent variable. First, we have to deal with forecasting error which is the gap between actual and forecasted dependent variable. The method with smaller forecasting error is superior.

For the purpose of forecast evaluation, first we choose "Root Mean Squared Error" (RMSE) as benchmark. This statistic refers to the gap between forecasted LMD and actual LMD. Smaller RMSE means better forecasting or more predictive power. By comparing the magnitude of this statistic for the two methods from figure 3 and figure 4 (0.1342 for FMOLS compared to 0.1407 for DOLS), we simply find out that FMOLS method is superior to DOLS for forecasting purpose. To see this better, we plot the forecasted LMD based on the two different estimation methods along with actual LMD.

Figure 5: Comparison of the predictive power of the regression based on FMOLS and DOLS estimation



It is clear that forecasted LMD using FMOLS is moving more closely to actual LMD compared to forecasted LMD using DOLS. Therefore, figure 5 is another evidence on the superiority of FMOLS over DMOLS. We may also consider Theil Inequality Coefficient (TIC) as another measure of the forecasting performance. If TIC = 0, there is a perfect fit meaning that forecasted LMD and actual LMD are the same. If TIC = 1, the predictive power of the model is worst. TIC is between 0 and 1. Again, TIC for FMOLS is less than that of DOLS certifying the fact that the forecasting performance of FMOLS is better than DOLS.

6. Conclusion

In this paper we applied two different estimation methods, namely DOLS and FMOLS to estimate real demand for money in Australia with the inclusion of financial innovations. We used a conventional money demand function that was enriched with a proxy for financial innovations. This sum of the number of cheques, credit cards, charge cards, ATM and direct entry payment was included in the regression model to proxy the effect of financial innovations on the money demand. Data (annually from 1995-2016) was collected from the official website of the World Bank and the official website of Reserve Bank of Australia. Our goal is to estimate the effect of financial innovations on the demand for money using two different methods (DOLS and FMOLS) and compare the predictive power of these methods.

DOLS and FMOLS are superior to the OLS for many reasons: (1) OLS estimates are super-consistent, but the t-statistic gotten without stationary or I(0) terms are only approximately normal. Even though, OLS is super-consistent , in the presence of "a large finite sample bias' convergence of OLS can be low in finite samples, (2) OLS estimates may suffer from serial correlation and heteroskedasticity since the omitted dynamics are captured by the residual so that inference using the normal tables will not be valid even asymptotically. Therefore, "t" statistics for the estimates OLS estimates are useless, (3) DOLS & FMOLS take care of endogeneity by adding the leads & lags. In addition, white heteroskedastic standard errors are used. FMOLS does the same using a nonparametric approach. FMOLS is a non-parametric approach used to dealing with serial correlation. Dynamic OLS (DOLS) is an alternative (parametric) approach in which lags and leads are introduced to cope with the problem irrespectively of the order of integration and the existence or absence of cointegration.

Before proceeding to estimation, we need to make sure that the all of the variables (including dependent variable) are non-stationary but when we convert them to first-differenced, they become stationary. In order to do so, we conduct unit root test using the Augmented Dickey-Fuller (ADF) test statistic. Then, we need to find out whether or not these variables cointegrated. Using Johansen Cointegration Test, we conclude that the variables are

cointegrated or they have long-run associationship. Also, there are 3 cointegrated equations. After making sure that the variables are cointegrated, we can proceed to DOLS and FMOLS which both are very efficient and sophisticated estimation methods. By doing this, we obtain long-run estimates.

In both methods, GDP coefficient is significant and bears the expected sign (positive sign). However, the magnitude of the GDP coefficient using DOLS is higher than that of FMOLS. However, our focus is on TPI which represents the impact of financial innovations on money demand. The estimated coefficient of TPI using DOLS is not significant yet it is highly significant using FMOLS and it bears positive sign so that 1 percent increase in TPI causes money demand to increase by 0.24 percent.

Finally, we did forecast based on these estimation method. According to table 1, there are four different measure to evaluate the forecasting performance. Out of these, we selected "Root Mean Squared Error" as the benchmark and concluded that FMOLS is superior to DOLD when it comes to forecasting. Also, FMOLS method produced significant TPI meaning that financial innovation did in fact impact on the money demand.

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EFFICIENCY MEASUREMENT OF 6 MAJOR CONTAINER PORTS IN THE WEST AFRICA REGION

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Abstract
Container terminal efficiency is a critical factor in the contemporary global trade. We apply the DEA and SFA methods to evaluate efficiency of 6 major ports in the West Africa region to investigate whether these ports can become the main hubs of container transport to African inland in the future. The DEA and SFA methods were applied to a number of inputs such as total quay length; total terminal area, number of quayside cranes, number of gantry cranes and number of reach stackers and single output, to measure efficiency.
Keywords: Transportation Economics, Ports, Efficiency, Sea Trade
JEL classification: R41, R11

1. Introduction

The efficiency of port operation is an important indicator of economic and, specifically, of regional development. In order to assist port authorities to identify their own strengths, opportunities, weaknesses and potential threats, a set of impartial and objective tools have to be selected and used to investigate transportation efficiency (Lin & Tseng, 2005). In this paper, we investigate Port's efficiency by using the DEA and SFA methods to six (6) major West Africa ports. Since W. Africa is gradually becoming a significant region in global trade, we examine whether these ports can become the main hubs of container transport to the vast African inland in the not too distant future.

2. Literature discussion

Container transport and containerization has led to increased competition between ports worldwide. The result of this intense inter-port competition highlights the importance of efficiency issues by port operators and port users (Cullinane & Wang, 2007). Ports in Western-Europe, North-America and East-Asia have, for many years, utilized efficiency analysis to improve operations by better use of resources. This led to ports infrastructure growth through massive investments in port related activities (Alabanos and Theodoropoulos, 2017). In this context, the port industry in West Africa has seen major growth in recent times. The last 20 years a number of West African ports has undergone serious restructurings by attracting more private sector involvement and increased capacities, efficiency and productivity. Lately, port development in West Africa region has been directed towards attaining hub port status (Kobina G. van Dyck, 2015).

Competition of international ports is at its highest level and private sector investment in port facilities continues to rise in the region. Nowadays, ports that play a regional role in West Africa are generally viewed as the leading potential hub port contenders, including ports in Ghana, Togo, Ivory Coast, Benin and Senegal, providing transit services for landlocked countries in West Africa.

There are several examples of port development projects in West Africa that have regional focus and are directed at attaining regional hub status. For example, in Nigeria, the Lekki Port project pursue to create a multi-purpose deep water port in the Lagos free trade zone area with

[1] This work has been partly supported by the University of Piraeus Research Center.

a projected capacity of 2.5 million TEU's (twenty-foot equivalent units) per annum. The port will include container, dry bulk and liquid bulk berths with a 14-metre draught and 670 metres turning cycle to accommodate larger ships[2].

Similarly, the Ghana Ports and Harbours Authority (GPHA) has secured $1.5 billion for the expansion of the Port of Tema. The project involves the construction of four (4) deep water berths and an access channel to accommodate larger vessels with high capacity equipment. The aim of the project is to create the largest cargo port in West Africa with a capacity of 3.5 million TEU per annum once complete in 2018 (Port Finance International, 2014). The Port of Lomé has constructed a $640 million berth in Togo. The new quay has double docking capacity and measures 450 metres able to accommodate vessels of more than 7000 TEU capacity (AFDB, 2010).

Similar port development projects can be found in other West African countries, as there is no exclusivity in the selection of a hub by shipping lines. The selection of a port to act as hub depends on a number of factors. In latest surveys, major shipping lines calling at West African ports were required to rank influential factors to the selection of a hub for the region (Kobina G. van Dyck, 2015). High port efficiency and performance were ranked first amongst a list of 20 factors. West African ports have been noted to be relatively congested and inefficient as compared with ports in Europe and Asia (Cullinane & Wang 2006). Measurement and analysis of port efficiency in West Africa allow port users to make efficiency comparisons and provide regional and national port operators with an important management tool for making informed decisions on port planning and operations (Kobina G. van Dyck, 2015). The improvement for port operating efficiency could include: improvement in efficiency through private sector management skills, enhancement of service quality through improved commercial responsiveness, reduction in the fiscal burden of loss making public enterprises, a reduction in the financial demands on central and local government through access to private sector capital, and additional revenue streams (McDonagh, 1999).

From the point of view of container terminal productivity, each port player has his own self-interest and his own definition of productivity, proposed by Dowd and Leschine (1990). As most port operations have been privatized, private operators aimed to maximize output, namely, container throughput and operating efficiencies (Heaver et al., 2000).

The operating efficiency of a container port or a container terminal is a mixture of multiple inputs and multiple outputs, which is in conformity with the characteristics of Data Envelopment Analysis (DEA). The DEA with mathematical programming techniques has applied to the measurement of port efficiency for hypothetical port data by Roll and Hayuth (1993). There are numerous papers that have extended and applied alternative models of the Data Envelopment Analysis (DEA) methodology, including BCC, Additive, FDH (Free Disposal Hull), etc, such as an application of BCC model to check global efficiencies of 26 Spain ports using 5 observations for each port from 1993 to 1997 and to examine efficiency evolution of individual port (Martínez et al., 1999). Utilization of CCR and additive models to make an international comparison of technical efficiencies in 4 Australian and 12 other international container ports in 1996 was proposed by Tongzon (2001). The CCR, BCC, and FDH models also used by Wang, Song, and Cullinane (2003) to evaluate production efficiencies of 57 terminals within 28 container ports for year 2001, and find that the FDH model is the best model of port efficiency measurement. Valentine & Gray (2001) further applied CCR model to calculate relative efficiencies of 31 global container ports in 2001, and follow cluster analysis to determine whether there is a particular type of ownership and organizational arrangement that leads to higher efficiency rating. Stochastic frontier analysis (SFA) method has been applied to the measurement of technical efficiency for 28 Britain ports during 1983-1990, by Liu (1995). SFA with Cobb-Douglas and Translog production function for the half-normal and truncated-normal distributions to estimate production efficiencies of 11 Mexico container ports with two inputs labour and capital and one output, volume of merchandise handled from 1996 to 1999, was applied by Estache et al (2002). Also, SFA method with Cobb-Douglas production function for the half-normal, exponential, and truncated-normal distributions to estimate production efficiencies of 15 Asian container

[2] http://lekkiport.com/theport/key-facilities.html

ports and terminals with unbalanced-panel data between 1989 and 1998) was used by Cullinane, Song, and Gray (2002). DEA and SFA methods also applied both to estimate the relative productive efficiency for 74 railway systems in 1999, and use the two-stage method of DEA with CCR and BCC models and the SFA method with Translog production function for the half-normal and truncated-normal distributions by Lan et al (2003).

DEA and SFA methods are also applied together in transport industry. The slack analysis of DEA supply observation to increase or decrease input resources to improve efficiency scores on the other hand the SFA method focuses on the economic justification and hypothesis testing. A mixture of both DEA and SFA support management helps to have a more comprehensive understanding of the operating efficiency of container ports and terminals and to identify the causes of efficiency and of inefficiency. Furthermore, both methods are frontier function to measure efficiencies of all firms with cross-section and panel data, and many container port and terminal operations may have characteristics of consistency for DEA and SFA. However, we would adopt both DEA and SFA methods to evaluate container port operating efficiency. Previous research on port's and terminals efficiency usually adopts either DEA or SFA method, but not both of them (Lin, L. C. & Tseng, L. A., 2005). We intend to measure the relative operating efficiencies of the 6 West African container ports from 2006 to 2012 by first applying Data Envelopment Analysis (DEA) with DEAP 2.1 and secondly SFA with Cobb-Douglas production function with Frontier 4.1 for the truncated-normal distribution. Previous evaluation to the West African container ports was proposed by Kobin G.van Dyck (2015) using DEA method.

3. Methodology

3.1. DATA ENVELOPMENT ANALYSIS (DEA)

Data envelopment analysis (DEA) is a non-parametric mathematical programming approach to frontier estimation. These models which are presented here is brief, with relatively little technical detail. Detailed methodology presented by Seiford and Thrall (1990), Lovell (1993), Ali and Seiford (1993), Lovell (1994), Charnes et al (1995) and Seiford (1996).

The piecewise-linear convex hull approach to frontier estimation, proposed by Farrell (1957), was considered by only a handful of authors in the two decades following Farrell's paper. Authors such as Boles (1966) and Afriat (1972) suggested mathematical programming methods, which could achieve the task, but the method did not receive wide attention until a paper by Charnes, Cooper and Rhodes (1978), which coined the term data envelopment analysis (DEA). There is large number of papers, which have extended and applied the DEA methodology.

A model proposed by Charnes, Cooper and Rhodes (1978), which had an input orientation and assumed constant returns to scale (CRS)[3] .Papers have considered alternative sets of assumptions, such as Banker, Charnes and Cooper (1984) who proposed a variable returns to scale (VRS) model. The following discussion of DEA begins with a description of the input-orientated CRS model in section 3.1, because this model was the first to be widely applied Data Envelopment Analysis (DEA) made for the purpose of calculating efficiencies in production. In the program that we use methods implemented are based on the work of Fare, Grosskopf & Lovell (1994).

In the program three options are available:

- The first involves the standard CRS and VRS DEA models that involve the calculation of technical and scale efficiencies which are outlined in Fare, Grosskopf and Lovell (1994).

[3] The constant return to scale assumption allows one to represent the technology using a unit isoquant. Furthermore, Farrell also discussed the extension of his method so as to accommodate more than two inputs, multiple outputs, and non-constant returns to scale.

- The second option considers the extension of these models to account for cost and allocative efficiencies. These methods are also outlined in Fare et al (1994).
- The third option considers the application of Malmquist DEA methods to panel data to calculate indices of total factor productivity (TFP) change, technological change, technical efficiency change and scale efficiency change. These latter methods are discussed in Fare, Grosskopf, Norris and Zhang (1994).

3.2. Stochastic Frontier Analysis (SFA)

3.2.1. SFA and FRONTIER 4.1

The stochastic frontier models can contain panel data and accept firm effects that are distributed as abbreviated normal random variables.

Two primary model specifications considered in the program are:

- Error components specification with time-varying efficiencies permitted (Battese and Coelli, 1992), which was estimated by FRONTIER Version 2.0.
- A model specification in which the firm effects are directly influenced by a number of variables (Battese and Coelli, 1995).

The program also allows the estimation of many other models.

FRONTIER Version 4.1, the program we worked on, is to provide maximum likelihood, estimates of a wide variety of stochastic frontier production and cost functions.

3.2.2. Model specifications

The stochastic frontier production function was independently proposed by Aigner, Lovell and Schmidt (1977) and Meeusen and van den Broeck (1977). The original specification involved a production function specified for cross-sectional data which had an error term which had two components:

- One to account for random effects
- Another to account the technical inefficiency.

This model can be expressed in the following form:

$$(1)\ Y_i = x_{i\beta} + (V_i - U_i) \qquad ,i = 1, \dots, N,$$

where $\mathbf{Y_i}$ is the production (or the logarithm of the production) of the i-th firm,

$\mathbf{x_i}$ is a $\mathbf{k \times 1}$ vector of (transformations of the) input quantities of the i-th firm is an vector of unknown parameters;

$\mathbf{V_i}$ Are random variables which are assumed to be . $\mathbf{N(0, \sigma_{V^2})}$, and independent of the

U_i which are non-negative random variables which are assumed to account for technical inefficiency in production and are often assumed to be iid.

$\mathbf{|N(0, \sigma_{U^2})|}$.

This specification has been used in a vast number of empirical applications over the past two decades. It has also been altered and extended in a number of ways and extensions include the specification of more general distributional assumptions for the $\mathbf{U_i}$, such as the abbreviated normal or two-parameter gamma distributions, the consideration of panel data and time-varying technical efficiencies, the extension of the methodology to cost functions and also to the estimation of systems of equations, etc.

A big number of completed reviews of this literature are available, such as Forsund, Lovell and Schmidt (1980), Schmidt (1986), Bauer (1990) and Greene (1993). The FRONTIER Version 4.1 as a computer program can be used to obtain maximum likelihood estimates of a subset of the stochastic frontier production and cost functions which have been proposed in the literature.

The computer program was written to estimate the model specifications detailed in Battese and Coelli (1988, 1992 and 1995) and Battese, Coelli and Colby (1989).

4. Empirical application to 6 Container Port Terminals in West Africa

For this case study, the container port terminals, which were selected in West Africa, are above 100,000 TEUs per year, for the period 2006-2012.

This case study selects six (6) West African container ports in six different countries with total throughput over 100,000 TEUs per year as shown in Table 1.Specifically the ports selected in this paper are:

- Tema Port in Ghana
- Abidjan Port in Cote D'Ivoire
- Dakar Port in Senegal
- Lomé Port in Togo
- Cotonou Port in Benin
- Lagos Complex in Nigeria

These port data are collected mainly from (Kobina G. van Dyck, 2015).

The majority of West African ports have both dedicated container berths/terminals and multi-purpose berths. The container terminals were used for the analysis in order to have equality in comparison and analysis of the data. Furthermore, the container terminals were the main terminals for the handling of containerized cargo at the ports. The ports analysed can be found in Table 1.

Table 1. Container throughput 2006-2012

Port	Terminal	Container Throughput (TEUs)						
Years		2006	2007	2008	2009	2010	2011	2012
Tema	MPS Terminal	425,408	489,147	555,009	525,694	590,147	756,899	824,238
Abidjan	SETV Terminal	507,100	531,809	652,358	610,185	561,535	546,417	633,917
Dakar	DP World Terminal	375,876	424,457	347,483	331,076	349,231	369,137	383,903
Lomé	Bollore Africa Logistics	215,892	237,891	296,109	354,480	339,853	352,695	288,481
Cotonou	Bollore Africa Logistics	140,500	167,791	193,745	272,820	316,744	334,798	348,190
Lagos Complex	APM Terminals-Apapa	587,600	711,100	947,400	710,800	1,128,171	1,413,27	1,623,141

(Source: Kobina G. van Dyck (2015)

This case study initially selected five inputs of container port infrastructures, including:

- Total Quay Length
- Terminal Area
- Number of Quayside Cranes
- Number of Container Gantry Cranes
- Number of Reach Stackers and single output,
- Container Throughput as shown in Table 1.

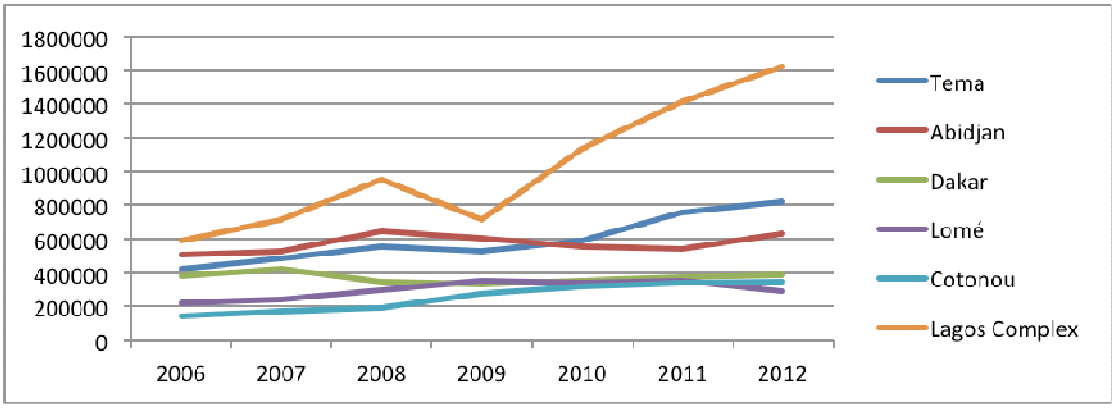
These indicators were selected to be in compliance with characteristic of consistency for both DEA and SFA.

Figure 1. Data and analysis indicators

DATA	
INPUTS	OUTPUTS
Total Quay Length (m)	Container throughput (TEUs)
Terminal area (ha)	
Number of Quayside Cranes	
Number of Yard Gantry Cranes	
Number of Reach Stackers	

Container throughput trend for the period 2006-2012 is shown on Figure 1. The difference between Lagos Complex Port and the other ports is clear. However we can see that it suffers from throughput fluctuations over time. Insignificant fluctuations on throughput noticed in all the other ports with exception of the port of Cotonou, which increased its throughput levels since 2006.

Figure 2. Container throughput trend 2006-2012



The selection of input and output variables is very important to the analysis of efficiency of ports and container terminals. Unclear variables can lead to false conclusions about port efficiency (Cullinane and Wang, 2006). Input and output variables should explain container port production as much as possible (Cullinane K.P.B. et al., 2004). Container throughput (output data) used in the efficiency analysis as primary basis upon which container ports are compared. As a container terminals and ports depends on the efficient use of land, labour and capital (equipment), the input data includes the quay length (m), the terminal area (ha), the number of quayside cranes, the number of yard gantry cranes, and the number of reach stackers used in each port over the period 2006-2012.

Specifically the quay length indicator is important in evaluating the efficiency of ports and container terminals. The quay length is also one important indicator as to the turn and around time that can be achieved by ports, since it shows the size of a ship that can be allocated a berth at a particular point in time.

Berth availability as a function of quay length can influence the efficiency of shipping lines. Furthermore, the number of quay-side cranes is an important measure of productivity. This input directly changes the speed with which container ships may be served for example if a container terminal has more cranes, this may increase the number of containers handled per hour, and effects the turn-around time as well.

The number of quayside cranes increases the agility of the port by handling more vessels at the same time (Pjevčević, 2012). The berth length and number of quay-side cranes accordingly influence the berth-side productivity. Likewise, the terminal area, the number of

yard gantry cranes, and the number of reach-stackers reflect yard-side productivity. In this case study, the number of yard gantry cranes and reach stackers is used in the evaluation because of their common use within terminals and ports in particular. The input and output data have been collected from (World Bank, 2014 & MLTC/CATRAM, 2013).

In Table 2 are shown the summary statistics of the data used.

Table 2. Sum statistics for sample of 6 West African ports

	Container throughput (TEUs)	Total Quay Length (m)	Terminal area (ha)	Number of Quayside Cranes	Number of Yard Gantry Cranes	Number of Reach Stackers
Mean	683645.00	701.50	27.67	5.17	8.67	20.33
Standard deviation	502677.21	244.54	17.07	2.40	5.75	6.02
Minimum	288481.00	430.00	10.00	4.00	0.00	15.00
Maximum	1623141.00	1005.00	55.00	10.00	16.00	31.00

In Tables 3, 4, 5, 6, 7 and 8 are shown the inputs and the output data for the period 2006-2012 more precisely.

Table 3. Input and output variables for port of Tema

Port	Variables	2006	2007	2008	2009	2010	2011	2012
Port of Tema	Container throughput	425,408	489,147	555,009	525,694	590,147	756,899	824,238
	Total quay length (m)	574	574	574	574	574	574	574
	Terminal area (ha)	10	10	10	10	10	10	10
	Number of quayside cranes	6	6	6	6	6	6	8
	Number of yard gantry cranes	4	4	4	4	4	4	13
	Number of reach stackers	0	4	4	10	10	10	23

Table 4. Input and output variables for port of Abidjan

Port	Variables	2006	2007	2008	2009	2010	2011	2012
Port of Abidjan	Container throughput	507,100	531,809	652,358	610,185	561,535	546,417	633,917
	Total quay length (m)	1000	1000	1000	1000	1000	1000	1000
	Terminal area (ha)	34	34	34	34	34	34	34
	number of quayside cranes	3	3	3	3	3	3	4
	number of yard gantry cranes	16	16	16	16	16	16	16
	number of Reach stackers	19	19	19	19	19	19	19

Table 5. Input and output variables for port of Dakar

Port	Variables	2006	2007	2008	2009	2010	2011	2012
Port of Dakar	Container throughput	375,876	424,457	347,483	331,076	349,231	369,137	383,903
	Total quay length (m)	660	660	660	660	660	660	660
	Terminal area (ha)	35	35	35	35	35	35	35
	number of quayside cranes	4	4	4	4	4	4	4
	number of yard gantry cranes	8	8	8	8	10	10	10
	number of reach stackers	15	15	15	15	15	15	15

Table 6. Input and output variables for port of Lomé

Port	Variables	2006	2007	2008	2009	2010	2011	2012
Port of Lomé	Container throughput	215,892	237,891	296,109	354,480	339,853	352,695	288,481
	Total quay length (m)	430	430	430	430	430	430	430
	Terminal area (ha)	12	12	12	12	12	12	12
	number of quayside cranes	4	4	4	4	4	4	6
	number of yard gantry cranes	0	0	0	0	0	0	0
	number of reach stackers	19	19	19	19	19	19	19

Table 1. Input and output variables for port of Cotonou

Port	Variables	2006	2007	2008	2009	2010	2011	2012
Port of Cotonou	Container throughput	140,500	167,791	193,745	272,820	316,744	334,798	348,190
	Total quay length (m)	540	540	540	540	540	540	540
	Terminal area (ha)	20	20	20	20	20	20	20
	number of quayside cranes	4	4	4	4	4	4	8
	number of yard gantry cranes	10	10	10	10	10	10	10
	number of reach stackers	15	15	15	15	15	15	15

Table 2. Input and output variables for port of Lagos Port Complex

Port	Variables	2006	2007	2008	2009	2010	2011	2012
Lagos Port Complex	Container throughput	587,600	711,100	947,400	710,800	1,128,17	1,413,27	1,623,14
	Total quay length (m)	1005	1005	1005	1005	1005	1005	1005
	Terminal area (ha)	55	55	55	55	55	55	55
	number of quayside cranes	10	10	10	10	10	10	10
	number of yard gantry cranes	12	12	12	12	12	12	12
	number of reach stackers	31	31	31	31	31	31	31

4.1. CRS Technical Efficiency results input oriented with DEAP 2.1

The most efficient West African ports are found to be the Port of Tema in Ghana and the Port of Lomé in Togo which both exhibit an average relative efficiency score of 100% for the period of analysis. The Port of Tema and the Port of Lomé achieves 100% efficiency in all 7 years while the port of Abidjan achieves 99.66% efficiency. Due to the world financial crisis on trade in 2008 as it shown in Table 9 we notice a shortfall in years 2008 and 2009 but after 2009 efficiency scores start to rise again. Amongst the ports in this case study, the Port of Tema is one of the smallest ports in terms size (terminal area and berth length) but one of the largest in terms of throughput in West Africa. On the other hand, the Port of Cotonou is relatively the least efficient port amongst the sample taken with an efficiency score of 52%, which indicates the port could have achieved efficiency with 52% of its inputs. The port has excessive capacity in relation to its inputs and therefore there exists a lot of waste in production.

Table 3. CRS Technical Efficiency scores for the period 2006-2012 and Means

PERIOD 2006-2012

PORTS	2006	2007	2008	2009	2010	2011	2012	Mean
TEMA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
ABIDJAN	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	97.60%	99.66%
DAKAR	95.00%	97.50%	67.80%	68.30%	66.60%	61.50%	59.10%	73.69%
LOME	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
COTONOU	40.30%	43.10%	42.80%	63.90%	66.50%	58.90%	49.50%	52.14%
LAGOS	80.60%	85.20%	99.70%	79.00%	100.00%	100.00%	100.00%	92.07%
Mean	85.98%	87.63%	85.05%	85.20%	88.85%	86.73%	84.37%	

Cotonou never achieves efficiency levels higher than 67% in the period 2006-2012.

In size, Cotonou is similar to Tema Port but achieves significantly lower output than Tema.

As a solution to increase its efficiency, there are two ways

- Put in measures to attract more containerized cargo
- Reduce its use of inputs.

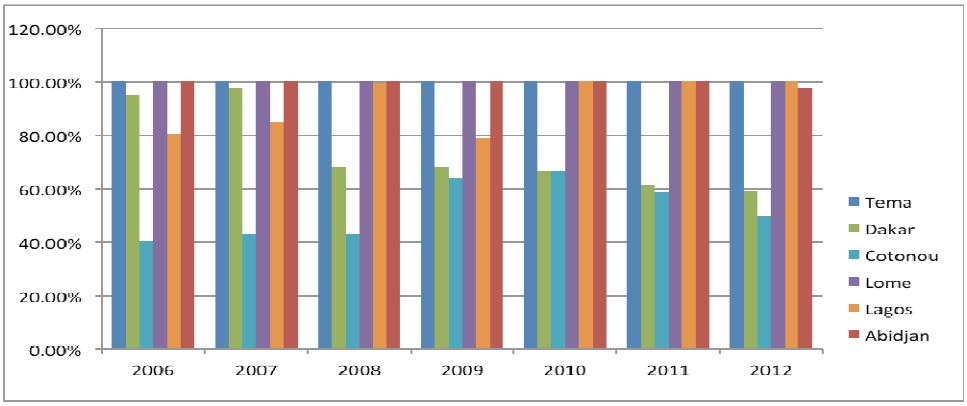
Lagos Port Complex is the largest port in terms of size and throughput amongst the ports under this case study. The port is located in Nigeria, Africa's largest economy and most populous nation.

Due to the analysis, the port achieves an average efficiency rating of 92.07%. Lagos Port Complex achieves its lowest rating during 2009, as a result of the effects of the world financial crisis on trade. The Port of Dakar exhibits quite an average performance throughout the period 2006-2012. The lowest efficiency score throughout the period was 49%, also in 2009 as with other ports in the sample. The port however only manages to achieve a high efficiency score of 82%, averaging 62% efficiency over the seven-year period under study. Table 10 and figure 3 show the ranking of West African ports according to their relative efficiency.

Table 10. DEAP Port Ranking 2006-2012

PORTS	TECHNICAL EFFICIENCY	RANK
TEMA	100.00%	1st
LOME	100.00%	2nd
ABIDJAN	99.66%	3rd
LAGOS	92.07%	4th
DAKAR	73.69%	5th
COTONOU	52.14%	6th

Figure 3.Technical Efficiencies for each port for the period 2006-2012



4.2. SFA application results. Technical Efficiency results with Frontier 4.1

Below are the SFA application results. Table 11 presents the technical efficiency scores – and figure 4 the relative percentages-, while table 12 presents the port rankings.

Table 11. Technical Efficiency scores for the period 2006-2012 and Means

PERIOD 2006-2012

PORTS	2006	2007	2008	2009	2010	2011	2012	Mean
TEMA	79.50%	73.40%	83.30%	68.20%	76.60%	98.20%	91.10%	81.47%
ABIDJAN	73.90%	77.50%	95.10%	88.90%	81.90%	79.60%	73.50%	81.49%
DAKAR	88.40%	99.80%	81.70%	77.90%	85.30%	90.20%	93.80%	88.16%
LOME	50.80%	56.00%	69.70%	83.50%	80.00%	83.70%	49.00%	67.53%
COTONOU	40.30%	48.10%	55.60%	78.30%	90.90%	96.10%	57.50%	66.69%
LAGOS	34.40%	41.60%	55.50%	41.60%	66.10%	82.80%	95.10%	59.59%
Mean	61.22%	66.07%	73.48%	73.07%	80.13%	88.43%	76.67%	

Figure 4. Technical Efficiencies for each port for the period 2006-2012

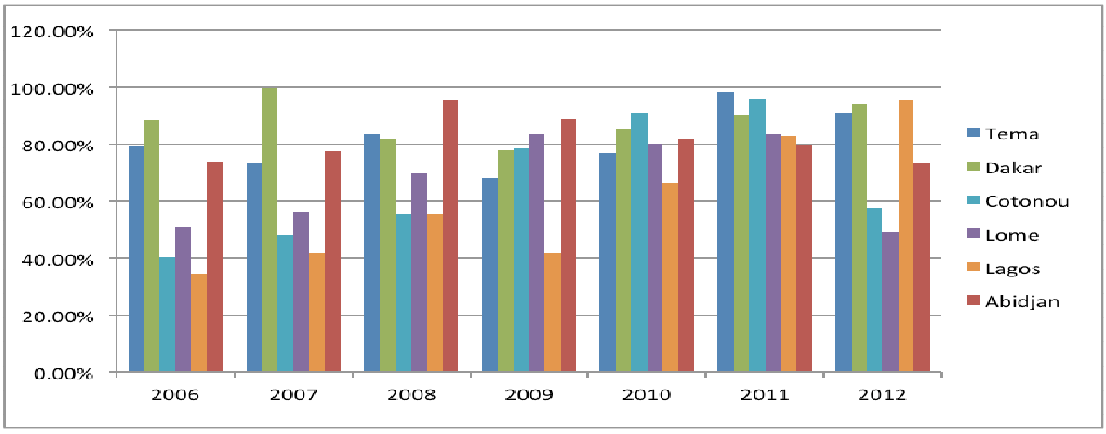


Table 12. SFAcd Port Ranking 2006-2012

PORTS	TECHNICAL EFFICIENCY	RANK
DAKAR	88.16%	1st
ABIDJAN	81.49%	2nd
TEMA	81.47%	3rd
LOME	67.53%	4th
COTONOU	66.69%	5th
LAGOS	59.59%	6th

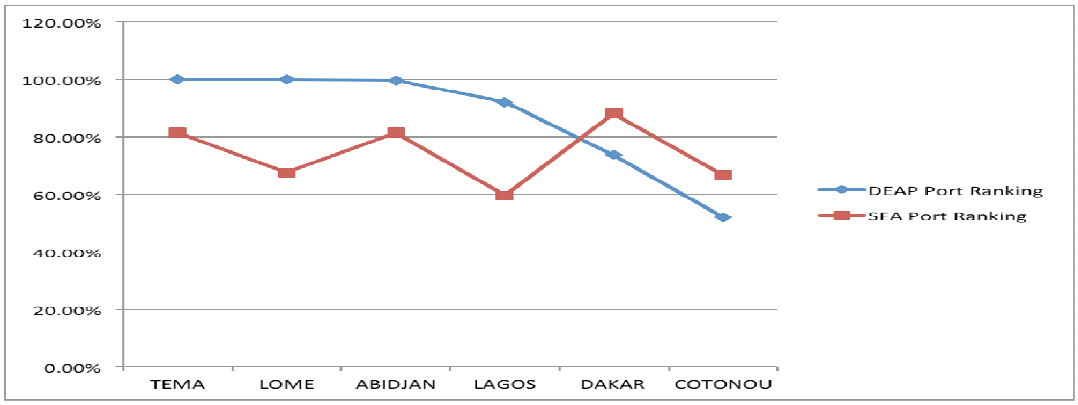
4.3. DEAP vs SFAcd

Below (table 13 and figure 5), one can find a comparison between the two methods. The results are different as efficiency via SFA method scores includes luck and random error which often leads to more accurate results and conclusions. Random effects and other factors like weather, political stability and economic crisis in each port country, when taken under consideration they usually offer more accurate results.

Table 13.DEAP and SFAcd Port Rankings

DEAP Port Ranking			SFAcd Port Ranking	
PORTS	TECHNICAL EFFICIENCY	RANK	TECHNICAL EFFICIENCY	RANK
TEMA	100.00%	1st	81.47%	3rd
LOME	100.00%	2nd	67.53%	4th
ABIDJAN	99.66%	3rd	81.49%	2nd
LAGOS	92.07%	4th	59.59%	6th
DAKAR	73.69%	5th	88.16%	1st
COTONOU	52.14%	6th	66.69%	5th

Figure 5. DEAP and SFAcd Port Rankings



5. Conclusions

The aim of this paper was to apply the DEA and SFA methods to evaluate efficiency in 6 major ports in the region of West Africa. The selection of 6 West African ports was based on their container throughput levels (up to 100,000 TEU's). The DEA and SFA methods were used to determine their relative efficiencies over time for the period 2006-2012.

Both DEA and SFA constitute efficiency frontier analysis methods and they provide a suitable way of treating the measurement of port operating efficiency. According to the results of the DEA model, the Port of Tema in Ghana with the Port of Lomé are the most efficient ports amongst the sample with the port of Abidjan closely following the first two. On the other hand, the Port of Cotonou is the least efficient and exhibited substantial waste in production throughout the period under study. The performance of the Lagos Port Complex adds to literature a doubt on the notion that larger ports are more efficient. The Lagos Port Complex, which is the largest amongst the sample in terms of size and throughput, achieves an average efficiency score of 92%, which is a result of some inefficiency in its operations. Lagos Port Complex achieves its lowest rating during 2009, as a result of the effects of the world financial crisis on trade. The Port of Dakar exhibits quite an average performance throughout the period 2006-2012. The lowest efficiency score throughout the period was 49%, also in 2009 as with other ports in the sample. The port however only manages to achieve a high efficiency score of 82%, averaging 62% efficiency over the seven-year period under study. The analysis also shows that three neighbouring ports, Tema, Abidjan and Lomé, who are the three largest providers of transit services to landlocked West Africa region, have the highest efficiency ratings. For most of the ports, major inefficiencies in production occurred in 2009, can be explained by the world financial crisis and a consequent reduction in output. The results of SFA model are quite different and this is because of the parametrical way it estimates the efficiency. SFA absorbs some effect of heterogeneity in inputs and outputs and also enable statistical testing of hypotheses, calculating confidence intervals. The main difficulty with the parametric approaches is the necessity of correct functional form and error term distributions to obtain unbiased parameter estimates. The efficiency via SFA method scores includes luck and random error which often leads to more accurate results and conclusions. Random effects and other factors like weather, political stability and economic crisis in each port country, when taken under consideration they usually offer more accurate results.

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VISUAL COMMUNICATION AND ICTS FOR THE APPLICATION OF VALUE CO-CREATION STRATEGIES IN HOTELS' WEBSITES IN ATHENS, GREECE

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Abstract
The purpose of this paper is to provide an understanding of the way principals for tourism development could incorporate Information and Communication Technologies (ICT) into their models, addressing such issues as new visual communication technologies and value co-creation, based on a survey in the city of Athens, Greece. The authors argue that collaboration among key stakeholders in the tourism industry around ICT may assist in the promotion of the destination and enhance economic development. The paper demonstrates the need to redefine the relationships and the ways of communication and value co-creation between tourism principals, according to new requirements in the evolutionary process of the tourism phenomenon.

Keywords: ICTs, Value co-creation, Visual Communication, e-Tourism, C-commerce
JEL classification: Z3, Z33, Z32, Z38, M31, M15

1. Introduction

All tourism stakeholders try to keep pace with the adoption of Information and Communication Technologies (ICTs), since new tools constantly emerge and aim for an effective and efficient response to evolving tourism marketing needs (Sigala and Baum, 2003; Braun and Hollick, 2006; Fuchs et al, 2007; Buhalis and Law, 2008); peer-to-peer communication is built and influential virtual communities are formed. These trends define also the future of marketing, especially in the field of the hotels' "web presence", as the majority of the hotels have already realized the importance of the internet as an innovative distribution channel for disseminating information on products and services, for online purchases and for opportunity to communicate directly with e-consumers. These hotels are trying to build the best websites in order to enhance their attractiveness and promote sales (Law and Hsu, 2006). The present paper provides an understanding of the way principals for tourism development could incorporate ICTs and Social Media (SM) into their models, addressing such issues as new technologies and their relation to the travel behavior, based on a survey in Athens, Greece. The paper demonstrates the contribution of Visual Communication in the city of Athens, Greece, and the need to redefine the relationships and the ways of communication between tourism principals, according to new requirements in the evolutionary process of the tourism phenomenon.

2. Background literature review

2.1. ICTs' role in Destination Marketing Practises

Information and Communication Technologies (ICTs) in general and Internet in particular, have surmounted temporal and geographical barriers and have tremendously affected the tourism industry as they are characterized by public access, open standard, global connectedness, and real-time communication, enabling the evolution of tourism demand and supply. The establishment of new technologies such as travel communities, blogs, travel review websites, photo galleries, visitor books, GIS applications, interactive maps and so on, have a role to play which may lead to economic activity and can be a means to reduce social

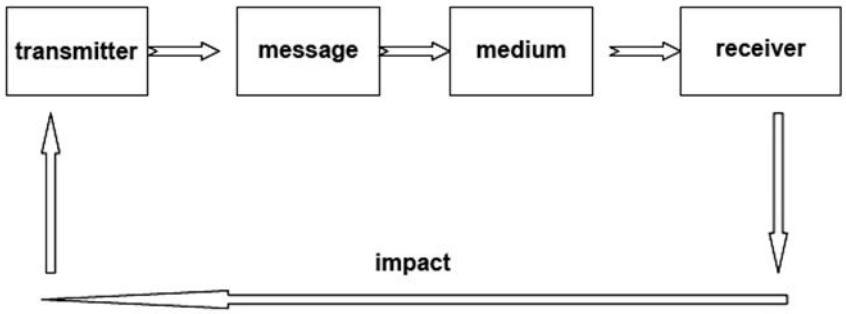
exclusion; they may achieve networks that link the global, the nation state and organizations (Argyropoulou et al, 2011; Werthner and Klein, 1999).However, ICTs can be fruitful only if "certain prerequisites are satisfied, namely long term planning, innovative business processes re-engineering, top management commitment and training throughout the hierarchy" (Buhalis, 1998, p. 410). In addition, e-business adoption leads to value co-creation, that is the process where ''the consumer and the firm are intimately involved in jointly creating value that is unique to the individual consumer and sustainable to the firm'' (Prahalad & Ramaswamy, 2004).

A type of network with great potential for tourism development is the 'virtual' or 'social' network,that is according to Kaplan & Haenlein, (2010): "a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of user generated content". The importance of Social Media and Consumer-Generated Media, as defined by Yoo and Gretzel (2011), provide "a new form of word-of-mouth that serve informational needs by offering non-commercial, detailed, experiential and up-to-date information with an access beyond the boundaries of one's immediate social circle". Therefore, websites should be more user-friendly, more understandable and more attractive and to inspire credibility (Xiang et al., 2010). Planning should be done carefully, paying attention even to details (using appropriate colors and sharp color contrasts, sharp images, smooth fonts readability, etc.), while the information must be accurate and updated frequently with personalized information, direct and live content (fashion, daily weather, etc.). A successful online promotion can be achieved by creating an "ideal" navigation experience on the website with feedback, either for a simple user or a potential traveler (Dionysopoulou and Pridezi, 2011). The perceived image of a tourism destination is influenced by the content of its website and creates an enhanced virtual experience for the tourist (Gretzel et al., 2006). Websites cover a large part of the tourism market with different needs and desires, aiming to satisfy the needs of all categories of tourists (Edwards and Curado, 2003); however, more content does not necessarily mean more effective advertising, as it may cause users' frustration in the reading process (Wang et al., 2005). A webpage should have hierarchical structure, designed by following the cycle of "the visitor's journey", from the initial contact when it needs to inspire him, charm him, impress him and make him dream a potential trip to the destination. Then it must give him the necessary information to plan his trip and also the opportunity to share his experiences of this trip (Fotiadis, 2009). Each site should have the opportunity to "seduce" the visitor, stimulate his interest, keep the attention more than a fleeting glance and create the desire to visit this destination or hotel. Thus, the success of a website depends not only on the accuracy and regularly updated information it contains, but also on the value-added services it can offer. Such value-added tools are: attractive messages, strategic choice of words, interactive maps, virtual tours, multilingual support, use of appropriate colors and high-quality photo, video and music, correct fonts readability, annual events calendar, forums, online surveys, informational e-mails and entertainment items (games, quizzes, screen savers).

2.2. The role of visual communication in tourism

According to Mc Quail, 1994, based on a previous study from Lasswell, 1948, the communication process as the social interaction through messages is built on five key elements, as seen in Figure 1 below: the transmitter, the message he wants to convey, the medium or communication channel selected for the transmission of the message, the receiver who gets the message and the impact of the message on the receiver (Mc Quail, 2001).

Figure 1. The communication process



Source: Mc Quail, 2001, p.23

Given that the concept of communication is accrete with the human nature, its evolution and the need for a contact with other people, visual communication, responsible for conveying information, ideas, messages or emotions plays an important role in shaping and influencing ideas, tastes and values through advertisements, promotional materials, product packaging, web design. As visual communication, we define the communication through visual messages, which must be designed, organized and conveyed via the proper form and means in order to be downloaded from the receiver's optical nervous system. (Bithynos et al., 2002). The great Greek philosopher Aristotle in his book Art-Rhetoric defines the rhetoric as the faculty to have someone the means to persuade. But even the visual communication has its own rhetorical action, which transforms a simple sentence. At the time of creation, the transmitter encodes the message with the selection and arrangement of objects within the image, starting with a simple sentence or creating a photographic print or an art project, which formed into a rhetorical shape. Upon receiving the message, the receiver restores the idea in its original form and should decode it through associations, semantic analysis or personal experiences in order to understand the image and the message sent by the transmitter through it (Antoniadis, 2002). Thus, the communication through the photographic capture is based on the detection and decoding of signs it contains (Antoniadis, 2002). The picture, therefore, is considered as a visual language with a global reach and has already begun to replace the speech form. The fast decipherment of messages offered for the transmission of a message (visualization of message) render it particularly popular as a mean of visual communication. Nowadays, image is the primary ingredient and the product is treated simply as a variable that attempts to represent the image (Schroeder, 2002) and, in many cases, the message is decoded by the consumer more quickly and accurately (Machin, 2004).

Image has become a strategic tool and constitutes a competitive advantage in tourism (Pikkemaat, 2003). Choosing a tourism destination or an accommodation is a difficult task for the tourists, especially considering the special characteristics and the particularities of the tourism product, which should be conceived as a complex product, such as a composition of material goods and intangible services (Middleton, 2001). Therefore, it is considered to be heterogeneous, not a priori distinguishable given that it is defined by the consumer behavior of the tourists themselves, not tangible and thus not visible before the consumption (Baker, 1991). This means that, due to the intangible elements of tourism product, tourists evaluate it after having consumed it (Middleton and Hawkins, 2004). The way the tourist information is presented influences also the individual judgements and choices (Orth et al., 2007). Furthermore, tourism businesses are called to serve the global tourism market directly and to offer updated, interactive and qualitative information, according to new demands and needs of the modern tourist in a competitive environment which is characterized by constant changes in tourism demand trends and by the entry of new tourism destinations in the world map.

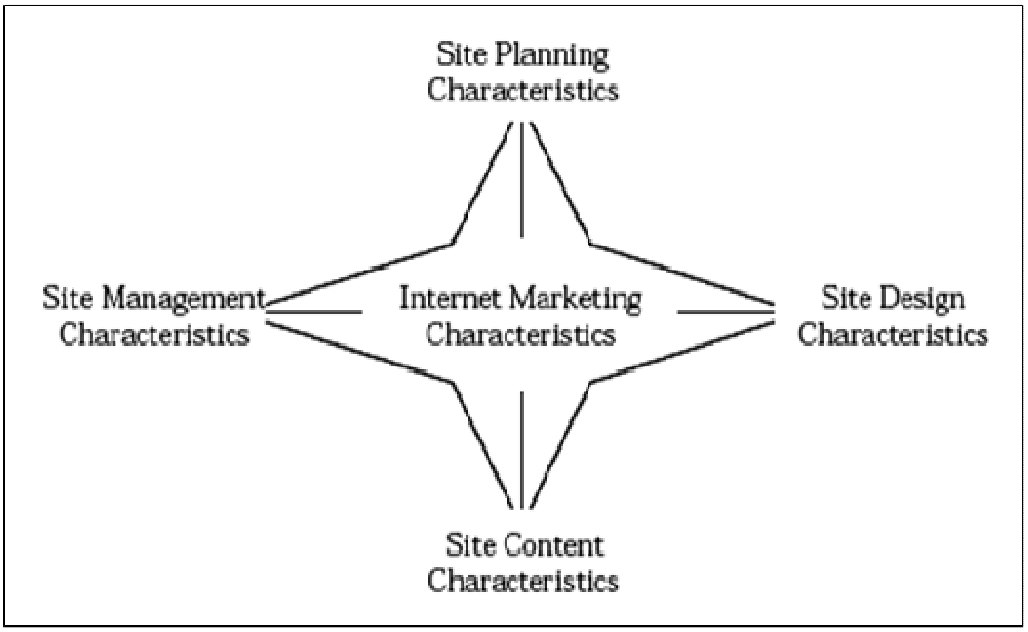
Recognizing these characteristics, tourism businesses search for the best promotion of the tourism product through the proper selection of mass media, movies, various television programs, literature etc., which can all provide substantial information about a destination and cause a variety of emotions and desires (Hyounggon and Richardson, 2003). Moscardo (1996) emphasizes the importance of orientation of tourists' behavior and the effects of interaction through the use of those media, which involve all five senses of the human being. Considering

the behavioral profile of tourists, businesses will be able to reach them with the appropriate communication tools in order to shape their opinions and desires during the destination selection. Concerning the effectiveness of advertising in combination with the use of more information in text, graphics (static/animated) and video on travel agency websites (Wang et al., 2005), it is noticed that more content does not mean more effective advertising, because it caused users frustration in the reading process. Tversky and Morrison (2002) argue that the incorporation of video into the components mix enhances ad effectiveness and consumers' perception of the destination image for the moment that the tourism product is tangible through the power of the image (Seaton and Hay, 1998). The tourism marketing plans to attract new visitors, or to remind ex visitors to return, using various communication processes and tools (Pan and Fesenmaier, 2006). Hotels and travel agencies usually offer a combination of visual and verbal communication in order to create an attractive product for the consumer and to stimulate their interest. The websites cover a large part of the tourism market with different needs and desires, aiming to satisfy the needs of all categories of tourists (Edwards and Curado, 2003). Seeking for new models and forms of communication, tourism businesses have turned to multimedia, which use text, audio, images and video (Sloan, 1996) and offer to the tourist-consumer interactivity and the ability to participate actively in the communication process (Bithynos et al., 2002). The same result can be achieved through virtual reality for the moment that it essentially offers “a multi-sensory experience” (Holmes, 2001).

At this point, it should be noted that McLuhan, communication theorist and philosopher of the 20th century, focused primarily on the way (by what means) a person experiences the world and not what (content) experiences, putting great emphasis on the strength of the medium. With the famous phrase "The medium is the message", McLuhan argues the power of the means in modern communication procedures (McLuhan and Fiore, 1967). A medium affects the society in which it plays a role not only by the content delivered over the medium, but also by the characteristics of the medium itself. So the message is not in the text but in the print media, on television or internet. Therefore, the value of means is defined by the way we use them. Ultimately, “no matter what medium we use, it is important that we be able to communicate clearly and precisely, and we are more likely to do so when we are explicitly aware of the character of the medium” (Robinson et al., 1976).It is true that “a picture is worth a thousand words”. But in design, it is so difficult to translate these thousand words, which are the goals and the message of a business, to a picture. The visualization of the message is met in all media. The space of promotion of the tourism product determines often its communicative nature. In the vast world of Internet information is not hierarchical nor controlled (Robbins and Webster, 1999). Internet has its own rules and requirements. For example, in print media when something is written, usually, there is an introduction, then an analysis of the issue with the presentation of arguments and finally the findings. On the internet, information follows the reverse path, with "the final message" at the beginning in order to facilitate users to find what they are looking for. The necessary elements of a successful website development grouped into four categories and the Internet marketing star is made up of these four categories (Fig.2):

- Planning (business objectives and identification of the target audience)
- Design (website design with interactive tools)
- Content (accuracy of the information presented and updated text content)
- Management (management and regular update)

Figure 2. Internet Marketing Star



: Benckendorff and Black, 2000, p.13

A webpage should have hierarchical structure, designed by following the cycle of "the visitor's journey", from the initial contact when it needs to inspire him, charm him, impress him and make him dream a potential trip to the destination. Then it must give him the necessary information to plan his trip and also the opportunity to share his experiences of this trip (Fotiadis, 2009). Meanwhile, the modern tourist is looking for recreation and personal consummation through unique experiences and emotions. Even the selection of a tourism product is based on his emotions, related to his needs and incentives such as relaxation, pleasure, prestige, etc. There is a correlation between logical and emotional incentives when consumers choose and buy a tourism product. The modern tourism industry does not seek to cover basic needs, anymore, but "sells" feelings and experiences. The feeling, however, is not something that we read. We want to feel it with all our senses before the trip. It is no coincidence, moreover, that many businesses have invested in this sector.

A successful website promotion will stimulate the attention and interest of potential customers; this requires creativity, originality, good knowledge of the communication process and searching of the best practices of other businesses worldwide (Martakis, 2005). Quoting McLuhan's famous phrase "The medium is the message", the power of the means in modern communication procedures becomes enormous (McLuhan and Fiore, 1967), as a medium affects the society in which it plays a role not only by the content delivered over the medium, but also by the characteristics of the medium itself.

2.3. Tourism and C-commerce; the case of Athens, Greece

An effective tourism marketing strategy contributes to the economic regeneration of cities, increases the use of external information and improves the perception value and availability of a destination (Bitsani and Kavoura, 2011, p. 35; Katsoni, 2011). Tourism boards can have a significant impact on these processes. In a recent study by Chiabai et al., (2011) in the City of Genoa in Italy, respondents were asked to suggest a set of e-services that could help in improving cultural tourism management and the visitors' experience. The e-services proposed by the respondents were classified into informative, communicative and participative e-services. In the first group, the user has a passive presence, only receiving information without interacting with other users or the service providers. The communicative e-services require an active attitude of the user because a dialogue is established among users and with service providers. The participatory e-services require the user to be involved in the cultural heritage management at various stages of the decision-making process, as they are asked to provide suggestions and opinions about some specific issues, and also e-Governance, where

citizens are directly involved in the decision-making for local actions. (Chiabai et al., 2011:45).

C-commerce combines e-services that improve cultural heritage, interpret the visitors' experience of local assets, and support communication with service providers (Mitsche et al., 2008). An interactive information exchange with the satisfied customer underlines a strong customer focus (Rust and Kannan 2003; Baida et al., 2004) and encourages the ongoing dialogue between the public and private sectors, as it provides information flows between business entities, forming collaborative management practices, and incorporating new culture, relationships, assumptions, trust, and all aspects that value partnerships. Collaborating organisations consider other organisations as an extension of the one, rather than as competitors (Chi and Holsapple, 2005; Levy et al., 2003).

C-commerce created from tourism destination Websites is particularly important, as the content of the Website directly influences the perceived image of the destination and creates a virtual experience for the consumer. This experience is greatly enhanced when Websites offer interactivity (Gretzel et al., 2006) and when a specific whole is created and advertised electronically. The promotion of such virtual experience via the website may not only include more than one participating businesses, but, on the contrary, it can create a network, aiming to promote a unique and consistent identity destination message.

Athens is a city with many tangible and intangible values, which create historical, cultural, tourist, social, artistic, environmental and emotional appreciation and has political, social and economic connotations. This study discusses the informative and communicative e-services offered in the city of Athens, Greece; Participative e-services were not analyzed, as they received the lowest priority compared to informative and communicative e-services in the Chiabai et al study mentioned above, as the authors think they do not serve the purpose of this research.

3. Methodology

3.1. Objectives and research questions

Two separate primary surveys, using two different structured questionnaires with closed and open type questions, were carried out in Athens, during the period from November 2014 to May 2015, based on the conclusions and experience gained from other two pilot studies in 2010 and 2013. The research aimed at two objectives: the first one is the record of tourism demand trends and the modern tourist profile, regarding the use of print and electronic media, with particular emphasis on Internet. The second one was focused on the tourism offer, attempting to outline the specific actions used by the tourism businesses in order to communicate with the potential tourists/customers and meet their expectations and their needs, by emphasizing on the tools of visual communication.

Based on the conceptual framework described in this study, the hypotheses or research questions considered are:

- What are the tourists' desires and needs regarding tourist information and services offered in Athens?
- What are the tourists' desires and needs on Internet services offered by hotels and tourism agencies?
- What are the businesses' desires and needs on Internet services offered by hotels and tourism agencies?
- What is the communication policy implemented by the hotels and travel agencies, what aspects are covered by the advertising and what strategic and effective promotional methods could use in order to reach the modern tourist?
- Is there a match between the needs and desires of the above mentioned parties?

- Is that in accordance of the cultural heritage profile of Athens and fulfills the needs of the previously mentioned set of e-services that could help in improving cultural tourism management and the visitors' experience?

3.2. Sample design and data collection

The first survey was addressed to a sample of 116 tourists and visitors of Athens. In particular, the participants were 54 women and 62 men, aged 17 and over. Respondents were both foreigners and Greeks who were selected by random sampling at Athens International Airport (AIA) and outside the Museum of Acropolis. The questionnaire was anonymous, included 15 questions in Greek and English language. The independent variables used in this questionnaire were age, sex, education level, nationality and frequency of trips made per year.

The second survey aimed at managers of hotels and travel agencies of the region of Attica. The questionnaire had 25 questions, the method of personal interview was used and after a random choice, 92 businesses participated:

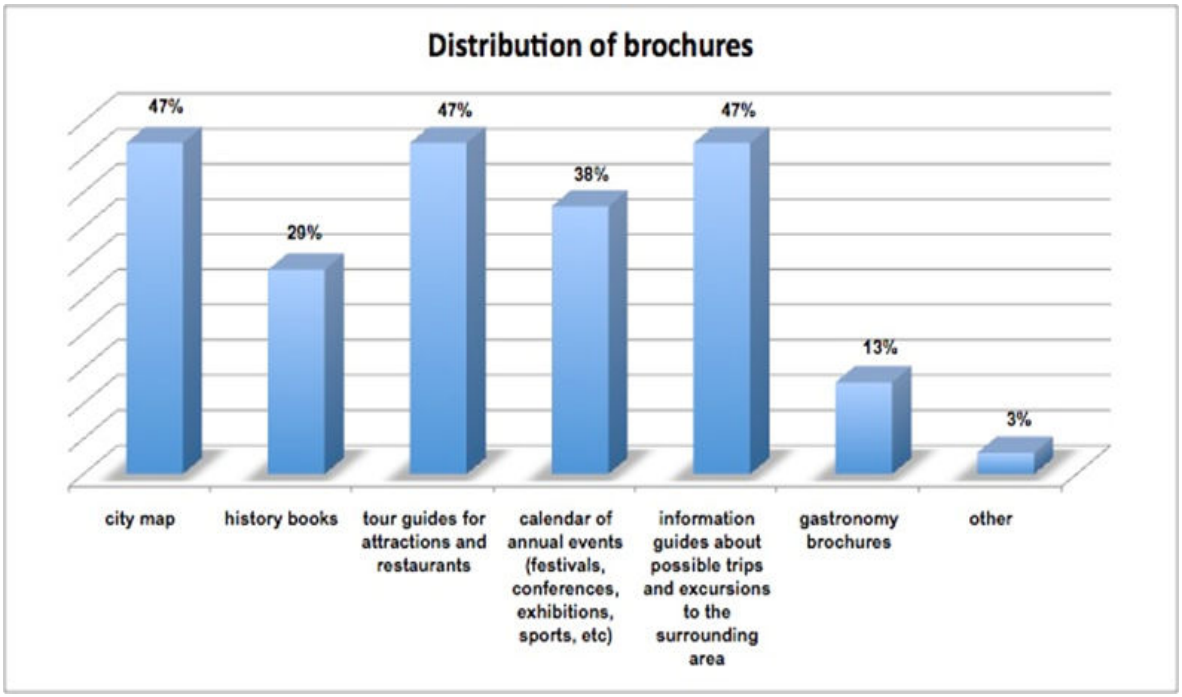
- 49 hotels (5 *, 4 * and 3 *)
- 43 travel agencies

4. Results

In total, 208 sample questionnaires were collected from both surveys (116+92), of which all of them were usable. According to the demographic and trip characteristics results of the first survey addressed to the 116 visitors-tourists of Greece, we had the following results: 54 respondents (47%) were women and 62 men (53%), 75% of them were between 17-45 years old, while 59% were university graduates. A large proportion of the sample (61%) said that they didn't travel frequently (till 3 times a year) and choose to travel individually (75%) rather than choose a tour package.

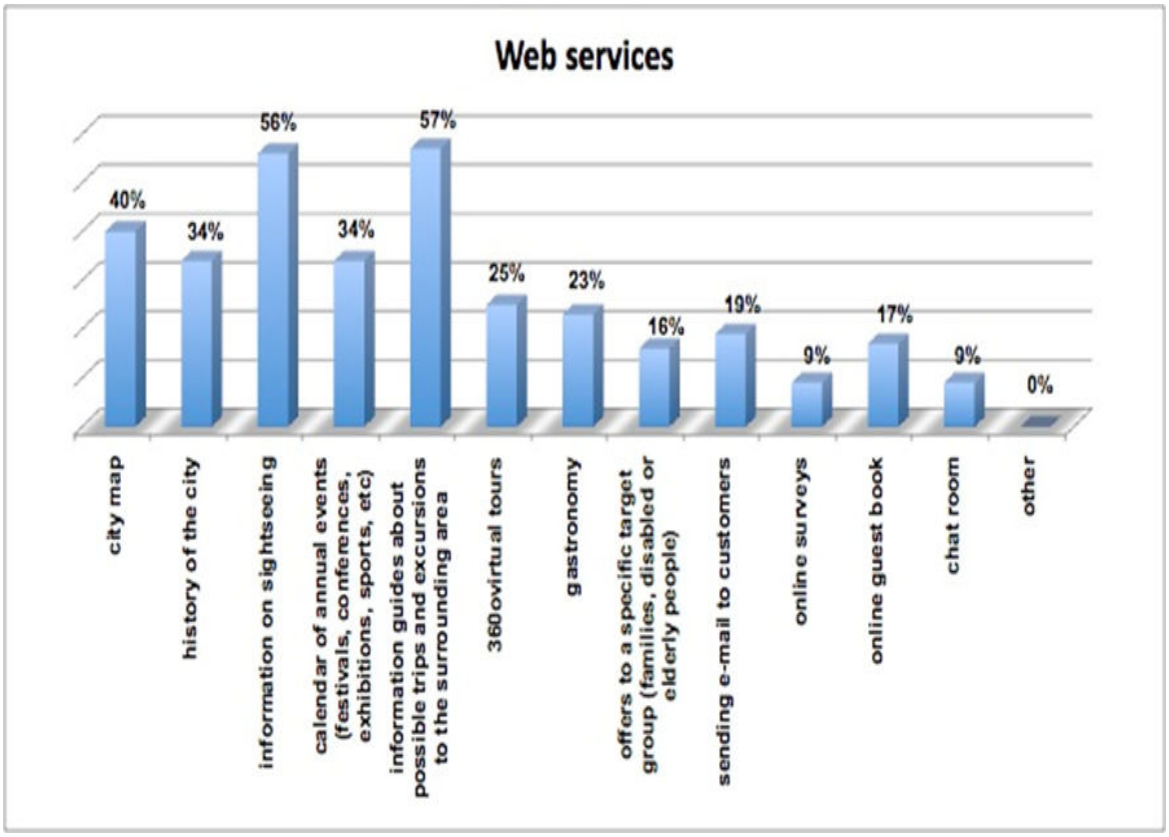
The experiences of friends and relatives (49%) and internet (32%) are the most common ways to choose Athens as a tourism destination. On the other hand, the tourists do not seem to trust media in order to choose Athens as a tourism destination, although it is very likely to use them, in general, as sources of information. The majority of visitors prefer less the GNTO (Greek National Tourism Organization) offices abroad to obtain reliable information (3%). For those who first visited Athens, the reasons for which they had not visited before were the incomplete and/or negative information about the city (47%). Between the main reasons for which they will not intend to visit Greece within the next years or would not recommend the city of Athens to friends and relatives, were cost (49%), hygiene (80%), transport (70%) and the lack of environmental awareness (50%).In the multiple choice question put to the tourists about what kind of information should be distributed to them by hotels and travel agencies in brochures (Fig.3), 47% answers a city map, tour guides for attractions and restaurants and guides with information about possible trips in the surrounding area. 37% of them prefer a calendar of annual events (festivals, conferences, exhibitions, sports, etc.), while for 29% and 13% history books and gastronomy brochures are respectively between their preferences

Figure 3. Distribution of brochures



According to the multiple-type question put to tourists on which additional services they consider necessary in web sites, in order to choose a hotel or a travel agency, tourists consider as more attractive the following additional web services: 57% want information on possible excursions to the surrounding area, such as islands, villages, etc. (66 tourists), 56% would like more information about sightseeing (65 tourists), 40% (46 tourists)would like a detailed map of the area and 34%(40 tourists) would like more information about the historical and cultural sites of the city. Furthermore, 46 tourists are looking for a calendar of annual events such as festivals, conferences, exhibitions, sports activities, etc. (34%) and 29 tourists would like the existence of interactive virtual tours and trips through the websites of hotels and travel agencies (25%). Availability of local gastronomy (23%), informative e-mails (19%), on-line surveys (9%) and chat rooms (9%) follow, as it can been seen at figure 4 below.

Figure 4. Web services offered by hotels



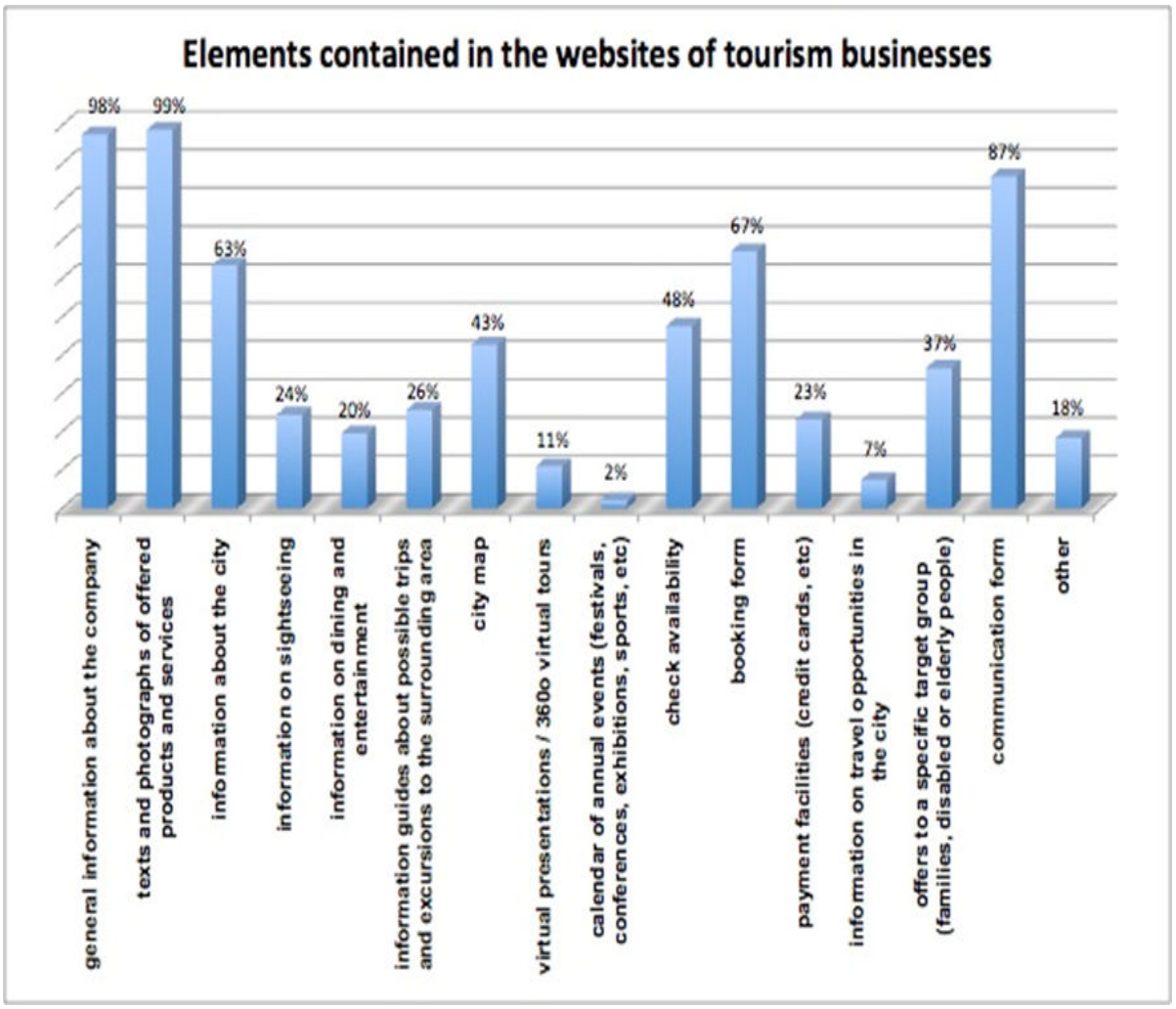
According to the results of the second survey which took place in the 92 tourism businesses of Attica, it is noticed that their customers are between 31-45 years old (88%) and 73% of the sample carries out a market research in order to know the needs and desires of their customers. In 71% of businesses operates a Sales and Public Relations Department, while a large percentage (75%) have set a goal to attract a specific tourism market (target group), such as wellness tourism, conference tourism, incentives, etc. The marketing tools used by businesses are ads in print media (66%), online advertising (71%) and distribution of brochures (61%). It is significant that the vast majority of the sample has a webpage (89%).However, with few exceptions, businesses have websites with low quality content and limited navigation. This is evidenced by the fact that 66% rarely update (1-2 times/year) the content of their WebPages, 33% of them updates often(4-6 times/year) and only 1% updates very often(every month). The main language in which information is available is English (85%) and Greek follows with 76%.

The percentage of customers who prefer the online booking is relatively low (15% for hotels and 28% for travel agencies). This shows that businesses have not understand the usefulness of a well designed website and the peculiarities of Internet. Noteworthy is the fact that 3* hotels present more responsive to the needs and desires of tourists, offering well designed and multilingual websites, rich information material, high quality photos and virtual tours. However, the large percentage of businesses seems to be optimistic and is satisfied with the advertising effectiveness (85%), while only 15% reported that ad is not so effective.

In the question put to the managers and hotel owners however, the information contained in the websites of hotels and travel agencies was limited to text and photographs on the services and products (99%), general information about the company (98%), a communication form (87%) and a booking form (67%). In contrast, low percentages hold those actions which tourists consider as very important and attractive, such as information on attractions (24%), information on dining and entertainment (20%), virtual presentations/360° virtual tours (11%), information on travel opportunities in the city (7%) and annual events calendar of the city, such as festivals, conferences, exhibitions, sports, etc. (2%). It is also important to note, that neither of the above businesses had a link with sites or portals of the

Greek National Tourist Organization, the Greek Ministry of Tourism, the portal of the Municipality of Athens, or any other public DMO.

Figure 5. Information contained in the websites of tourism businesses



5. Conclusions and recommendations

Tourism destination stakeholders may become committed to its branding and promotional efforts and actively participate to the city's promotion, including themselves to such a branding procedure (Kemp et al., 2012; Kerrigan et al.,2012; Kuscer, 2013). In that way and with the contribution of technological advancement the way in which destinations are imagined may be affected (Frías et al., 2012, p. 439). Regarding the results of this primary survey, it is noticed that the destination's pre-visit image assumed by visitors of a tourism destination is essential for the promotion and competitiveness of the tourism product. For a large proportion of respondents (38%), Athens was not an attractive destination.

Generally, the image of a tourism destination is created through direct and indirect advertising communicated abroad. Media, including entertainment media, internet, tour operators, travel brochures, the experiences of relatives and friends are sources of information about a tourism destination. The survey underlines the necessity to find some alternative ways of promotion and marketing, which are beyond usual practices and therefore will be more effective. Nowadays, tourists know exactly what they want and they are able to prepare their own holidays, based on their wishes. The long-term trends in tourism demand show the need to develop thematic discussion forums, where groups of users can discuss various subjects based on their interests (e.g., forest protection, wine tourism, ecotourism), share their experiences and multimedia material (photographs, videos, audio files), communicate and advise other members (Sigala et al., 2007). The effective promotion of the destination requires creativity, originality, good knowledge of the communication process and searching of the

best practices of other businesses worldwide (Martakis, 2005). An advertisement showing impressive plans from the interior of a hotel or the natural beauties and attractions of a region could create a very positive opinion, but it would not translated necessarily into a desire to visit it. The question is therefore how effective are the means of communication, how could influence the tourism market, how businesses exploit their power and how could use them in the best possible ways in order to achieve the best possible results. Furthermore, an ad that no one read it in a magazine or watch it on television has no effect. For example, the brochures are now obsolete. They could be used to attract people at an initial level but certainly they are not the decisive tool for tourists-consumers to decide a tourism destination.

This paper asserts that the digital era calls for collaborative management practices between the tourists, the public and private sectors, thus enhancing and reinforcing the management of cultural tourism in Athens. All these groups should develop dynamic relations with the aim to cooperate and collaborate rather than compete (Kavoura and Katsoni, 2013). The creation of collaborative commerce (c-commerce) requires a new approach by management incorporating a user-centric approach for sustainable cultural management of the town's e-services and comply to tourists needs; new relationships based on trust, and a culture that values partnerships are essential.

It seems that tourism businesses in the city of Athens neither satisfy the promotional marketing needs of a cultural destination, nor adopt a tourist-centric approach. According to the present study, the information contained in the websites of hotels and travel agencies was limited to text and photographs on the services and products (99%), general information about the company (98%), a communication form (87%) and a booking form (67%). In contrast, low percentages hold those actions which tourists consider as very important and attractive, such as information on attractions (24%), information on dining and entertainment (20%), virtual presentations/360° virtual tours (11%), information on travel opportunities in the city (7%) and annual events calendar of the city, such as festivals, conferences, exhibitions, sports, etc. (2%).

The informative and communicative e-services provided, as mentioned above, are not only inadequate but in some cases do not even exist at all, as there is no link mentioned or provided in their websites to other tourism stakeholders who are able and efficient in providing these services themselves. Tourism stakeholders in Athens do not have to compete with each other, but on the contrary, they can collaborate in many areas, including their websites, so that all partners can win and thus creating a win-win solution. Creation of c-commerce could enable all tourist stakeholders involved to use technology effectively and in time, to take advantage of situations that may emerge in the market, and to enable small independent tourism players to form partnerships in an expeditious way to keep up with or to access unique or innovating resources.

In an increasingly competitive environment, the new tourism products should gain added-value and be able to satisfy the customers in order to gain their trust and loyalty. Moreover, the expectations are not the same for all tourists and are always changing over time. This finding requires constant evaluation of the impact of these changes and strategy review. Furthermore, the effective implementation of good practices and the successful and proper use of new technologies and visual communication's tools are required. It is obvious that traditional methods of communication are insufficient, while modern ones are on the way and should replace the old, such as road tours, video surround, virtual reality, interactive digital communication and online games. The online communication is offered as a wonderful tool of visual communication, marketing and promotion of products and services. It is one of the best practices in order to raise emotions, "steal" the impression and the prospective visitors further aiming at the intense desire to visit and live the "dream" offered in their virtual tours. Therefore, websites should be more user-friendly, more understandable and more attractive and to inspire credibility. Planning should be done carefully, paying attention even to details (using appropriate colors and sharp color contrasts, sharp images, smooth fonts readability, etc.), while the information must be accurate and updated frequently with personalized information, direct and live content.

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TRENDS AND PROSPECTIVE MODELS FOR THE FORMATION OF INNOVATIVE CLUSTERS IN THE RUSSIAN FEDERATION

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Abstract

Paper deals with the dynamics of clusterization of the Russian economic space, reveals the main stages and prospects for the generation of the "fourth wave" of clustering. The purpose of this research is to offer a quantitative approach to identify regional clusters and their further parametrization within the framework of an integrated model of clustering the region's economic space. Particular attention is given to organizational aspects of the clusters of microelectronics and information technologies in the Russian regions. The paper offers models for the organizational development of clusters based on the values of the Herfindahl-Hirschman Index and the concentration coefficients. The result of the analysis shows: successful cluster initiatives combine a developed innovative core, an essential industrial basis and a significant number of small and medium-sized forms of innovative entrepreneurship. Promising for the development of the high-tech industry in the Russian Federation is the conclusion that it is possible to synthesize organizational forms of economic development of forest industrial clusters and existing territorial production complexes in regions. Modeling of the development processes of innovative clusters made it possible to conclude that the state support of cluster policy remains relevant. The findings of the study are of scientific and practical interest in the framework of the problem of improving sectoral and regional clusterization strategies.

Keywords: industrial clusters, innovative multiclusters, cluster policy, regional economy, economic development

JEL classification: O1, R58

1. Introduction

Innovative cluster is an interbranch territorial complex of industrial enterprises, localized within one or several regions. Localization of innovative industries of related industries within a certain territory makes it possible to identify points of economic growth in the region. In modern Russian conditions, the cluster form of the spatial organization of the forestry sector becomes one of the key areas of rational nature management. The relevance of the chosen direction of research is evidenced by considerable attention to the clustering of the forest industry of the Russian Federation by the Federal Center and state authorities of the subjects of the Russian Federation.

In modern conditions the formation and development of innovative clusters remains the main direction of increasing the competitiveness of developing economies. The development of the cluster concept, as a rule, is linked with the work of M. Porter (Porter, M. 2003). . M. Porter justifies the need for industrial specialization, carried out in accordance with historical assumptions in contrast to the prevailing at that time in the US development goals, which consist in supporting a diversified economy. M. Dunford notes the role of organizational structures of the cluster, neoclassical transaction costs, non-commercial interdependence, organizational and managerial networks (Dunford M., 2003) . According to E. Bergman and

E. Fether «cooperative competition» is typical for small and medium-sized enterprises in the cluster as a means of counteracting the pressure exerted by large companies using the advantages of internal economies of scale (Bergman E.M., Feser E.J., 1999). B. Arthur showed that the sectoral orientation of the cluster depends on the previous history of technological development and the sequence of previously adopted state decisions (Arthur B., 1989).

2. Model of innovative multicluster

At the same time, the problems of practical realization of the cluster concept for Russia actualized by the necessity of accelerated implementation of the import substitution policy and increasing the output of high-tech products (Achenbach Y.A., 2012).. The optimal solution to these problems is possible with the support of existing territorial production complexes and some large enterprises that are not part of the cluster (Hopf C.G. and G.A. Tularam, 2014).. A key feature of the developed by the author model of «innovative multicluster» is the possibility of synthesizing organizational forms of economic development of regional clusters and territorial production complexes.

Scientifically justified systematization of the main directions of the clustering of economic systems of the Russian regions, depending on their specialization in the following bigger types of economic activities:

1 "Agriculture, hunting and forestry", which represent the main areas of environmental management and creating the basis for the formation of natural resource-based multiclusters;

2. "Fisheries", which have special characteristics and in the coastal regions of the Russian Federation;

3. "Mining", which forms the raw material profile of a number of Russian regions and updated formation for production processing of raw materials, as well as technologies for the rational subsoil;

4. "Manufacturing", which are the basis of economic growth of the national economy and the main consumers of innovative technologies;

5. "Production and distribution of electricity, gas and water", forming the basis for the energy of the "new industrialization" of economic systems of the Russian regions within the framework of import substitution policies;

6. "Hotels and restaurants", forming the potential of domestic tourism development in the Russian regions and the development of tourism clusters.

The model of clustering of the economic space realizes the dialectic law of denying negation: the policy of cluster development comes to replace the previous concept of territorial production complexes, but in practice, it uses the industrial and infrastructural basis established within it. This denial of negation forms an institutional synthesis, which is one of the conceptual foundations of the model for the formation of regional clusters, developing on the basis of a conglomerate of territorial production complexes. Within the framework of complex clusterization model for the regional economy, clusters are considered as a fundamental segment of innovative multiclusters. In addition, multicluster development appears as one of the directions for differentiating the priorities for the development of multi-unit economic systems in Russian regions. Innovative and industrial clusters formed during the implementation of state programs can be considered within the framework of the author's model of systematic integration into the multicluster of the three echelons of clusters presented in Table 1.

Table 1 : Directions of integration of innovative and industrial clusters in multicluster formations in the conditions of the Russian economy

Innovative clusters that	Clusters of innovative	Clusters of high-tech

develop breakthrough technologies of the next technological order	technologies and means of production that initiate multiplicative effects	products, massively replicating innovative technologies
Clusters of new composite and polymeric materials	Clusters of additive technologies and digital modeling tools	Clusters of heavy and medium engineering
Clusters of sensorics and mebiotics	Cluster of robotics	Clusters of precision engineering
Clusters of quantum communication and cryptography	Clusters of new communication technologies	Clusters of personal security systems
Clusters of new and portable energy sources	Clusters of distributed energy technologies	Clusters of energy-efficient lighting equipment
Clusters of genomics and synthetic biology	Clusters of biopharmaceutical technologies and biomedicine	Clusters of personal medicine
Clusters of nuclear physics research	Clusters of radiation technologies	Clusters of nuclear engineering
Nanotechnology clusters	Radioelectronic clusters	Clusters of microelectronics and instrument engineering
Photonics clusters	Clusters of laser and fiber optic technologies	Clusters of industrial and medical equipment
Clusters of neuroethologies	Clusters of technologies of virtual and augmented realities	Clusters of artificial components of consciousness and psyche
Clusters of artificial intelligence and Big Data	Clusters of distributed registry systems	Clusters of information technology, decentralized financial systems
	Clusters of unmanned aerial vehicles, maritime transport without crew, vehicles without a driver	Clusters of aerospace technologies, shipbuilding clusters, automobile clusters
Innovative-nature-use clusters	Clusters of technologies for the protection and restoration of the environment	Timber clusters and clusters of subsoil use
	Agrotechnological clusters	Clusters of personal production and food delivery
	Clusters of intelligent water supply and wastewater technologies	Clusters of production and purification of drinking water

Alternative methodological approaches focuses on the construction of cluster organizational schemes development (Dzhindzholia A., E. Popkova and L. Shakhovskaya, 2015), (Boush, G.D., O.M. Kulikova and I.K. Shelkov, 2016). Among these approaches, the basic organizational model of O. Solvell's cluster, developed on the basis of the balance of supply and demand (Sцlvell O., 2009), the E. Feather model of cluster and regional specialization (Feser E.J., 1998), the institutional model of the cluster of K. Ketels and J. Lindquist (Ketels Ch., Lindqvist, G. and Sцlvell, O., 2012)., should be singled out. Also in the Russian economic literature, the current trends in the formation of clusters with mixed industry specialization and territorial clusters are practically not considered. For the purposes of this article we have studied the scientific papers of Goula M., Ladias C., Gioti-Papadaki O., Hasanagas N. (2015), Alabanos N., Thodoropoulos S. (2016), Amitrajeet A. Batabyal (2017).

3. Data and method

As a criterion of specialization of the regional economic system in certain types of economic activity, it is proposed to use the localization coefficient of production (LC) (Matafonova Yu.A., 2016). Given that unlike territorial production complexes, clusters are characterized by both localization of production and its organizational deconcentration, the use of the Herfindahl-Hirschman Index (HHI), traditionally used to assess the degree of monopolization of production within a certain industry, is justified. For identifying the objective prerequisites for the formation of regional clusters deserves the coefficient of concentration of economic activity – «concentration ratio» (CR), which is calculated as the sum of market shares of three (four) largest economic agents of the territory (Kleiner G.B., 2015)..

Use of the indicators discussed above is not self-sufficient and the only approach for making managerial decisions on supporting cluster initiatives at the regional level. The technique proposed by the author supplements existing approaches to assessing the effectiveness of cluster development, which also requires a detailed analysis of the specific socio-economic development of a particular territory. The advantage of using these indicators is the possibility of cluster development models in order to select the optimal strategy for clustering the economy for each particular territory, as well as differentiation of clusters from territorial production complexes and quasi-clusters (Kucenko, E.S., 2009).

Based on data from the Federal Service for State Statistics of the Russian Federation [1] for 2014 year, the values of the localization factor for production of 83 regions of the Russian Federation were calculated. Analysis of the relationship between the sectoral specialization of regional economic systems and the formation of innovative and industrial clusters in the Russian Federation focuses on enlarged types of economic activity and industrial production. The main reason for this choice is the economic essence of innovative multiclasters, which integrate production in related economic activities. Also for modern Russian conditions, clusters characterize the traditionally unrelated types of economic activity. The choice of 2014 as a period for calculating the values of the localization factor of production on the basis of official statistics is based on the following considerations. In 2014-2015, the largest number of cluster initiatives started during the entire period of implementation of the state policy of cluster development in the Russian Federation. Also in 2014, we can talk about the beginning of a full-fledged implementation of «third wave» projects for the formation of pilot innovation clusters as a relatively new form of economic development for Russia.

4. Results

Russian clusters are characterized by significant concentration of high-tech enterprises, high dynamics of growth in production volumes, the availability of research and educational organizations. In general, the analyzed clusters are located in areas with a high concentration of scientific, technical and production activities (Stricker, L. & Baruffini, M., 2017).. These include science cities and special economic zones, in particular the cities of Zelenograd, Dubna, Pushchino, Obninsk, Troitsk, Sarov, Zheleznogorsk, Dimitrovgrad. Industrial clusters are also located on the territory of large urban agglomerations of St. Petersburg, Novosibirsk, Nizhny Novgorod, and Samara (Gimadeeva, Je.N., 2015, Markov, L.S., 2015).

From the point of view of the territorial organization of industrial production, two models of cluster development can be distinguished:

1) localization of the cluster in clearly delineated territorial boundaries, almost coinciding with the boundaries of municipalities (Sarov, Zheleznogorsk, Troitsk);

2) localization within the network structures of large agglomerations (St. Petersburg, Novosibirsk and Tomsk regions).

The leading role of large-scale industrial production is characteristic for cluster strategies of the Republic of Tatarstan, the Republic of Bashkortostan, the Arkhangelsk and Nizhny Novgorod regions, and the Khabarovsk Territory. At the same time, cluster development is

[1] Regions of Russia Social and economic indicators, 2015. Statistical compilation. Moscow, Rosstat, 1266.

expected here due to a more intensive transfer of scientific and technical research results to the activities of existing industrial companies, as well as the creation of new small and medium-sized enterprises that are built into the value chains formed by large companies.

The development programs for clusters in Pushchino, Obninsk, Troitsk, Dimitrovgrad, are characterized by an orientation toward using the potential of the world-class scientific and educational organizations located on their territory (Napolskikh Dmitri Leonidovich, 2017). This involves attracting large Russian and foreign companies to the development of high-tech production due to the existing human resources and research infrastructure of clusters, as well as the active development of small and medium-sized innovative entrepreneurship through the commercialization of technologies developed here (Yalyalieva T.V., Napolskikh D.L., 2017).

Thus, the variety of models for the development of clusters determines the need to use the most flexible use of government support instruments, taking into account the specifics of each specific region (Enright, M. , 1996).. The organizational prerequisite for support of cluster infrastructure is adoption of regional and municipal programs for social and economic development and the provision of subsidies for development of technology parks. Technology parks is a complex of real estate and infrastructure that provides conditions for the efficient operation of a number of small and medium-sized industries. Technology park is managed by a single operator, the main service is to lease or purchase land and premises, as well as provide the necessary transport, logistics and telecommunications infrastructure (Larionova N.I., Yalyalieva T.V., Napolskikh D.L., 2015).

The adoption of government programs to support the development of clusters should include mechanisms for public-private partnership. In this case, the regions have the right to establish benefits for the payment of taxes and fees. The possibility of granting tax privileges at the regional level within the framework of the creation of special economic zones is an effective tool for the development of clusters (Napolskikh D.L., Yalyalieva T.V., Larionova N.I., Murzina E.A 2016).

One of the areas of support for the development of clusters is the identification and minimization of administrative barriers. Implementation of the principle of "one window" when obtaining a building permit and conducting state expertise of project documentation is an important factor in attracting investment in the cluster.

Dynamics of cluster formation in the regions of the Russian Federation is shown in Table 2. Table 3 shows the dynamics of the number of Russian regions that effectively implement cluster initiatives.

Table 2 : Dynamics of clusters formation in the Russian Federation (Compiled by Registry of clusters of the Russian cluster observatory of the Higher School of Economics)[2]

Years	Number of created clusters (units)	Number of participating organizations in 2016 for clusters created in the corresponding period (units)	Number of employees in 2016 for clusters established in the corresponding period (people)
1999-2007	1	66	20 838
2008	1	11	2 532
2009	4	125	35 130
2010	7	178	68 955
2011	4	48	33 175
2012	19	970	558 553
2013	11	295	129 407
2014	27	656	231 661
2015	23	599	161 488
2016	4	71	25 925
Total	101	3 019	1 267 664

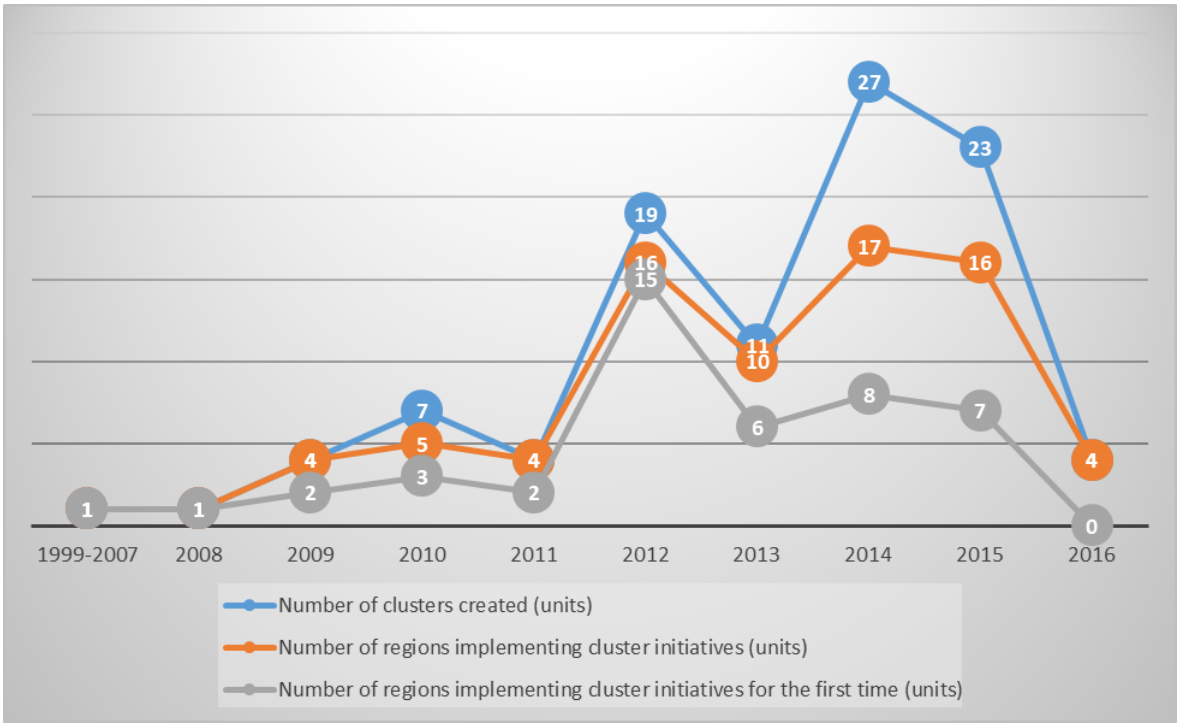
[2] Russian cluster observatory. [Electronic source] URL: http://cluster.hse.ru Access on: 20.08.2017. (Date of access: 01.11.2017)

Table 3 : Dynamics of the number of Russian regions successfully implementing cluster initiatives (Compiled by Registry of clusters of the Russian cluster observatory of the Higher School of Economics)[3]

Years	Number of regions implementing cluster initiatives		
	Total in this period (units)	Of them realizing for the first time (units)	The total number of regions, Implementing cluster initiatives Since 1999 (units)
1999-2007	1	1	1
2008	1	1	2
2009	4	2	4
2010	5	3	7
2011	4	2	9
2012	16	15	26
2013	10	6	32
2014	17	8	40
2015	16	7	47
2016	4	0	47

Accordingly, three "waves of clusterization" of the economic space of the Russian regions are singled out the first - 2009-2011, the second - 2011-2013, the third - 2013-2016. These clustering waves are shown in Figure 1 as an overlay of the data of Tables 2 and 3.

Fig. 1. Waves of clustering the economy of Russian regions (compiled by the author on the basis of the data in Tables 2 and 3)



Accordingly, the key task of the study is the development and parametrization of the organizational cluster development, which can become a factor in the generation of the "fourth wave" of clustering Russian regions. At the same time, the insufficient implementation of cluster policy instruments in the development of strategies and programs for regional development impedes the optimal use of the potential of innovative infrastructure facilities. The solution of the problems of economic development and modernization of the old industrial economic systems of the Russian regions actualizes the task of practical

[3] Russian cluster observatory. [Electronic source] URL: http://cluster.hse.ru Access on: 20.08.2017. (Date of access: 01.11.2017)

implementation of the model of perspective development of cluster initiatives within the framework of the innovation economy.

The author singles out two innovative multicluster integrating adjacent clusters of microelectronics, instrumentation and information and communication technologies within the region: "Innovative multicluster of the Penza Region", "Innovative multicluster of the Rostov Region". It is also necessary to note the Innovation cluster of information and biopharmaceutical technologies of the Novosibirsk region, which is a multicluster formation of the intersectoral type. At the same time, the Moscow and Leningrad regions are characterized by the formation of multicluster formations based on the intersectoral and territorial principle, which unite high-tech industrial enterprises created within the territorial production complexes and «science cities». Tendencies and prospective models for the formation of regional industrial clusters in the Russian Federation are examined on the example of the economic systems of the regions in which clusters are formed, the key specialization of which are the information technologies, microelectronics, instrumentation, optics and photonics. Table 4 presents the characteristics of these clusters.

Table 4 Organizational aspects of formation of clusters of microelectronics, instrument engineering and information technologies

Cluster	Region	HHI	CR_3	CR_4
Radioelectronic cluster of the Voronezh region	Voronezh region	1721	0,61	0,69
Cluster "Voronezh Electromechanics"		1828	0,63	0,75
Information Technology Cluster	Perm Region	2094	0,73	0,82
Innovative territorial cluster of fiber-optic technologies "Photonics"		1384	0,54	0,70
Cluster of integration of technologies «Zarechensky»	Penza region	2981	0,78	0,89
«Penza Instrument-Making Cluster "Security"		1709	0,63	0,73
The innovation-technological cluster "Southern constellation"	Rostov region	2603	0,84	0,90
Innovative territorial cluster of civil marine instrumentation "Marine Systems"		3302	0,89	0,93
Cluster of information and communication technologies of the Rostov Region		1734	0,61	0,77
Innovative territorial cluster "Zelenograd"	Moscow	1064	0,53	0,60
Cluster of high-tech components and systems of Omsk region	Omsk Region	1452	0,58	0,68
The Scientific and Industrial Cluster of Instrument Making and Electronics of the Oryol Region	Oryol Region	1666	0,61	0,74
Cluster of information technologies, radioelectronic and telecommunications	St.Petersburg	283	0,21	0,25
Energy-efficient lighting technology and intelligent lighting control systems	Republic of Mordovia	1637	0,64	0,74
Innovative cluster of information and biopharmaceutical technologies of the Novosibirsk Region	Novosibirsk region	1034	0,47	0,54
Cluster of Information Technologies of the Vologda Region	Vologda Region	1636	0,62	0,70
Cluster of Information Technologies of Novgorod Region	Novgorod region	6497	0,87	0,88
Information Technologies cluster of the Republic of Tatarstan	Republic of Tatarstan	4103	0,74	0,76

From the list of enlarged types of economic activity and industrial production sectors were chosen that should influence the formation and development of clusters of microelectronics, instrumentation and information technologies.

From the list of enlarged types of economic activity and industrial production were chosen the ones that influence on the formation and development of clusters of microelectronics, instrumentation and information technologies of clusters. The values of the localization coefficient for these enlarged types of economic activity are presented in Table 5.

Table 5 The values of the localization coefficient of enlarged types of economic activity and industrial production in the regions of the Russian Federation on the territory of which are created clusters of microelectronics, instrumentation and information technologies

Region	Agriculture and forestry	Manufacturing plants as a whole	Food production	Woodworking	Machinery, vehicles and equipment	Manufacture of electrical, electronic, optical equipment
Penza region	2,43	1,21	2,37	1,31	0,93	2,47
Novosibirsk region	1,24	0,74	1,95	0,92	1,1	2,02
Rostov region	2,5	1,01	1,49	0,15	1,52	0,68
Moscow	0,45	1,16	1,67	1,46	1,1	1,11
St.Petersburg	1,33	1,39	1,69	2	1,77	1,72
Omsk Region	1,98	2,09	0,64	0,15	0,15	0,54
Voronezh region	3,17	0,78	2,47	0,15	0,95	2,3
Perm Region	0,62	1,74	0,33	1,08	0,78	0,91
Vologda Region	0,95	1,9	0,51	4,08	0,34	0,07
Novgorod region	1,55	1,94	1,52	6,77	0,52	0,75
Republic of Tatarstan	1,21	1,04	0,65	0,38	1,54	0,7
Oryol Region	3,31	1,05	2,47	0,23	1,19	1,67
Republic of Mordovia	2,45	1,29	2,52	1,15	0,61	3,09

Low values of the localization coefficient of manufacture of electrical, electronic, optical equipment for the regions examined due to the following factors:

orientation of information technology clusters in the Novgorod and Vologda regions to innovation and technological support for the formation of forest industrial clusters;

orientation of the cluster of high-tech components and systems of the Omsk region to manufacturing industries in general;

orientation of the information technology cluster of the Republic of Tatarstan to high-tech production in general, in particular: the production of machinery, vehicles and equipment, petrochemical production, etc.

The analysis of the interconnection of the industry specialization of regional economic systems and the formation of clusters of microelectronics, instrumentation and information technology in the Russian Federation made it possible to propose the following model of cluster development in this sector. Accordingly, the organizational aspect of the clusterization model of the economy of the Russian regions based on the formation of clusters of microelectronics, instrumentation and information technologies of clusters is presented in Table 6.

Table 6 Organizational aspect of clustering the economy of Russian regions on the basis of the formation of clusters of microelectronics, instrumentation and information technology

Parameter of clustering model of the regional economy	Level of cluster organizational development		
	Low	Medium	High
Number of participating organizations (units)	10< … <25	25< … <50	>50
2. Number of employees (people)	>500	>5000	>10000
3. Herfindahl-Hirschman Index (HHI)	>1800	<1800	<1000
4. Coefficient of concentration CR_3	<0,90	<0,60	<0,50
5. Coefficient of concentration CR_4	<0,95	<0,75	<0,60

The obtained parameters of the clustering model are based on the following data. According to the data of the Russian cluster observatory from the clusters considered «Innovation Cluster of Information and Biopharmaceutical Technologies of the Novosibirsk Region» (60 organizations, 12,869 employees) and «Cluster of information technologies, radioelectronic and telecommunications of St. Petersburg» (66 organizations, 20838 employees) are at a high level of organization development. «Innovative territorial cluster of fiber-optic technologies "Photonics"» (34 organizations, 15762 employees), «Innovative territorial cluster "Zelenograd"» (48 organizations, 7772 employees), «Information Technology Cluster of Vologda Region» (31 organizations, 6182 employees) and Cluster "Energy Efficient Lighting and Intelligent lighting control systems" (24 organizations, 9,866 employees) are at the medium level of organizational development. Accordingly, the values of the Herfindahl-Hirschman Index and the Coefficient of Concentration for these clusters are presented above in Table 4. The remaining clusters are located at the initial level of organizational development.

The systematization of the findings is presented in the form of models of organizational development of clusters of microelectronics, instrumentation and information technologies in Table 7.

Table 7 **Models of organizational development of clusters of microelectronics, instrumentation and information technologies**

Number of participating organizations (units)	Values of the Herfindahl-Hirschman Index (HHI) and the Coefficient of Concentration (CR_3 , CR_4)		
	HHI>1800, CR_3<0,90, CR_4<0,95	HHI <1800, CR_3<0,60, CR_4<0,75	HHI <1000, CR_3<0,50, CR_4<0,60
From 10 to 25	Cluster formed on the basis of territorial production complex. Priority: development of small and medium-sized innovative entrepreneurship.	Cluster with a clearly defined core. Priority: development of small and medium-sized innovative entrepreneurship.	Cluster with a developed competitive environment. Priority: development of innovative infrastructure.
From 25 to 50	Cluster formed on the basis of territorial production complex. Priority: the formation of points of growth in industrial production.	Cluster with a clearly defined core. Priority: development of innovative infrastructure.	Cluster with a developed competitive environment. Priority: development of innovative infrastructure.
More than 50	A cluster formed on the basis of territorial production complex. Priority: the formation of points of growth in industrial production.	A cluster that has a clearly defined core. Priority: development of an innovative cluster core	Cluster with a developed competitive environment. Development of the institutional environment of the cluster

Models of organizational development are based on the need for a cluster of "core" from large enterprises and the institutional environment for small and medium development Entrepreneurship, whose evaluation is based on the parameters presented in Table 6.

5. Conclusion

Analysis of the values of production localization coefficients in the regions in which the clusters are created allowed us to conclude that the high localization coefficient of production is a factor in the successful development of cluster initiatives. At the same time, it is necessary to emphasize that the localization of production is of fundamental importance for the effectiveness of cluster policy both within the key sector for the cluster and within the framework of the enlarged type of activity and related types of industrial production. It was noted that for the formation of innovative clusters developing technologies of the next technological order, the high value of the localization factor of production is not a critical success factor.

This trend is because innovative clusters form the technological core of modernizing the economic space of the region as a whole. Clusters, acting primarily as a supplier of innovative technologies, new materials and means of production, and form an institutional environment for the transmission of successful management practices. Consequently, an additional criterion for differentiating clusters from territorial production complexes is the development of non-traditional types of economic activity for the region, targeting not only large enterprises, but also small and medium-sized forms of innovative entrepreneurship.

As features of development of clusters of microelectronics, instrumentation and information technologies, it should be noted the possibility of implementing cluster initiatives outside of the link to the industrial base of large territorial production complexes. The research identified clusterization directions of Russian regions, whose interaction with clusters of microelectronics, instrumentation and information technologies have the potential to form innovative multicluster for implementing multiplicative effects within the framework of regional economic systems. The identified directions of clustering economic systems of the Russian regions include nuclear and radiation technologies, medical industry, biopharmaceutical technologies, aircraft building and space industry, machine and equipment manufacturing, new materials, automotive and auto components.

The approach proposed by the author to modeling the formation of industrial clusters complements the existing concepts of cluster development on the basis of the interrelation between the parameters of cluster organizational development and the localization of related economic activities. The objective limitations of the proposed approach are a quantitative approach to the identification of criteria for cluster development, which has a certain formality and mechanistic nature. Discussion of the findings is also because clusters are a new form of the territorial organization of production for the Russian economy. The obtained results served as a basis for further research into modeling of regional clusters, including spatial modeling based on geostatistics methods.

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PUBLIC PARTICIPATION IN URBAN HERITAGE PROMOTION: RESIDENTS', VISITORS', AND STUDENTS' CONTRIBUTIONS

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Abstract

The present study is part of a broader research carried out in Chaves, a medium sized town on the border with Spain, in the interior north of Portugal, and it took place within the Monumental Chaves – Valuing and Promoting Cultural Values and Heritage Strategic Programme. This programme focussed on keeping and promoting the town's monumental heritage (both architectural and archaeological) at the heart of the town's historic centre, and aimed to make a positive difference on the development of the territory in which it is located. It included a set of studies on impact monitoring which ended up attaining goals that had not been foreseen in the initial programme, not only because these were purposely extended, but also because of the methodological approach that was chosen. Thus, this article presents the residents', students', and visitors' perspectives on the subject of monumental heritage protection, conservation and enhancement. Results show that protection, conservation, and enhancement of cultural heritage still matters for the population segments whose opinions were taken into consideration, who acknowledge its value as a solid resource for the town's and the region's development. Cultural tourism as a personal strategy of informal self-learning also plays a specific role. Worth mentioning is the fact that young people have different and broader views on the future of both the heritage and of the town containing it. Results of the studies in question amply justify a promotion and development proposal that goes beyond the limits of the town's historic centre and bestows on it a major role in terms of the town's and the region's development. The conclusions of the study are a contribution to increase public opinion monitoring and public participation in actions designed to enhance cultural heritage, more so in towns which have an historic centre.

Keywords: historic centre renewal, public participation, cultural tourism, youth, regional development

JEL classification: O18, P25, O21

1. Introduction

The present research is part of an articulate set of strategic programmes developed by Chaves municipality, a medium sized town in the interior north of Portugal, in order to rehabilitate and renew the town's historic centre, enhancing its cultural heritage (both architecturally and archaeologically). The major goals of these strategic programmes are preserving the town's historical identity, improving its urban condition, and promoting the town/region (Chaves) in the network of cultural cities. This research is part of *Monumental Chaves – Valuing and Promoting Cultural Values and Heritage Strategic Programme*, and of the *Urban Network Strategic Programme for Competitiveness and Innovation*, sub-item *Designing Monitoring Studies on the Impacts of Cultural Heritage Enhancement on the Region's Tourism and Educational Communities.*

Some of the *Founding Topics* underlying the candidacy strategy were the fact that the tourism sector is a strong component of Chaves' socio - economic development; its cultural

values and cultural heritage which represent structuring specific resources that sustain many local economic activities; the need to preserve, enhance and promote these values so that they can be passed on to future generations, making sure they remain a competitive, attractive and distinguishing asset; the fact that the strategic programme for enhancing the architectural and archaeological heritage is part of a strategy to support local development (Chaves Municipality, 2008).

These studies were, therefore, part of a series of plans and interventions in Chaves' Historic Centre and were designed to allow an understanding of the impacts of the heritage enhancement process. They also help the various communities involved in the region's development know each other better, due to the programme's original goals having been extended and as a result of the methodology that was chosen, as well as the commitment of those responsible to discuss and disclose conclusions. (Diniz, Costa, Joukes, Morais, & Pereira, 2014). Notably, stakeholders have been heard - visitors, residents, teachers and students – and, each in their own way, have expressed their views on how this habitat has evolved. In view of the input of the public segments that were consulted, these studies may be deemed a public participation tool, in that they are also a contribution to future strategies to promote and develop the town and the region.

2. Urban renewal and its audiences

This section includes a brief presentation of Chaves town and of some concepts which were instrumental to both the candidacy and the studies, namely "the Historic Centre renewal processes", "cultural heritage enhancement", "cultural tourism" and "public participation".

2.1. A few notes on Chaves town

Chaves, a border *concelho*[1] in the interior north of Portugal, integrates the CIM-AT - Comunidade Intermunicipal do Alto Tâmega (the Alto Tâmega Intermunicipal Community) and the Eurocidade Chaves-Verín (Chaves-Verin Eurocity) (Ourense, South Galicia, Spain). It has an area of 591.23 km^2 and in 2016 it had 39,682 inhabitants (PORDATA, 2016), of which around 50% lived in the urban centres of Chaves and Vidago (a small spa town worldly renowned for its medicinal waters and the Vidago Palace Hotel complex. Like most *concelhos* in inner Portugal, Chaves demographic evolution has been negative, a tendency that needs to be reversed. With regard to formal education, as head of the *concelho*, Chaves has several pre-primary education schools, primary schools, secondary schools, vocational schools and High schools (currently, there is a Nursing School and until 2014 there was a branch of the University of Trás-os-Montes e Alto Douro – UTAD). Besides a group of private schools and associations dedicated to arts and sports (painting, music, dance, sports, among others), the town has an Arts Academy and a Vocational Training Centre. The *concelho*'s economy mainly revolves around the tertiary sector, the commercial sector and tourism and, to a lesser extent, agriculture.

Thanks to its spa and its location on the border (it is one of the partners of Chaves-Verin Eurocity), Chaves has been benefiting from tourism, which is an important development factor especially since the 1950s. In the last decade, there has been a notorious increase of visitors[2] that makes the town the major tourist attraction centre in the interior north of Portugal (PDMC, 2015). Suffice to say that the number of available beds in the *concelho* has been rising from1,222 in 2009 and 1,333 in 2013 to 1,514 in 2016. In terms of the number of visitors that have been assisted at Chaves Tourist Office, the tendency is also very positive: 6050 visitors were assisted in 2015, and the figure more than doubled in 2017. As to the main reasons for visiting the town, in 2013 visitors specifically mentioned cultural tourism, health and well-being tourism and the food. It should be noted that the number of beds available in Portugal is only higher in larger towns and coastal areas like Porto, Guimarães and Braga (Município de Chaves, 2016; PORDATA, 2016). Besides, the increase of tourism in Chaves

[1] Portuguese territorial unit referring to the municipality.

[2] in this paper, "tourists" and "visitors" are used as synonyms, despite the UN Statistics Commission's distinction from 1983.

is in keeping with the general trend for Portugal; in fact, in recent years the country has been increasingly registering high tourist flows and the thereof ensuing revenues (PORDATA, 2016).

3. Urban renewal processes for the Historic Centre

The candidacy that is being monitored focussed on revitalising the cultural heritage, namely the urban renewal of the Historic Centre. When one mentions the "historic centre", one does not necessarily mean the geometric centre of the town or city, since they do not grow in a concentric way. The concept of Historic Centre appeared in the 1950s to describe the enhancement of towns' and cities' more ancient zones (Santos, 2014) and is permanently being revised (Fernandes, 2010). The Historic Centre is recognised by everybody as the place where the town or city first started, which helps increase its symbolic importance. These spaces are also often called "the ancient part" of town/city, "the medieval quarters" "the old core" or by other similar expressions.

Historic centres take on (or are almost always likely to do so) a major role on how towns/cities work; therefore, they should be attractive to its inhabitants as well as visitors, which fully justifies the need to renew them so that they may enhance the towns/cities they are part of and become a specific resource on which local development depends.

Historically, tourism has played an important role in raising people's awareness of Historic Centres and consequently in helping enhancing them. New synergies that feed back into each other have been taking place; in other words, local residents are once again interested in the Historic Centres due to the interest shown by visitors in those places, for they gather multiple, attainable as well as unattainable values as a result of their civilisational/historic dimension. This dimension reflects itself in the place, the monuments' property value, the singular elements of erudite, religious, military architecture, and the value of the whole set of houses and the organics of the urban matrix.

In Chaves Historic Centre specifically, there is a built heritage that leads one in a journey through centuries of History, beginning with the Roman Bridge, dating back from 79 B.C., and extends to the medieval streets and houses, the sixteenth century town walls, the hundred year old churches and the recently inaugurated Nadir Afonso Museum of Contemporary Art, designed by Siza Vieira. Some buildings stand out like the well preserved Roman Healing Spa, which was discovered in the present millennium and is presently being converted into a museum, whose importance makes it comparable to other European big spa complexes, such as Bath, Badenweiler or Hammam Salehine (Carneiro, 2013; Vaz, Martín-Seijo, Carneiro and Tereso, 2016). This Roman monument shows the relevance of all the work that has been done in recent years and which has uncovered the urban layout, structures and objects (some quite unique, in fact) of the old Aquae Flaviae town (Carneiro, 2018). As we see it, this process of studying the town's past, including its Roman origin, done by multidisciplinary teams led by the town's archaeological group, is also part of the town's rehabilitation process. That is why Chaves has now a modern Thermal Spa and a recently discovered Roman Healing Spa, both located near the river, but in different places: the thousand year old spa is WITHIN the Historic Centre (about 3o metres away from the Roman bridge); the modern spa is OUTSIDE the Historic Centre, a little further away but also by the river, in a green area.

Through the Plano Integrado de Reabilitação e Revitalização do Centro Histórico de Chaves[3] (PIRRCHC, 1988), an area was formally circumscribed - now referred to as Chaves Historic Centre - according to specific urban management rules, and later included in the town's Masterplan (PDMC, 1995). As such, since the 1980s, Chaves historic centre has been at the heart of a number of plans and interventions; and although a lot has already been done, there is still much to do, according to the towns' Masterplan (Quaternaire Portugal, 2012). The Masterplan suggests a few strategies to help and retain and attract residents, especially young people and attract and diversify business, while involving the different stakeholders in the process (Quaternaire Portugal, 2012). Getting all segments of the population to be involved and keeping them satisfied seems to be the right way to face the never-ending

[3] An Integrated Plan for the rehabilitation and Renewal of Chaves Historic Centre

challenge of revitalising any Historic Centre, as we will see further along (Joffe and Smith, 2016; Węziak-Białowolska, 2016)

It should be pointed out that most of the documents about the Municipality of Chaves that have been looked into, although referring to the Historic Centre, mostly focus on life concepts, cultural heritage, history, preservation and interaction, notions that are extremely relevant in terms of interpreting the results of the present studies. Debate on such concepts as urban renewal, rehabilitation and regeneration has been intense. In this case, urban rehabilitation seems to be especially suitable to the actions that have been centred on Chaves Historic Centre since the 1980s, since this concept goes beyond the mere rehabilitation of cultural heritage, despite its common acceptance as an integrated perspective comprising the restoration of urban and built heritage. However, the sought-after renewal results from the rehabilitation, which accounts for the use of both concepts in the present article.

In fact, the number of plans and actions that have been undertaken in the city suggest the existence of specific policies to stimulate the development of the economic fabric, for instance, by granting residents and local commerce tax benefits. The above mentioned plans and actions are also meant to retain and attract population, by creating the conditions for businesses to stay on the area and ensuring jobs linked to culture, heritage and tourism. The idea is clearly to decentralise urban centres and reach territorial cohesion (Leite, 2010). In this context, as regards Chaves Municipality's strategic options over the last two decades (*see* PDMC, 2015), tourism is considered one of the main bases for developing the town and the region, namely as far as spa and wellness tourism, cultural tourism and gastronomic tourism are concerned, since, despite targeting different people, they are inextricably linked. Hence, the importance of studying and enhancing the built heritage, mostly located in the Historic Centre, which is a symbolic place where the town began and from where it spread.

4. Heritage enhancement, cultural tourism and public participation

The focus on renewing Historic Centres may indicate different dimensions, of which "heritage enhancement", "cultural development", "cultural tourism" and "public participation" are the most frequently used as the basis for regeneration strategies in Historic Centres. As far as cultural tourism is concerned, it was considered as "the movement of persons to cultural attractions away from their normal place of residence, with the intention to gather new information and experiences to satisfy their cultural needs" by the World Tourism Organization (WTO, 1985). Actually, cultural tourism is a form of longlife learning led by the individuals themselves, who decide about their own destiny according to their educational/cultural interests, other than leisure, rest or relaxation.

Also, natural or cultural heritage is a development factor in terms of tourism and of the regions themselves; in fact, the development of a region must ensure a balance between economic dynamics, preservation of the heritage and respect for the environment, while involving the communities in these processes, giving them an intrinsic responsibility, a feeling of "ownership" over the local heritage. Local heritage does not belong to a single entity but to all and, according to Sureda, Guerra and Castells (2008), it is up to all to look after it. For these authors, interpreting the heritage is an effective way of preserving it that can only work if local communities are involved and if it serves an educational purpose. The municipality is, still according to Sureda, Guerra and Castells (2008), the context where territory, heritage and community can merge.

Urban centres that wish to enhance themselves through investing on cultural tourism know how important it is to listen to public opinion. Cultural heritage should be looked into not only for its historic and cultural value, but also for its economic one, understood herein not as how much an asset is worth, but what it represents both in terms of tourism and the populations' intellectual/cultural knowledge and development. Ever since the beginning of urban reconstruction in post-war Europe, public participation has played a major role and can be seen in the rehabilitation of certain urban centres and historic places in particular (ICOMOS, 1987; Dargan, 2009; Koorosh, Sza and Ahad (2015). This is an important field of research but more studies are necessary, especially on the impacts of enhancing cultural heritage and in several dimensions (*e.g.* environmentally, economically, culturally) as posited by Mäntysalo and Schmidt-Thomé (2008) or Della Torre (2010). As a matter-of-fact, studies on this subject are few and far between, compared to studies on cultural industries and

services and the research that is done does not fully grasp the impacts of enhancing cultural heritage on regional development. Results of some studies, however, have shown that an urban regeneration process is more likely to be consistent if it takes into account the different stakeholders' views on cultural heritage (Bakri, Ibrahim, Ahmad, and Zaman, 2015). And others point out that cultural tourism, which often focuses on built heritage, must be developed according to stakeholders' perspectives. (Jung, Lee, Yap and Ineson, 2015).

In this respect, one can say that the research underlying this paper, due to the goals it had and the methodological approach it followed, took on a public consultation feature, albeit of a low-spectrum (corresponding to level 4 of the Arstein scale, 1969; Gershman, 2013). As a matter-of-fact different segments of the population were heard on the subject of cultural heritage enhancement, which resulted in contrasting views: the ones from "inside" and the ones from "outside". Of the multiple stakeholders active in town, residents, visitors and young students were considered the most likely segments to be heard in these circumstances, as belonging to sub-sets of agents responsible for developing and transmitting cultures. In other words, the balanced enhancement of Historic Centres cannot ignore those who use it or may do it in the near future, because they are the ones who have the best insights on the potential of the place. Therefore, in any urban rehabilitation context, public consultation processes, inescapable as they are (Wood, 2002), will only gain if specific segments of the population are included, such as tourists and younger people; tourists for their almost direct influence on heritage enhancement options; the youths, because the future will be built with and for them, whether they are part of the processes in which formal and non-formal education is definitely instrumental or not. Besides, the young people's views have been the object of many a theoretical perspectives, influencing several studies which seek to understand the dynamics of youth socio-educational processes in boarder areas of Portugal (Silva and Silva, 2015). In some studies, listening to students (who are mostly young) is particularly valuable in the context of historic sites conservation (Halu and Küçükkaya, 2016). A study on young visitors' perceptions regarding heritage buildings has shown that the majority of youths valued events taking place in historic sites (the presence of shopping centres, for instance) more than the heritage, suggesting that these results might be used to help and develop those areas (Ismail and Nadarajah, 2016). The more actively one tries to commit young people to change the places they attend the easier it will be to reach a wider topophilia which, in turn, will motivate them to get involved in preserving their quality of life, their heritage and ways. That is, the argument here is that the acceptance and success of a sustainable Historic Centre depends on how social expectancies are understood and on the correct application of governance principles, listening to all parts involved, especially young and not so young residents (Scheffler and Calvanus, 2010).

Earlier, the authors presented the results of studies which departed from the articulation of both visitors' and educational communities' viewpoints, contributing with some suggestions (Costa, Joukes, Diniz, Cantante, 2016). The present article focuses on some of the results of monitoring studies that were conducted about the impacts of heritage enhancement, highlighting residents', visitors' and students' perspectives on how to enhance one's cultural heritage. It also tries to gather suggestions for the future and different views on the limits and value of the heritage – as well as of the spaces – that are being enhanced. Finally, it was the authors' goal to understand and be able to make some conclusions of what role investments on heritage enhancement play on local development and their relevance, according to these stakeholders

5. Methodological approach

The research favoured a multi-method approach, resorting to techniques that complement each other, based on the assumption that there cannot be only a quantitative perspective, neither can it be the most relevant one, if one is to understand social phenomena (Velasco and Rada, 1997; Costa, 2006; Dencker, 2007). The present research was divided into sub-studies, targeting residents, visitors and the educational community (students and teachers, although the present article does not refer to the teachers study).

Questionnaires were applied to 114 residents, 209 visitors and 58 students – totaling 381 questionnaires. Close-questions were subject to statistical analysis (SPSS). Since

questionnaires included some open-questions, these underwent a content analysis. Initially, analysis of the questionnaires applied to each group was treated as an independent study. The study targeting the students was extended, by applying semi-structured interviews to 41 students; these interviews were later subject to content analysis (Bardin, 2009; Esteves, 2006), using NVIVO software. As regards methodology, it is important to note that the initial research project did not contemplate building focal groups. Yet, when questionnaires and interviews to students were being analysed, this data gathering technique proved very useful and so focus groups with students were created. This reinforces the role of data triangulation in result discussion; when one is doing research within human and social sciences, complementarity and the comparing and contrasting of data are more important than generalisation, that can be so questionable. In these studies, researchers were not held hostage of the initial research plan, and so they resorted to another technique that was not originally planned (focus group) when it proved to be helpful. This description about the methodological procedures would not be complete if no mention were made of the contribution of exploratory studies, observations and informal talks inspired by ethnographic methodology and previously carried out by members of the research group (Costa, 2009). Besides adding other components like field work, consultation and direct observation to the research *continuum*, these exploratory studies subsequently helped researchers make decisions as regards methodology, including drawing up the interview scripts.

This article does not focus on details pertaining to results obtained from residents', visitors' and students' analysis but rather does a comparative and integrating overview of these three groups' answers, by triangulating data in an attempt to get an overall view of similar aspects, while highlighting meaningful differences. Finally, some suggestions are made as a contribution to promotional and developmental strategies for both the town and the region, taking into consideration cultural heritage enhancement and making the Historic Centre become a leading space within Chaves global strategy.

6. Some findings and comparisons: similarities and differences

The conclusion of this article highlights some of the most striking similarities and differences found among the perceptions of the three segments of the population that were interviewed; it also looks into those more likely to help establish the basis for specific policies leading to the enhancement of Chaves Historic Centre.

The most obvious similarity is that, not unlike residents and students, visitors tend to have the same feeling about the Historic Centre and almost always in a positive direction. The main aspects these three groups agree on are: the most emblematic sites of the Historic Centre; the fact that the Historic Centre is a good place to go for a walk; their favouring of the historical and architectural heritage; the fact that they are not aware (or do not give much importance to) of some of the rehabilitation interventions that have been made, which are not so much under the spotlight (the deployment of optical fibre, urban furniture); the importance of safety; the opinion that the Historic Centre is a tourist site that has the enormous potential of attracting visitors and develop the town.

The similarities that have just been listed are not absolute, but rather have some nuances worth highlighting. It is clear that although all the groups that have been looked into have a positive image of Chaves Historic Centre and clearly think of it as a good place "to go for a walk", full of "tourist interest", the reasons why they choose to visit it differ: residents go there for multiple reasons (shopping, taking care of administrative businesses, going for a walk, having a meal,…); students see it as a place to hang out with friends and go out at night (they walk through it to get to their favourite pub)); as for visitors, they enjoy looking at built heritage and the food. And here is the first indicator that the centre must remain multifunctional.

As regards built heritage, as expected, quantitative data leave no doubt: some historic buildings are better known and more visited than others. In Chaves, the *Torre de Menagem* (the Tower House or the castle, as it is usually called) was by far the most referred to. Therefore, it can be included in various thematic itineraries, and used as a symbol of the town. Based on this indicator, it is possible to look for ways of making the symbolic power of Chaves "Castle" profitable. Since built heritage in general is appreciated by residents, visitors

and students, the effort to preserve and rehabilitate it must be continuous and any initiative related to it, like cultural tourism, must be prioritised

The Roman Healing Spa is known by almost all the residents and students and by some of the visitors; among those who knew of the existence of this important archaeological complex, everyone without exception say it is extremely valuable in many respects. In fact, opinions are unanimous when it comes to the importance of turning the Roman Healing Spa into a museum (that is currently under way), ascribing it an important, even transforming role within the town's developmental strategy. However, they criticize the little information available on this project and the fact that archaeological studies and the construction work (still going on) to house the Roman Healing Spa is taking too long.

Less visible interventions (optic fibre deployment, historic balconies requalification, urban furniture …), with the purpose of improving people's quality of life and visual impact go almost unnoticed. Hence, the suggestion that these improvements be signaled by means of information signs, accompanied by photos of what it was "before" and it has become "after".

Next, some of the discrepancies between students', residents' and visitors' perceptions will be presented.

Most residents and students are familiar with more impacting interventions – like rebuilding part of the sixteenth century Wall, pedestrianisation of the Roman Bridge, and modernisation of the main shopping streets – unlike most of the visitors who are not aware of them.

Another of the few topics which significantly differed from group to group was the concern over safety: while visitors stated they feel safe in the Historic Centre, residents expressed somewhat different opinions, although it is difficult to pinpoint exactly what their concerns are about; surprisingly, most students confessed that they do not feel very safe in the Historic Centre, especially at night, because of what they call "night excesses". These results indicate there is more to the safety issue than meets the eye, which calls for more studies about the subject.

However, it is about the limits of the Historic Centre that opinions differ the most, which implies some deeper thought about what places are identified as fitting the description of Historic Centre. The official limits are indicated in Figure 1, marked in red (Quaternaire, 2012), whereas Figure 2 represents students' visitors' and the population's views on how far the Historic Centre goes, according to what they expressed in the questionnaires, and also to the analysis of the interviews and the focus-group with students.

The three groups agree that the Historic Centre is composed of the old streets that converge in the Northeast with the area of the most monumental built heritage (including the main churches and the Tower House), and in the Southwest with a square (where the Roman Healing Spa is located) that leads to the Roman Bridge. More "peripheral", less ancient zones of the officially established Historic Centre are not considered by any of the groups as being part of it. Nevertheless, residents seem to be nearer the official notion of Historic Centre, since they include in the central nucleus described above a sixteenth century fort (São Francisco Fort).

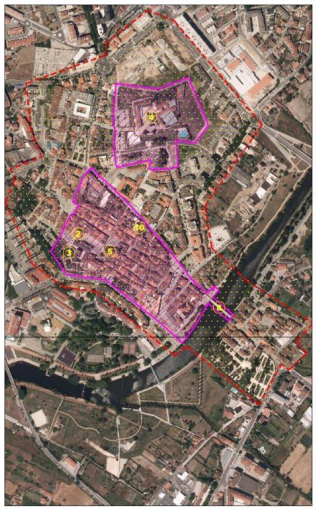
As regards visitors and students, some "deviations" were observed that are worth reflecting on. By looking at Figure 2, it is possible to conclude that students and visitors include the green areas on both banks of River Tâmega (where the present spa is located) in Chaves Historic/symbolic Centre. These green areas have just been regenerated through the POLIS Programme European funds (a programme that was designed to increase urban centres' attractiveness and competitiveness by promoting interventions of an urban and environmental nature in order to improve quality of life in towns; it was implemented in Chaves from 2002 to 2008). The above mentioned "deviations" allow one to assume that what visitors and students perceive as the town's Historic Centre does not coincide with the official definition. That is, for both students and visitors, the Historic Centre is wider and consists of heritage of another nature, because, besides the older parts of town, it includes the river, whose banks that are appreciated and have been reconfigured, invite one to enjoy green spaces in a sequential and integrated way along with the traditional spaces in the Historic Centre. It should be noted that as regards students, the interviews and the focus group reinforced the notion of continuity (both discursive and conceptual) between the ancient houses and the renewed nature, connecting this (widened and transformed) Historic Centre

with its life experiences and its perception as a socialization locus (Costa, Joukes, Dinis and Cantante, 2016).

Figure 1 – Orthophoto representing the official delimitation of Chaves Historic Centre (marked in red)

Source: PIRRCHC, 1988.

Figure 2 – Perceptions on the Historic Centre (according to residents, visitors and students).



Residents' perceptions on the Historic Centre

Visitors' perceptions on the Historic Centre

Students' perceptions on the Historic Centre

This also confirms what was discussed in the theoretical section of this article, namely that a town's "centre of gravity" may continue to change, after having been assigned new functions as a result of revitalisation projects, for instance.

This evolution in how Chaves significant areas are perceived means that promoting the town is much more than promoting only its Historic Centre; people want to roam the old streets, but they also want to enjoy the green, airy spaces along the river. Apparently, in this town, History easily mingles with the built heritage and nature. This combination may be seen as an enough differentiating factor to be held into account in future initiatives that wish to think and promote the town and the region. Indirectly, it shows that some of the regeneration projects that have been carried out have succeeded (in this particular case, the POLIS Programme), since they are spontaneously appreciated by visitors and students. Future strategic plans to promote tourism activities cannot ignore these new realities and must include itineraries that contemplate places other than the traditional Historic Centre.

Another aspect worthy of further reflection is the fact that the groups that were consulted seem to believe in the potential of increasing tourist activity in Chaves Historic Centre. According to them, The Historic Centre has a significant built heritage and a "lot of life"in it (residents, business, firms, public/administrative services, schools), therefore, increasing tourism should be done in much the same way as referred to in other studies all over the world, because turning the Historic Centre into a tourist attraction may prove itself to be a good idea. The challenge consists of finding sustainable, responsible and little invasive ways to do it, in order to avoid negative impacts on the residing population. (Gilbert and Clark, 1997).

If these criteria are met with, there is social support for a candidacy of the whole of Chaves Historic Centre to World Heritage, focusing on the Roman Spa (networking with other European Roman Spas as it has also been suggested).

All the results that have been mentioned and commented on may be looked at as a strong argument for investing in the town's heritage enhancement, combining the historic built heritage with natural heritage. In other words, these results prove that Chaves Historic Centre and the whole process of heritage enhancement that has been planned (and somewhat put into practice, depending on certain specific circumstances) through diversified resources (human, financial, public, private, plans, initiatives) meets with the approval of important segments of the population and visitors.

7. Suggestions: six guidelines to revitalise the Historic Centre

As a contribution to outline strategies to revitalise the Historic Centre, we would like to suggest six guidelines on which to work. Options must second and reinforce the proposals contained in other strategic documents like the recently adopted Masterplan for Chaves Historic Centre. Besides, the definition of Historic Centre as appears in that document is supported by the findings of these studies, insofar as all the participants seem to favour "an Historic Centre whose heritage is duly valued, rehabilitated and renewed, based on economic and socially and culturally innovative dynamics that are capable of assuming an urban, tertiary, and cultural centrality in the context of "Chaves-Verín Eurocity" (Quaternaire Portugal, 2012).

Guideline 1 – Multifunctionality of the Historic Centre – So far the Historic Centre has been offering a set of services and functions (which are very appreciated, shown by the reasons why people choose to go there); therefore, it makes all the sense to keep this mixed use of the place. Furthermore, other study-cases involving other towns with a Historic Centre show that multifunctional Historic Centers attract a large diversity of residents, visitors, business people, etc. In this case, we would like to stress the notion that the Historic Centre must be promoted along with recreational areas on the banks of River Tâmega, since it all points to their being considered by many of the users as loci of life experience, whose perception and enjoyment represent a geographical, symbolic, and urban and historical continuum, with all the symbolism that it entails.

Guideline 2 – Defining target audiences in tourism – Identifying target audiences of the tourism market one wishes to attract. A set of more traditional options was formulated, based on the results of the questionnaires: cultural tourism, food tourism. To these we add some less obvious types of tourism, such as educational tourism *latu sensu*, archaeotourism, sustainable tourism, senior tourism and nature tourism regarding which it is easy to create joint packages because they explore complementary markets. Actually, archaeotourism is amply justified by ongoing archaeological studies around the Roman Healing Spa, especially if done in a networking perspective with all Roman Spas in Europe or around the Mediterranean Basin.

Guideline 3 – Innovation – The possibility to adopt a differentiating strategy based on innovative perspectives, establishing itself as a "pioneer" town in a given domain (not necessarily in a typically tourist area like lean urbanism, fabrication laboratories, innovation hubs). It entails clarifying the target audience as well as political options.

Guideline 4 – Heritage Enhancement – The heritage as a whole was much appreciated by the people who were interviewed and, as such, it is a catalyst in the Historic Centre, deserving special attention. The study, preservation and enhancement of the heritage are instrumental to achieve the hitherto proposed goals.

Guideline 5 – Training and Dissemination of Information– There is not much one can do in Historic Centers without citizen participation. That involves training and dissemination of knowledge/information, establishing the basis for good, effective communication. All parties must be constantly heard, according to current governance principles.

Guideline 6 – Transversal, structuring principles – Decision-making on subjects that are directly linked with the Historic Centre and how its heritage must be used for tourist purposes must obey transversal, broad spectrum, and structuring principles. Any intervention to increase the quality of services, the general outlook of the town and quality of life, *tout court,* within the Historic Centre will simultaneously serve both the local population and the visitors. Anticipating that the number of visitors will considerably increase after the opening of the Roman Spa Museum, it is important to start thinking ahead on terms of long-term urban planning in tourism destinations (García-Ayllón, 2015), for instance, how to manage and monitor tourist flows, to allow likely adjustments to the goals that have been defined, thus avoiding eventual difficulties. It is also relevant to value partnerships in an effort to make the Historic Centre more resilient. Working on all these subjects is consistent with the concepts of sustainability and social accountability.

Final remarks: generalising from this particular case study

The main purpose of this article was sharing the results of some monitoring studies on the impacts of cultural heritage enhancement on specific segments of the population which, due

to their goals and methodological approach, may be deemed public participation tools. A thorough consultation of several stakeholders provided reliable basis for drawing up future strategies to revive and promote the historic centre, the town and the region in ways that explicitly respect the inputs of the consulted groups.

Some of the decisions that were taken in Chaves might serve as an inspiration to other medium sized towns all over the world, with a rich architectural heritage in their Historic Centre and a history of rehabilitation projects. Their city councils might understand that it is worthwhile considering elements of public participation processes in their monitoring and planning procedures. Through this research, we consider that it is a valid option to consult a rather original composition of the stakeholders – namely residents, students and visitors – about the future of the local heritage and its presence in revitalization projects which not only pretend to charm endogenous local residents but also exogenous visitors. That is, the research methodology used for this case study can be repeated elsewhere in similar cases, with the necessary adjustments.

Somehow surprising outcomes of this research were the similarity in responses by the three segments of the population, on one hand, and the diversity of suggestions offered by the students on the other. All the quantitative and qualitative data that were obtained, then, led to the development of six guidelines for the revitalization process of the Historic Centre which will also characterize future promotion and development strategies for the town. In other words, the opinions of actors crowding the Historic Town Centre were the starting point of this exercise. Of course, these guidelines will be unique for each destination. The multi-products to be formulated for other contexts will certainly not copy the multiproduct Chaves is perfecting: a mix of cultural tourism, thermal tourism, nature tourism and, even, archaeotourism and edu-tourism.

Future studies might also want to focus on a combined quantitative and qualitative methodology, since, in the course of this research, interviews with smaller groups provided details and even concrete suggestions which might be easily and efficiently integrated in future strategic plans.

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REGIONAL ECONOMIC DISPARITIES IN EASTERN INDONESIA AND DETERMINANTS: COMPARATIVE ANALYSIS OF ORIGIN DISTRICT AND NEW DISTRICT

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Abstract

The objective of this research is to know specifically the difference of regional economic disparity and expansion in districts / cities in eastern Indonesia, as well as determinant of disparity base on development indicators covering economic growth, decentralization policy and quality of human resources. This is a quantitative study using econometric methodology. In this methodology, regression with the dummy variable is used to estimate the data. The results showed differences between origin district and new district, where new district showed higher disparities than origin district. Thus, according to Myrdall Theory, regional economic development disparities are caused by larger backwash effects than spread effects occur in Eastern Indonesia. Another important contribution is that fiscal decentralization plays an important role in reducing regional income disparities in new district, while economic growth and human development index have no significant effect on disparities. In the origin district shows different impacts related to fiscal decentralization in which the policy has a significant positive effect on the disparity, while the human development index has a significant negative effect and economic growth has no significant effect on the disparity.

Keywords: Regional Disparity, Development Indicator, Regional Status
JEL classification: P25, R11

1. Introduction

Diversity is characteristic of Indonesia. The western region of Indonesia has more population density than the eastern region. These geographic differences are in line with significant economic difference. Regional Gross Domestic Product (RGDP) per-capita variation reflects a marked discrepancy. This extreme difference is the result of an evaluation that gave rise to regional autonomy.

The euphoria of regional autonomy in Indonesia has impacted both the community and the government. One of the impacts is the demand for the formation of new local goverments (expansion) from existing local government. The expansion focuses on the creation of the district or city government level with new autonomy (decentralization). Decentralization aims to promote a more autonomous form of revenue generation. In other words, the district or city is the real form of autonomy to govern (Mcwilliam, 2011; Seymour and Turner, 2002)

The encouragement of regions in regional profiliration should be able to minimize inequality and improve social welfare (Jamal, 2017). Since 1999 the number of autonomous regions has grown from 319 (covering 26 provinces, 234 districts and 59 cities) to 542 (34 provinces, 415 districts and 93 cities excluding administrative district and cities in the Province of Jakarta) by 2014 (Direktorat Jenderal Otonomi Daerah Kementerian Dalam Negeri Republik Indonesia 2014). Most of the expansions are outside of Java Island especially Eastern Region of Indonesia.

Regional autonomy is expected to be able to manage local fiscal capasity as a determinant of income level in accordance with regional potency. On the other hand regional autonomy

raises the regional ego and competence in promoting growth and development (Mahardiki and Santoso, 2013). Regional readiness is also important to face the regional autonomy policy because for regions with advanced economic structures have high economic growth and the welfare of the community. This is different from developing regions or relatively lagging eith low economic growth.Kuncoro (2013) expains that inequality between regions describes the development gap between advanced and lagging regions.

Economic development should reflect the total change of a society and adjust the social system as a whole without ignoring the diversity of individuals and social groups within it, aiming to move toward a better materially and spiritually (Todaro and Smith, 2011). Rustiadi et al (2011) adds that some regional development performance is based on equity, balance and fairness. Regional development has an important aspect of reducing regional inequality and this requires appropriate government policies (Ezcurra and Pascual 2008; Guastella and Timpano 2010).

Fiscal decentralization is a policy to overcome disparities between regions (Fadli 2014). During its implementation the effects of growth and economic progress are stronger in areas with natural resources. This area should be able to manage effectively and efficiently, so that autonomous regions become more independent in financing public services and development. Local governments will be more responsive to local needs and preferences (Zakaria 2013). Increased regional self-sufficiency reflects the region's revenue on the increasing total revenue and the proportion of the transfer decreases.

Fiscal decentralization is related to regional disparities. The relationship between fiscal decentralization and inequality is still contradictory at the level of development. Fiscal decentralization minimizes inequality among regions. Decentralization is able to reduce inequality between regions (Aritenang, 2014; Ezcurra and Pascual, 2008). There are also conflicting results on the relationship of fiscal decentralization with increasing inequality between regions (Arham, 2014; Baransano et al, 2016; Bonet, 2006; Rodriguez-Pose and Ezcurra, 2010).

Inequality between regions is a polemic in a development. Various efforts have been made to address these problems, such as reducing poverty, quality of human resources, income distribution and economic growth (Baransano et al. 2016; Hirobe, 2014; Shobha, 2014). The growth and inequality of inter-regional development is a logical consequence of economic development (Dhyatmika and Atmanti, 2013). Further implications indicate that economic growth is capable of driving the shift in structure, distribution and distribution of income. Many studies discuss economic growth and inequality that show different results. Increased economic growth increases inequality between regions (Fadli 2014; Zakaria 2013). Different results show Antonescu (2012) and Yuliani (2015) that high economic growth is in line with increasing welfare and minimizing inequality between regions. In the Kuznet hypothesis, the early stages of national economic development and the difference in the rate of economic growth result in the inequality of income distribution between regions. In the long run, when economic conditions reach maturity and assuming free market mechanisms and inter-regional factor mobility without a few obstacles and distortions, the different rates of economic growth across regions tend to shrink as the average per capita income level is higher in each region , and ultimately reduce the regional economic disparities (Arsyad 2010).

Moreover human capital becomes an important factor for economic growth. The quality of human resources has an effect on good economic performance. The quality of human resources is reflected in the level of education, health and other indicators, such as the development report published by the United Nations Development Program. The human development index dimension uses new methods of life expectancy as the health aspect, the long-term expectation of school and the duration of education as the educational aspect, and the per capita GDP as the standard of living aspect. The quality of human resources is a proxy of the Human Development Index (HDI). The index has a role that is still ambiguous, because the results of several studies show different results. Increased HDI will be able to reduce inequality between regions (Baransano et al. 2016). On the other hand shows that HDI is the cause of inequality (Dholakia 2003).

Regional economic disparities are decomposed in several sub-groups, sources of income, diverse unit characteristics and heterogeneity that lead to the trend of inequality between regions and between economic sectors of a region (Kuncoro, 2013; Ramos and Coimbra,

2009). Some studies of economic development disparities with different levels of inequality indicators ranging from inequality between countries (Ezcurra and Pascual, 2008; Habanik et al, 2013; Postoiu and Bușega, 2015; Rodriguez-Pose and Ezcurra, 2010) between the provinces of Indonesia (Antonescu, 2012; Bonet, 2006; Islam and Noman, 2015; Wijerathna et al, 2014), interprovinces in Indonesia (Aritenang, 2014; Fadli, 2014; Mahardiki and Santoso, 2013; Zakaria, 2013), between districts / cities in one province outside Java (Baransano et al. 2016; Yuliani 2015; Arham 2014), inter districts / cities within an internal Java province (Abdulah, 2013; Kurniawan and Sugiyanto, 2013), in residency (Cahyono, 2017; Suseno, 2015), inter-district in one district / city (Nugroho 2014). There is also research on pre-crisis and post-crisis disparites (Đoki, Fröhlich, and Bakaric, 2016) and post-expansion inequality (Dhyatmika and Atmanti, 2013).

The emergence of phenomena in development caused by shifts and changes in the paradigm of economic development. Errors in the application of development models cause distortion. The development paradigm shift is done by changing the tendency to measure macro development success to regional and regional approaches. In other words, the optimal utilization of economic potential will increase equity. Convergence in the determination of the region and the center of growth will encourage equal distribution of regional development, so that the development process requires both elements of growth and equity simultaneously. Myrdall's theory explains that in the long-term development process exacerbating disparities caused by circular cumulative causation (O'Hara, 2008; Samudro, Bloch, and Salim, 2015). The condition is triggered by two forces namely the circumstances under which the development of backward areas is tempered by more backwash effects and the circumstances under which the development of underdeveloped regions is driven by more developed areas. Therefore, the deterioration of regional economic disparities due to the impact of spread effects is smaller than backwash effects. The impact of backwash effects of excessive resource exploitation from remote and developing regions (Rustiadi, 2011). It is suspected that the impacts are in the natural areas of eastern Indonesia.

Taking into account previous research that not specified the regional economic disparities with the basic concept of disparity, there is much discussion of regional disparities in Eastern Indonesia that have been done, but there is still a possibility of a gap to discuss regional disparities from various corners of the field. In other words, the purpose of this study is to specifically discuss the identification of differences in economic income disparities in the parent regions and divisions in Eastern Indonesia, as well as the determinants of disparities based on development indicators that include economic growth, decentralization policies and human resource qualities.

2. Research Method

The positivist approach explains that researchers begin causal relationships that are logically derived from causal laws in general theory. All processes lead to empirical testing and legal confirmation (theory) in social life. In general, positivism perspectives use an approach with a deductive direction. Approach with deductive direction can develop and assert a theory that begins with abstract concepts and theoretical relationships and leads to more concrete empirical evidence (Neuman, 2011). Therefore, this research uses positivism perspective with deductive approach.

The type of data used is secondary data with cross section type covering the districts / cities in the Eastern Region of Indonesia in 2016. The data sources of this research are reports, journals and websites such as the Central Bureau of Statistics. This research is a quantitative research using econometric methodology. In this methodology, the analytical tool used is regression, a statistical analysis tool designed to measure the direction and magnitude of the influence of one or more variables on one or more dependent variables (Gujarati and Dawn, 2010; Feshari and Mojtaba, 2017). Regression used in this research is doubled linear regression. The model of multiple linear regression equation is:

$$I_i = \beta_0 + \beta_1 REG_i + \beta_2 FD_i + \beta_3 HDI_i + \varepsilon_t \quad (1)$$

In the formula, i refers to districts / cities; β are parameters (constants and coefficients); REG is an economic growth that shows the development of activities in an economy where the production of goods and services is increasing used for the welfare of society; FD is Fiscal

Decentralization which shows the ratio of local revenue to total revenue; HDI is a human development index. I is a regional disparity calculated using the J.Bonet index.

The revenue disparity between regions is measured by Jaime Bonet (I) Index. The index measures the relative per-capita income disparity. The measurement of the Jaime Bonet index is based on the perfect balance that occurs when per-capita districts / cities are equal to the provincial average in certain regions and years. The Jaime Bonet Index calculation formula is:

$$I_i = \left| \frac{PCPDB_i}{PCPDBNAL_i} - 1 \right| . \quad (2)$$

PCPDBi refers to Gross Regional Domestic Product per capita District / City and PDBNALi is the Province Gross Domestic Product per capita. Gross Regional Domestic Product per capita is calculated based on Gross Regional Domestic Product divided by population. i denote County / City and t show years of observation.

To know the difference of disparity between regions and the magnitude of the influence of each independent variable in the regression model in the parent region and the division with the dummy variable. According to Gujarati and Dawn (2010), the dummy variable is a tool for classifying data by dividing the sample into subgroups based on qualities or attributes and explicitly enabling to operate individual regressions for each subgroup (flexible dummy variable techniques). To avoid dummy variable traps, the number of dummy variables is k-1 = 2-1 = 1 (one dummy variable). Application of dummy variables on the regression equation:

$$I_t = \beta_0 + \beta_1 REG_t + \beta_2 FD_t + \beta_3 HDI_t + \beta_4 d1_t + \beta_5 d1REG_t + \beta_6 d1FD_t + \beta_7 d1HDI_t + v_t \quad (3)$$

The formula can be explained that d1 refers to dummy variables, worth 1 for the post new district of Law 32 Year 2004 and 0 for the origin district. Please note that mapping related to expansion areas is indicated by local laws based on the establishment of autonomous regions in Indonesia from the publication of the Directorate General of Regional Autonomy of the Ministry of Home Affairs of the Republic of Indonesia.

3. Result and Discussion

Regression analysis with dummy variables identifies differences in regional income regional economic disparities and expansion in Eastern Indonesia and the determinants of the objectives in this study. Table 1 shows the regression results with dummy variables.

Table 1. Regression Result

Variable	Coefificient	t-Stat	Prob.t
C	0,7286	3,0662	0,0024***
D1	0,8358	2,1838	0,0300**
REG	0,0009	0,1625	0,8710
FD	0,0091	1,8080	0,0720*
HDI	-0,0074	-1,9509	0,0523*
D1*REG	-0,0307	-1,2958	0,1964
D1*FD	-0,0412	-2,4899	0,0135**
D1*HDI	-0,0080	-1,3988	0,1633
R-squared	0,1382	F-stat	5,0183
DW-stat	1,7534	Prob(F-stat)	0,0000***

Note: * significance of α(10%); ** significance of α(5%); *** significance of α(1%)

Based on the regression result, estimation model in this research are:

$$I_i = 0{,}7286 + 0{,}0009 REG_i + 0{,}0091 FD_i - 0{,}0074 HDI_i + 0{,}8358 d1_t - 0{,}0307 d1REG_i - 0{,}0412 d1FD_i - 0{,}0080 d1HDI_i$$

Regression results for the simultaneous test show that the model used is exist because the prob. F statistics of 0,0000 < α (0,01). Simultaneously, some variables, like variable of economic growth, fiscal decentralization and human development index have a significant effect on economic disparity in the origin district and the new district in eastern Indonesia. In addition, the determinant coefficient (R-Square) interpreted variance of disparity able to explain the variable of economic growth, fiscal decentralization and human development index 13,82 percent, while the rest explained other factors not included in research model.

Please note that the number of observations in this study covers all districts / cities in Eastern Indonesia except Kolaka district, Mimika district, Teluk Bintuni, West Sumbawa

district and Kupang City. The district / city is not included because they have unique characteristics that look very different from other observations. Here comes the form of extreme values for either a single variable or a combination (outlier data). The identification of data outliers in this study is due to the extreme value that is too high and too low on the variable income per capita that shows too big gap. This causes an abnormal residual distribution. According Ghozali (2016) philosophically should the data outlier maintained if able to represent the population but if unable to describe the observations in the study, it should be discarded. If it is maintained it will be the cause of abnormal distribution. Without the inclusion of outlier data expected to fulfill normal distribution. In addition, this study has met other supporting tests such as model specifications are correct and there is no problem of autocorrelation and homoskedastisity.

Table 1 of the regression results shows the disparity of economic income in the origin district and the new district in Eastern Indonesia. This is indicated by the significance of dummy variable (D1) that is statistical prob.t 0,0300 is smaller than α (0,05). Disparities in economic revenues in new district were 0,8358 higher than origin district in Eastern Indonesia. This indicates that the new district, especially Eastern Indonesia, takes time in the long term to adjust internal conditions, administratively, socioeconomic, political and other conditions. This is reversed with origin district that have long been able to control the development disparities that emerge in the area.

Regression results in the origin district and new district show that economic growth is not too strong to affect the disparity of economic income. This suggests that in the very short period of time, economic growth has not shown an impact in overcoming or exacerbating disparities in both regions. There are indications that economic growth is capable of reducing disparities in new district, but vice versa in origin district to diverge. This result is in line with research conducted by Jamal (2017) with the result that economic growth does not have a strong influence on the disparity of economic development.

The same regression result table shows different results related to the effect of fiscal decentralization on disparities in origin district and new district in Eastern Indonesia. Fiscal decentralization has a significant positive effect on the disparity of economic income in the origin district. This is indicated by fiscal decentralization statistical probabilities of 0,0720 less than α (0,10). Based on the value of the regression coefficient, fiscal decentralization risen by one percent then the economic income disparity increased by 0.0091. This result is in line with Arham's (2014) research indicating that fiscal decentralization is increasing so that disparities will increase. In general, income levels have increased since the implementation of decentralization, but the development and increase in regional income varies with relatively richer origin district developing faster than relatively poor origin district. Wealth of the region, especially Eastern Indonesia because of the large potential of natural resources and investment is great. The resource potential of course varies in each region. The richer origin districts have per capita fiscal resources including local revenue from higher revenue-sharing taxes than the relatively poor origin district. Wealthy origin district are able to receive greater benefits from economic recovery programs in addressing disparities than poor origin district.

In the new district, fiscal decentralization has a significant negative effect on economic income disparities. This is indicated by a fiscal decentralization statistical prob.t of 0,0135 which is smaller than α (0,05). Based on the value of the regression coefficient indicates that fiscal decentralization increases by one percent then the economic income disparity decreases by 0,0412. In other words, fiscal decentralization increases then the disparities will decrease. This result is in line with Ezcurra (2008) and Prodromidis (2012) research but the measurement aspects of fiscal decentralization and disparity are different. Fiscal decentralization as measured by the ratio of local revenue to total revenues is able to show its existence in financing local needs and preferences of new district. Increased local revenue reflects the level of regional autonomy. The greater the region's original revenue shows the dependence on the central government is reduced and fiscal decentralization is able to be implemented expansion areas. The existence of decentralization policy, the regions will be more independent in regulating the area. More autonomous regions in the presence of fiscal decentralization can bring substantial economic efficiency in the allocation of resources across the public sector. Fiscal decentralization has been able to improve economic efficiency since local governments are closer to local people than central government so that local

governments will be more responsive to local needs and preferences. Governments and communities are expected to simulate local resources to create high economic development in their respective regions when both reach autonomous levels. Thus, the fiscal decentralization policy shows success in reducing the disparities of regional economic revenues of new district.

The Differences in HDI in each region make this index as one of the factors that affect the income disparity between regions, as happened in the origin district in eastern Indonesia. The new indicator in the calculation of human development index was able to represent the central role of this index in reducing regional economic disparity. This is because the quality of human resources is good cause the economic performance will also be better. In other words, the higher the human development index will be the higher the level of population productivity which then push the level of income becomes higher. Based on the results, the regression shows that the human development index has a significant negative effect on income disparities between regions in origin district. The result is indicated by a statistical prob.t value of 0,0523 which is smaller than α (0,05). In other words, if the index of human development increases then the disparity of economic income also increases. The results are in line with research by Baransano et al (2016) but for aspects of different dimensions of human development index and the different aspects of disparity. The importance of human development does not show a significant role in reducing disparities in the new district of eastern Indonesia. However, it indicates an important role for human development in reducing disparities.

4. Conslusions

The research results show the differences between the origin district and the new district in Eastern Indonesia. Disparities in new district are higher than origin district. Thus, according to Myrdall Theory, the deterioration of regional economic development disparities is caused by backwash effects greater than in spread effects. This happened in Eastern Indonesia. In origin district, the human development index has significant negative effect and fiscal decentralization has a significant positive effect on disparity, while economic growth has no significant effect on disparity. In new district, the human development index and economic growth have no significant effect on disparity, whereas fiscal decentralization has a significant negative effect on disparity. In expansion areas are able to capture the phenomenon in the implementation of fiscal decentralization policy to reduce disparity between regions. In contrast to what happens to the origin district that cause wider disparities. However, in the origin district, improving the quality of human resources has a role to reduce disparity between regions.

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THE ROLE OF SOCIAL CAPITAL IN REGIONAL DEVELOPMENT

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Abstract
The role of social capital in the development process is rendered essential by the intervention of local authorities, local initiatives, relations and networking. In this article is attempted the association of the means of social capital, such as the information transfer, relations of trust, networking, and cooperation, with the main instruments of regional policy, which endogenous growth strategy utilises. Instruments, such as industrial districts, technological parks, local productive systems, business clusters, creative cities, etc. are based on the utilisation of local social capital, which is a prerequisite for a viable application of the endogenous growth and local development policies. The aim of this paper is to examine the relation between endogenous growth and social capital in the configuration of a local development strategy.

Keywords: social capital, economic development, regional development, endogenous growth, local development
JEL classification: O10, R10, Z13

1. Introduction

During the last decades scientific bibliography records the contribution of social capital to the economic development process. As it is pointed out by Granovetter (1973; 2005), structures such as the social networks can influence positively the economic outcome through the diffusion of information and technological knowledge, as well as via the containment of the information costs. Moreover, social capital, with the consolidation of interpersonal interactions and relations may strengthen trust between firms, employees, banks, entities and consumers, achieving a decrease in the transaction cost, facilitating access to funds, improving the employer-employee relations, also achieving an easier access to the required workforce, more effective consumer protection, and a decrease in the firm operating costs (Uzzi, 1996), clearly affecting the economic performance of firms. Engbers et al. (2013), claim that higher social capital levels relate to higher levels of economic development.

Furthermore, positively valuated is the importance of social capital through a macroeconomic perspective. As it is extracted from the analysis of Knack and Keefer (1997) in a sample of 29 countries, trust, values and norms have a positive impact on macroeconomic performance, while Zak and Knack (2001), in an analysis of a greater sample, deduce that trust has a strong impact on collective economic activity. Moreover, Beugelsdijk and van Schaik (2005), record the significance of social capital as a determinant of the development inequality in the European regions.

Concerning the innovational dimension that characterizes the social capital, Breschi and Lissoni (2001), claim that innovation spreads more easily among actors that are located in the same area, because of the social bonds that inspire mutual trust, as well as the face-to-face contact. Thus, the generation and diffusion of innovation depends on the intensity of the relations among people and organisations.

According to Agrawal et al. (2008), the spatial, and the social proximity contribute to a great extent to the knowledge exchange as well as to other economic interactions (De Dominicis et al., 2013). De Dominicis et al. (2013), suggest that the aforementioned relations allow firms to share the cost and risk of innovation with a greater number of actors, to have access to new research results, and obtain significant technological components of new

products or methods. De Dominicis et al. (2013), conclude that regions with higher levels of social capital tend to be more efficient in the production of new knowledge.

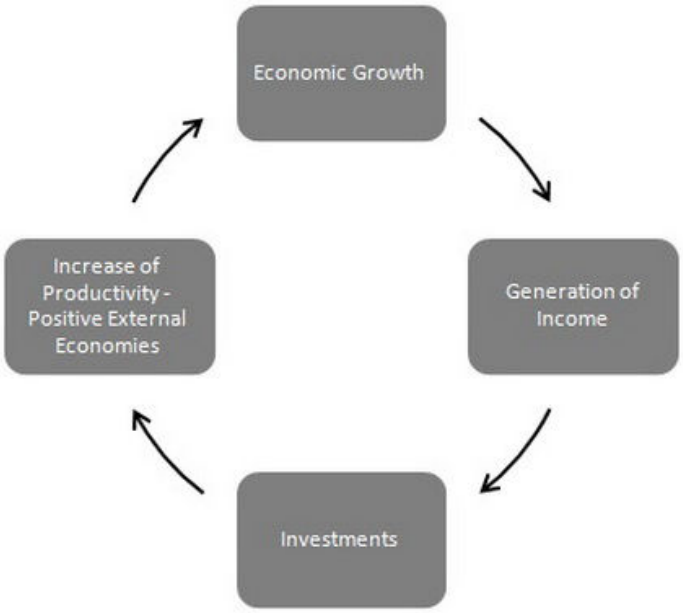
Aim of this article is to examine the role of social capital in regional development. More specifically, it intends to highlight the relation between the endogenous growth model and the utilisation of social capital, as well as the role of the central and local government in the activation and reinforcement of the aforementioned relation. The role of the government entities is also being considered in the routing of the endogenous growth process. In addition, this paper records the utilised instruments of regional policy for the processes of local development and endogenous growth, which in turn leverage social capital in the regional and local level.

2. Endogenous growth

The adequacy of the economic development neoclassical model has been strongly questioned due to the exogenous nature of technological change, among other characteristics. The essential role of technology in the generation of development, through the creation and the utilisation of innovation, makes its exclusion from an economic development theory rather controversial.

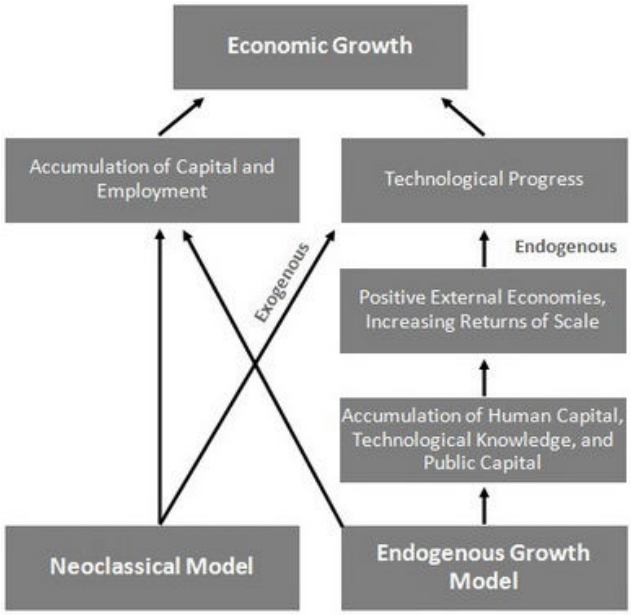
According to the approach of endogenous growth, that emerged during the 1980s, economic development results from the activation of economic actors (households, firms, and the state), which invest through accumulation of capital (human capital, research and development-R&D, physical capital and public capital-infrastructure). These investments are funded by the economic growth generated incomes, which in turn -through the increase of total productivity, and the simultaneous form of positive external economies- create growth. Therefore, development is self-sustained, cumulative, and depended on the reserves of capital, infrastructure, accumulated knowledge, innovation, etc. The term "endogenous" refers to the interpreting qualities of the endogenous variables, the capabilities, and the behaviours of the economic actors, as far as the generation of development is concerned.

Figure 1. The process of economic growth



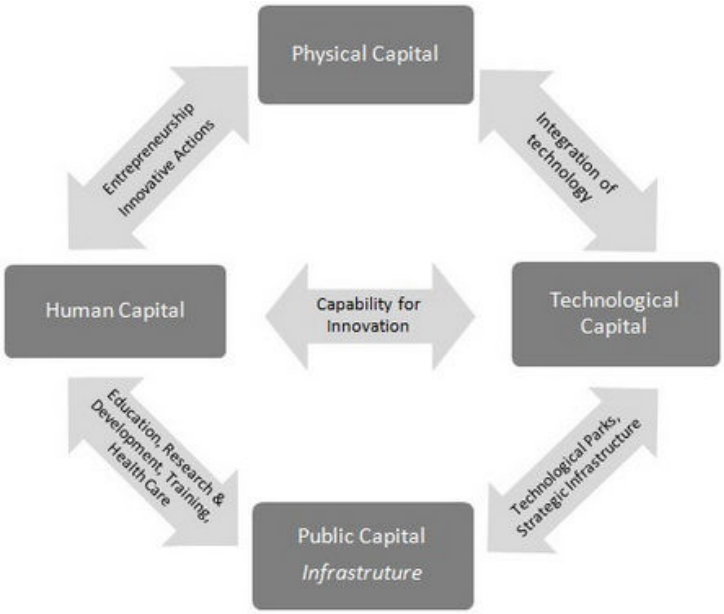
The theories of endogenous growth allow for a more accurate interpretation of economic growth, in contrast to pre-existing theories, which explained the generation of growth though the quantitative increase of the production factors (capital and labour), and the exogenous component of technological progress. Endogenous growth theories show that technological progress is not inexplicable. Development is self-sustained because it allows the funding of investment that reinforces its process, and results from the behaviour of economic actors, that is, it is generated inside the system (endogenous nature).

Figure 2. Neoclassical model vs endogenous growth model



In the theories of endogenous growth, one can find different approaches. Romer (1986) focuses on the accumulation of technological knowledge, while Lucas (1988) focuses on the accumulation of human capital. Moreover, Aghion and Howitt (1989), and Romer (1990) highlight the accumulation of innovation, while Ashauer (1989) and Barro (1990) concentrate their research on the public form of capital.

Figure 3. The relations between the different types of capital



The behaviours that allow the generation of economic development, are the investments carried out by firms, the state or individuals utilising different types of capital, such as natural, technological, public (infrastructure), and human capital. These investments create positive external economies and increase the total productivity of the production factors.

3. Endogenous growth and state intervention

The theories of endogenous growth give reason for state intervention in the economy, which aims at:

- the decrease of the social cost, caused by the underemployment or the inefficient employment of humans and natural resources
- the decrease of regional disparities, the strengthening of a balanced development and the redistribution of wealth
- the rationalisation and utilisation of developmental means, such as the balanced allocation of funding resources, targeted sectoral development programs, and special policies for local development
- the creation of a favourable environment for local development through the utilisation of local developmental reserves, reinforcement of local initiatives, and adoption of an endogenous growth model
- the generation of growth poles in order to develop important urban centres and strengthen the exogenous growth model
- the building of strategic infrastructure that reinforces the endogenous as well as the exogenous growth

The state constitutes one of the key factors for economic development, since it can promote the accumulation of technological capital and generate positive externalities. The aforementioned fostering takes place through the reinforcement of business research, of higher and technological education, and of vocational and technological training, the support of innovational actions, the operation of public research centres of human capital, etc. The generation of positive external economies concerns the technical infrastructure, the entrepreneurial infrastucture, the telecommunications and health infrastructure, etc. The accumulation of this knowledge over time provides development with an accumulative dimension, in the sense that knowledge constitutes a collective good of accumulative nature.

The endogenous growth is based on local initiatives. The regional disparities are interpreted through the entrepreneurial capacity and adaptability of a region. Development is achieved by mobilizing the local resources of the region, rather than through external factors, such as foreign investment at its growth poles. The economic policies that are based on this type of development are called “bottom-up” development policies.

The basic elements that characterise endogenous growth is training, R&D, the building of necessary for the development process infrastructure, as well as the support of local entrepreneurship.

The strategies of regional development are based more and more on the endogenous growth model, aiming to generate a favourable environment for local initiatives which focus on the increase of the regional capability to adapt to the contemporary developmental reality at the macroeconomic level, where economic policy integrates social, cultural and environmental factors.

Endogenous growth is based on three assumptions:

- Development is a process that takes place at the international level
- Local initiatives matter for the international development
- Human and social capital constitute the driving forces of development

So, development policies aim to reduce the inequalities at the interregional, as well as the intraurban level.

The theory of endogenous regional growth tries to integrate the policies, and the social and cultural dimensions of development, into the economic development. Such dimensions appertain to cultural trends, the utilisation of local heritage and identity, the local communities, the participatory processes, the existing interactions and social relations.

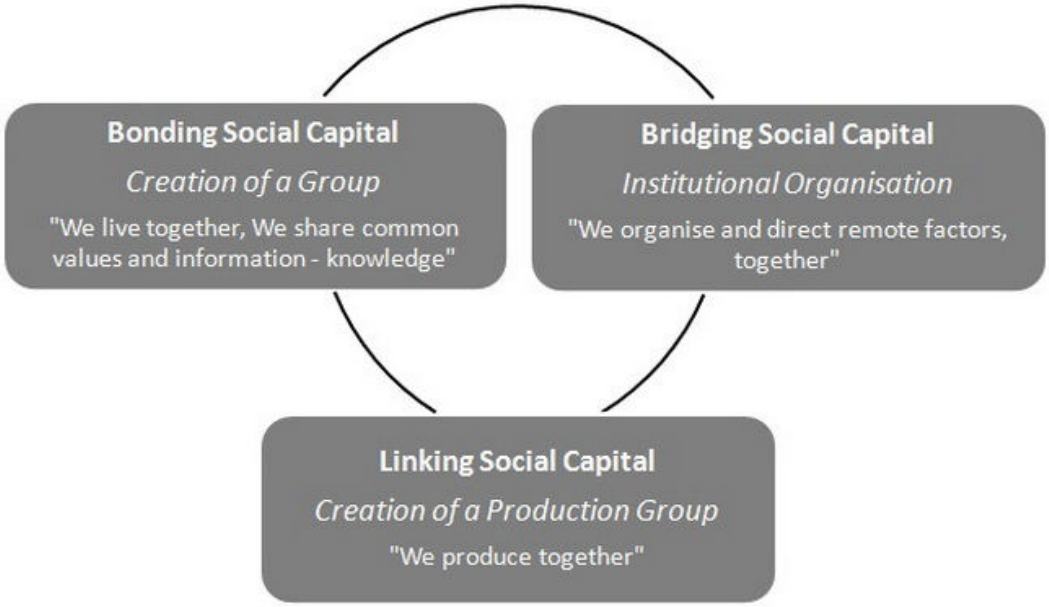
To sum up, the analysis and the utilisation of social capital is at the core of regional development, since its vital role is acknowledged as a determinant for the prosperity of a community, as well as the local and regional development.

4. Social capital

According to Bourdieu (1980), social capital is perceived as “the aggregate of the actual potential resources which are linked to the possession of a durable network of more or less institutionalised relationships of mutual acquaintance and recognition, that provides each of its members with the support of the collective capital”.

Analysing social capital from a network perspective, one can distinguish the bonding social capital and the bridging social capital (Aldridge *et al.,* 2002; Gittell and Vidal, 1998; Putnam, 2000). Bonding social capital refers to the horizontal relations among people in the same community, and it is characterised by geographical proximity, while bridging social capital is about the vertical relations between different -and more distanced- communities (Dolfsma and Dannreuther, 2003; Narayan, 2002; Wallis *et al.*, 1998). Moreover, Anheier and Kendall (2002), relate bridging social capital to low levels of trust, while its bonding counterpart is characterised by high levels of trust. Some researchers claim that there is also a third type of social capital, the linking social capital (see Aldrich, 2012; Woolcock, 1998 and 2001). This particular form, which shares common characteristics with bridging social capital, is about the connection of people with formal institutions, that gives the opportunity to access institutional resources.

Figure 4. The different types of social capital



Another categorisation of social capital is that from the perspective of social structure. The relevant types are the structural social capital, the cognitive, and the relational one (Nahapiet and Ghoshal, 1998). Structural social capital refers to the forms of social organisation that comprise society. According to Hitt *et al.* (2002), structural social capital promotes mutual beneficial collective action through the established roles and social networks, with the contribution of norms, procedures and habits. Consequently, interaction, exchange and cooperation are strengthened, and the cost of transactions is contained. Cognitive social capital constitutes the social environment that determines human behaviour in any given situation. The cognitive form includes social norms, values, behaviours and beliefs, while it predisposes people toward common action (Uphoff, 1999). According to Uphoff and Wijayaratna (2000), the structural and cognitive dimension of social capital closely relate and reinforce each other. Last but not least, relational social capital is about the personal relations that people develop through interaction (Granovetter, 1992, cit. Nahapiet and Ghoshal, 1998), while Lefebvre *et al.* (2016), claim that it also refers to the nature of these relations. The distinction between cognitive and relational social capital can be described as confusing since both notions concern intangible elements detected through observation, perception, and opinion, and therefore are rather objective and varying among different individuals and different contexts.

Dudwick *et al.* (2006), distinguish the following dimensions of social capital: 1) groups and networks, 2) trust and solidarity, 3) collective action and cooperation, 4) information and communication, 5) social cohesion and inclusion, and 6) empowerment and political action. These dimensions allow for a consideration of social capital from two different perspectives,

each of which relates to the sociologist Pierre Bourdieu and the political scientist Robert Putnam, respectively.

The first one focuses on the way that social relations function as a means of securing access to resources for people, households, or small groups. Consequently, the access to important resources or a favourable position in a network, are considered as "higher" social capital for people, households or small groups, as their social relations and position in the network secures better access to and control of the available resources. From this perspective, unequal distribution of community social capital is implied, while social capital may function as a mechanism for exclusion or inclusion, as well.

Alternatively, the analysis –in the second perspective- moves towards the community unit, focusing on the nature and the extent of the cross-cutting ties, along with the participation of individuals in informal networks and formal civic organisations. From this perspective, weight is given to the way that members of the community cooperate, particularly when it comes to matters of common interest. The consideration of social capital as an indicator, or a prerequisite of civic capacity, the role of the state and legal institutions are of great importance for the facilitation -or the undermining- of the civic participation.

According to Dudwick *et al.* (2006), the dimensions of social capital in detail are:

- 1st Dimension: Groups and networks, is about the groups and networks that support access to resources, as well as the cooperation between individuals to achieve common goals. Informal networks are spontaneous, informal, and unregulated ways of exchanging of information and resources inside the community, as well as efforts for cooperation, coordination, and mutual assistance for the maximization of the utilisation of the resources available.
- 2nd Dimension: Trust and solidarity, refers to how strongly individuals feel that they can rely on the elements of their greater social environment, such as relatives, neighbors, colleagues, acquaintances, providers of basic services, and strangers. As far as trust is concerned, it can be characterised as a choice, while in other occasions, it is considered as a necessary dependency, based on existing relations or familiar networks.
- 3rd Dimension: Collective action and cooperation, relates highly to the dimension of "Trust and solidarity", however this third dimension focuses on the presence and the extent of the efficient cooperation between individuals in a community, in order to achieve a common goal or to deal with a common problem.
- 4th Dimension: Information and communication, concerns the forms and the means utilised by households for receiving and sharing information on community issues, as well as the degree of access to communication infrastructure. World Bank (2002) claims that better access to information is increasingly recognised as of vital importance for the reinforcement of disadvantaged communities in matters related to their prosperity.
- 5th Dimension: Social cohesion and inclusion, is closely related to all the aforementioned dimensions. However, it focuses on the durability of social bonds and the twofold dynamics, regarding the inclusion or the exclusion of the community members. The degree of community cohesion and inclusion can be recorded through the events or the actions, that increase solidarity, reinforce social cohesion, improve the diffusion of information, etc.
- 6th Dimension: Empowerment and political action, which examines the sense of satisfaction, efficacy, and the capacity of networks and group members to influence local scale events, as well as broader political outcomes.

Moreover, at the national level it has been confirmed that certain elements of social capital strengthen economic development. Business partnerships, networks and specific local features have a positive impact on the process of local development (Callois, 2004). Coleman (1988) highlights that private resources drawn by individuals through social capital utilisation have a macroeconomic impact, while Putnam *et al.* (1994) claim that social capital favours collective action, cooperation, governance and economic development.

The importance of social capital is based on the ascertainment that social actors influence economic phenomena. In his definition, Lin (2001), characterises social capital as resources integrated into a social structure, mobilised for certain actions. Social capital is highly related

to the technological and the public form of capital, although it has a more obvious connection to the human capital, which refers to knowledge, skills, abilities and general characteristics of a person, that facilitate the attainment of personal, social and economic prosperity (OECD, 1998).

The differences between social and human capital are presented in Table 1.

Table 1. Differences between human and social capital

	Human capital	**Social capital**
Focus	Individuals	Relations
Support measures	Education Specialisation Training	Reinforcement of values Participation in groups Increase of the degree of trust
Aim	Income Productivity Health care Social action	Social cohesion Economic development

Social capital resources (information, goods, services, and behaviours), are necessary to be integrated into social relations and flows, in order for development to be attained. Thus, social capital becomes a determinant of local development via certain relation mechanisms (see Table 2).

Table 2. The social capital as a factor for local development

Mechanisms of relations	**Effects on development**
Transfer of information	Specialised employment New techniques Market knowledge Image- Promotion of the regions
Relations of trust	Engagement to the goals Dedication- stability of employment Informal contracts Trust between firms
Cooperation	Decrease of risk Reinforcement of external economies Shared utilization of resources Local public goods

Putnam (1994), integrates relations and networking in the definition of social capital, stating that social capital "refers to characteristics of social organisation, such as trust, norms and networks, that are capable of improving the efficiency of society by facilitating the actions of coordination". As it is pointed out by Gagnon *et al.* (2008), the emphasis shifts from the role of social capital as a factor of personal promotion, towards a role as a factor of local development, involving social relations and flows. Thus, bridging social capital (Putnam, 2001; Woodhouse, 2006), is of particular importance, since it is generated from the interactions among heterogenous group members, the networking of which allows an increase of the information diffusion and the economic and human resources mobilisation.

The handling of information shortage regarding, among others, prices, employment and investment opportunities, which is achieved through interaction, adds an economic dimension to the notion of social capital. Moreover, social capital strengthens the knowledge of techniques and operation of service production, and eventually constitutes a source of learning externalities, human capital reinforcement, as well as the improvement of entrepreneurial efficiency (Coleman, 1988; Westlund & Bolton, 2003).

Eventually, social capital represents the networks, patterns, values and agreements that facilitate cooperation inside and between social groups, and becomes a mediator and a determinant of local development.

5. The spatial dimension of endogenous growth and the utilisation of social capital

In the late 70's, regions of industrial tradition were hit by the economic crisis, while at the same time successful development endeavours were noted at the local level, leading to a search for alternatives of the exogenous growth models (or "top-down" development). The exogenous growth was based on the model of stages, growth pole model and core-periphery model. The inefficiency of the exogenous growth policies, particularly the ones dealing with regional inequality, resulted in the quest for a new model, utilising the local resources and the strong synergies of small and medium-sized enterprises (SMEs) networks. Thus, the model of endogenous growth or "bottom-up" development came out. Theories of endogenous growth concern models of local development, community economic development and innovative milieu.

According to the definition by the French Regional Planning and Regional Attractiveness Delegation (Délégation interministérielle à l'aménagement du territoire et à l'attractivité régionale, DATAR) (Gouttebel, 2003), local development is the activation, in the context of a community cooperation, of an integrated development plan that mobilises development, economic, social, cultural and human resources. Vachon and Coallier (1993), claim that local development is a strategy aiming to create, through mechanisms of cooperation, a favourable environment for the local initiatives in order for the spatial entities to increase their potential to adapt to the new rules of the development process at the macroeconomic level or to find other development forms, which through informal ways of organisation and production, will incorporate the concern for social, cultural and environmental order, among strictly economic considerations.

Local development is based on the following principles:

- Development is a global process
- Initiatives at the "micro" level contribute to the global development
- Human resources constitute a driving force for development

Community economic development -a term more widely used in the USA- is a special form of local development based on the same theoretical foundations, such as civic activation for the development process and local entrepreneurship (Newman *et al.*, 1986). Its aim is to mobilise citizens, solidarity, and creativity and to utilise local natural resources.

The innovative milieu theory (see Aydalot, 1986; Beccatini, 1992a; Camagni, 1990), with reference to the Sillicon Valley and the "Third Italy" is mainly about the formation of new innovative firms, highlighting the importance of milieu as a source of innovation.

Endogenous growth is applied at the local level, with local development being a special form of endogenous growth. Moreover, in order to support endogenous resources and to reinforce local SMEs local development strategy adopts as main instruments of action the following:

5.1. Industrial districts

In 1898, Alfred Marshall highlighted the agglomeration economies and the operation results of industrial districts. Their advantages are:

- the generation of a specialised labour market
- the supply of specialised inputs at lower prices, due to the interpersonal relations, among others, and
- the diffusion and circulation of information, new ideas and innovation

Industrial districts constitute socio-spatial entities with main features:

- the accommodation of specialised SMEs, organised with reference to a leading industrial firm
- the perfect osmosis between local communities and firms
- an organisation model based on the triptych "competition, emulation, cooperation", and
- an "industrial atmosphere" resulting from training and accumulation of skills

Despite the use of the term "industrial district", in this type of infrastructure are located service sector firms, as well. Contemporary instruments of regional policy related to the

organisation of entrepreneurial infrastructure (industrial parks, business parks, etc) can be considered as transformations of the Marshallian industrial districts.

5.2. Italian industrial districts

Becattini (1992b) defines an industrial district as a spatial agglomeration of SMEs in a particular industrial sector, each one specialised in a different stage of the production process. Italian industrial districts concern a delimited settlement for SMEs of a particular employment pool, and an operation based on the endogenous growth model (specialised human resources, dynamic labour market, industrial culture).

This model is applied to particular places, where economic activities are firmly connected to social and cultural structures. Thus, an industrial district is a local or regional territory with concentrated SMEs of the same sector, which rely on an artisan or industrial tradition and local expertise that facilitate innovation (Levesque *et al.,* 1996). Every firm is specialised in the production of a specific product part, resulting to the division of labour among firms. The industrial district model falls into the model of endogenous growth, and depends not on foreign investment, but on the potential of local entities.

5.3. Local productive systems

According to Courlet (1994), a local productive system is an agglomeration of firms on one single or more industrial sectors, which relate to each other and to the sociocultural innovative environment in which they operate. These relations are not always market-based; on the contrary, there exist informal relations that generate positive external economies for all firms.

Local productive systems are based on the agglomeration of specialised firms, they require locations embedded with innovation and business setups, and are characterised by flexibility and agglomeration economies. Flexibility refers to the small size of the production units, the density of relations between them and their ability to adapt to external changes. Agglomeration economies result from the firm specialisation of production, mobility degree of the specialised workforce, and frequency of interpersonal relations.

Local agro-food systems are a special form of local productive systems, which are delimited agglomerations for agro-food production, characterised by their tradition, relations with the internal and external markets, sectoral structure, location, and last but not least, their socioeconomic organisation. The aforementioned characteristics outline the importance of Local Agro-Food Systems for the local economy.

5.4. Milieux innovateurs

According to Aydalot (1985), innovation is not generated by the firm, but in specific milieus with innovative environment instead. Creativity is integrated into experience and tradition, while the accumulated knowledge is the basis for progress. Aydalot (1985) laid the foundations for the approach, which is part of the endogenous growth theory.

The milieux innovateurs (innovative milieus) theory was formed by the Research Group for Innovative Milieus (Groupe de recherché sur les milieux innovateurs, GREMI), established by Philippe Aydalot, who noted from as early as 1974 that large firms do not seem they are still capable of playing a dominant role in the generation of innovation. The framework of economic development is mainly formed by endogenous factors, which highlight specific milieus that are capable of generating innovation.

The model of milieux innovateurs rely on:

- the ability of industrial firms to extend
- the ability of local resources to attract economic activities
- the interaction between firm innovation process and their location milieu
- the reinforcement of local firm networks
- the opening to interlocal networks
- the examination of the relation between innovation networks and Innovative Milieu
- the long term evolution of Innovative Milieus

- the examination of the relation between an Innovative Milieu and dynamic urban centres
- the utilisation of relevant resources, such as the natural environment and culture
- the role of technology
- the role of firm organisation and synergies
- the role of milieu (accumulation of knowledge, skills and capital) and the presence of innovative firms

Milieu innovateur can be defined as a cognitive unity (Maillat, 2006), which results from a process based on the strategies of the stakeholders and collective learning phenomena.

Highly relevant to the application of the milieu innovateur is the designation of the innovative region, which treats the economy of a region as a network of firms, institutions and individuals connected through varied, formal or informal, bonds.

Innovative region as a model of endogenous growth concedes firm a central role in the development process, utilising local and global resources. This model is based on initiatives of the central government, or the regional/ local government, which focus on research and development, regional deliberation and the activation of human resources, the diffusion of knowledge and the integration of technology.

The innovative region can be defined as a coalition of firms, entities and researchers for the development-integration of innovation and the regional economy extroversion (Milcent, 2018). This model is mainly based on trust and networking among stakeholders, whereas the function of innovative region is based on the model of endogenous growth, namely the utilisation of local resources (natural resources, traditions and skills), as well as the capability of the region to feature and utilise innovative solutions to every aspect of the economic and social life (Commissariat général à l'égalité des territories, 2015).

5.5. Creative city

Creative City is based on a sociological approach, that aims to define the elements, enabling an urban centre to attract groups of people able to make up a decisive factor for the urban dynamics. The aforementioned approach has its roots in the view of the endogenous growth theory that technological change is essentially a process of cultural change (Perret, 2011).

Key notions of this approach are:

- The creative economy, which includes sectors of economic activity relevant to the cultural creation.
- The creative class, which consists of scientists, researchers, artists, writers, etc.
- The creative city, where the creative class and the creative economy sectors concentrate and operate.

The creative region approach focuses on the attraction of talents and the preservation of a relevant pool in a specific territory (Tremblay, 2012). According to the theory of Florida (2002, 2004 and 2005), the density and variety of talents or human capital contribute to the volume and speed increase of knowledge circulation, in the fields of innovation, quality employment and the creation of new firms. Thus, human capital constitutes a source of competition and development.

5.6. Clusters

A cluster can be defined as a network of small and very small-sized firms, located in and connected to a place, often in a niche of production, or in the same field that mobilises around a common strategy and the utilisation of common actions and services.

Bussiness clusters, in contrast to Innovative Millieus, which concern multiple sectors of economic activity, refer to a specific sector; they are established by firms and supportive organisations, and are geographically concentrated.

Key function of a Cluster is the utilisation of social and human capital for supporting the co-located firms, in the form of human capital participation in production, interactions, synergies, and exchange of views and ideas in the context of the cluster function (Julien,

2005). Moreover, the characteristics of social capital, such as the role models, trust, and conventions, facilitate the development of relations, the networking, the exchange and the synergies inside the cluster.

Clusters accelerate the circulation and analysis of information to the benefit of firm development, allow the comparison and competition of firms, and provide new information to the companies mainly in the field of innovation thus leading to the diffusion of information to cluster firms, and ultimately reinforcing the inter-firm cooperation, without eliminating the competitive relations.

According to OECD, clusters of firms and networks allow small firms to combine the advantages of a small size with the potential of a large scale in the field of international competition, given that it is difficult for them to be small and efficient at the same time (OCDE, 2004). Thus, more and more countries and regions with a significant number of SMEs turn to the formation of business clusters and networks.

5.7. Scientific and technological parks / Technopoles

According to the definition of OCDE (1998), a scientific – technological park (STP) or technopole is an initiative that includes the formation of an organised area with all the necessary infrastructure and equipment, for the location of higher education units, scientific centres, and high technology organisations and firms, with key characteristics the production, diffusion and integration of high technology. Hansson (2007), defines STPs as man-made physical infrastructure that facilitate the interaction among the co-located firms (Jimenez-Moreno *et al*., 2013).

Technopole agglomerations refer to large urban centres, in which knowledge and technology is accumulated for the generation of production activity, or delimited areas of urban centres in which scientific centres and hi-tech firms are located. Innovative actions take place in the Technopole area, where universities and scientific centres operate, rather than in the interconnected STPs area (Merlin and Choay, 1996).

The importance of technological parks and scientific – technological parks in the policy debate for local development makes local communities concern themselves with the technological attractivity of their spatial entity. However, in the international experience difficulties emerge for the local governance, and a lack of adapted tools and policies for the development of technopoles and its diffusion in the local economy. Particular attention is required in the functions of planning and governance since in many cases, the desired connection of technological parks with their region and local economy has failed (Gouvernement du Quebec, 2006).

The policy of technological parks refers to endogenous growth, but has evident elements of exogenous growth as well, which result from the need to attract foreign companies, the integration in international networks, the focus on the tackle of international competition, the international cooperation, etc.

According to the European Commission (2008), key actors that create social capital in the STPs are:

- Universities, Institutes of research and development, as well as other higher education institutes, which participate in the creation and commercialisation of the outcome of the research.
- Other renters that seek for new cooperations in order to upgrade research and development with world class ideas, improved information systems, specialised employment markets, better location, and optimal services for the increase of their profits.
- Managers of the STPs, that act as mediators for the development and facilitation of the relations aiming to the increase of profits, providing the necessary infrastructure and services for the development and consolidation of the STP.

5.8. Pôles de compétitivité

Pôles de compétitivité (Competitive poles) gather in a particular space, and most of the times in a particular thematic, SMEs and large enterprises, laboratories, research centres and training centres (Tholoniat and Bouabdallah, 2006). National and local authorities back the

whole effort, which aims to support innovation, R&D and firms through new products and new production processes, that come out of the research activity.

The advantages of pôles de compétitivité are:

- the local socioeconomic culture
- the generation and tolerance of change
- the tolerance of new cultures and of actors capable to support them, such as creators, intellectuals, designers, researchers
- the adaptation of firms to new technologies and to the international competition
- the formation of efficient mechanisms for the diffusion and exchange of social and entrepreneurial services

The main characteristics of pôles de compétitivité policy are:

- the investment in local social capital
- the strengthening of education and training
- the adoption of the endogenous growth model
- the adaptation of a participatory governance model.

The emergence of pôles de compétitivité aims to the configuration of a new industrial policy with specific spatial dimension, connecting private and public bodies in common projects of innovative nature and an extrovert – international perspective (Darmon, 2004).

5.9. Metropolises

The, among others, endogenous nature of the metropolitan development process, which involves focusing on fields as the city tourism and creative economy (Local Government Institute, 2017), is largely based on the existence and strengthening of social networks (social capital).

Labasse (1994), records the characteristics of global metropolises as follows:

- Population that participates in networks of economic, scientific and cultural exchange
- Supply of international level services in the fields of technology, financial services, business administration, and R&D
- Foreign human capital in businesses and multinational organisations that collaborates with the corresponding metropolitan workforce
- International reputation in the fields of special tourism, recreation and culture.

Thus, social capital may be considered as a potential determinant of the metropolitan area competitive advantage, because of its effects on human capital, entrepreneurial environment, and the attraction of the creative class (Engbers *et al.*, 2013).

6. Conclusions

Development policy at the national, regional and local level, particularly under the current economic conditions, may and should be disengaged from the rationale of exclusive exogenous growth and the expectations for large foreign investment. As it was presented in the previous sections of this paper, endogenous economic growth may be promoted through the reinforcement of human capital, infrastructure, technological capital and physical capital as well as through the overall utilisation of social capital and the means of endogenous growth.

As the relevant theory and international practice advocate, social capital utilisation may eventually reform the main instruments of regional policy to function as means of endogenous growth. Their classification by, firstly, the type of participation and secondly, the type of initiative is presented in Table 3.

Table 3. Classification of the main instruments of Regional Policy by type of participation and initiative undertaking

	Private initiative	Initiative of public authorities
Particiption of Firms	• Industrial Parks – Industrial Districts • Innovative Milieus	• Local Production Systems • Industrial Entrepreneurial Areas
Participation of Organisations/ Firms/ Univerisities/ Researchers	• Clusters • Creative Region	• Competitive Poles • Metropolitan Development • Technological Parks • Innovative Region

In conclusion, the potential of endogenous growth points out the importance and the decisive role of central, regional and local government, as well as that of local communities, in planning, activating and supporting the economic development process, at the regional and local level. A significant precondition for the activation of the main instruments of regional policy that endogenous growth utilises, is the systematic integration of local social capital.

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INNOVATION POLICY IN EUROPEAN UNION FROM A SUPPLY CHAIN PERSPECTIVE

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Abstract
The spectrum of implemented instruments of research, technology and innovation policy is widely differentiated nowadays, reflecting the scope of institutions and interests involved, stretching from public funding of research institutions over various forms of financial incentives to the conducting of research and experimental development, including the institutions and mechanisms of technology transfer. In many European countries, these instruments dominated the practice or research and technology policy for the last three decades. This paper focuses on the analysis of these topics, focusing on the institutional context in European Union.

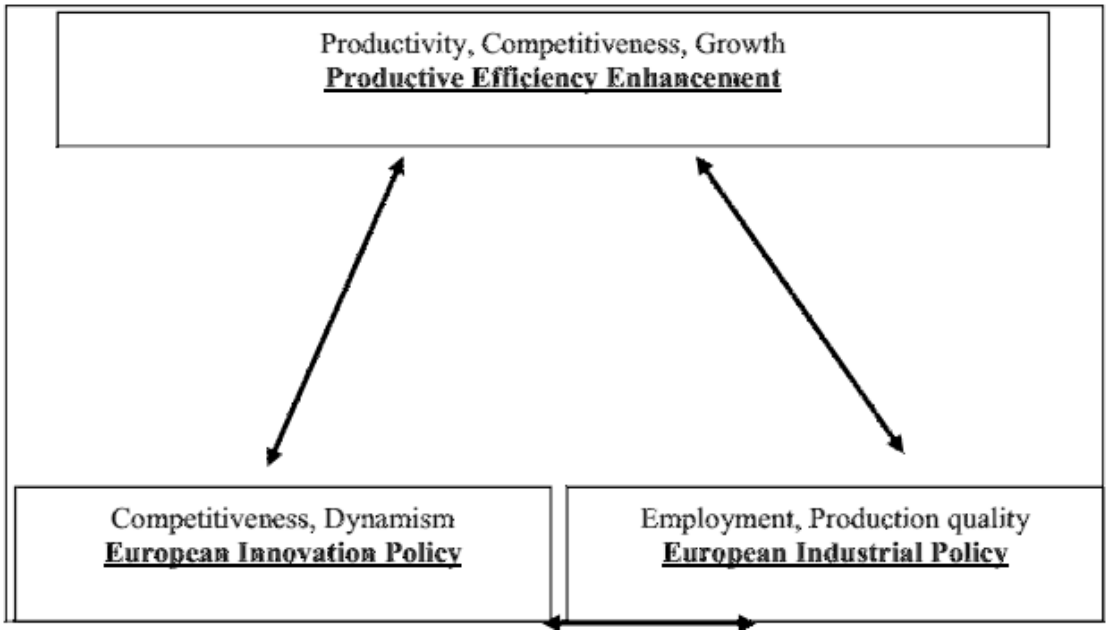
Keywords: Productive Efficiency, Innovation and Industrial Policy, Supply Chain Management
JEL classification:

1. Productive Efficiency and Innovation Policy

As technical efficiency enhancement becomes an increasingly important issue, production must draw on a wide range of production ideas, component technologies and complementary capabilities. Within this framework, it is rather difficult for any single industry to incorporate and take advantage of the relevant technological advances, as well as the underlying industrial and innovation policies. This means that the actions of industries involve the targeted development of specialized knowledge assets, which are integrated from a wider range of knowledge areas (Oh et al, 2009).

Growth and competitiveness become contingent on the ability of firms to compose, establish and maintain external interfaces (Oh et al, 2009), to choose the right mode of governance and to link these effectively to internal knowledge accumulation and capability development. The relationship between productive efficiency and innovation and industrial policy is illustrated in the following figure (1):

Figure 1. Strategic policies flows

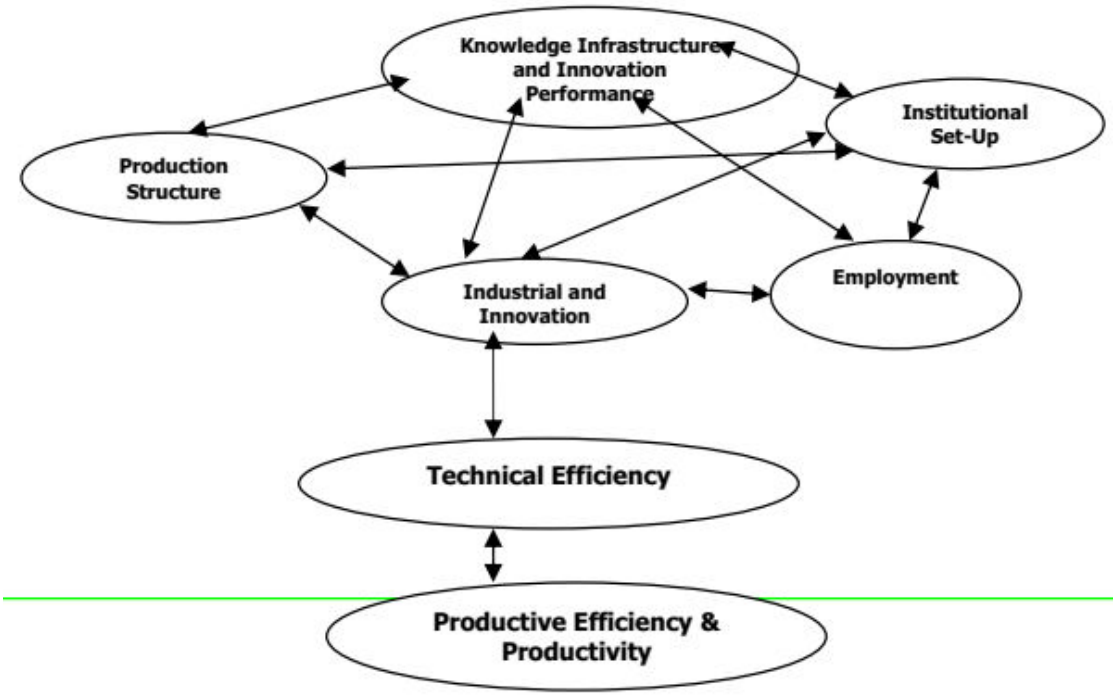


Source: Own Elaboration

European industrial, technology and innovation policies are no longer exclusively in the hands of national authorities: increasingly, national initiatives are supplemented by or even competing with regional innovation policies or transnational programmes, in particular, the activities of the European Union. At the same time, industrial innovation increasingly occurs within international networks. Research, technology and innovation policies of European countries clearly reflected the profiles of their national (and regional) 'innovation systems', understood as the various institutions, corporate actors and processes contributing to industrial and societal innovation.

The innovation policies of the European Union played a noticeable, but not yet a dominant role in the national contexts, at least not in the bigger member states (Battese et al., 2001). The following figure highlights the interactions among the main policy elements regarding the enhancement of technical and productive efficiency.

Figure 2. Productive Efficiency and Institutional Framework



Source: Own elaboration

The spectrum of implemented instruments of research, technology and innovation policy is widely differentiated in the meantime, reflecting the scope of institutions and interests involved: it stretches from public funding of research institutions over various forms of financial incentives to the conducting of research and experimental development in public or industrial research labs, up to the design of an innovation-oriented infrastructure, including the institutions and mechanisms of technology transfer. In many European countries, these instruments dominated the practice or research and technology policy for the last three decades. As further instruments one could mention efforts to guide public demand, measures in education and further training and the regulatory possibilities available. In the 21st century, though, the national and (regional) innovation systems are experiencing revolutionary shockwaves: the growing pull of internationalising economic relationships has mixed up traditional regional or national divisions of work between industrial enterprises, educational and research institutions as well as administration and politics, and it debased many of their traditional strengths. Internationalisation, however, has so far not led to a uniformity of the national innovation systems, which would finally mean their abolition. The various national and regional innovation cultures and related policy arenas react very differently, which partly leads them into crises, partly stabilises, but partly also reveals unexpected, novel chances in a transformed international context. At the same time, European transnational innovation policies have been entering the stage, increasingly since 1985, nowadays covering the whole range of instruments (Battese et al., 2001).

As a consequence, industrial policies were defined, aiming mainly to the competitive growth of the European industry, focusing on the following objectives:

- Accelerating the adaptive process of the industry to the structural changes;
- Developing an environment in the favour of initiative and development of enterprises;
- Encouraging the favourable environment for business cooperation;
- Favouring the industrial potential of the research, technologic development and innovation policies.

The following table presents the main priorities regarding the effectiveness of innovation and industrial policy implementation:

Table 1: Policy Effectiveness Priorities

Priority	Means and actions
• give priority to innovation and enterprise	• creating closer links between research institutes and industry, developing conditions favorable to R&D, improving access to finance and know-how and encouraging new business ventures;
• ensure full employment	• emphasizing the need to open up employment opportunities, to increase productivity and quality at work and to promote lifelong learning;
• ensure an inclusive labor market	• reducing unemployment and disparities in access to employment;
• connect European Union	• promoting closer integration by improving transport, telecommunications and energy networks;
• protect the environment	• stimulation of innovation, and introducing new technologies, for example, in energy and transport.

Source: Own elaboration

The difficult fiscal environment sets limits to policy action, but robust growth will reduce the burden of public deficit and debt, in line with the goals of the Stability and Growth Pact. For this an environment that favours new ideas and new businesses is required. Innovation is the primary driver of a successful and sustainable industrial policy. A strong lead in R&D and innovation is Europe's key competitive advantage and of central importance in finding solutions to economic challenges. With increased globalisation, one can only hope that industry will be an engine for the spreading of social progress, environmentally friendly technologies and innovations worldwide (Bhattacharjee et al., 2009). To achieve a truly sustainable, positive effect for manufacturing industry and the workforce it employs, the EU and its Members States should aim to avoid the relocation of manufacturing activities and related services (e.g. R&D, ICT) and support the permanent upgrading of European manufacturing industries.

One of the main aims of industrial policy regards the encouragement of innovation, knowledge and research. European Union industrial policy consists a framework which aims to encourage private investments in R&D, and insure an optimal use of the public resources for industrial research. Furthermore, encouraging investments in intangible assets and human capital is crucial, in order to maximize the efficiency of the current technology and its effects. Furthermore, supporting entrepreneurship and developing industrial sectors is an objective that goes beyond the limits of the industrial policy, by joining actions of the educational policies, internal market, financial services and tax policy (Bhattacharjee et al., 2009). Certain fields require specific intervention, in order to improve the internal market, such as the financial or services markets, where the technical barriers and the legislative differences limit the free trade, in order to improve the economic environment, with special attention in areas which present the fastest technological progress. However, the development objectives set at European level cannot be reached without a tight interconnection of the industrial policy measures with those of some complementary policies, such as the commercial policy, the single market policy, transport and energy policies, research and development policies, competition policy, regional and macroeconomic policies. While in these fields the policies are already coordinated, the sustainable development requirements, with the three development pillars: economic, social and environmental, require supplementary measures for coordinating the industrial policy with the associated policies and requirements. Thus, European Union must insure the balance between the different policies, and this balance must be followed at national level, within the limits of competency of the different member states (Nica and Cuza, 2010). On the other hand, cohesion policies amount to an efficiency-based long-run strategy of 'catch-up growth', in which the interventions aim to accelerate catch-up growth and achieve cohesion policies, rendering industrial policy aims into increased growth and employment and the improved international competitiveness of European industrial sectors (Belyakova et al., 2017, Almeada et al., 2017)

Currently, competition, the efficiency of public and private services, and infrastructure are important determinants of industrial competitiveness in European member states. A stronger enforcement of competition rules is necessary to reduce competition distortions. Moreover, today, the competitiveness of European industry crucially depends on the quality and efficiency of the energy, transport and communication infrastructure services, with the upgrading and modernisation of these networks being rather essential. Transport networks need to be improved to overcome any related obstacles and improve cross-border connections. These improvements will require massive investments and the development of innovative financing solutions. According to European Commission (2010), a new industrial innovation policy is needed to encourage the development of productive processe of goods and services, as well as the enhancement of productive efficiency.

European industry must also strengthen the knowledge base to remain competitive, investing in research and innovation for a sustainable and inclusive economy. Most importantly, science, technology and innovation play a significant role in increasing technical efficiency and are a driving force in international competition. Innovation policy is a broad concept that contains research and technology policy and often overlaps with industrial policy.

A transition towards a sustainable, resource efficient economy is paramount for maintaining the long-term competitiveness of European industries. Overall, European member states have made significant progress in defining and implementing consistent national legislative frameworks for stimulating efficiency. However, some lack the experience and the administrative capacity to do this and for these countries the framework legislation at the EU level can provide guidance and support.

To ensure progress towards the Europe 2020 goals, a broad range of existing EU policies and instruments are used, including the single market, the EU budget and external policy tools. The ten priorities of the Commission guide the EU policies and help ensure progress towards smart, sustainable and inclusive growth. The strategy itself identified seven policy areas where jobs and growth were put forward through the following seven flagship initiatives: 'Innovation Union', 'Youth on the move', 'Digital agenda for Europe', 'Resource efficient Europe', 'An industrial policy for the globalisation era', 'Agenda for new skills and jobs' and 'European platform against poverty and social exclusion'.

The Europe 2020 strategy gives recognition to the economic, social and environmental dimensions of sustainable development by drawing attention to education, research and development and innovation, low carbon emissions, climate resilience and environmental impact, and job creation and poverty reduction. In a broader policy perspective, the Europe 2020 strategy plays an important role in addressing the internationally adopted 2030 Agenda for Sustainable Development and thus putting the European Union on the right track to achieving a sustainable future.

The 2030 Agenda was formally adopted by world leaders at the United Nations Sustainable Development Summit in September 2015. The document, titled 'Transforming our world: the 2030 agenda for sustainable development', consists of a declaration, a set of 17 Sustainable Development Goals (SDGs; see Box 1 for a full list) and 169 related targets, a section on the means of implementation and on the follow-up and review of the 2030 Agenda. The EU was instrumental in shaping the global 2030 Agenda, which is fully consistent with Europe's vision and has now become the world's blueprint for global sustainable development.

In March 2017, at its 48th session, the United Nations Statistical Commission (UNSC) adopted a global indicator framework for monitoring progress towards the SDGs. The global list consists of 244 indicators to measure progress towards the 169 targets of the SDGs. In November 2016, the European Commission released the Communication 'Next steps for a sustainable European future: European action for sustainability', outlining its approach to achieving the 2030 Agenda. It presents the EU's answer to the 2030 Agenda and includes two work streams. The first work stream is to fully integrate the SDGs in the European policy framework and current Commission priorities, assessing where we stand and identifying the most relevant sustainability concerns. A second track is related to reflection work on further developing the EU's longer term vision and the focus of sectoral policies after 2020, preparing for the long-term implementation of the Sustainable Development Goals:

- Goal 1. End poverty in all its forms everywhere
- Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture
- Goal 3. Ensure healthy lives and promote well-being for all at all ages
- Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
- Goal 5. Achieve gender equality and empower all women and girls
- Goal 6. Ensure availability and sustainable management of water and sanitation for all
- Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all
- Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
- Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
- Goal 10. Reduce inequality within and among countries
- Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable
- Goal 12. Ensure sustainable consumption and production patterns
- Goal 13. Take urgent action to combat climate change and its impacts

- Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development
- Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
- Goal 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
- Goal 17. Strengthen the means of implementation and revitalize the global partnership for sustainable development

The quality and availability of infrastructure (energy, transport, and broadband) make an important contribution to an efficiency promoting environment. Industrial sectors need a modern public administration, able to deliver efficient and high quality public services (Korres and Kokkinou, 2011, Kokkinou, 2010). Coordinating clusters and networks improve industrial competitiveness and innovation by bringing together resources and expertise, and promoting cooperation among businesses, public authorities and universities. EU industrial and innovation policies should aim to overcome existing market failures and funding gaps, especially to supply the bridge between technical efficiency and productivity enhancement.

2. 3. Conclusions and Policy Implications

European governments are in need of a more coherent, more coordinated approach towards industrial technical efficiency support. However, the pressure on public budgets adds to the urgency of this matter in different policy areas of industrial and innovation policy. The range of explicit innovation policies being applied is very much concerned with the supply side and even more with R&D support of various types, ranging from funding of science in public institutions through to fiscal incentives for firms to increase R&D spend. A comprehensive approach to industrial and innovation policy can be achieved by supporting markets for innovative goods and services and excellence in research in new technologies, including information and communication technologies (ICT), introducing a more focused strategy to facilitate the creation of areas for action, and in particular introducing a more focused strategy to facilitate the creation and marketing of new innovative products and services (European Commission, 2006). Within the domain of industrial and innovation policy, regulatory reform is seen to affect innovation indirectly through affecting the funds available for investment and market size and structure, and directly through its impact upon the promotion of technical efficiency and productivity.

An open, efficient and competitive business environment is a crucial catalyst for growth in a global context. Improving the business environment covers policies in areas ranging from improving infrastructure to shortening the time needed to obtain a building license. In many cases, better institutional mechanisms need to be functioning as a single research area, business environment and innovation system. There need to be strategic approaches, which not only promote closer interaction among sectors but also among policy-makers (from different policy fields and different levels of government). European innovation and industrial policy is therefore recommended to develop strategic approaches which integrate R&D, innovation and industrial policy along with a more coherent EU strategy for innovative competitiveness, giving special attention to ICT in innovation and industrial policy.

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PORTFOLIO OPTIMIZATION IN SELECTED TEHRAN STOCK EXCHANGE COMPANIES (SYMBIOTIC ORGANISMS SEARCH AND MEMETIC ALGORITHMS)

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Abstract

The optimal portfolio selection problem has always been the most important issue in the modern financial literature. So, in this paper, we had shown that how an investment with n risky share can achieve the certain profits with less risk that spread between stocks. Such a portfolio, it is called an optimal portfolio and it is necessary to find solving the optimization problem. Hence, meta-heuristic algorithms such as Symbiotic Organism Search (SOS) and the Memetic Algorithm which is combination of the Genetic and SOS algorithms have been utilized to solve portfolio optimization in 23 selected Tehran stock exchange market during the period of 2009-2017. The results of optimization indicated that at the same precision. Memetic algorithm despite its time consuming has better performance than other algorithms. Moreover, Genetic algorithm despite its performance has the lowest time consuming. Hence, the main policy implication policy of this study is that the investors and financial analyzers should adopt the Memetic method as a proper and optimal meta-heuristic algorithm for minimizing the risk and maximize the return investment in portfolio.

Keywords: Portfolio Optimization Problem, Sharpe ratio, Genetic Algorithm, Symbiotic Organism Search Algorithm, Memetic Algorithm

JEL classification: C22, G35, G43

1. Introduction

One of the important theories in determining the optimal portfolio in last decades is the "Modern Portfolio Theory" which is proposed by Harry Markowitz and William Sharpe. The modern portfolio theory is a holistic approach to the stock market. Unlike the technical ones, this method discuss about the whole stock in market. In other words, this theory has a macro perspective versus a micro view. So the portfolio and the optimal combination of stocks are emphasized. Although in making a portfolio, the relationship between risk and return of stocks is important. One of the most important criteria of decision making in stock market is the return of stocks. Return of stock itself includes information and investors can use them in their financial analysis. In portfolio selection theory, some of the risk`s measures, add some difficulty to the problem and make it non-convex or non-differentiable. Moreover, the constraints in model make the feasible area as a non-convex area. Because of the complicated problem, optimization tools are limited to the group of tools that can obtain proper simplicity. These constraints in the model are the reasons of evolutionary algorithms usage and their extensions (Chen, 2015).

Modern portfolio theory aims to allocate assets by maximizing the expected risk premium per unit of risk. In a mean variance framework risk is defined in terms of the possible variation of expected portfolio returns. The focus on standard deviation as the appropriate measure for risk implies that investors weigh the probability of negative returns equally against positive returns. Portfolio optimization should consider realistic constraints such as portfolio size, transaction costs, or additional demands from investors rapidly, which adds a complexity level that exceeds regular optimization methods which falls into class of considerably more difficult NP-hard problems (Shaw and et al., 2008). Therefore, several studies have focused on the heuristic algorithms for complex constrained portfolio optimization problems which will be discussed in section 2.

If the system is nonlinear, these techniques have better potential to allow a feasible solution through its expert approach to self-organization. It has been noticed that these techniques generate better results than the statistical approaches when the time series is chaotic.

Today, with real world constraints, mean-variance model loses it functionality. So the best solution to solve portfolio problem with real world constraints is heuristic and meta-heuristic algorithms. Meta-heuristic algorithms can be divided into two categories. The first category is population-based algorithms like GA[1], PSO[2] and the second ones is local search algorithm like Taboo search and simulated annealing. Recently mixed algorithms like memetic algorithm has been used for underlying problem. Hence, the main aim of this paper is to optimize the portfolio selection problem in selected Tehran Stock Market companies during the 2009-2017. The first purpose of this paper is to compare the performance of the new memetic algorithm with its comprising algorithms. In other word, our memetic algorithm is the combination of Genetic and SOS algorithm. We want to compare this mixed algorithm with SOS and Genetic algorithm. The second purpose of this paper is to compare these algorithms with benchmark algorithm. Our benchmark algorithm is quadratic programming. Since, quadratic programming is used as the benchmark algorithm, unconstraint portfolio problem used as the main model. Otherwise, quadratic programming will be inapplicable. So, the model of this study is unconstraint mean-variance portfolio problem, benchmark algorithm is quadratic programming and the meta-heuristic algorithms are used are memetic, genetic and symbiotic organism search algorithms and Sharpe ratio has been applied for evaluating the performance of these algorithms during the period of 2009-2017.

The rest of this paper has been arranged as follows: In next section the review of literature has been stated. In third section, the problem of portfolio optimization has been explained and in next section, we present the meta-heuristic algorithms such as genetic algorithm, symbiotic organisms search and memetic methods. In section 5, the empirical findings of portfolio optimization have been reported and finally, the concluding remarks of paper has been presented.

2. Review of literature

In general, portfolio theory can be divided into modern and post-modern categories. Modern portfolio theory was introduce in an article by the name of (portfolio selection) by harry Markowitz in 1952. Thirty eight years later, Markowitz, Merton Miller and Sharpe won noble prize for (extended portfolio selection theory) in 1990. In 1952, he explained portfolio theory by Mean-Variance model. Some years later, this theory became the base of other theory. In a way that, risk became quantitative criterion for the first time. Before Markowitz, for evaluating portfolio performance investors focused just on one of the criteria. But Markowitz, explained the model in details and offered investors portfolio diversification in order to change stocks risk and return with portfolio risk and return criteria (Markowitz, 1952).

In post-modern portfolio theory, that introduced by Ram, Fergosen, Kaplan and Sigel in 1994, portfolio optimization and investors behavior was explained by return and downside risk. Down side risk is introduced as a risk measurement index, it means, the probability of minus return volatility in the future. In modern theory, risk in introduced as a volatility around the mean of return and is calculated by variance. Variance is considered as a balanced risk criterion, however in booming market, duo to investor`s short term goals, seek to gain positive fluctuation and just negative fluctuation is considered as a risk. So in this situation and according to investor`s risk aversion, investors are more risk averse than to find higher return. In other word, risk is not balanced and severely tends to downside risk. This theory, recognize the risk that is related to investor`s expected return. Other results that are better than expected return are not considered as a risk.

The advent of Value at Risk criterion as one of the accepted methods for quantifying market risk is the most important stage in risk management revolution. The word ‘VaR’ was

[1]. Genetic Algorithm
[2]. Particle Swarm Algorithm

introduced in a report by group of thirty in 1993. In that report 'VaR' was introduced as one of the branches of capital risk management. That report contributed a lot and emphasized on importance of risk measurement for tracing aim. Afterward, VaR became the most famous assessment economic risk method and as a risk measurer is widely used for tracing aim. Especially when G.P Morgan introduced the risk metrics in 1994. Today, value at risk is the most famous and applicable risk measurement method. This method is an intuitive method with capability of calculation and easy to understand to measure extended portfolio risk. This criterion can be introduced as a maximum loss in a specific time horizon with a confidence interval in a usual market situation. Although value at risk is a usual risk criterion, but it has undesirable mathematic features. So, Artzener and et al in 1992 introduced the idea similarity as a set of risk measurement feature in relation with the tail of distribution function. Conditional Value at Risk is one of the most important risk measurer that is introduced by Rakefeller and Uryaseff in 2000. CVaR has shown better feature than VaR and it can tell us that if the condition is unfavorable, how much loss do we expected (Farzi & Shavazi, 2015).

On the empirical point view, portfolio optimization has been used in most previous studies with multiple objectives, and many heuristic algorithms for solving this problem. Crama & Schyns (2003) used simulated annealing algorithm (SA) for optimizing portfolio selection problem. The objective function of their model was to reduce portfolio risk, and expected return of investor was assigned and set as a constraint. The method is an efficient solution in the scope; however, it is still a complicated solution to manage due to the space of feasible portfolios that is simplified in our algorithm. Lin & Liu (2008) proposed a decision making model for portfolio selection aimed at minimizing transaction lots. They solved the model with genetic algorithm (GA). Their method found the solution in a short reasonable time, but the current case that is the market is the only uncertainty in reality and some other risk cases must be added. In another study, Soleimani et al (2009) considered a new factor called market capitalization in addition to transaction cost and the number of stocks in the portfolio constraints. They utilized genetic algorithm for solving the proposed model. This method seems could be salient and an efficient method applied in portfolio problem but we would that it has had some limitations for the various markets with hard boundaries and still has a problem in scalable uncertain markets. Hami and Itmi (2010) proposed a new method for a modified particle swarm optimization algorithm (MPSO) combined with a simulated annealing algorithm (SA). This method has the relative advantage to provide best results comparing with all heuristics methods PSO and SA. In this matter, a benchmark of eighteen well-known functions is given. These functions present different situations of finding the global minimum with gradual difficulties. Findings of this study results showed the robustness of the MPSO-SA algorithm. Numerical comparisons with these three algorithms: Simulated Annealing, Modified Particle swarm optimization and MPSO-SA prove that the hybrid algorithm offers best results. Farzi et al (2010) proposed mean-variance model and employed two meta-heuristic algorithms based on improved PSO and GA algorithms to solve the underlying problem. The results of their studies showed that although GA algorithm presented higher return but PSO algorithm prepared lower risk and it can be the superiority of PSO algorithm. Zhu et al (2011) applied two heuristic algorithms for constrained and unconstrained mean-variance model. The results indicated that the PSO algorithm is better than GA algorithm in all cases. Tuba and Bacanin (2014a) employed mixed meta-heuristic algorithm in comparison to four algorithms for cardinality constrained mean-variance model. The underlying algorithm was mixed bee colony and firefly algorithm, other algorithms are GA, SA, TS and PSO. The results show that, the mixed algorithm has better performance than other methods. Tuba and Bacanin (2014b) utilized improved firefly algorithm for constrained and unconstrained portfolio optimization problem. Then compare this algorithm with other algorithms. Results indicate that improved firefly algorithm is better than other algorithms. In other studies, Salahi et al (2014) proposed constrained mean-variance portfolio problem and applied two meta-heuristic algorithms based upon improved PSO and HS algorithms. The results of this paper indicate that in finding the solution, improved HS algorithm is faster than PSO. Raie and Beigi (2010) proposed constrained and unconstrained mean-variance portfolio problem model and employed two meta-heuristic algorithms based on PSO and GA. The sample that was used for this study was 20 weekly security prices. The final results indicated that PSO algorithm performed much better than GA. Later, Eslami Bidgoli and Taiebi Sani

(2014) applied Memetic Ant Colony Algorithm for cardinality constrained mean-variance portfolio model and Value at Risk approach. (Value at Risk approach was risk criterion) the results indicated that in every respect, memetic algorithm has better performance than genetic algorithm.

Shadkam et al (2015) had studied the determination of the optimal portfolio with respect to stock returns of companies, which are active in Tehran's stock market during the 2008-2013. The empirical results of their paper showed more convergence rate and accuracy of the COA rather than the Genetic Algorithm in low iteration. Batabyal (2016) has investigated the increasing returns in a model with creative and physical capital. Results of this study showed that there is increasing return to scale in the growth model.

Eftekharian et al (2017) by applying a new efficient multi-objective portfolio optimization algorithm called 2-phase NSGA II algorithm is developed and the results of this algorithm are compared with the NSGA II algorithm. The results of this study indicated 2-phase NSGA II significantly outperformed NSGA II algorithm. Johanyák (2017) presents a modified version of the original method by combining PSO with a local search technique at the end of each iteration cycle. The new algorithm is applied for the task of parameter optimization of a fuzzy classification subsystem in a series hybrid electric vehicle (SHEV) aiming at the reduction of the harmful pollutant emission. The new method ensured a better fitness value than either the original PSO algorithm or the clonal selection based artificial immune system algorithm (CLONALG) by using similar parameters. Pantazis and Pelagidis (2017) analyzed the financial indicators affecting stock performance in the case of capital product partners. The results of this article indicated that there is a positive and negative relationship between financial indicators and stock performance in listed shipping companies.

Reviewing the empirical studies in Iran indices that, in previous studies in the context of portfolio selection, the SOS and MA has not considered for solving and optimizing the problems. So, the main contribution of this paper is to solve and optimize the portfolio selection in 23 selected of Tehran stock companies during the period of 2009-2016.

3. Portfolio optimization problem definition

There are many portfolio optimization problems. The one the basic ones is Markowitz mean-variance model. This model is quadratic objective function and linear constraints. It is formulated as follow:

$$Min\ \sigma_p^2 = \sum_{i=1}^{N}\sum_{j=1}^{N} w_i w_j \sigma_{i,j} \quad (1)$$

Subject to:

$$\sum_{i=1}^{N} w_i \mu_i = R^* \quad (2)$$

$$\sum_{i=1}^{N} w_i = 1 \quad (3)$$

$$0 \le w_i \le 1, \forall i \in (1,2,\dots,N) \quad (4)$$

In equation (1), N is the number of assets (*i and j*), σ^2 is the portfolio variance, w is the weight of each assets in portfolio or the proportion of total capital that is invested in security i and $\sigma_{i,j}$ is the covariance matrix of assets. In equation (2), R^* is the targeted return of portfolio and μ is the average return of each assets. Equation (3) indicates that, the sum of all assets weight must be equal to one. And in equation (4) it is indicated that the weight of each assets must be between zero and one.

Eq. 1 is objective function (risk) which is subjected to minimization. Eq. 2 is the predefined return. Budget constrained for feasibility is in Eq. 3 and in Eq. 4 indicates that all investment should be positive (no short selling).

This model can provide one portfolio. If we need efficient frontier, we must define a new parameter that is investor risk sensitivity. With this parameter, model can provide a portfolio for each investor`s sensitivity.

$$\min \lambda\left[\sum_{i=1}^{N}\sum_{j=1}^{N}[w_i w_j \sigma_{i,j}]\right] + (1-\lambda)\left[-\sum_{i=1}^{N}[w_i \mu_i]\right]$$

Subjected to:

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

$$0 \leq w_i \leq 1, \forall i \in (1,2,\dots,N)$$

The parameter λ is investor sensitivity, when λ is equal to 1, model provides lowest risk portfolio and when λ is zero, model provide highest return portfolio in efficient frontier. There is a trade off in this model, it means that the more risk an investor can tolerate, the higher return portfolio he can earn. And the last thing that should be mentioned here is that, in efficient frontier for the given level of risk there is no portfolio that has higher return than efficient frontier portfolio return. It is the same for the given level of return.

The study of the Artificial Neural Networks began in 1943 by Warren S. McCulloch & Walter Pitts. Since the aim of the artificial intelligence is to develop the humanly used paradigms or algorithms for machines, the artificial intelligence emulates the human brain performance. One neuron (nervous cell) is a certain biological cell, which processes the data. This cell is made up of a body of cells, Axon and Dendrites. The neuron receives signals (simulators) through dendrites (recipients) from the environment or from other neurons, and transmits the created signals by a body of cells, through Axon (sender). At the end of them, there are synopses. A synopsis is a basic structure and a functional unit between two neurons (one neuron at Axon, the other at Dendrite).

Synoptic connections can be corrected by passing signals through them whereby synopses may be engaged in learning process from their share of work. This historic dependence in synoptic connections acts as memory and may provide a response to the memory accordingly.

The first artificial neuron was presented by McCulloch & Pitts which is derived from the natural neuron. The inner connections and communications, i.e. the input and outputs, shape models out of Dendrite and Axon, communicative weights represent synopses and activity function, which estimate the body performance.

One of the major features of the artificial neural networks, whose function approximates more to that of human beings, is the power of learning. The neural networks use basic rules (like input-output links) out of a set of interpretive models for learning in place of pursuing a set of rules defined by an expert. In order to understand or design a learning process, first it is essential to have a model of the environment in which the network is involved. Such a model is named “learning algorithm”. Second the learning rules governing the updating process, or in other words, networks weight updating process should be known.

One of the most important learning algorithms in the neural network is the "back propagation algorithm" which per se is based on the rule of “error – correction”, and for the gradual decrease of error, where the actual output of (y) network is not equal to the desirable output (d), the neural weights can be corrected by using the error sign of (d-y).

Considering the way the neurons stand out , their interrelationship, the neural networks characterize a specific architecture out of which a well- known one is the multi–layer perception network where by the data direction is why they are called “Feed-forward neural network

4. Symbiotic organisms search algorithm

Symbiosis is derived from the Greek word for ‘‘living together’’. De Bary first used the term in 1878 to describe the cohabitation behavior of unlike organisms. Today, symbiosis is used to describe a relationship between any two distinct species. Symbiotic relationships may be either obligate, meaning the two organisms depend on each other for survival, or facultative, meaning the two organisms choose to cohabitate in a mutually beneficial but

nonessential relationship. The most common symbiotic relationships found in nature are mutualism, commensalism, and parasitism. Mutualism denotes a symbiotic relationship between two different species in which both benefit. Commensalism is a symbiotic relationship between two different species in which one benefits and the other is unaffected or neutral. Parasitism is a symbiotic relationship between two different species in which one benefits and the other is actively harmed (Chen, & Prayogo,2014).

Algorithm pseudo code and equation

Initialization
Repeat

- **Mutualism**

$$X_{inew} = X_i + rand(0,1) * (X_{best} - Mutual_{vector} * BF_1)$$
$$X_{jnew} = X_j + rand(0,1) * (X_{best} - Mutual_{vector} * BF_2)$$
$$Mutual_{Vector} = \frac{X_i + X_j}{2}$$

In mutualism, organisms receive benefit from each other. Here means two categories of random numbers are generated and make mutual vector as an average numbers.

- **Commensalism**

$$X_{inew} = X_i + rand(-1,1) * (X_{best} - X_j)$$

Commensalism means benefiting from organisms is one sided. Here means, two kinds of random numbers are generated and subtract number from each other.

- **Parasitism**

Organism X_j is selected randomly from ecosystem and parasite vector generate and organism (generate random number). If the generated fitness of parasite vector is better than generated fitness of organism X_j, then parasite vector will be replaced by organism X_j.

Until (termination criterion is met)

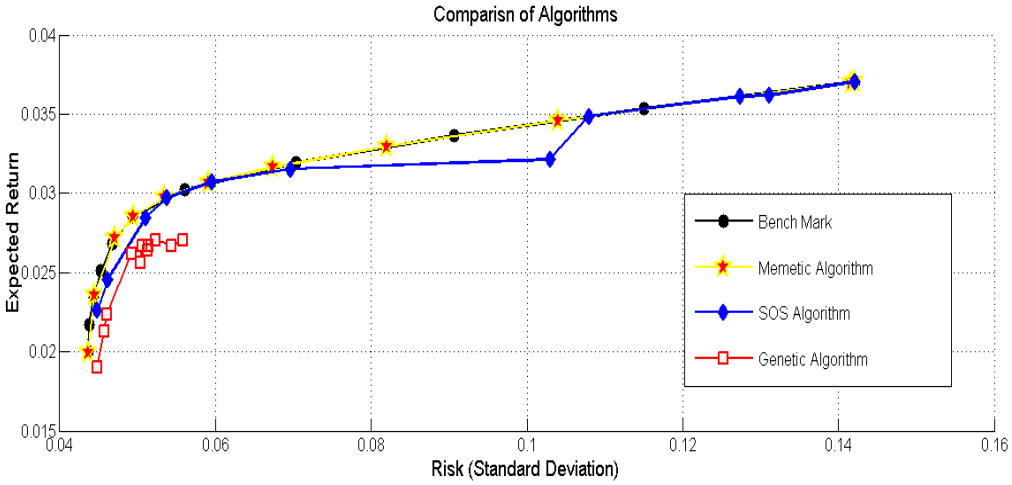
4.1. Memetic Algorithm

Since genetic algorithm has mutation and crossover as the only two operators, sometimes in some cases, the performance of genetic algorithm is not sufficient or satisfactory. So, we use other algorithm to contribute to genetic algorithm and undertake the local search operation. This mixed algorithm is called Memetic. Memetic algorithm can be constructed by combination of genetic and other algorithms. It means, the base algorithm is genetic and it can be combining by other algorithms to make Memetic algorithm. In this study, Memetic algorithm is comprise of GA and SOS algorithm. The data sets for stock price for 23 selected companies of Tehran stock exchange market during the period of 2009-2017 have been extracted from the financial reports of companies. Moreover, the calculation of return and risk of portfolio has been formulated in MATLAB software. We constrained the companies to the 23 companies of 50 companies of most active industry in stock market of Tehran. The main constraint of our sample selection is concerned to the availability of all data sets to these companies.

5. Empirical findings

In this paper, we propose unconstrained M-V model and apply three meta-heuristic algorithms and M-V model as a benchmark to obtain the efficient frontier line. At first, the algorithms are compared with their performances and then, Sharpe ratio is used to compare their best portfolios. The result of algorithm and benchmark for achieving efficient frontier has been shown in following figure:

Figure 1: Comparison the performances of algorithms

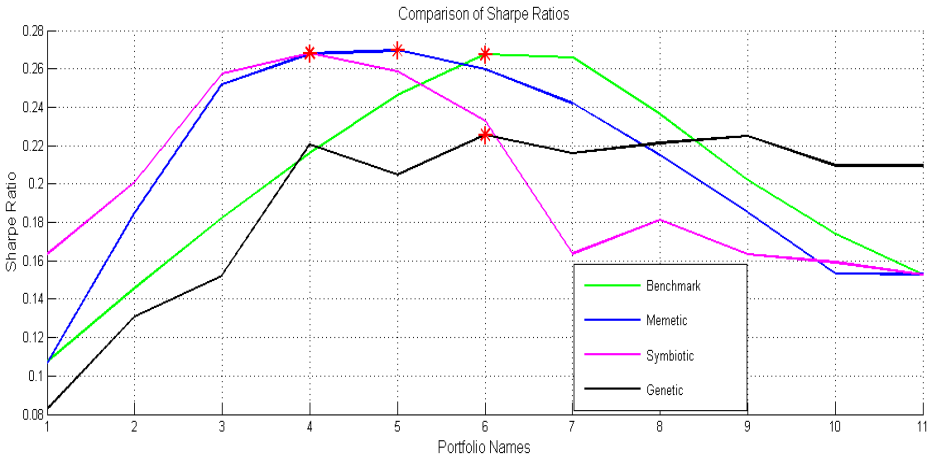


As it is depicted, the genetic algorithm that is shown by red color, can`t fully achieve the efficient frontier like Memetic algorithm. Hence it is shown the inefficiency of genetic algorithm. SOS algorithm is shown by blue color. Its performance is better than genetic algorithm but it stills have differences with benchmark. And finally, Memetic algorithm that is shown by yellow color can cover the benchmark with low error. The results of Sharpe ratio for each algorithm have been shown in Table 1:

Table 4: Algorithms Sharpe ratios

The Sharpe ratio of algorithms			
Markowitz	Memetic	SOS	Genetic
0.1072	0.1064	0.1634	0.0826
0.1457	0.1851	0.2008	0.1309
0.1823	0.2518	0.2576	0.1525
0.2162	0.2679	0.2680	0.2205
0.2461	0.2696	0.2587	0.2048
0.2696	0.2597	0.2331	0.2254
0.2658	0.2422	0.1636	0.2160
0.2361	0.2149	0.1811	0.2212
0.2020	0.1855	0.1634	0.2248
0.1742	0.1532	0.1592	0.2096
0.1528	0.1528	0.1528	0.2096
Maximum Sharpe ratio			
0.2696	0.2696	0.2680	0.2248

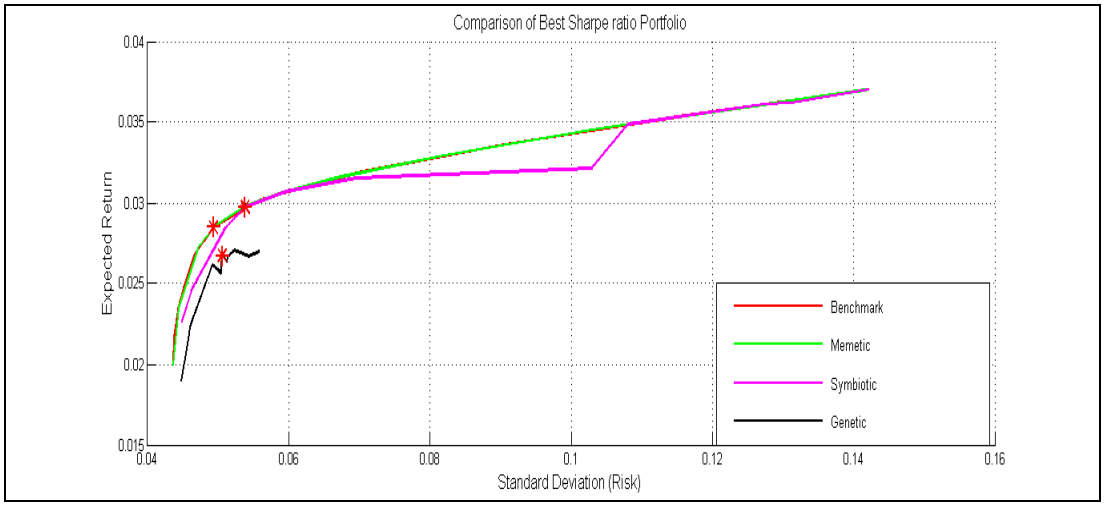
Figure 2: Best Sharpe ratio for each algorithm



The highest Sharpe ratio are indicated as the red star for each algorithm. As you can see above the blue line is memetic algorithm and its value is as the same as benchmark value. The purple line is symbiotic organism search algorithm. Its value is just slightly lower than memetic algorithm and the black ones is Genetic algorithm that has the lowest value. We choose the highest Sharpe ratio and its corresponding portfolio in each algorithm and plot them in figure bellow.

The result of Sharpe ratio for best portfolio in efficient frontier line:

Figure 3: best Sharpe ratio portfolio



Best portfolio in each algorithm efficient frontier line is shown by red star. As it is shown, there are three red stars for four efficient frontiers. It means that since Memetic algorithm has the same Sharpe ratio with benchmark, their best portfolios (red star) are exactly in the same place and we can see just three portfolios. The best Sharpe ratio portfolio is in the green line or (it is obtain by memetic algorithm) and worst Sharpe ratio is in the black line (obtained by GA).

In next section, the calculated portfolio value, risk and cost function for the two algorithms of SOS and Memetic have been tabulated as following table.

Table2. Comparison of final result for two algorithms

comparison	cost	portfolio value	risk
SOS	-5323.945	10324.177	5000.321
Memetic	-5588.964	12388.727	6799.762

Also, below table shows, the weights that are got by two algorithms in constrained portfolio problem.

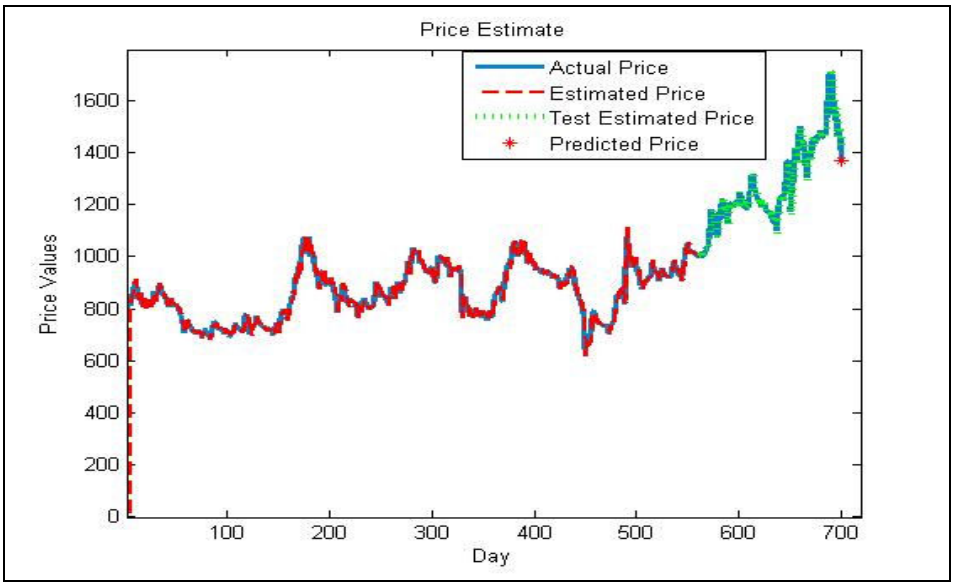
Table3: The weight allocated to any company in portfolio

	company	weights by SOS	weights by Memetic
1	Takin Co	0.0522	0.0123
2	Bu-Ali Investment	0	0
3	Transfo Iran	0.0176	0.01
4	Jaberebn Hayan Darou	0.0511	0.0141
5	Isfahan Folad	0.0274	0.0116
6	Fars Khozestan	0	0
7	Saipa	0	0
8	Service Anformatic	0.2997	0.2997
9	Behshar Toseeh	0	0.0104
10	Sina Bank	0.0106	0
11	Ghadir Investment	0.1599	0.1249
12	Building Iran	0.0246	0
13	Roy Iran	0.0202	0.01
14	Ama	0.00114	0.0112
15	Yasa Iran	0.1399	0.2934
16	Traktor	0.00241	0.0119
17	Iran Chini	0.00213	0.0105
18	Mokhaberat Iran	0	0.0105
19	Abadan Petroloshimi	0.1298	0.158
20	Hafari Shomal	0.01	0.0111
21	Zamyad	0.004	0.007
22	Saipa Azin	0.0021	0.008
23	Saipa Diesel	0.021	0.01309

Source: Empirical Findings

In the next level, in order to calculate and estimate the value of optimized portfolio and risk for the next day, we should predict the prices. In order to do this, AR(10) is used and the parameters of this model are estimated by RLS method. The prediction of this model is based on a step forward method. In this model, 80 percent of data are used as a training data and other 20 percent are used as a test data. For example, in this figure a time series is showed and the price of day 701 is predicted by price of 700 days.

Figure4. Estimation and prediction of a next step prices by RLS method



In order to be assuring of the estimation accuracy, we predict the price of days 650-700 and make a comparison between the real price and predicted price. To show the error of prediction, standard deviation is used. The error of estimation is the absolute difference of estimated prices and real prices as below:

Table 4. The absolute standard deviation of estimation error for 50 days price by RLS method

company	absolute standard deviation	company	absolute standard deviation
Takin Co	126	Ghadir Investment	95
Bu-Ali Investment	19	Building Iran	81
Transfo Iran	84	Roy Iran	73
Jaberebn Hayan Darou	138	Ama	239
Isfahan Folad	122	Yasa Iran	317
Fars Khozestan	96	Traktor	89
Saipa Dissel	46	Iran Chini	164
Service Anformatic	132	Mokhaberat Iran	67
Behshar Toseeh	109	Abadan Petroloshimi	202
Sina Bank	53	Hafari Shomal	98
Zamyad	59		
Saipa Azin	83		

To show the applicability of this method, this process has been done for all the stocks. In other word, we optimized portfolio with 50 predicted and real data by Memetic algorithm. In this table, is indicated that there is little difference between real and predicted cost function, portfolio value and risk. The optimized results are got from 100 iteration of algorithm.

Table 5. Comparison between real and predicted data by Memetic algorithm in optimization problem

Comparison of Data	Cost	Portfolio Value	Risk
average of exact data	-5610.215	12903.803	7293.587
average of exact data	-5620.821	12881.341	7260.518
error standard deviation	21.7	214.4	217.5

6. Concluding remarks

Since the stock market behavior is non-linear thus, the linear models are unable to describe the share return behavior. The systems can simply recognize a major portion of the system, which is non-linear. Each share is inspired by diverse factors and conditions which are sometimes systemic and at times non-systemic with unique models of import as well.

The parameters of Markowitz model, which are comprised of expected return of portfolios, variances and covariance, must be estimated.

This paper presents a new meta-heuristic algorithm that is called 'symbiotic organisms search' and then combines this algorithm with GA to make a new Memetic algorithm. Then, apply this three algorithm to solve unconstrained M-V model. Finally the results of this study reveal that in comparison to benchmark, Memetic algorithm has the best performance but it takes 40 seconds to solve the model. And the worst performance is dedicated to GA. GA has the worst performance but it is the fast algorithm among the others. The Sharpe ratios are provided by the algorithms are 0.2696, 0.2680 and 0.2248 that Memetic has the higher Sharpe ratio among the others. The most important and interesting result is that, Memetic algorithms has the same Sharpe ratio as the benchmark. This result indicates that, if there is not possibility for using quadrating programming (because of cardinality constraint e.g.), Memetic algorithm can be the best choice for solving this kind of problems. Because Memetic algorithm has shown its performance in comparison to benchmark!

The result of this paper is consistent with theoretical framework and empirical studies. Moreover, the main policy implication of this study is that the investors should adopt the Memetic algorithm to select the best approach in stock market.

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METHODOLOGICAL AND PRACTICAL ASPECTS OF HUMAN POTENTIAL MANAGEMENT IN THE REGION

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Abstract

Human potential is the main factor, a key aspect of the socio-economic development of the region. The article presents a systematic approach to the management of the human potential of the region, which is distinguished by its novelty and based on modern methods of system analysis, management and regional economy. In the course of the study, a model for managing the human potential of the region is formed, based on a system with a closed loop, consisting of a number of simpler functional subsystems. The structure and the mechanism for managing the human potential of the region based on the proposed conceptual model are substantiated. The scientifically grounded proposals and recommendations on the formation, use of the system at the regional level are presented. A system of indicators for the integrated assessment of the human potential of the region has been developed in linking them to strategic development guidelines. In total, eight fundamental quantitative indicators have been identified. Based on these indicators, the integral indicator (the level of the human potential of the region) is calculated. Using the formed system of indicators makes it possible to assess the magnitude of human potential, the effectiveness of the proposed management model. In addition, it is planned to monitor the dynamics of indicators, conduct interregional comparisons. Approbation of methodological tools was carried out on the example of Oryol region, Russia (2010-2015). Priority directions of development of human potential in Oryol region are determined and some recommendations for their implementation are given.

Keywords: human potential, structural components, Oryol region, priority directions
JEL classification:

1. Introduction

Human potential of the region (HPR) is described as a set of development expectations and opportunities related to individuals, companies and other regional economy entities and pointed towards achieving desired development goals for the regional society [1]. It represents a complicated scientific category that includes both economic and social aspects and requires and overall, multifaceted review.

Research findings dealing with human potential, its separate components, various approaches to the qualitative and quantitative assessment of the human potential magnitude are introduced in several papers by Russian and foreign scientists .

Foreign researchers who substantially contributed to the studies on this topic are represented by E. Denison, A. Toffler, R. Layard, W. Petty, A. Smith, K. Marx, A. Sen. S Bowles et al.

Such Russian scientists as T.I. Zaslavskaya, K.A. Kotomnova, Ye.V. Chuchulina, O.I. Ivanov, N.N. Morozova, S.N. Sakharovsky, A.O. Verenikin, S.Ye. Yolkin, A.B. Doktorovich, et al, have investigated human potential.

These days it seems reasonable that major tasks in this area include development of the integrated model for managing the HPR, methodological framework and regional human potential management mechanism. It is extremely important for implementation of regional development strategies, system-based coordination of regional management constituents.

2. Modern Approaches to HPR Management and Assessment

The research papers highlight various human potential features called as elements, components and opportunities. These components constitute HP complicated structure. The analysis completed on the previously conducted research suggests that the most significant HP components include health, industrial/organizational, social, educational and demographic components [2-3]. Some papers also describe such HP (in, particular, HPR) components as innovation, competitiveness, labor, activity, etc.

In addition to specific components highlighted, researchers denote HP levels. Thus, micro-, macro- and meso-levels of HP implementation have been identified. Besides, human potential features basic and active, individual and collective levels [4].

Along with investigating human potential structural components, its features and indicators, researchers give much attention to HP assessment. Since "human potential" notion implies versatility and diversity, this task is rather difficult. It is very difficult to give a qualitative assessment to the components like cultural, moral and spiritual [5].

However, the current situation suggests some quite mature approaches to calculation of HP quantitative indicators. Thus Human Development Index (HDI), calculated using living standards, education and health (life expectancy at birth) data, has proved to be the most widespread. Ye.V. Chuchulina highlights the following indices (indicators) of the regional HP full assessment: stock of human potential in regions (SHP), flow of human potential in regions (FHP), quality of human potential in regions (QHP), investment into human potential in regions (IHP).

Referring to sustainable management of human potential in regions, it is important to indicate fragmentary nature of studies dedicated to this topic and lack of an integrated model for managing human potential of the region. A similar model shall be developed taking into account various external and internal factors (with respect to the regional system) and shall provide for forecasting human potential status and development.

3. Structure and Quantitative Indicators of Regional Human Potential Assessment

With regard to the analysis of the current techniques, we propose a hierarchically structured model of the human potential (so called, hierarchy model that has some similarities with the hierarchy of needs). The first basic level features the following components: *health (physical and psychic), demography, socio-economic components*. This level is called fundamental since it forms the basis serving to establish and develop other components. In case, the basic level is not in proper condition other components can hardly exist.

The second human potential structure level (with consideration of a particular region) includes the following components: *education, profession and labor, competition and entrepreneurship.* The second level correlates and interacts with the first one. For example, total health and income standards have a significant impact on the education quality and further actualization of the potential in the labor market.

The third top level is formed by *research, scientific and technical, innovative and creative* components. This level involves great intellectual capital, striving for maximum self-actualization, generation of new knowledge and innovative products. Intensive personal growth in diverse respects is the case in point [6].

The authors of this research have developed a system of indicators for the integrated assessment of the human potential in the region based on the components identified in the hierarchy structure. In total nine basic quantitative indicators have been identified:

1. Health indicator – IH.
2. Demographic indictor – ID.
3. Socio-economic indicator – ISE.
4. Educational indicator – IE.
5. Professional and labor indicator – IPL.
6. Competition and entrepreneurship indicator – ICE.
7. Research indicator – IR.
8. Scientific and technical indicator – IST.
9. Integrated indicator (HPR level) – HPI (UHP).

Let us discuss in more detail the calculation method used for these indicators, their interpretation and importance for developing and functioning of the HPR management system.

The first estimate indicator engaged in the proposed method is a health indicator (IH):

$$IH = \frac{TRP - (MR + DN)}{TRP} \quad (1)$$

TRP – total regional population;

MR – population morbidity rate per major categories of diseases (number of patients diagnosed with the condition for the first time);

DN – number of individuals aged 18 and over recognized as disabled persons for the first time.

This indicator represents the regional population share not falling into the categories designated as MR and DN in the total population. The IH health indicator shall grow; in this context, it is important to conduct a factor analysis, i.e study which indicators trigger changes in the indicator total value. Thus, it is evident that a component to (MR + DN) sum shall go down, in this respect, it is necessary to achieve a sustainable increase in TRP and healthy population share.

The next indicator reflects the quantitative aspect of the ID (HPR) demographic component:

$$ID = \frac{(AB - DI) + MP}{TRP} \quad (2)$$TRP – total regional population;

AB – annual births in the region;

DI – deaths of infants aged under one year in the region;

MP – number of people moved into the region (in particular – from Russian regions, CIS countries, from other foreign countries).

The introduced indicator is mainly descriptive of MP inflow to the region resulting from natural and migratory population mobility. AB is adjusted for DI value that designates the number of people who will never become human potential bearers and will not participate in regional socio-economic processes.

The third developed indicator (ISE) serves as a quantitative feature of the HPR component:

$$ISE = \frac{TRP - RPLI}{TRP} \quad (3)$$

TRP – total regional population;

RPLI – number of regional population with money income lower than a subsistence wage.

The provided indicator represents the population share in the total TRP with incomes higher than a subsistence wage. The proposed indicator is important on the ground that in case money incomes are lower than the SW value HP (HPR) reproduction and development is not only extremely complicated but practically not possible (let alone, high quality and continuously improved human potential). Generally, ISE indicator value shall tend to one. As the formula shows (3), ISE = 1 provided the region has no individuals whose incomes are lower than the subsistence wage (RPLI = 0).

The fourth indicator (IE) is necessary for quantification and assessment of the HPR educational component:

$$IE = \frac{CPE + SGS + SVT + SHE}{TRP} \quad (4)$$TRP – total regional population;

CPE – number of children in preschool educational institutions;

SGS – number of students in general education schools;

SVT – number of students in vocational education and training institutions;

SHE – number of students in higher education institutions.

The above indicator describes the share of individuals in the total regional population who are going through an educational process. The higher the IE indicator is the higher HPR quality and the wider the range of strategic benchmarks of the innovative development are, etc. This indicator represents a potential that may be actualized in the future labor market,

including the market outside a particular region, it also reflects opportunities for replenishment and saturation of the professional and labor component [7].

The next indicator (IPL) may be applied to quantitative assessment of the professional and labor component:

$$IPL = \frac{WFS}{TRP} \quad (5)$$TRP – total regional population;

WFS – work force size in the region.

This indicator represents the work force share in the total regional population. It is known that WFS indicator covers both economically active and unemployed population. When calculating the IPL indicator we consider the unemployed to be bearers of human potential that will be actualized at some time in the labor market and in various society life spheres. The indicator value should grow but for the purposes of factor analysis, principally, due to the growing number of economically active people.

In accordance with the proprietary method, the competition and entrepreneurship indicator (ICE) is calculated as follows:

$$ICE = \frac{SME}{ERE} \quad (6)$$

SME – number of small business employees (including, micro enterprises);

ERE – number of people engaged in the regional economy.

The indicator represents the share of small business employees in the total number of people engaged in the regional economy. This formula indicates the quantitative status of small business in the region. It is advisable to underscore that the full-fledged description of the competition and entrepreneurship component requires reviewing competitive environment status, etc. [8].

Besides, for the research purposes this indicator may undergo further modification. For example, active private entrepreneur rate in the region (PER) may replace SWE indicator in the numerator, the SME indicator may omit regional micro enterprises, etc. In order to avoid repeat count, it is not recommended that SME and PER be used in the same formula (for example, if private entrepreneurs are also small business employees).

The seventh indicator is the indicator corresponding to the research indicator (IR) and is calculated as per the following formula:

$$IR = \frac{PST + DST}{PS + DS} \quad (7)$$

PST – number of postgraduate students with PhD thesis Viva Voce;

DST – number of doctoral students with doctoral thesis Viva Voce;

PS – number of postgraduate students;

DS – number of doctoral students.

The provided indicator describes the reserve pool of research staff as well as productivity in terms of thesis Viva Voce (logical and successful completion of postgraduate and doctoral studies, respectively). Empirically this indicator presents the level of desire, experienced by the regional population, for generation of new knowledge, plunging into new areas, discoveries, very high level of self-development and self-actualization [9].

The eighth indicator is descriptive of two components – scientific and technical; innovative and creative (IST):

$$IST = \frac{RN}{RDP} \quad (8)$$

RN – number of researchers (along with technicians, auxiliary and other staff, which are also classified as RDP by the official statistics);

RDP – number of personnel involved in research and development.

The above indicator shows the share of individuals directly involved in researches (persons who are engaged in developments and bring in a greater creative portion to the research) in total RDP. This indicator differs from the previous indicator– formula (7) – mainly by the fact that it takes into account the researchers employed by particular enterprises whose job is more applied (than theoretical) in nature as compared with researchers in educational institutions.

Scientific and technical achievements in this case are sufficiently closer to their actual practical use and commercialization.

We combine the feature of both above components in this indicator, as innovative products may be invented and used and technology transfer implemented (in particular, through specialized technology transfer centers (TTC) in regions, etc.) in the course of research conducted at enterprises [10].

Finally, based on eight relative indicators obtained, we may calculate the ninth summarizing indicator (integral) that describes the HPR – HPI (UHP) level. It is calculated as a geometric mean value of eight above indicators:

$$HPI(UHP) = \sqrt[8]{IH * ID * ISE * IE * IPL * ICE * IR * IST} \quad (9)$$

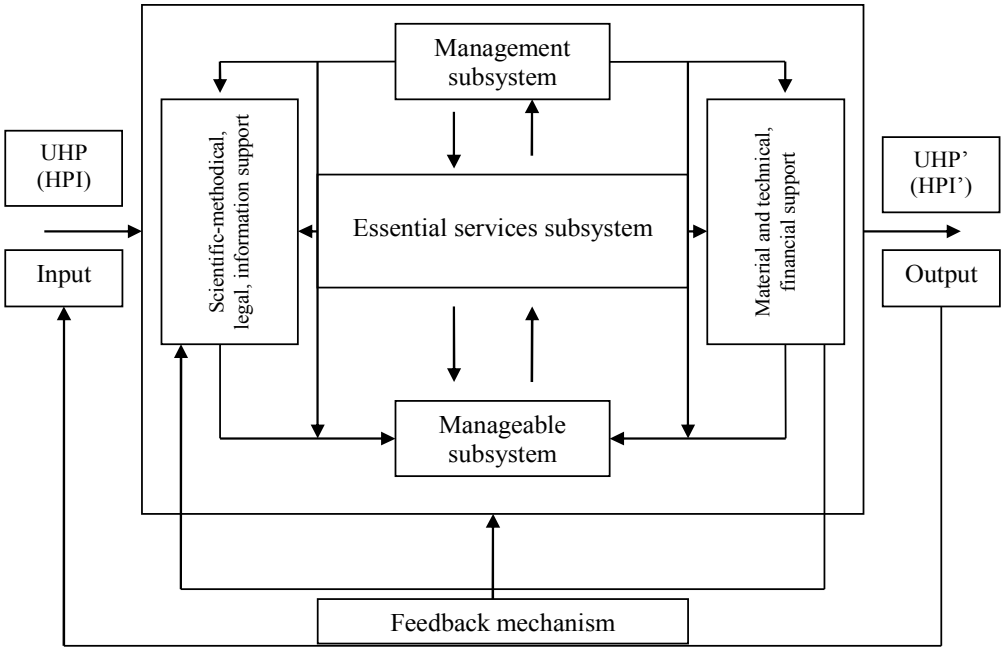
HPI (UHP) indicator may be used to monitor the status and dynamics of the human potential in the region in order to conduct inter-regional comparisons, HP analysis within separate federal districts.

It is worth noting that integral indicators may be calculated at each HP structural level as well (basic, medium and top level). In this case, they will represent geometric mean values related to the indicators of the components that comprise each level. This procedure may be convenient for differentiated approach to management [11] to ensure detailed research and assessment of HPR structural components.

4. HPR Management System

Based on the identified components, considering all the above elements we have developed the model for human potential management system in the region. The HPR management system model is shown in Fig.1.

Figure 1. Regional model of the human potential management system



Source: compiled by the authors.

The model formed in this research encompasses the closed loop which interior part comprises continuously interacting simpler functional subsystems, thus ensuring HPR formation, development and actualization.

The system places the central emphasis on the essential services in the region (housing and utility services, transport, communications, etc.), since not only do they participate in the human potential dynamics, but also create proper environment in order to support operation of

the management mechanism. Essential services subsystem in the region also serves as a link (and a "conductor") between a management and manageable subsystem.

The level of human potential in the region - HPI (UHP) is an input indicator; its calculation method has been provided above – formula (9). In this instance, the provided indicator represents the expected and forecasted HPR level, which can be achieved through orchestrated and efficient operation of the system management mechanism. As it has been noted previously, separate or integral indicators at each HPR structural level (1-3) may be also reviewed for the research purposes.

The achieved and formed regional human potential - HPI' (UHP') - is located at the output end. It is evident that given proper operation of the system and its components, the HPI' (UHP') indicator actual (real) value shall be equal to HPI (UHP) indicator value or exceed it. Otherwise (in case the output value is lower than an input one) we may expect management or operational problems associated with the entire regional complex and thorough analysis of the current situation is required. In this instance, the adjusted feedback mechanism is of great importance.

The presented model also contains two important subsystems that ensure smooth implementation of the management process. We would like to note that each of such subsystems is strongly linked to the economic sectors, which, largely, supply required resources to them (then resources are redistributed in the identified subsystems deliberately for management purposes).

The proposed HPR management system model allows:

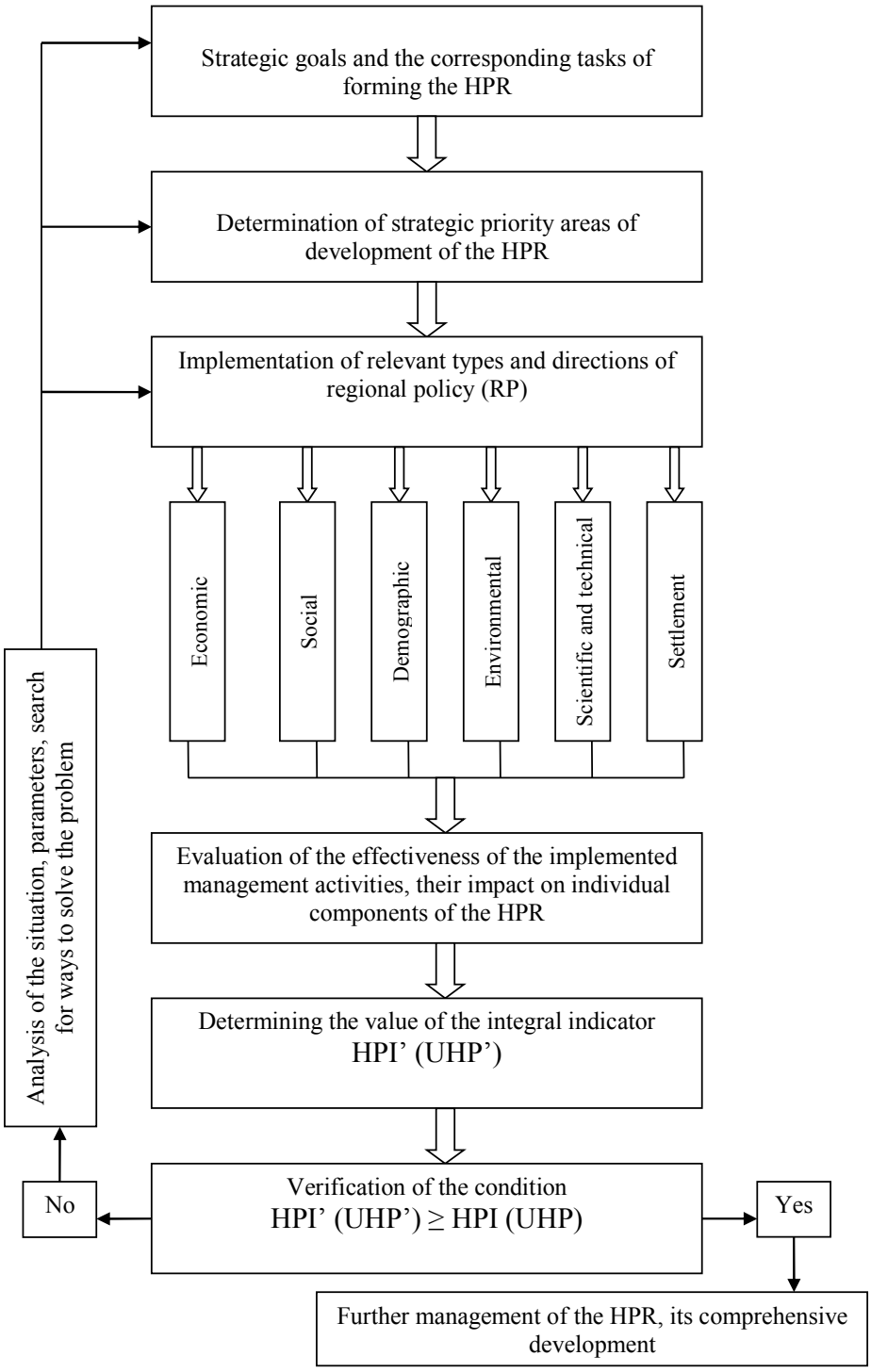
1. Implement HPR complicated management process more effectively and consistently.
2. Form and develop new and still more balanced interrelation among HPR fundamental components and its structural levels.
3. Perform goal-oriented activities on HPR recovery, development and accumulation, verified by qualitative and quantitative indicators.
4. Motivate the regional complex and socio-economic system to improve HP indicators, enhance its quality and take leading positions among other regions (based on interregional comparison results).

It is necessary to notice the importance of observing the following system formation (establishment) principles that ensure successful operation of the management system:

1. Harmonious integration into the regional government authority system (lack of contradictions, in particular, regarding implementation of priority projects dedicated to HP development).
2. Efficient interaction of the proposed management system with budgetary and investment sources (including, additional budgets, various funds, etc.).
3. Differentiated approach to management that features focus on separate regional population categories and various age groups in order to make more targeted and relevant regulatory impact using varied tools.
4. System flexibility, ability to adapt management mechanism to changeable environment (it is most important to respond actively and timely to changes in HPR separate components as well as to the impact of exogenous and endogenous factors).

We will demonstrate the managerial decision-making algorithm in the context of the described system-based approach and HPR management mechanism (for convenient visualization shown in Fig.2). This chart presents major stages in the regional human potential management process. Compliance with a specific requirement (fulfilment of a condition) acts as a basic efficiency criterion. Certainly, the rate of change of HPR qualitative characteristics during management process is also important [12]. Should failure to comply with the requirements occur, it is recommended that a systematic analysis be conducted to reveal factors, causes, etc, contributed to HPR level decrease (in particular, to identify HP deformation and degradation up to its disappearance).

Figure 2. Generalized scheme for the implementation of HPR control mechanism concept



Source: compiled by the authors.

It is appropriate to note that return to any initial stage of the algorithm logic chain is possible (depending on revealed problems, their depth, complexity, etc.) The algorithm is available for repetition with respect to all stages and then summarized assessment of the obtained results follows. It is objectively needed to identify new goals and tasks, type and form of HP development in the region, etc. at specified intervals, even if there are no severe problems encountered.

However, it is recommended that the strategy be updated in whole only if it is not viable to adjust parameters and improve situation at separate stages [13] (i.e. strategic goals, priorities can be changed last of all after all other tools and methods have been applied and a comprehensive analysis completed).

5. Findings of approbation of the Proposed Evaluation Methodology and Model

It is advisable that the indicators developed for HPR integrated assessment, the management system model and a number of other identified provisions and elements be tested using a region (or a group of regions) as an example. As for this study, Oryol region was taken as an example. The eight main quantitative characteristics of the HPR components and the level of the region's HP for the period 2010-2015 have been calculated. The results are shown in the table.

Table 1. The indicators of the HPR in Oryol region in 2010-2015

Indicator	2010	2011	2012	2013	2014	2015
IH	0.111262729	0.1003827	0.0474568	0.0806039	0.0602444	0.0218981
ID	0.024035132	0.0342391	0.0387613	0.038326	0.0378581	0.0385955
ISE	0.851832994	0.8540893	0.8865687	0.872987	0.8715369	0.8594182
IE	0.197347251	0.1958211	0.1962929	0.1954766	0.1953803	0.1967987
IPL	0.506364562	0.4981441	0.5041248	0.5118182	0.507449	0.5071739
ICE	0.134388628	0.131313	0.1331145	0.1321746	0.1273391	0.124477
IR	0.08282476	0.0713115	0.0971625	0.1177665	0.0564042	0.0509383
IST	0.484316186	0.4277251	0.4301607	0.5258493	0.4638109	0.4820359
UHP (HPI)	0.182436653	0.1809012	0.175449	0.1963416	0.1687159	0.1472965

Source: compiled by the authors.

Based on the results obtained, it is possible to conclude that three components have made the largest contribution to formation of the integral index value: socio-economic (ISE), vocational (IPL) and scientific and technical, combined in the calculation with innovative and creative (IST). In general, the values for each indicator differ in dynamics over the years only insignificantly.

It is evident that the values of the health component indicators and the cognitive-research component have been decreasing during the latest three years of the period under review. There has been a decrease in the number of postgraduate and doctoral students, as well as the number of defended graduates of post-graduate and doctoral studies, respectively. While analyzing the IH index dynamics, we have observed an increase in all major classes of illnesses against declining total population of the region.

The indicator of the demographic component (ID) has begun to increase since 2015. Referring to the structure of this indicator, we can note an increase in the number of deaths under the age of 1 year and increased number of arrivals in Oryol region. Nevertheless, the registered changes are local in nature and do not have a pronounced tendency (were recorded from 2014 to 2015).

The indicator that describes "critical state" of the HPR social and economic component (ISE) tends to its maximum value - one. However, based on the recommended factor analysis, it has been determined that this indicator is growing in Oryol region mainly due to reduction of the total population in the region, while the population with incomes below the subsistence level is increasing (in general, the indicator of the regional socioeconomic component has been decreasing after 2012). In this regard, as for Oryol region, it is not possible to deem the contribution of this component as positive in terms of quality.

The value of the integral indicator - HPI (UHP) – has been decreasing (also after 2012). This is a strong reason for an in-depth analysis, recognizing, in particular, the fact that the important health component, belonging to HPR basic structural level, is deteriorating significantly. In addition, other components of this level are also hard-pressed. Consequently, in the long run, further development of other regional HP components is under risk.

It should be noted that the obtained HPI (UHP) value can be used both as the output (actual value) - HPI '(UHP') and input HPI indicator (UHP) to assess HP of Oryol region in a year. That is, for example, in 2016 the obtained value of the indicator is transferred to the input, and then compared with the value achieved by the end of the year, etc. On the other hand, it is also possible to forecast the input indicator.

As for application of the developed HPR management system to Oryol region, it is important to emphasize the need for its harmonious implementation in the structure of the authorities. These include: Government of Oryol region, territorial bodies of federal authorities, state executive authorities of special competence, and other state bodies of Oryol region. The Youth Government of Oryol region, as well as non-profit organizations, firms (as

subjects of the region's emergency management) have a great influence on the HP formation and development in this region.

Regional HP development and improvement of its quality should occur owing to the synergetic effect that results from interaction of the actual authorities [14] and other subjects related to regional HP management and the special structures (represented in the proposed model), which should have direct effect on certain HPR parameters.

Based on this study we are introducing some proposals on HP development in Oryol region using the developed methodology. First, it is necessary to devote special attention to the health, fertility and mortality of the population in order to reduce morbidity and overcome the decline in the total population of the region [15]. Second, it is necessary to pursue a balanced social policy, strive to minimize the number of people with incomes below the subsistence minimum, purposefully implement the measures necessary to improve the standard of living of the population. Third, it is important to develop a competitive environment and implement measures to support entrepreneurship (including individual entrepreneurial initiatives) - based on the analysis of the ICE indicator.

In order to facilitate more successful implementation of priorities, the authors recommend that an "objective tree" be derived to include definition of the main objective (objectives) of the priority direction, followed by sub-objectives of the first, second, third levels, etc. It is also advisable to identify entities assigned to certain directions on each tree branch (particular departments, etc.). Finally, we can determine indicators on the share and relevance of each direction needed to achieve the main objective (for example, so that the sum of the values at each level be equal to one, etc.).

6. Conclusion

The findings and recommendations provided in this study could be used in the work of expert groups, as well as by regional authorities and the regional community to improve effectiveness of human resource management. It is possible to use the model and system of indicators in order to forecast and assess the status and dynamics of the regional human potential taking into account the system-forming factors of the internal and external environment.

Further development of the methodology involves the following studies: develop various methods for HPI (UHP) forecast and describe them; carry out correlation-regression analysis in order to establish particular relationships, dependencies among the HP components (their direction, strength, etc.) as well as assess the contribution of various factors; carry out a comprehensive study of the HP level in various regions (presumably - in the context of federal districts), implement interregional comparison and factor analysis.

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EXPLORING DETERMINANTS AND RELATIONS BETWEEN NATURE-BASED ("ECO"-)TOURISM AND AGRO-TOURISM

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Highlights:

- Non-local and female visitors tend to invest more time in enjoying local products while the local and the male visitors tend to spend more time dealing with the nature.
- Local male visitors seem to combine nature-based tourism with agro-tourism, achieving thereby a multifaceted orientation while female ones appear to separate the nature-based from the agro-touristic interests, setting more distinct priorities.
- Education level, feeling of social status, income and age proved to be only slight or not significant at all.
- Hypotheses that the non-local visitors are more stimulated by the "landscape" (nature) than the local ones or that the susceptibility to engage with nature-related values (nature-related "romanticism") depends on the gender can be regarded as disputable.

Abstract

This research analyzes the initial intentions and the final leisure options of visitors travelling to the rural area of Polikarpi, Greece, and the relation between nature-based and agro-tourism. 161 standardized questionnaires and in-depth interviews were used. Important determinants of the intention, final behavior and their relation proved to be the spatial origin and the gender. Non-local and female visitors tend to invest more time enjoying local products while local and male visitors tend to spend more time enjoying nature. Local male visitors seem to combine nature-based with agro-tourism, achieving thereby a multifaceted orientation. Female visitors appear to separate the nature-based from the agro-touristic interests, setting more distinct priorities. The final leisure options of non-local female visitors seem to be driven by their initial intention to enjoy products while the final leisure options of local female visitors seem to be driven by the initial intention to enjoy the nature. Education level, status, income and age proved to be only slightly relevant or irrelevant. Hypotheses that non-local visitors are more stimulated by the "landscape" than the local ones or that the susceptibility to engage with nature- relatede values ("romanticism") depends on gender proved to be disputable.

Keywords: forest policy, rural development, landscape, local products, gender, spatial origin

JEL classification:

1. Introduction

The definitions are imposed but the properties are not imposed. The properties of definitions can only be found out (when they exist). The old epistemological structure of Social Sciences (and Policy Analysis) unfortunately includes plenty of arbitrary definitions and inflationary concepts without properties, hypotheses and "theories" which are either ad

hoc and occasional or too abstract or too self-evident, arguments which are often trivial and not insightful and subjective "qualitative research". The fragmented quantitative research may enable really insightful middle-range theorization but in future and not soon. These serious epistemological "diseases" are the rule in the old structure of Social Sciences. Concepts such as "nature-based tourism" (or "eco-tourism") and "agro-tourism" seem not to be exceptions to this rule. The authors are not going to invest much time in presenting such definitions, hypotheses and arguments which can be found in the literature. They hope that certain quantitative empirical evidence concerning properties related to these concepts will be provided in this paper.

The nature-based tourism is a much discussed issue in the field of forest policy analysis. Questions have been posed on its cross-sectoral setting, on its developmental role, on its parameters and determinants as well as on conceptual dimensions. However, whether the nature-based tourism can only be developed "in the shadow" of agro-tourism in a specific area or inversely, and to what extent and how these two types of tourism interact and depend on each other, still remain open questions. These questions are important for planning a more integrated or more specific strategy of rural development. They can empirically be answered only by exploring to what extent the visitors prefer to visit a place for the natural values or for the local products or for both of them. Examining also the tourists' characteristics which may influence these preferences enables a deeper understanding of their initial intentions and final leisure behavior. As implied by the literature review, the interaction between nature-based and agro-tourism can be explored in a multiple and as possible integrated context including landscape, rurality, gender and spatiality.

In this context, aim of this the research is to explore the relation between nature-based and agro-tourism, to what extent the nature-based or the agro-tourism is the intention of travelling or the real leisure behavior practiced by the visitors when they arrive in the place of visit. Simultaneously, determinants of being oriented to nature- or rural-related values are also examined.

The possibly complementary, antagonistic or neutral relation between nature-based and agro-tourism, namely nature-related values and local ("traditional") products is examined.

The nature-based tourism is here defined as enjoying natural environment (namely landscape values) while agro-tourism is here defined only as enjoying local products produced by the local female rural association of the research area (town of Polikarpi). (Other possible forms of agro-tourism such as open-light rural museums with participation of visitors in simulation of rural activities, meat products, wine etc) have not been examined on this research occasion.) These simplified forms of nature-based and agro-tourism respectively have been selected, as they constitute quite clear, characteristic and -to certain extent- elementary dimensions of these two alternative types of tourism. Moreover, if more dimensions were implicated, the results could be considered to be more "complete" but possibly less clear. This research does not depreciate the other several forms of eco- and agro-tourism but it is focused only on these basic ones in order to be less descriptive and more explanatory.

Classical hypotheses derived from the literature reviewed below concerning to theoretical field of landscape perception and leisure patterns and from in-depth interviews with members of the female rural association of Polikarpi, Northern Greece, and visitors of this place, are discussed:

- The susceptibility to engage with nature-related values (nature-related "romanticism") which is expected to characterize the female visitors is critically examined.

- To what extent the visitors coming from other cities and far away distanced regions see the place they visit more as a "landscape" than a "place" and thereby to what extent they should be moved by nature-related values rather than local products is also critically considered. Namely, the possible role of gender and the spatial origin of visitors are thoroughly explored.

- The what extent the high education level, income or feeling of high social status create tendency to the "noble" choice of enjoying nature rather than local products (supposed appreciation of nature-related values induced by eco-ideologies vs. consumption values) is also critically examined.

- The possible role of the age which would be expected to influence the susceptibility to the choice of local spa (which is examined as a nature-related value) or to the travel activity in general is also explored.

- The hypotheses that investing time in enjoying nature is antagonistic or not to time investment in dealing with local products is explored at the level of initial intention of visit and of the real choice of leisure behavior appearing at the place of visit as well as the consequence (accordance) between intention and real behavior are also examined.

The expected scientific added value of this research lies in the description and understanding of the leisure orientation (intentions and behavior) related to the natural environment of a forested mountainous area and the local products, namely the synergistic or antagonistic or neutral relation of nature-based tourism (which is here seen as a dimension of forest policy) and the agro-tourism (which is in general a dimension of rural development policy). The possible use of these results in future design and implementation of these dimensions of forest and rural development policy aiming at maximizing their synergy and harmonization and thereby to a more integrated regional development planning is supposed to constitute the practical added value of this research.

2. Literature review

The nature-based tourism has already been examined as a dimension of forest policy (Elands and Marwijk, 2012). Nybakk and Hansen (2008) have pointed out the need for more insightful research focusing on nature-based tourism in the framework of forest policy as well as of wider rural development from an entrepreneurial point of view. Sikora and Nybakk (2012) have examined the start-up of nature-based tourism from an entrepreneurial and institutional point of view. Selby et al. (2011) have also followed a similar approach, proposing an interesting typology of entrepreneurs taking into account local institutional parameters. Luo et al. (2016) have suggested the cross-sectoral character of nature-based tourism, focusing, nevertheless, mainly on the socio-political role National Forest Parks and not on the interaction of this kind of tourism with agro-tourism.

Erdogan and Tosun (2009) analyzed extensively the relation between natural values and tourism using indicators but without strong focus on the role of landscape as a factor of tourist attraction nor on social characteristics. Buckley et al. (2008) emphasized the importance of nature-based tourism for the rural and general development but without conducting intensive quantitative social research on the landscape and natural environment or on the visitors' characteristics (such as gender or origin). Sedmak and Mihalič (2008) explored the role of "authenticity" in the choice of destination. However, they focused on the non-local visitors and not on the local ones. Mallawaarachchi et al. (2006) dealt with the environment as a factor of attraction. They did not compare, though, its value with alternative values (such as local products, "tradition", etc).

The hypothesis that the non-local visitors perceive a "landscape" (namely, an impression from a "place") while the local people perceive just an unimpressive "place" is a classical assumption (Cosgrove 2006, Cosgrove και Daniels 1988, Royo-Vela 2009, Hasanagas 2010). Tyrväinen et al. (2014) have found that foreign tourists' willingness to pay for forest landscape improvement is significantly higher than domestic tourists'. This constitutes evidence that the foreign visitors are more interested in being familiar with new landscapes than domestic ones. This finding seems also to be in accordance with the conception of out-there-ness (distancing from everyday life), which has insightfully been examined (in terms of amusement, change, interest, rapture and dedication) and supported by Elands and Lengkeek (2012), an may reasonably be supposed to be a stimulus for foreign tourists rather than for domestic ones (who can hardly perceive their everyday place as "out-there").

Holmes (2006) analyzed insightfully the complexity of the rural changes based on certain driving forces such as agricultural capacity, market and social awareness of support and maintenance issues. However, parameters of integration of forest policy and rurality were not taken into account. Che (2006) examined nature-based tourism as an interesting developmental and cultural instrument, without focusing, though, on factors of tourist attraction. Daugstad et al. (2006) explored extensively the multidimensional role of agriculture in the development through food production and the restructure of the rural sector.

However, they did not focus on the interaction between nature-based and agro-tourism. Stamboulis and Skayannis (2003) discussed alternative forms of tourism, differing from mass tourism and characterized by information and communication technologies, but they did not analyze the role of forest policy in these forms of tourism. Insights have been offered into the social effects of tourism in developing countries, without deepening into the relation between landscape values and local products (Gössling 2002).

Crick-Furman and Prentice (2000) laid emphasis on the tourists' expenses during their holiday. However, they did not examine the relevance of the tourists' income. Telfer and Wall (1996) analyzed extensively the role of food in tourism, without, though, taking into account the intended leisure choice of the tourists. Grenier et al. (1993) focused accurately on issues of global tourism and the diffusion of environment-related ideologies influencing the landscape architecture and urban planning. Directions and practices of tourism regarding development issues in relation to landscape values as well as parameters of cultural and nature-based tourism have also been analytically discussed, but without considering the synergy of agro-touristic values (Galani-Moutafi 2004, Royo-Vela 2009). Lin and Huang (2009) discussed interesting evaluation patterns of tourists' destinations. However, they did not extensively examine the role of local products. The role of non-agricultural motives of visiting areas has been discussed (Farmaki 2012). However, the role of nature-based stimuli is still an open research challenge.

As for the role of the gender in agro-tourism, rural development and entrepreneurship (e.g. female rural associations) has been emphasized in various substantial studies (Iakovidou and Turner 1995, Garcia-Ramon et al. 1995, Koutsou 2002, Koutsou et al. 2006). However, these studies emphasized the role of the gender on the side of the rural entrepreneurs and not on the side of visitors.

Hovardas and Korfiatis (2008) offered useful insights into the conceptual, forest-political and communicational dimension of nature-based tourism. However, spatial and gender-related parameters still remain open research questions. Dhami et al. (2014) proposed an interesting pattern for monitoring, evaluating and planning of nature-based activities which could be enriched with agro-touristic parameters. Other researchers (Alexiadis et al. 2013a, Alexiadis et al. 2013b, Ladias 2013, Papadopoulou et al. 2012, Ladias et al. 2011, Ladias 2010, Ladias 2006, Papadopoulou et al. 2007, Papadopoulou 1998, Pedrana 2013, Shimamoto 2016, Sitarov and Urekeshova 2017) show that there exist serious perspectives of conceiving indicators, evaluation patterns for monitoring rural development issues (e.g. nature- and agro-tourists flow, natural value and spa, "traditional"-local products, "local" cultural peculiarities) and multiple parameters for understanding developmental relevance of forest policy and environmental issues (Sarah et al. 2016, Krott and Giessen 2014, Marta-Costa et al. 2014). Rastogi et al. (2015) have already pointed out issues of restrictive effects of wildlife-tourism on agriculture under certain politico-ecological and socio-economic conditions of India. In extension of this research, it seems to be worth exploring the relation between nature-based and agro-tourism in European area.

The role of forest- and agro-related values and in part of gender, spatial issues have been discussed in an insightful and integrated way either in developmental (Gu et al. 2012, Elands and Wiersum 2001) or in institutional context (Chomba et al. 2015, Secco et al. 2011). Therefore, proposing a model integrating the interdependence among these parameters is still an interesting research challenge and the possible interaction of nature-based tourism with agro-tourism, particularly regarding the intentional and behavioral patterns of visitors remains an unexplored issue.

Additionally, the role of the gender in the perception of landscape and nature constitutes a challenging research terrain (Plumwood 1993). There are empirical findings supporting the hypothesis that female visitors or observers of a landscape present a noticeable susceptibility to the engagement with naturalness and nature-related values (Hasanagas et al. 2007, Hasanagas et al. 2010). The perceived landscape as well as the priorities and the value system of the visitors who perceive this seem also to depend on their social and personal characteristics, including also their spatial origin and gender (Goula et al. 2015a, Goula et al. 2015b). These findings seem to make a more specific research on forest policy and rural development issues such as nature-based and agro-tourism reasonable. Finally, the education level has also been discussed as a parameter of interestedness in nature-based tourism (Young

1999) and it has been supported that the education level is positively related to the nature-based tourism while the age is insignificant (Luzar et al. 1998).

3. Method

3.1. Questionnaire

Two types of standardized questionnaires have been used in the present research: a specifically formulated for visitors considered as "local" another one, specifically formulated for visitors considered as "non-local" in the area of Polikarpi, Northern Greece. Despite their slight differentiations, they were formulated in such a way that the primary data remain comparable and processible in a single data basis. The questionnaires were formulated after in-depth interviews with visitors and members of the female rural association of Polikarpi which produces marmalades, sweets and liquors, which are promoted as local and traditional products. Additional to these interviews, literature was also used for conceiving and operationalizing of variables. In-depth interviews were used for interpreting the quantitative results. The content of the questions is presented in the tables.

3.2. Sampling and research area

The sampling was conducted in 2008 in the area of Polikarpi (fig. 1), Northern Greece (region of Pella). It was selected as research area due to the combination of nature-based and agro-touristic opportunities provided there. It combines both forest-mountainous landscape and local agricultural production. It has also a local female rural association function as pole of attraction of agro-tourists with the products it produces and promotes. An additional research advantage of this area lies in the possibility of examining the touristic role of the local natural spa which is here regarded as a part of the values of the natural environment of this area. According to the in-depth interviews conducted with the local municipal agencies, the thermal balneotherapy in Polikarpi spa is expected to be effective in numerous cases of diseases such as rheumatic, gynaecological, circulatory system diseases as well as diseases of nerves and skin. Additionally, the particular spa is supposed to be especially attractive because of the combined use of hot and cold water. According to the same sources, the local population is about 1050 inhabitants without serious tendency to migration while the tourists are expected to vary from 100 to 200 annually. Thus, this area seems to have an interesting potential for regional development.

Figure 1. Satellite photo of Polikarpi, region of Pella, Northern Greece. The town of Polikarpi is indicated with "+" on the satellite photo of Greece above.

(scale 1:10000, coordinates: 40o 55΄35.91΄΄, 22o 00΄56.13΄΄, altitude: 157m, source: gis.ktimanet.gr-National Land Registry SA)

The sampling took place from Mai to August 2008 because this was the high tourist season, assuring the largest possible sample of nature- and agro-tourists. Aim of this research was not the generalizable descriptive but analytic statistics (correlations). For this reason, the sample was a judgement sample and not a random sample. It was collected in such a way that visitors of a great possible variance of age, education level, gender, spatial origins etc were included. Questionnaires were distributed at places where visitor groups of such variance were concentrated, namely the hotel of Polikarpi and the building of the Union of Rural Associations of Almopia.

This hotel was the most appropriate place for finding interviewees with permanent residence outside the region (prefecture) of Pella (which town of Polikarpi is located in). The rural association union's building was an appropriate place for finding interviewees who were permanent residents of the region of Pella. The former were regarded as "non-local" while the latter as "local". Non-random sampling but full survey has taken place within these groups of local and non-local interviewees. More precisely, on the third Sunday of Mai and July, the whole group of the members of the rural association union has been interviewed. On the third Sunday of June and August, all visitors found in the hotel of Polikarpi have been interviewed. The interviewer approached personally all local and non-local interviewees in the rural association union and the hotel, respectively. In this setting, all of them were fully responsive and answered the standardized questionnaire during individual interviews of 2-3 minutes.

The following descriptive statistics are presented as a basic depiction of the sample: The composition of the sample in terms of spatial origin and gender was: 20 non-local male and 30 non-local female, 43 local male and 68 local female. All were permanent residents in Greece and native Greek-speakers. Namely, there were Greek tourists among them in terms of first language and residence (possible international citizenships according to their passports were not asked, as this feature was not considered to be examined in this research).

The following descriptive statistics are presented as a basic depiction of the sample: The age varied from 22 to 59 (average: 38 years old), the education level from non-primary school to higher education graduate (dominant level: high school graduate), the travel distance (measured as bee line) varied from 0 to 166 km (average: 17km). The composition of the visitors sample was: 43 local male, 68 local female, 20 non-local male and 30 non-local female. (The permanent residents of the region (prefecture) of Pella (which town of Polikarpi is located in) were characterized as "local" while visitors with permanent residence outside this region were characterized as "non-local".)

3.3. Process

The bivariate Pearson test has been applied at significance level 1%(**) and 5%(*). This test was preferred as it yields an overview of the possible correlations. Using the binary variable "local – non-local", a clear typology of visitors has emerged, which is interpretable by the data of in-depth interviews. The proposed typology derived from a gender- and origin-based analysis through moderating effect (grouping according to gender or spatial origin). Although Pearson test is influenced by outliers, this is still desirable, if the results are interpretable, as the outliers are also a part of the reality (cf. Goula et al. 2015). Moreover, the results have been verified by the non-parametric tests Kendall and Spearman. Such a bivariate analysis was preferred to cluster or principal component analysis, offers more complete and concise overview of all possible dependences. Multivariate analysis (classic and logistic regression) was applied on the binary variables but its results were not evaluated by the researchers as useful. Additional interpretation of the quantitative results took place from 2008 to 2015 in order to try a more insightful in-depth analysis of the quantitative results.

4. Results and discussion

4.1. Determinants and leisure orientations

4.1.1. Personal characteristics

The gender generally appears to be a strong determinant of the leisure behavior in the whole sample (-.397 to .277) while the age plays a quite weak role (.156) and the education level seems to be irrelevant (insignificant coefficients) (table 1).

Table 1. Personal characteristics and leisure patterns

Whole sample= 161	Spend more time for: products (=1) or natural environment (=2)	Visit frequency (from never to sometimes weekly:1-4)	Initial intention of visit for local products (0-3)	Initial intention of visit for natural environment (0-3)	Initial intention of visit even without natural environment (0-1)	Specific desire for the mountains (0-1)	No specific attraction by the natural environment (only for local visitors) (0-1)	Enjoying natural environment by walking (0-1)	Enjoying natural environment by static viewing (0-1)	Not enjoying natural environment at all (only for local visitors) (0-1)
Gender (male=1, female=2)	**-,397(**)**	-,047	**,167(*)**	**-,226(**)**	**,200(*)**	**-,228(**)**	**,277(**)**	**-,295(**)**	**,181(*)**	**,277(**)**
	,000	,550	**,034**	**,004**	**,011**	**,004**	**,003**	**,000**	**,022**	**,003**
Birth year	,052	**,156(*)**	,029	-,051	-,006	-,130	,134	-,086	,017	,134
	,514	**,048**	,718	,522	,938	,100	,162	,279	,835	,162
Education level (no primary school:0-PhD:7)	-,043	,093	,041	,078	-,034	-,098	,163	-,054	,001	,163
	,585	,239	,606	,328	,667	,215	,086	,498	,992	,086

Specifically, the female interviewees tend to spend more time in dealing with the traditional products made by the local women rural association during their visit in Polikarpi while the male interviewees invest more time in enjoying the landscape. This behavior (final choice) is in accordance with the initial intention of visit. The female would also visit the place without the attractive landscape while the male tend much more to prefer the mountains.

The male prefer to enjoy walking. On the contrary, the female prefer the static view. As expected, the younger visitors visit the place more frequently due to their greater capacity of mobility or interest in making excursions.

It is also noticeable that the education level does not influence the intention or the final choice of leisure behavior. Thus, a possible hypothesis that "educated" visitors should be characterized by greater "perceptiveness" regarding nature-related values, as suggested by

Luzar et al. (1998), does not seem to be supported. The age seems to slightly influence the visit frequency as the younger visitors have more energy for travelling.

4.1.2. Socio-economic characteristics

The feeling of high social status (.192) is correlated with intention of enjoying natural environment (table 2). However, it is remarkable that this intention is not clearly realized, as it is not supported by any other correlation. Apparently, the "escaping" to the natural environment to find relaxation or to break monotony as well as the nature-related values constitute abstract notions and dogmas adapted by the "high society" visitors rather than real choices of leisure. The income presents a similar effect (.187).

Table 2. Socio-economic situation and leisure patterns

	Spend more time for: products (=1) or natural environment (=2)	Initial intention of visit for natural environment (0-3)	Initial intention of visit even without natural environment (0-1)	Intention of visit even without local products (0-1)	Specific desire for the mountains	No specific attraction by the natural environment (only for local visitors) (0-1)	Enjoying natural environment by walking	Not enjoying natural environment at all (only for local visitors)
Feeling of social status (lowest:0- highest:4)	-,107	**,192(*)**	,008	,046	,092	,038	-,089	,038
	,176	**,014**	,921	,561	,247	,689	,262	,689
Income per month (up to 650 euro:0 - more than 5000 euro:7)	-,069	**,187(*)**	-,025	-,130	,042	,169	-,015	,169
	,386	**,018**	,754	,102	,594	,076	,854	,076
Being producer of agricultural products (0-1)	**,299(**)**	**,371(**)**	**-,352(**)**	**,260(**)**	**,378(**)**	**-,378(**)**	**,324(**)**	**-,378(**)**
	,001	**,000**	**,000**	**,006**	**,000**	**,000**	**,001**	**,000**
Member of female rural association of Polikarpi (0-1)	**-,208(*)**	,049	,084	-,173	,047	-,047	-,034	-,047
	,028	,608	,380	,070	,623	,623	,723	,623

The producers of agricultural products (.299 to -.378) appear to be more interested in enjoying the natural environment. This is reasonable, as they are expected to be already familiar enough with local products which constituted a basic agro-tourist value in Polikarpi. However, the members of the women rural association of Polikarpi (-.208) show a quite different leisure behavior. Although they also are producers, their products are not massively produced like that classical agricultural products (e.g. crops, cereals). Their products are traditional food (marmalades, sweets and liquors). Thus, they see them as a pleasant and personal creation rather than as a massive production for merely commercial purpose.

4.1.3. Geographic characteristics

In the table 3a, the distance of the residence from the visit place seems to influence several parameters (-.233 to -.179). The further one travels, the more time one spends in dealing with the local products than with the natural environment at the visit place, in spite of declaring a specific desire for the mountainous landscape. Consequently, the local products could constitute a stronger motive for visit with an appropriate promotion. The travel distance does not even seem to be justified by the desire for visiting natural environment (negative coefficients) nor to be significantly correlated with the initial leisure intention (namely visit the place for products or for nature), therefore the insignificant correlations are not presented in the table 3a (insign. coefficients). Thus, the natural environment does not prove to be the real visit motive for the non local visitors. The visitors coming from closer origins visit Polikarpi more frequently while one could expect a greater interest from the non-local ones, as suggested indirectly and in part by Tyrväinen et al. (2014) (no matter whether they would be considered to be in our case "international" or not, but just non-local or local) and more

clearly by Elands and Lengkeek (2012). Subsequently, a certain locality can be of interest (a "landmark", "landscape", "tourist feature") even for the local people.

Table 3a. Geographic parameters and leisure patterns

	Spend more time for: products (=1) or natural environment (=2)	Specific desire for the mountains	No specific attraction by the natural environment (only for local visitors)	Not enjoying natural environment at all (only for local visitors)	Visit frequency (from never to sometimes weekly:1-4)
Distance of origin from place of visit-Polikarpi (km)	**-,233(**)**	**,173(*)**	**-,188(*)**	**-,188(*)**	**-,179(*)**
	,003	**0,28**	**,048**	**,048**	**,023**
Size of residence place (Thessaloniki:3, other capital city of prefecture:2, town or village:1)	-,052	,125	-,138	-,138	**-,206(**)**
	,513	,113	,150	,150	**,009**

In the same table, it is also observed that the larger the urban place of the visitors' residence (-.206) is, the less frequently they visit Polikarpi. This may be interpreted as a result of the fact that large urban places are normally far away from Polikarpi. Thus, it is in accordance with the previous findings about the negative influence of the travel distance on the visit frequency. Simultaneously, visitors from towns and villages (which are as a rule closer to Polikarpi), are more familiar with local products and nature-related values. Thereby, they know how and where to find and to enjoy these under optimal conditions or at optimal quality level. It is also noticeable that even for the visitors coming from urban centers, and, thereby, they would be supposed to "miss" natural environment, this appears not to be a strong motive of visit, as the correlations are respectively insignificant.

In order to avoid criticism about outliers, the only four residents of Thessaloniki city, the Pearson test was repeated without these, producing the results of the table 3b. In this table, the size of the origin place is still decreasing (-.176) the visit frequency.

Table 3b. Size of residence place except for Thessaloniki

	Visit frequency (from never to sometimes weekly:1-4)	Intention of visit even without spa (only for non-local visitors) (0-1)	Intention of visit even without local products (0-1)
Size of residence place (capital city of prefecture except for Thessaloniki:2, town or village:1)	**-,176(*)**	**,306(*)**	**,178(*)**
	,028	**,041**	**,027**

Moreover, for the visitors of the table 3b neither the spa of Polikarpi area (.306) nor the local products (.178) constitute the main visit motive. The nature is also not attractive enough (the insignificant correlations are not presented in this table). Thus, other determinants seem to influence the residents of larger urban centers in choosing their recreation place.

4.2. Relation between initial intention and final leisure behavior

In the table 4a, the local male visitors present an obvious accordance between intentions and final leisure behavior is obvious. Visitors, who initially intend to visit Polikarpi for enjoying natural environment, indeed tend to invest more time in this than in dealing with local products (.554). Those who spend time in enjoying nature also tend to declare that they would not visit the place, if the natural environment would not exist there (-.476).

However, there is not necessarily accordance between intention and final behavior regarding local products (insignificant .121 and -.122). Additionally, the intention of visiting for nature is positively correlated with the intention of visiting for local products (.391). Therefore, the local male visitors tend to seek nature-related and agro-touristic values simultaneously. This combined attitude is also fostered by the fact that these visitors also present a flexible combination of interests, as the intention of visit the place for the nature is negatively correlated but with weak coefficient (-.376) with the intention to visit the place without the natural environment. If the nature was the only motive to visit the place, the

coefficient would approach the -1. In other words, they intend to visit the place for the nature, but without it they would not necessarily disdain and devalue the place. A similar correlation (-.386) also appears in the case of products.

These two characteristics of the leisure patterns of local male visitors, namely accordance between intention and final behavior and simultaneously flexibility of interests can be attributed to the fact that they are familiar with the recreation opportunities of this place. This can also be interpreted as a single and multisided assumption of the recreation at this place, without distinguishing between nature-related and agro-touristic values.

Table 4a. Relation between nature-based and agro-tourism in the case of local male visitors

43 visitors	Initial intention of visit for local products (0-3)	Initial intention of visit for natural environment (0-3)	Initial intention of visit even without natural environment (0-1)	Intention of visit even without local products (0-1)
Spend more time for: products (=1) or natural environment (=2)	121 ,438	**,554**** **,000**	**-,476**** **,001**	-,122 ,437
Initial intention of visit for local products(0-3)		**,391**** **,010**	,032 ,838	**-,386*** **,011**
Initial intention of visit for natural environment (0-3)			**-,376*** **,013**	-,214 ,168

The local female (table 4b) seem to present similar tendencies with these of the local male, regarding the accordance between intention and final leisure behavior. Those who tend to invest time in enjoying nature rather than local products, seem also to have such an intention initially (.594). Additionally, they also confirm that they would visit the place without the natural environment (-.592) while they declare more clearly than the male (in table 4a) that they would visit the place also without the local products (.433).

However, they differ from the male of table 4a, as their intention to visit the place for the nature is not significantly correlated with the intention to visit it for the local products (insign. 0,036). Thus, the local female do not present clear tendency to enjoy nature-related and agro-touristic values combined, as the male do. Moreover, the female who intend to visit Polikarpi in order to enjoy local products tend to declare more clear than local male that they would pay the visit also without the natural environment. Concerning the local products, as the local male do, the local female who intend to visit the place for these declare with relatively not so strong coefficient (-0,381, quite weaker than -1). Thus, the local products do not seem to be a crucial determinant of attraction. However, one more difference between the local male and female lies in the perception of the value of natural environment, as the coefficient -0,675 considerably approaches the -1 (namely, much more than in the case of local male). Thus, in the case of the female the natural environment appears to be a more decisive motive of visit than the local products. Simultaneously, this crucial role of the natural environment seems also to be indirectly verified by the positive correlation of the intention of visiting it even in the hypothetical case of absence of local products (.354).

Table 4b. Relation between nature-based and agro-tourism in the case of local female visitors

68 visitors	Initial intention of visit for local products(0-3)	Initial intention of visit for natural environment (0-3)	Initial intention of visit even without natural environment (0-1)	Intention of visit even without local products (0-1)
Spend more time for: products (=1) or natural environment (=2)	-,233 ,056	**,594**** **,000**	**-,592**** **,000**	**,433**** **,000**
Initial intention of visit for local products(0-3)		,036 ,771	**,327**** **,007**	**-,381**** **,001**
Initial intention of visit for natural environment (0-3)			**-,675**** **,000**	**,354**** **,003**

Generally, the local female visitors present a quite clear tendency to separate nature-related from agro-touristic values in contrast to local male who tend to perceive these two

categories of values as a single whole. Namely, the local female visitors seem to maintain a more clearly separated and structured and less flexible tourist value system. Subsequently, they can constitute a more stable pole of influence in *setting priorities* in family, concerning the perception and management of leisure behavior while the local male can be a pole of *multisided or holistic orientation.*

In the table 4c, the non-local male interviewees are characterized by flexibility in the intention of visit the place for the nature: These who declare that they visit the place for this reason would apparently not devalue the place, even without them, as the coefficient -.501 is far from the absolute -1. Thus, the nature-related value is a serious motive, however not exclusive. Simultaneously, no significant correlation appears between any intention and final choice of leisure behavior. Therefore, the leisure pattern of non-local male appears to be noticeably different from this of the local male (table 4a), as no significant correlations appear to imply a clear tendency for accordance between intention and behavior in leisure nor consolidated holistic orientation. This may be in part attributed to the fact that the non-local visitor is not meticulously familiarized with the leisure opportunities of the place. They only know (or hope) that they will find there a "beautiful landscape". Although it may be possible to find out details about a place through internet, it is not conducive to the familiarization, if the place is not appropriately promoted through this.

In contrast to the significant coefficient (-.510) concerning the nature-related values, the respective coefficient regarding agro-tourist values (local products) is insignificant (-0,270). Thus, the agro-tourist values do not seem to constitute any strong and clear motive of visiting the place.

Table 4c. Relation between nature-based and agro-tourism in the case of non-local male visitors

20 visitors	Initial intention of visit for local products(0-3)	Initial intention of visit for natural environment (0-3)	Initial intention of visit even without natural environment (0-1)	Intention of visit even without local products (0-1)
Spend more time for: products (=1) or natural environment (=2)	-,402 ,079	,157 ,509	-,236 ,317	,058 ,808
Initial intention of visit for local products(0-3)		,395 ,085	-,041 ,865	-,270 ,250
Initial intention of visit for natural environment (0-3)			**-,510* ,022**	-,333 ,151

Like the local female (table 4b), the non-local female in table 4d seem to be a pole of more clear influence on the touristic interests in comparison with the non-local male, as they present more significant correlations. These who intend to visit the place for the products indeed invest time in dealing with these rather than with the natural environment (-.590). Simultaneously, the non-local female who would intend to visit the place even without the local products, tend indeed to invest more time in enjoying nature (.612). They differ, though, from the local female in that their leisure behavior is strongly influenced by their intention to visit the place for the local products (-0,590) while the leisure behavior of the local ones tend to be influenced by the intention to visit the place for the nature (respective coefficient 0,594 in table 4b).

Table 4d. Relation between nature-based and agro-tourism in the case of non-local female visitors

30 visitors	Initial intention of visit for local products(0-3)	Initial intention of visit for natural environment (0-3)	Initial intention of visit even without natural environment (0-1)	Intention of visit even without local products (0-1)
Spend more time for: products (=1) or natural environment (=2)	**-,590** **,001**	-,016 ,931	-,111 ,559	**,612** **,000**
Initial intention of visit for local products(0-3)		,008 ,965	,057 ,767	-,312 ,093
Initial intention of visit for natural environment (0-3)			**-,592** **,001**	-,111 ,560

Simultaneously, the existence of natural environment in the place Polikarpi constitutes only a slightly stronger motive of visit the place for the non-local female (-0,592) comparing with the non-local male (respectively -0,510 in table 4c), which is again quite lower than -1. As for the local products, they do not appear to be a clear motive for visiting the place (insign. -0,312).

5. Conclusions, suggestions and points for future research

The most important determinant for the initial intention of visit and the final choice of leisure behavior (local products vs. natural environment) is the gender and not e.g. the education level, as one could expect (Luzar et al. 1998). The female visitors generally intend to travel to Polikarpi for the local products and indeed to mainly invest time in dealing with these and not with the natural environment. This result seems to challenge any consolidated expectation about susceptibility of the female visitors to engage with nature-related values ("romanticism"). The age proved to be slightly relevant to travel activity, as expected, but quite irrelevant to spa use or to any other leisure pattern. Thus, intensive travelling is a characteristic of young visitors but nature-based (incl. spa use) or agro-related leisure patterns are age-independent.

The examination of origin has also produced interesting results. The hypothesis that the local people see just a "place" while the non-local pay more attention to "landscape" (in this case, to natural environment) perceiving it as noticeable sightseeing, and subsequently the theory of out-there-ness supported by Elands and Lengkeek (2012) or the findings of Tyrväinen et al. (2014) about the possible greater interest of foreign tourists seems here to be also critically challenged, as the visitors coming from further areas tend to spend more time dealing with local products rather than with the nature, independently of their initial intention of visit. In this sense, the agro-touristic consumption values seem to prevail over the nature-related values.

The visitors of high income and social status may intend to visit Polikarpi as nature-tourists (namely for enjoying natural values) but they do not strictly remain stable to this intention. This supports the hypothesis that the nature-related values remain at the level of ideology (dogma) without coming into any considerable effect, namely the nature-related intentions have not necessarily led to nature-based tourism during the visit.

In a more detailed typology, the local male and female visitors are characterized by stronger accordance between intentions and leisure behavior concerning either nature-related or agro-touristic values. However, the male ones proved to maintain a more flexible touristic value system (or, from another point of view, not quite clear) and a more holistic assumption in comparison with the local female visitors. Namely, the local male visitors tend to combine nature-related and agro-touristic interests while the female tend to separate them. In other words, in former case (male visitors) the nature-related and agro-touristic values function more complementarily to each while in latter case (female visitors) these values are more distinct and antagonistic to each other.

The non-local male do not present clear tendency of holistic approach of touristic values nor as clear accordance between intention and behavior as the local ones. The non-local female are, though, more clear and decided in their orientation. Generally, the female visitors tend to be a pole of clear orientation in personal leisure management, as they distinguish between nature-related and agro-touristic values. In general, the non-local and female visitors tend to be rather agro-tourists, while the local and male rather nature-tourists. The choosing between agro-touristic or nature-related orientation seems to be strongly dependent on the spatial origin (local or not, and the distance of the origin place) and the gender (male-female) of the visitors.

These results can be supposed to constitute basic research results, as they enable a deeper understanding of the tourist stimulation and behavioral patterns and they reveal the specific relevance of gender and origin in the leisure behavior. However, to certain extent, they may also be supposed to be of applied orientation, as they in part show that local products alone seem to be enough strong stimulus for visitors, even without the natural landscape. Thus, rural areas without attractive natural landscapes may still have the potential to attract visitors even from far away, if the local products are appropriately promoted. Simultaneously, visitors coming from closer rural places may be a well perceptive group for nature-based tourism.

It has been pointed out that nature-based and agro-tourism are not only interdependent but there are visitors of specific profile who prefer an holistic pattern of tourism. Thus, a clear suggestion for entrepreneurs and municipal actors would be not to follow a strategy of specializing but of integrating tourism. However, whether a hotel entrepreneur who provides an integrated program of riding and environmental education in forest and of testing local products (e.g. wine or even liquor made by the visitors from herbs collected by them during their riding and education in the forest) is expected to be more profited or achieving stronger entrepreneurial sustainability than an entrepreneur who only develops nature-related activities should be a specific question of future research.

In this research, the visitors were sampled non-randomly only from one place (Polikarpi- at the hotel and the local rural association union). Although, this should not be deem a weakness, as the aim of this research was the analytic and not the descriptive statistics, a wider and random sample from other places would make sense in future, e.g. using telephone catalogue. A future sample may also be extended to more complex forms of nature-based tourism (riding, rafting, climbing, environmental education, camping etc) and agro-tourism (wine, meat participation in rural and agricultural activities, open-light rural museums etc) or to groups of international tourists in order to examine whether such features produce different results. Moreover, in future research more statistical techniques like classical or logistic regression, principal component or cluster analysis can be applied on more variables. Also, from a theoretical point of view, the results of this research may provide further research initiatives in the field of gender analysis.

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Announcements, Conferences, News

The first international conference: "Challenges in Evaluating Regional and Urban Policy", CERUP 2018The first international conference: "Challenges in Evaluating Regional and Urban Policy", CERUP 2018

8-9 March 2018, Rome, Italy

A. I. S. Re.

Conference Overview[1]

The Department of Social Sciences and Economics of Sapienza University of Rome (DISSE) and the Department of Political Science of University Roma Tre (DISCIPOL) and the Regional Science Association of Italy (AISRE) organized the first international conference: "Challenges in Evaluating Regional and Urban Policy", CERUP 2018.

The conference was hosted by the Sapienza Conference Centre, on 8-9 March 2018.

Slow growth or decline in less developed areas, and natural or economic shocks that challenge the wellbeing of individuals and communities, have a strong social impact. Inequality increases and some territories are left behind. Geography of discontent emerges, with social and political consequences. Questions of how cities and regions can develop in more continuous, equal and resilient ways and how "place-based" policies can support this pattern constitute an important research agenda for regional scientists. However, evaluating regional policies after severe shocks is not an easy task. Causality, endogeneity and spatial spillovers bias the estimate of the critical parameters, and make more difficult our understanding of the policy effects. Researchers are exploring a new methodological approach, pointing to robust and clear empirical answers to the policy questions related to the economic and social development of region and cities. The Department of Social Sciences and Economics of Sapienza, University of Rome and the Department of Political Science of University Roma Tre organized an international conference on the evaluation of public policies focused on regional growth and resilience. The main focus of interest were the methodological challenges imposed by economic and social regional policies in the framework of counterfactual evaluation approach. The conference debated the following main topics: counterfactual evaluation methods, policies for competitive cities and regions, spatial econometrics methods for impact evaluation, policies for urban economic growth and development, policies for territorial economic and social resilience. Both theoretical and empirical papers were welcome. The program included keynote presentations from invited speakers and policy makers.

Keynote speakers included: Giusepe Arbia, Professor of Economic Statistics, Università Cattolica del Sacro Cuore, Rome, and Martin Huber, Professor of Applied Econometrics, University of Fribourg.

The Organizing committee consisted of: Guido Pellegrini, Sapienza, University of Rome Marusca De Castris, University Roma Tre.

1 Conference overview by Eleni Stamatiou-Lacroix, RSI Journal

3rd International Scientific Conference and Workshop ERSA Polish Section -Annual Meeting Regions of Tomorrow – Hopes & Threats
8-9 December 2017, Lodz, Poland

Conference Overview[1]

The main topics included: a) nomad societies & territorial identity; b) innovative cities & regions; c) regional analysis & forecasting; d) networks & communication.

Keynote Speaker: Prof. Eveline van Leeuwen, University of Amsterdam

The aim of the conference was to bring together researchers and practitioners to facilitate the exchange of knowledge and experience concerning multidimensional aspects of regional development. Thus, the scope of the ERSA 2017 Conference was "Hopes & Threats ' that are or will be influencing the social, economic, environmental, and political situation of Regions of Tomorrow". The event was intended to be an excellent opportunity for networking activities on participant's future projects. The idea of the conference was to present and discuss ongoing research on both novel theories and latest applications in regional science and to follow and support the regional policy. Therefore, i.a. regionalists, statisticians, econometricians, applied scientists, political scientists, sociologists, geographers, and economists participated and shared knowledge and exchanged ideas.

The idea of the workshop allowed participants to discuss the key functional offerings accessible to regional researchers thanks to the use of Geographical Information Systems. The workshop was organised in two parts. The first part focused on the primary visualization methods of socio-economic phenomenon and the second part dealt with database management available with the use of the GIS software. The workshop was designed as a crash-course. The main audience targeted by the workshop were early career researchers in regional science and PhD students, but allowed others to participate.

1 Conference overview by Eleni Stamatiou-Lacroix, RSI Journal

Academic Profiles

Pinelopi Koujianou Goldberg is the Elihu Professor of Economics at Yale University. She was the Editor-in-Chief of the American Economic Review from 2011 to 2016, and Coeditor in 2017 and from 2007 to 2010. She is currently Vice-President of the American Economic Association, Member of the Executive Committee of the Econometric Society, and President of the Eastern Economic Association. She is also Member of the American Academy of Arts and Sciences, Recipient of the John Simon Guggenheim Memorial Foundation Fellowship in 2010-11 and the Bodossaki Prize in Social Sciences in 2003, Elected Fellow of the Econometric Society, Research Associate at the National Bureau of Economic Research (NBER), and Board Member of the Bureau for Research and Economic Analysis of Development (BREAD).

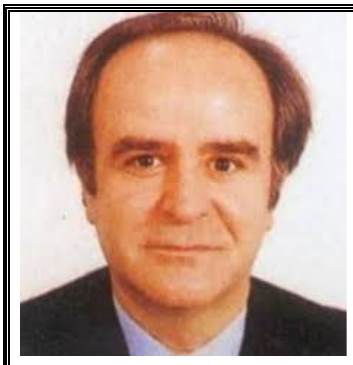
Prior to Yale, she was faculty at Princeton and Columbia University.

She has published numerous articles in the areas of applied microeconomics, international trade, and industrial organization. Her current research interests include the effects of trade liberalization on growth and the income distribution, the effects of intellectual property rights enforcement in developing countries, and the determinants of incomplete exchange rate pass-through.

Her most recent publications include:

- Prices, Markups and Trade Reform, with Jan De Loecker, Amit Khandelwal and Nina Pavcnik, Econometrica, Vol.84, 2, March 2016, pp. 445-510.
- Firm Performance in a Global Market, with Jan De Loecker, The Annual Review of Economics, Vol. 6, Aug. 2014, pp. 201-227.
- A Structural Approach to Identifying the Sources of Local-Currency Price Stability, with Rebecca Hellerstein, Review of Economic Studies, Jan. 2013, 80(1), pp. 175-210.
- Imported Intermediate Inputs and Domestic Product Growth: Evidence from India, with A. Khandelwal, N. Pavcnik and P. Topalova, Quarterly Journal of Economics, 125(4), 2010, pp. 1727-67.
- Intellectual Property Rights Protection in Developing Countries: The Case of Pharmaceuticals, Journal of the European Economic Association, Volume 8, April-May 2010, pp. 326-53.

Academic Profile by:
Assoc.Prof. Aikaterini Kokkinou, RSI J



Theodosios B Palaskas is the Director of IEME/KEME at ACCI. He is a Professor of Economic Analysis & Development Economics, Director of the Centre for Economic Policy Studies at Panteion University of Athens, President of his Department and scientific associate of Athens Academy. He completed his graduate studies in Athens and his postgraduate studies, (M.Sc, MA (honours) & D. Phil), at the University of Oxford. Previous academic appointment has been at the Oxford University - Institute of Economics and Statistics, International Development Center, and at St Peter's College. He worked for the World Bank, the USAID and UCTAD. He was elected Vice Rector at Panteion University for the period 2000-2002 and directed for five years the Greek Foundation for Economic and Industrial Research (IOBE). He was a holder of the IKY - Foundation of Public Scholarships- and the NATO Scholarships for three years to study at Oxford. His research has been financed by the European Commission, The World Bank, University of Oxford, ODA Research Scheme, Greek Ministries, such as Ministry of Development, Ministry of Economics, Bureau of Credit, Bank of Greece, Association of Greek Banks, Athens Chamber of Commerce and Industry, Association of Greek Industries, etc. His research interests focus on Economic Analysis, Industrial Economics, International Development and Finance. He has published papers in scientific economic journals, books and working papers and has been quoted in the 'Journal of Econometrics', 'Journal of the Royal Statistical Society', 'Review of Economics and Statistics', 'Oxford Bulletin of Economics and Statistics', 'Journal Of Development Economics', etc. A few selected publications of his research include the following:

- 2017: (with C.E. Stoforos & S. Degiannakis).'Hedge fund returns under crisis scenarios: A holistic approach'. Research in International Business and Finance, 42, 1196-1207.
- 2015: T. Palaskas, Y. Psycharis, A. Rovolis and C. Stoforos (2015) 'The Asymmetrical Impact of Economic Crisis on Unemployment and Welfare in Greek Urban Economies' Journal of Economic Geography, 15(5), 973-1007.
- 2011: Zervopoulos, P. and Palaskas, T. (2011) 'Applying Quality-Driven, Efficiency-Adjusted DEA (QE-DEA) in the Pursuit of High-Efficiency – High Quality Service Units: An Input-Oriented Approach', IMA Journal of Management Mathematics 22 (4), 401-417.
- 2007: "Globalization and Competitive Strategy in Europe's Vulnerable Regions: Firm, Industry and Country Effects in Labor intensive Industries". Regional Competitiveness by R. Martin et. all, Regional Studies Association.
- 2004: "Market revenue and the scope and scale of SME networks in Europe's vulnerable regions" (with G. L. Clark, M. Tsampra and P. Tracey), 2005, Environment and Planning A, volume 36 (7) July, pp. 1305-1326
- 2004: (with G. Clark, G., P. Tracey, & ,M. Tsampra). 'Globalization and competitive strategy in Europe's vulnerable regions: firm, industry and country effects in labour-intensive industries'. Regional Studies, 38(9), 1085-1100.
- 1997: (with B. Harriss‐White & T. Crowe). 'POLICY ARENA The evolution of local market commodity price behaviour in South India, 1972–92'. Journal of International Development, 9(1), 101-115.
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- 1996:"The Evolution of Agricultural Price Behavior in South India, 1972-1992". Journal of International Development, Vol. 9, No.1, 101-115 (97)
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- 1993: (with B. Harriss‐White. 'Testing market integration: new approaches with case material from the West Bengal food economy'. The Journal of Development Studies, 30(1), 1-57.
- 1990: "Is There Excess CO-Movement of Primary Commodity Prices? A CO-integration T Test" (with P. Varangis). PPR Working Paper, World Bank Series (WPS 758)
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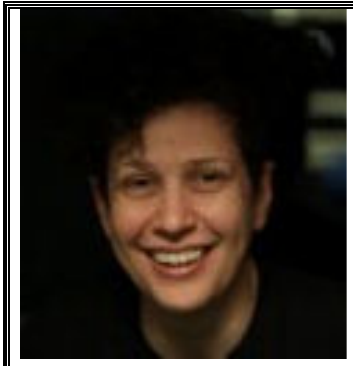
Academic Profile by:
Assoc.Prof. Aikaterini Kokkinou, RSI J



Irini Moustaki is a Professor in Social Statistics in the Department of Statistics at the London School of Economics where she was awarded her PhD in 1996. Her main research interests are latent variable models, structural equation models, analysis of categorical data, methods of estimation, goodness-of-fit, detection of outliers and missing values. She has co-authored books on latent variable models and multivariate data analysis, published many methodological and applied papers and served as an associate editor and editorial member for a number of journals including Computational Statistics and Data Analysis, Structural Equation Modelling and the Journal of Educational and Behavioural Statistics. She has taught postgraduate courses on multivariate analysis and multilevel modelling designed for statistics and social science students and run professional short courses in UK and abroad. She is a member of the Technical Advisory Group of the PIAAC project I and II (Program for the International Assessment of Adult competencies) of the OECD. She has been elected Honorary Professor in the Department of Psychological Studies, at The Hong Kong Institute of Education in July 2015. She received an honorary doctorate from the Faculty of Social Sciences at the University of Uppsala in 2014 and she is the current editor-in-chief of the journal Psychometrika (2014-2018). Some academic publications –indicative of her research work- include the following:

- 1996: A latent trait and a latent class model for mixed observed variables. British journal of mathematical and statistical psychology, 49(2), 313-334.
- 2000: (with M. Knott). Generalized latent trait models. Psychometrika, 65(3), 391-411.
- 2002: (with J. Galbraith, D.J. Bartholomew & F. Steele). The analysis and interpretation of multivariate data for social scientists. CRC Press.
- 2006: (with M.P. Victoria-Feser 2006). Bounded-influence robust estimation in generalized linear latent variable models. Journal of the American Statistical Association, 101(474), 644-653.
- 2011: (with D.J. Bartholomew & M. Knott 2011). Latent variable models and factor analysis: A unified approach (Vol. 904). John Wiley & Sons.
- 2015: (with J. Kuha 2015). Nonequivalence of measurement in latent variable modeling of multigroup data: A sensitivity analysis. Psychological methods, 20(4), 523.
- 2018: (with I. Papageorgiou). Sampling of pairs in pairwise likelihood estimation for latent variable models with categorical observed variables. Statistics and Computing, 1-15.

Academic Profile by:
Vilelmini Psarrianou, Chief Executive, RSI J

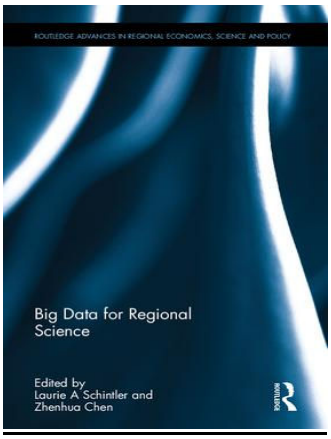
Sarantis-Evangelos G. Lolos serves as a Professor of Economics at Panteion University. He was an Executive of the Economic Research Department of the Bank of Greece from 1985 to 1997, while he collaborated as an expert and researcher with an advisory role in economic Ministries. Professor Lolos served as a Non-Executive Director of Alpha Bank A.E. from 2010 to 2015. He has been an Independent Non-Executive Director at Alpha Astika Akinita S.A. since 2015. He studied at Warwick University in the U.K. and received a BSc degree in Engineering and a BA degree in Economics. In 1981 he obtained a PhD in Economics from the Council for National Academic Awards (CNAA) in collaboration with Imperial College, London. His research and published work focuses mainly on issues of economic growth, macroeconomic and structural policies and financial economics.

Some of his published works include:

- The Greek Industry in the European Community, (with Papayiannakis, L.), Academy of Athens, 1993.
- 1995: (with Suwa-Eisenmann, A., Zonzilos, N., & Bourguignon, F.). Evaluating the CSF with an extended computable general equilibrium model: the case of Greece (1988–1995). Journal of Policy Modeling, 17(2), 177-197.
- 1999: (with Hondroyiannis, G. & Papapetrou, E.). Assessing competitive conditions in the Greek banking system. Journal of International Financial Markets, Institutions and Money, 9(4), 377-391.
- 2002: (with Hondroyiannis, G. & Papapetrou, E.). Energy consumption and economic growth: assessing the evidence from Greece. Energy Economics, 24(4), 319-336.
- 2005: (with Hondroyiannis, G. & Papapetrou, E.). Financial markets and economic growth in Greece, 1986–1999. Journal of International Financial Markets, Institutions and Money, 15(2), 173-188.
- The Greek Regions: Convergence and Cohesion, Gutenberg, Athens, 2009.
- 2009: The effect of EU structural funds on regional growth: assessing the evidence from Greece, 1990–2005. Economic Change and Restructuring, 42(3), 211-228.
- 2017: (with Kostakis, I. & Sardianou, E.). Foreign direct investment and environmental degradation: Further evidence from Brazil and Singapore. Journal of Environmental Management & Tourism, 8(1 (17)), 45.

Academic Profile by:
Dr. Thomas Georgiadis, RSI J

Book Reviews



Big Data for Regional Science
Edited by Laurie A. Schintler, Zhenhua Chen
2018, Routledge

This book is well written and provides valuable and significant addition to the literature and brings together leading contributors to present an interdisciplinary, agenda-setting and action-oriented platform for research and practice in the urban and regional community.

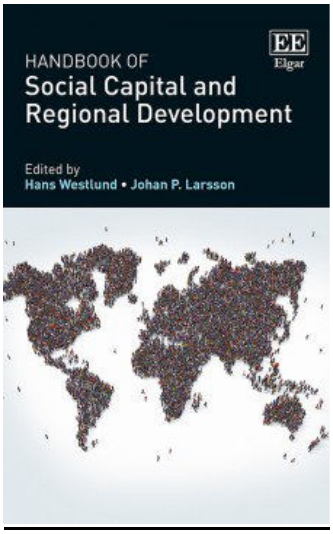
We could say that this book provides a comprehensive, multidisciplinary and cutting-edge perspective on big data for regional science and focus on recent technological advancements and other related factors and trends which are contributing to the production of an astoundingly large and rapidly accelerating collection of data, or 'Big Data'.

Specially, the content is organized along four themes: sources of big data; integration, processing and management of big data; analytics for big data; and, higher level policy and programmatic considerations.

As well as concisely and comprehensively synthesising work done to date, the book also considers future challenges and prospects for the use of big data in regional science

Overall, this book should be of interest to a wide audience such as academia, business analysts and policy makers.

Book Review by Dr. Christos Genitsaropoulos, RSI J



Handbook of Social Capital and Regional Development
Edited by Hans Westlund and Johan Larsson
2016, Edward Elgar Publishing

This book highlights the role of social capital in regional development and covered the related topics using various methods and numerous disciplines.

This book offer an overview of this rapidly expanding field of research and to thoroughly analyse the complex issue of social capital and regional development

In fact, social capital is important for regional development, however, it is less clear how this works in practice. For example, this book tries to answer in the following question: Do all types of social capital have the same effects and are different kinds of regions impacted in the same way?.

More specific, a particular focus is on entrepreneurship and the social capital of enterprises, whilst the role of social capital for modern governance and planning is also highlighted. The different components of social capital and data availability are also treated in depth.

Overall, we could say that, this Handbook is "must have book" and an ideal resource for students and scholars studying social capital, social networks, and especially for those working on issues of regional economic and development.

Book Review by Dr. Christos Genitsaropoulos, RSI J

GUIDELINES

for the Writers & a format model for the articles submitted to be reviewed & published in the journal

Regional Science Inquiry Journal

(EconLit, Scopus, RSA I) – www.rsijournal.eu

Guidelines for the Writers & a format model for the articles submitted to be reviewed & published in the journal

The Title of the paper must be centered, and the font must be Times New Roman, size 12, in Uppercase, in Bold

For the writers' personal information use the Times New Roman font, size 11, in bold, and centered. Use lowercase for the first name and uppercase for the last name. The line below the name includes the professional title and workplace; use the Times New Roman font, size 10, centered. In the third line write only the contact e-mail address in Times New Roman 10, centered.

Name LAST NAME
Professional Title, Workplace
E-mail Address

Name LAST NAME
Professional Title, Workplace
E-mail Address

Abstract

The abstract consists of a single paragraph, no longer than 250 words. The font must be Times New Roman, size 11. The text must be justified. The title "Abstract" must be aligned left, in Times New Roman, size 11, in bold. A space of one line must be left between the title and the text of the abstract. The abstract must contain sufficient information, be factual, and include the basic data of the paper.

Keywords: Use 3 to 5 keywords, separated by commas

JEL classification: We kindly request that you classify your paper according to the JEL system, which is used to classify articles, dissertations, books, book reviews, and a variety of other applications. The use of the JEL classification is necessary so that your paper be properly indexed in databases such as EconLit. Select the codes that represent your article and separate them by commas. You can find information on the JEL system here: https://www.aeaweb.org/jel/guide/jel.php

1. Introduction

All articles must begin with an introduction, a section which demarcates the theoretical background and the goals of the paper.

The present document provides the necessary information and formatting guidelines for you to write your article. We recommend that you copy this file to your computer and insert your own text in it, keeping the format that has already been set. All the different parts of the article (title, main text, headers, titles, etc.) have already been set, as in the present document-model. The main text must be written in regular Times New Roman font, size 11, justified, with a 0.5 cm indent for the first line of each paragraph.

We recommend that you save this document to your computer as a Word document model. Therefore, it will be easy for you to have your article in the correct format and ready to be submitted. **The only form in which the file will be accepted is MS Word 2003**. If you have a later version of Microsoft Office / Word, you can edit it as follows:

- Once you have finished formatting your text, create a pdf file, and then save your file as a Word "97-2003" (.doc) file.

- Compare the two files – the pdf one and the Word "97-2003" (.doc) one.
- If you do not note any significant differences between the two, then – and only then – you can submit your article to us, **sending both the pdf and the Word "97-2003" (.doc) files** to our e-mail address.

If you use a word processor other than Microsoft Word, we recommend that you follow the same procedure as above, creating a pdf file and using the appropriate add-on in order to save your document in MS Word "97-2003" (.doc) form. Once you compare the two files (and find no significant differences), send us both.

2. General Guidelines on Paper Formatting

2.1. Body

The body of the text consists of different sections which describe the content of the article (for example: Method, Findings, Analysis, Discussion, etc.). You can use up to three levels of sections – sub-sections. For the Body of the text, use the default format style in Word, selecting the Times New Roman font, size 11, justified, with a 0.5 cm indent for the first line of each paragraph (this is further detailed in the section "Paragraphs").

2.2. References

The references included in the paper must be cited at the end of the text. All references used in the body of the paper must be listed alphabetically (this is further detailed in the section "References").

2.3. Appendices

The section "Appendices" follows the section "References".

3. Page formatting

3.1. Page size

The page size must be A4 (21 x 29,7 cm), and its orientation must be "portrait". This stands for all the pages of the paper. "Landscape" orientation is inadmissible.

3.2. Margins

Top margin: 2,54cm
Bottom margin: 1,5cm
Left and right margins: 3,17cm
Gutter margin: 0cm

3.3. Headers and Footers

Go to "Format" → "Page", and select a 1,25cm margin for the header and a 1,25cm margin for the footer. Do not write inside the headers and footers, and do not insert page numbers.

3.4. Footnotes

The use of footnotes or endnotes is expressly prohibited. In case further explanation is deemed necessary, you must integrate it in the body of the paper.

3.5. Abbreviations and Acronyms

Abbreviations and acronyms must be defined in the abstract, as well as the first time each one is used in the body of the text.

3.6. Section headers

We recommend that you use up to three sections – sub-sections. Select a simple numbering for the sections – sub-sections according to the present model.

3.7. First level header format

For the headers of the main sections use the Times New Roman font, size 11, in bold and underlined, and leave a size 12 spacing before the paragraph and a size 6 spacing after the paragraph. The header must be aligned left. Use a capital letter only for the first letter of the header.

3.8. Second level header format

For second level headers, follow this model. Use the Times New Roman font, size 11, in bold, and leave a size 12 spacing before the paragraph and a size 3 spacing after the paragraph. Select a 0.5 cm indent. The header must be aligned left. Use a capital letter only for the first letter of the header.

3.8.1. Third level header

For third level headers, follow this model. Use the Times New Roman font, size 11, in bold and italics, and leave a size 6 spacing before the paragraph and a size 0 spacing after the paragraph. The header must be aligned left, with a left indent of 1 cm. Use a capital letter only for the first letter of the header.

4. Paragraphs

In every paragraph, use the Times New Roman font, size 11, with single line spacing. We recommend you modify the default (normal) format style in Word and use that in your text. For all paragraphs, the spacings before and after the paragraph must be size 0, and the line spacing single. Use a 0,5cm indent only for the first line of each paragraph. Leave no spacings nor lines between paragraphs.

4.1. Lists

In case you need to present data in the form of a list, use the following format:

- Bullet indent: 1,14cm
- Text:
    - Following tab at: 1,5 cm
    - Indent at: 1,5cm

Use the same format (the above values) if you use numbering for your list.

1. Example of numbered list 1
2. Example of numbered list 1

5. Figures, images, and tables

5.1. Figures and images

Insert your figures and images directly after the part where they are mentioned in the body of text. They must be centered, numbered, and have a short descriptive title.

Figures put together "as they are", using Office tools, are absolutely inadmissible. The figures used must have been exclusively inserted as images in Word, in gif, jpg, or png form (with an analysis of at least 200dpi), and in line with the text. The width of an image must not exceed 14,5cm so that it does not exceed the margins set above.

The images, figures, and tables must be inserted "as they are" in the text, in line with it. **Figures and images which have been inserted in a text box are absolutely inadmissible.**

5.1.1. Reference inside the text

Avoid phrases such as "the table above" or the "figure below" when citing figures and images. Use instead "in Table 1", "in Figure 2", etc.

5.1.2. Examples

A model of how to format figures/images follows. For the title, use the Times New Roman font, size 10, in bold. Write the title above the figure, and set a size 6 spacing before the title and a size 0 spacing after it. The line spacing of the title must be 1.5 line. Both the image and its title must be centered.

Image 1: Title

Source: cite the source

Directly below the figure you must cite the source from which you took the image, or any note regarding the figure, written in Times New Roman, size 10. Write it below the figure, leaving a size 0 spacing before and after it, use a line spacing of 1.5 line, and make it centered.

5.2. Tables

For the title, use the Times New Roman font, size 10, in bold. Write the title above the table, and set a size 6 spacing before the title and a size 0 spacing after it. The line spacing of the title must be 1.5 line. Both the table and its title must be centered. The width of the table must not exceed 14,5cm so that it does not exceed the page margins set.

Table 1. Example of how a table must be formatted

Age	Frequency	Percentage %
Under 40	44	32.1
40 - 49	68	49.6
Over 50	25	18.2
Total	**137**	**100.0**

Source: cite the source

If the table needs to continue on the next page, select in the "Table properties" that the first line be repeated as a header in every page, as in the above example of Table 1. **Tables (or figures or images) which are included in pages with a "Landscape" orientation are absolutely inadmissible.**

Every table must have horizontal lines 1 pt. wide at the top and bottom, as shown in the example. The use of vertical lines and color fill at the background of the cells is strictly prohibited.

Directly below the table you must cite the source or any note regarding the table, written in Times New Roman, size 10. Write it below the table, leaving a size 0 spacing before and a size 6 spacing after it, and make it centered.

6. Mathematical formulas

There is a variety of tools in order to insert and process mathematical formulas, such as the "Mathematics", found in the most recent editions of Word, "Math Type", "Fast Math Formula Editor", "MathCast Equation Editor", "Math Editor". Since it is impossible for us to provide you with compatibility with all these tools in all their editions, **we can only admit your paper if it contains mathematical formulas solely in the form of images.**

Keep a continuous numbering for the mathematical formulas and center them in the page, as shown in the following example:

$$y = ax^2 + bx + c \tag{1}$$

The same stands for formulas or particular mathematical symbols you may have integrated in your text. For instance, if you want to use the term ax^2 in your text, you must insert it as an imaged, in line with the text. The images containing the mathematical formulas must be legible (at least 300dpi).

In the exceptional case of a text which may contain a great number of mathematical formulas, the writer may send it to us in TeX form if they so wish.

7. References

We recommend that you use the Chicago Manual of Style Author-Date system, as it is recommended by the AEA (American Economic Association) for the journals included in the EconLit database, and it is the dominant style of bibliography in the field of Economics. For more information you can go to the following links:

- https://www.aeaweb.org/journals/policies/sample-references
- http://www.chicagomanualofstyle.org/tools_citationguide.html
- http://libguides.williams.edu/citing/chicago-author-date#s-lg-box-12037253

7.1. Online references (internet citations)

Check your links again before sending your file, to confirm that they are active.

Avoid long internet links. Where possible, also cite the title of the website operator-owner. Return the font color to black, and remove the hyperlink. Links such as the following are impractical and distasteful, therefore should be avoided.

Example of an inadmissible hyperlink

https://el.wikipedia.org/wiki/%CE%9F%CE%B9%CE%BA%CE%BF%CE%BD%CE%BF%CE%BC%CE%B9%CE%BA%CE%AC

7.2. References Formatting

For your list of references, use the Times New Roman font, size 10, with single line spacing. The paragraph format must include a size 0 spacing before the paragraph and a size 0 spacing after it, aligned left. Use a 0,5 cm indent only for the first line of each paragraph. Leave no spacings or lines between paragraphs.

7.3. Example of how References must be formatted

Bureau of Labor Statistics. 2000–2010. "Current Employment Statistics: Colorado, Total Nonfarm, Seasonally adjusted - SMS08000000000000001." United States Department of Labor. http://data.bls.gov/cgi- bin/surveymost?sm+08 (accessed February 9, 2011).

Leiss, Amelia. 1999. "Arms Transfers to Developing Countries, 1945–1968." Inter-University Consortium for Political and Social Research, Ann Arbor, MI. ICPSR05404-v1. doi:10.3886/ICPSR05404 (accessed February 8, 2011).

Romer, Christina D., and David H. Romer. 2010. "The Macroeconomic Effects of Tax Changes: Estimates Based on a New Measure of Fiscal Shocks: Dataset." American Economic Review. http://www.aeaweb.org/articles.php?doi=10.1257/aer.100.3.763 (accessed August 22, 2012).

Ausubel, Lawrence M. 1997. "An Efficient Ascending-Bid Auction for Multiple Objects." University of Maryland Faculty Working Paper 97–06.

Heidhues, Paul, and Botond Kőszegi. 2005. "The Impact of Consumer Loss Aversion on Pricing." Centre for Economic Policy Research Discussion Paper 4849.
Zitzewitz, Eric. 2006. "How Widespread Was Late Trading in Mutual Funds?" http://facultygsb.stanford.edu/zitzewitz.