STUDIA UNIVERSITATIS
BABEŞ-BOLYAI

OECONOMICA

3/2012

YEAR **(Volume 57) 2012**
MONTH **DECEMBER**
ISSUE **3**

STUDIA
UBB
OECONOMICA
3

EDITORIAL OFFICE OF OECONOMICA:
Teodor Mihali str. no. 58-60, s. 231, 400591 Cluj-Napoca,
Phone: 0040-264-41.86.52, oeconomica@econ.ubbcluj.ro,
http://studiaoeconomica.ubbcluj.ro/

SUMAR – SOMMAIRE – CONTENTS – INHALT

THE IMPACT OF FACTORS INFLUENCING UNEMPLOYMENT SPELLS AND EXIT DESTINATIONS OF HIGHER EDUCATED PEOPLE IN ROMANIA AND HUNGARY

Daniela-Emanuela DĂNĂCICĂ [*]
University of Tîrgu-Jiu, Romania &
National Institute for Economic Research, Romania

Abstract. The aim of my study is to analyze factors influencing unemployment spells and exit destinations of higher educated people from Romania and Hungary. The empirical analysis is based on two datasets offered by National Agency of Employment Romania and Institute of Economics, Hungarian Academy of Sciences. For both countries, the impact of different covariates on the duration of unemployment spells and exit destinations is analyzed.

JEL Classification: J64, J21

Keywords: unemployment spells, survival model, hazard model

1. Introduction

Numerous studies have examined the *economical* (Reyher, 1979; Klugman and Kolev, 2001; Arulampalan, 2001; Fitzenberger and Wilke, 2007), *social* (Fajnylber *et all*., 1998; Fedorov and Sahn, 2005, Fougère *et all.*, 2006) and *individual* (Lewis and Sloggett, 1998; Stakunas, Kalediene, Starkuviene and Kapustinskiene, 2006; Tansel and Tasci, 2010) consequences that unemployment induces in both developed and developing countries. There are some empirical studies in the literature which prove that long durations of unemployment are linked to social problems like crime and violence, or personality changes, like depression and drug abuse. Unemployment leads to negative consequences for all individuals from all education categories. However, the impact of unemployment on the higher educated people is different compared with the other educational groups, due to the high expectations of higher educated individuals and due to the financial resources already invested in their development. The aim of this paper is to analyze the impact of factors influencing the unemployment spells and exit destinations of higher educated people from Romania and Hungary. The results of my study can be useful for policy makers, in order to promote viable measures to

[*] Address: National Institute for Economics Resarch, Costin C. Kirițescu, Romanian Academy, Calea 13 Septembrie, Nr.13, București, România, Email: danadde@yahoo.com

combat unemployment and its negative consequences and to improve employment among higher educated people from the two analyzed countries.

The empirical analysis is based on two micro-data sets, offered by the National Agency for Employment Romania (NAE) and Institute of Economics, Hungarian Academy of Sciences.

The Romanian database has individual information regarding all the higher educated people spells registered at the NAE Romania during January 1st 2008 – December 31st 2010. The period of unemployment can start at any moment during January 1st 2008 – December 31st 2010, but all the ongoing spells at the moment when I received the data from NAE (30th 2011) are right censored.

For each registered spell I received information concerning the gender of the unemployed, age at the registration date, region of residence, urban/rural area of residence, if the subject received unemployment allowance (UI) or not during the current spell, the reason of exit from unemployment for every registered subject and health status (whether the subject has a disability or not). Subjects whose unemployment spells begun and ended on the same day were removed from the database due to the non-existent duration of unemployment. Also subjects with discordance between age and education were dropped out. After this pre-processing database, the analyzed Romanian sample has 219299 registered spells, representing 9.22% from the total registered unemployed during the analyzed period.

The Hungarian sample has individual information regarding half of the UI higher educated people spells registered at the Hungarian National Employment Service during January 1st 2004 until December 31st 2008 and that have the exit date in between January 1st 2006 and December 31st 2008. The dataset was filtered by education level, it only contains those who are highly educated and who were eligible for unemployment allowance on 1st January, 2006 or later since, until 31st December, 2008. The original dataset contains half of those in the 15-74-year old Hungarian population who registered at the Employment Office in between 2004 and 2008. There are no available data for the period January 1st 2008 – December 31st 2010 for Hungary. For Hungary there is a dataset of registered unemployed who are not entitled to benefits, but these records do not include an "exit code", and these spells are very unreliable. Subjects whose unemployment spells begun and ended on the same day were removed from the database due to the non-existent duration of unemployment. Also subjects with discordance between age and education were dropped out. After this pre-processing database, the analyzed Hungarian sample has 38686 registered spells.

For the Romanian dataset, due to the confidentiality law regarding registered unemployed individuals, I did not receive the names of the individuals or an identification number for each of them. Therefore, I could not identify multiple spells for the same subject and unite them. The existence of multiple spells for the same individual is possible in the Romanian dataset. However, after I investigated the coding used by Agency of Employment I noticed that a particular category of individuals, being in a sort of transitional state of unemployment and having "4-request for registration without unemployment allowance" as a reason for the end of spell are a potential source of multiple spells existence. A part of these subjects (especially young graduates) changed their status from being registered as unemployed without allowance into unemployed with allowance in a few days, and implicit a new spell for the same subject appears. However, due to the unclear exit

destination, all these spells with “4” at their end are censored in the econometrical analysis. Thus the problems generated by the intra-person correlation are avoided. For the Hungarian dataset the multiple spells problems was solved from the initial filter of the data. Thus there are no multiple spells in the Hungarian dataset.

The rest of the paper is organized as follows: a short overview of the unemployment dynamics in the analyzed labor markets is presented in section 2. Section 3 presents the variables of the study. A preliminary description of the two datasets is given in section 4. The results of the empirical analysis are given in section 5. Conclusions are presents in the last section of my paper.

2. Brief overview of unemployment in Romania and Hungary

Due to the nature of the economic system, in both Romania and Hungary the unemployment was non-existent or negligible during the communist period. For both countries the imbalances caused by transition to free market economy and the economic downturn determined quite an explosion of unemployment in the early years of transition. However, Romania was among the few former communist economies registering relatively low unemployment rate (5.3% in 1996, compared with 9.6% for Hungary, Eurostat).

The unemployment rate of 6.4 percents in 2007, 5.8 percents in 2008, 6.9 percents in 2009, 7.3 percents in 2010, 7.1 percents in the first quarter of 2011, 7.4 percents in the second quarter of 2011 and 7.5 percents in the third quarter of 2011 places Romania below the average EU 27 unemployment rate (Eurostat Database). Labor force migration outside of Romania can be one of the reasons for the relatively low rate of unemployment in our country, compared with other EU countries. However, the unemployment rate began to increase with the appearance of the economic crisis and finding a job on the labor market began to be a major problem in Romania. In table 1 I presented the dynamics of the ILO unemployment rate for EU 27, Romania and Hungary.

Table 1. Dynamics of the ILO unemployment rate for Romania and Hungary

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2010
UE27	8.8	8.6	8.9	9.1	9.2	9.0	8.3	7.2	7.1	9.0	9.7	9.7
Romania	6.8	6.6	7.5	6.8	8.0	7.2	7.3	6.4	5.8	6.9	7.3	7.4
Hungary	6.4	5.7	5.8	5.9	6.1	7.2	7.5	7.4	7.8	10.0	11.2	10.9

*Sources of data: Eurostat database

Unemployment is one of the most serious problems in Hungary. 10000000 inhabitants were registered in 2010 in Hungary, and 4231000 people are the labor force of this country (OECD report). Hungarian ILO unemployment rate is above the EU 27 average from 2007 (table 1), however compared with the other European countries is not exceptionally high.

According to Hungarian economists, there are at least three ways in which Hungarian unemployment differ from other developed or developing countries: the speed of unemployment rate spread, almost double in 2010 than 2000; the increase of unemployment in Hungary is not structural but a consequence of financial crises. Unemployed people cannot find a job in new fields due to the fact that new fields are not developed. As a consequence, unemployment is long-term and cause impoverishment; a high part of the unemployed are from the rural area, due to the breakdown of the collective farm system. As Hungarian economists

pointed out, the main problem in Hungary is not the unemployment itself, but the decline in production caused by financial crises, that led to arise of unemployment.

3. Variables

The dependent variable of my study, *duration of an unemployment spell*, was calculated as the difference between the first and last day of registered unemployment and is measured in days for both countries.

For the Romanian dataset, the exogenous variables included in my study are: *gender*, *age at the time of entering in registered unemployment*, *education at the time of entering in registered unemployment*, *region of residence*, *area (urban or rural) of residence*, *marital status at the time of entering in registered unemployment*, *if the subjects receive or not UI during his/her current spell*, *health status and entry year in unemployment*. However, I wanted to analyze also the impact of type of education (specialization) on the higher educated people unemployment spells, the impact of existence of young children in the households, the effect of income, religion and ethnical background for the unemployment spells. But these types of data aren't available at this moment in both countries; I hope on the future to extent this study to a more profound one.

The exogenous *gender* variable was coded as 0 for women and 1 for men. The *age* variable has values in between 21 and 64 years and was divided in the econometrical analysis into five intervals, as follows: 21-24 years, 25-34 years, 35-44 years, 45-54 years and 55-64 years. The *education* variable includes the following two categories: college and university. Until the Bologna process, we had in Romania short term university education, namely college (three years of study), and long-term university education (four, five or six years of study). Unfortunately, I didn't receive information about post-university education, e.g. master level or PhD. Thus the highest educational level in my analysis is university education, were people with a master or a maybe a PhD are included.

I analyzed also the impact of *urban or rural area* for the duration of unemployment spells. The variable area was coded as 0 for rural area and 1 for urban area. The exogenous variable *region* has the following categories: North-East Region, that includes six counties- Iași, Botoșani, Neamt, Suceava, Bacău and Vaslui, West Region with four counties, Arad, Caraș-Severin, Hunedoara and Timiș, North-West Region, with six counties, Bihor, Bistrița-Năsăud, Cluj, Maramureș, Satu-Mare and Sălaj, Central Region, with six counties, Alba, Sibiu, Mureș, Harghita, Covasna and Brașov, South-East Region, with six counties, Vrancea, Galați, Brăila, Tulcea, Buzău and Constanța, South-Muntenia, with seven counties, Prahova, Dâmbovița, Argeș, Ialomița, Călărași, Giurgiu and Teleorman, – Bucharest-Ilfov Region, which includes the capital Bucharest and Ilfov county, and South-West Oltenia Region, with five counties, Mehedinți, Gorj, Vâlcea, Olt and Dolj. For *unemployment allowance (UI)* I had just information about if a subject has received allowance during his/her unemployment spell or not (0- if not, 1-if he/she received allowance). I would like to underline that, in the econometrical analysis I estimated the impact of receiving or not unemployment allowance during the current spell on the duration of the spell and exit destination. This mention is important since I have in my database subjects that received unemployment allowance at one point, found a job, lost their job and came back in the NAE

registration as an unemployed person without receiving benefit and with a new spell different from the first one.

Same situation I had for *health status:* 0- subjects with no disability, 1- subject with disability. For *marital status* I have the following categories: 0- unknown marital status, 1- unmarried, 2- married, 3- widowed and 4- divorced. For *the entry year in unemployment,* I have subjects that entered in unemployment in 2008, 2009 and 2010.

For the Hungarian sample, I received the following information: *start of the unemployment spell* (day/month/year), *end of the unemployment spell* (day/month/year), *reason of end of the spell, gender*, *year of birth, region of residence, reason of quitting last job*, *last average wage (used for calculating the unemployment benefit, occupational code (FEOR) of the job looking for, type of the job looking for, and requested wage of the job looking for.* In the preliminary descriptive statistics section I will present descriptive statistics for all the above mentioned variables. However in the econometrical analysis were included just the variables related to duration of unemployment in Hungary.

The exogenous *gender* variable was coded in the Hungarian dataset as 1 for men and 2 for women.

The *age* variable was extracted from the year of birth information and its values are in between 21 and 64 years; age was divided in the econometrical analysis into five intervals, as follows: 21-24 years, 25-34 years, 35-44 years, 45-54 years and 55-64 years.

The exogenous variable *region* was coded as follows: 0- Budapest, 1- Northern Hungary, 2 - Northern Great Plain, 3- Southern Great Plain, 4- Central Hungary, 5- Central Transdanubia, 6- Western Transdanubia, 7- Southern Transdanubia.

For *reason of end of the spell* variable I have the following codes: 40001 for all the spells that ended in reemployment, 40002 for all the spells ended due to labor-market training (ALMP), 40003 for all the spells ended due to becoming eligible for childcare allowance, 40007 for all the spells ended due to fostered employment, 40010 for all the spells ended due to becoming eligible for old-age retirement pension, 40011 for all the spells ended due to becoming eligible for disability pension, 40014 for all the spells ended due to enrollment in a form of education, 40015 for all the spells with "other" as exit reason, 40016 for all the spells ended due to extortion of eligibility of unemployment provision, 40017 for all the spells with "doesn't co-operate" as the exit reason, and 40018 for all the spells with the mention "delete from the registration" for exit reason.

For the variable *reason of termination of last job* we have the following categories: 1- mutual agreement, 2 - employer gives regular notice, 3-employer gives exceptional notice, 4-employer gives notice during the trial period, 5 - employee gives regular notice, 6 -employee gives exceptional notice, 7 - employee gives notice during the trial period, 8-end of temporary job, 9–retired due to the old-age, 10-employer's liquidate without legal successor, 11-other reasons, not applicable, and 13-gave up the business.

The exogenous variable *last average wage (used for calculating the unemployment benefit),* has values in between 0 and 1518000 HUF. There are also 6 spells without the value for the last average wage, treated in the econometric analysis like missing system errors. The variable was divided in the

econometrical analysis into four intervals, as follows: 1- less than 300000 HUF, 2- 300001-600000 HUF, 3- 600001-900000 HUF, 4- 900001- 1518000 HUF.

For the *occupational code (FEOR) of the job looking for* variable, there are hundreds different codes in the dataset. However, first digit of the codes has a particular meaning, as follows: if the occupational codes has the first digit code in between 1 and 4, it shows that the unemployed is looking for a white collar job (professional, managerial, or administrative work), and if the codes has the first digit in between 5 and 9, it shows that the unemployed is looking for a blue collar job (manual labor). In the analysis I put all the codes with the first digit in between 1 and 4 into category 1, and the other into category 2.

For the variable *type of the job looking for,* I have the following categories: 11 - junior fellow worker, 12-semi-skilled worker, 13-skilled worker, 21- administrative co-worker, 22–clerk, 31-production manager, 32- manager and 33- number one manager.

The exogenous variable *requested wage of the job looking for* has values in between 0 and 500000000 HUF. There are also 7 spells without the value for the last average wage, treated in the econometric analysis like missing system errors. The variable was divided in the econometrical analysis into five intervals, as follows: 1- less than 100000 HUF, 2- 100001-200000 HUF, 3- 200001-500000 HUF, 4-500001-1000000HUF and 5- 1000001-5000000 HUF.

As I mentioned before, for every registered unemployment spell I had information regarding the reason of unemployment end, for both of the micro-datasets. Due to this information in hand, I could discriminate between different types of end destinations. For the Romanian dataset I divided the end destinations in three categories: 1- exit from unemployment due to reemployment, 2-expiry of the legal period of receiving unemployment allowance (UI) and 3- nonparticipation on the Romanian labor market (inactivity). All the spells without an end date or with unclear exit destinations (e.g. “4- request to be registered without UI”, “9-accepted file with UI”, “51–doesn’t cooperate”) are right censored.

For the Hungarian dataset I divided the end destination in four categories: 1- exit from unemployment due to reemployment (40001), 2 – exit from unemployment due to involvement in active labor market programs (40002 and 40007 – fostered employment), 3 – exit from unemployment due to expiring the eligibility of unemployment allowance (40016) and 4- exit from unemployment in inactivity (4003, 40010, 40011, 40014). All the spells without an exit state or with the exit state 40015 "other", 40017 "doesn't co-operate" and 40018 "delete from the registration" are right censored due to the lack of information.

4. Preliminary descriptive statistics

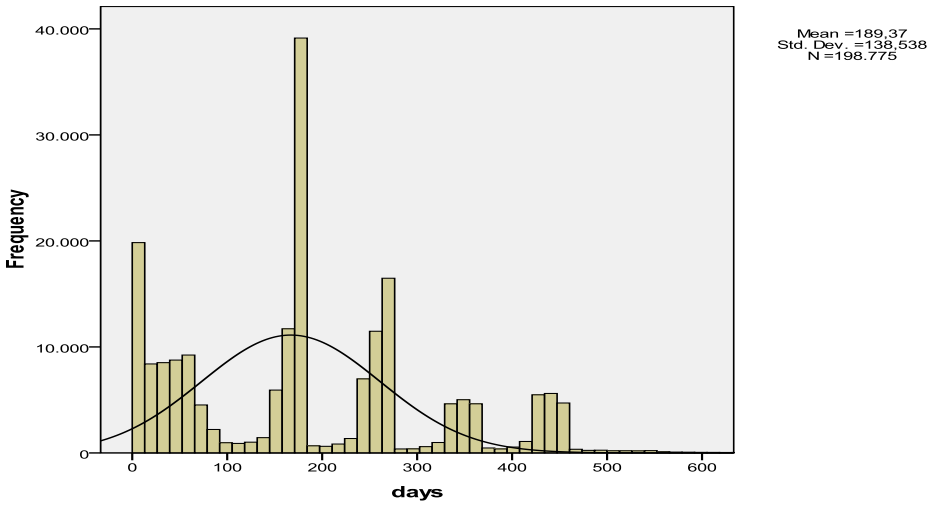
Romanian dataset has 219299 unemployment spells of higher educated unemployed aged in between 21 and 64 years, registered at the Agency of Employment Romania during January 1st 2008-December 31st 2010. 20524 spells, representing 9.35% from the total dataset are ongoing spells. All the ongoing spells are right-censored in the econometrical analysis. The minimum duration of unemployment, in days, is 1 day, and the maximum is 1202 days, with a mean of 189.37 days. In Table 2, I presented descriptive statistics for the duration of unemployment spells and in Figure 1 it is presented the histogram for the duration

of unemployment spells (days). The distribution of the unemployment spells is positive asymmetrical and leptokurtic. (Table 2 and Figure 1).

Table 2. Descriptive statistics for the duration of unemployment (days)

Central tendency	Mean	95 % confidence interval for mean	Median	Mode
	189.37	(188.76.189.98)	181	184
Dispersion	St.deviation	Range		
	138.53	1201		
Skewness and kurtosis	Skewness	Kurtosis		
	0.695	0.839		

Figure 1. Histogram of the duration of unemployment spells (days)



Out of all the 219299 unemployment spells of higher educated people, 62082, representing 28.3% ended due to reemployment, 58955, representing 26.9%, ended due to expiry of the legal period for receiving unemployment allowance, and 6062, representing 2.8% ended in inactivity. 92200 spells, representing 42% of the total dataset are right-censored.

Analyzing the above presented histogram, we can notice peaks that appear to suggest a strong link between end destinations of spells and legally period of unemployment allowance (UI eligibility). The highest frequencies of the unemployment end are registered after 1 day (2.6%), 181 days (2.9%), 182 days (2.0%), 184 days (5.1%) and 273 days (1.7%), 365 days (1%) (an important part of the analyzed subjects are young graduates and they have legal right to receive unemployment allowance for 6 month).

Out of 219299 analyzed higher educated people unemployment spells, 60% represents women unemployment spells, and 40% represents men unemployment spells. For the entire database the number of men spells is higher than the number of women spells. In the case of higher educated people, we can notice the opposite. The decomposition of higher educated unemployment spells

by destination state and gender is presented in table 3. Among higher educated women, 26.7% of unemployment spells ended with a transition in employment and these spells have the mean duration of 179.01 days and a median of 175 days. For higher educated men, 30.7% of spells ended due to employment, having a mean duration lower with 2.44 days and a median duration lower with 7 days compared with women. Spells ending in economic inactivity have the longest mean duration, especially for higher educated men.

Table 3. Duration (days) of Romanian higher educated unemployment spells by end destinations and gender

Destination state	Women			Men			Total		
	%	Mean	Median	%	Mean	Median	%	Mean	Median
Reemployment	26.7	179.01	175	30.7	176.57	168	28.3	177.95	173
Expiry of the eligibility for UI	26.9	263.15	255	26.8	287.28	265	26.9	272.79	259
Inactivity	3.1	288.64	265	2.3	370.65	419	2.8	315.07	276
Censored	43.3	-	-	40.1	-	-	42	-	-
Total	100	183.73	180	100	197.97	182	100	189.37	181

By age, from 219299 higher educated people unemployment spells, 41.3% represents subjects aged in between 21 and 24 years, 32.8% represents subjects aged in between 25 and 34 years, 12.4% are subjects aged between 35-44 years, 10.2% for the 45-54 age group and 3.3% for the 55-64 age group. We can notice that 74.1% from the analyzed spells belong to the young higher educated people, aged in between 21 and 34 years. 131.12 days is the mean duration of spells that ended in employment for higher educated people aged in between 21 and 24 years old, 163.41 days for the 25-34 age group, 244.81 days for the 35-44 age group, 253.28 for the 45-54 age group and 225.51 days for the 55-64 age group. Even from this preliminary descriptive statistics we can notice a positive association between age and duration of unemployment.

By region, 15.6% of the total analyzed spells belong to the North-East region of Romania, 11.6% to the West region, 13.4% to the Nord-West region, 13.6% to the Central region, 10.3% to the South-East region, 12.1% belong to South-Muntenia region, 8.7% to Bucharest-Ilfov region and 14.5% to the South-West region. North-East region has the shortest mean duration of spells ended in employment and Central region the longest.

Out of the 219299 higher educated people unemployment spells analyzed in my study, 81.1% are urban spells, and only 18.9% of the spells belong to the rural area. Mean duration of unemployment spells ended in employment is 163.88 days for rural area, and 180.54 days for urban area.

8.5% from the total analyzed spells don't have the marital status declared, 54.9% are unmarried subjects, 34.3% are married, 2.1% are widowed and 0.2% are divorced subjects. Divorced subjects have the longest mean duration of the spells that ended in employment, 257.15 days, and unmarried subjects the shortest- 110.34 days.

57.4% from the total analyzed spells are UI-spells and 42.6% are non-UI spells. Mean duration of UI unemployment spells is 285.67 days, compared with 48.20 days for non-UI spells.

Regarding existence or non-existence of a disability, from the total analyzed spells, 99.8% belong to subjects without disability, and only 0.2% spells

belong to subjects with a disability. 24.57% from all the spells of disabled subjects ended in employment, compared with 27% spells without disability that ended in employment.

The distribution of higher educated unemployment spells by entry year in unemployment is presented in table 4.

Table 4. Distribution of Romanian higher educated unemployed by entry year in unemployment

Year	Number of spells	Percent	Mean duration of unemployment until reemployment occurs
2008	46101	21.0	121.35
2009	81737	37.3	246.84
2010	91461	41.7	145.73
Total	219299	100.0	-

As I expected, for both 2009 and 2010 I have an increase of the number of higher educated people unemployed compared with 2008 year, due to economic crises which began to make its presence felt on the Romanian labor market. 38.53% from all the 2008 spells ended in reemployment, compared with 28.03% in 2009 and 23.40% in 2010. 121.35 days is the mean duration of unemployment spells that start in the 2008 year and ended in reemployment, 246.84 days for 2009 and 145.73 days for the 2010 year. As I presented before, according to OUG no. 28/2009 regarding the implementation of a social protection measures, all the people dismissed due to the economical difficulties have the right to receive unemployment allowance three months more than the legal period. This can be one of the reasons because the mean duration of unemployment is longer compared with 2008 and 2010 year (for the 2010 year we have to take into account that the end of period of my study led to an artificially shorter duration).

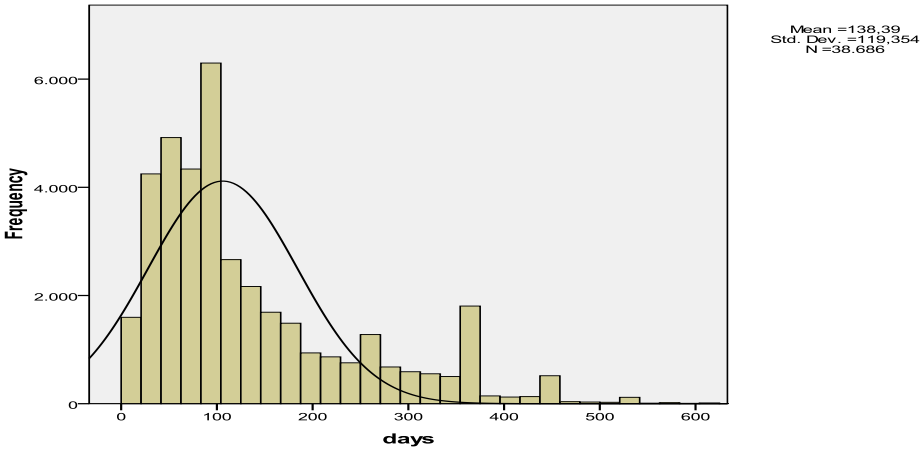
Hungarian dataset has 38686 spells of higher educated people, aged in between 21 and 64 years, who were eligible for unemployment allowance on 1st January, 2006 or later since until 31st December, 2008.

The minimum duration of unemployment is 1 day, and the maximum is 1548 days, with a mean of 138.39 days. In table 5 I presented descriptive statistics for the duration of unemployment spells and in Figure 2 it is presented the histogram for the duration of unemployment spells (days). The distribution of the unemployment spells is positive asymmetrical and leptokurtic. (Table 5 and Fig 2).

Table 5. Descriptive statistics for the duration of unemployment (days)

Central tendency	Mean	95 % confidence interval for mean	Median	Mode
	138.39	(228.07.229.42)	91	89
Dispersion	St.deviation	Range		
	119.354	1201		
Skewness and kurtosis	Skewness	Kurtosis		
	2.193	10.034		

Figure 2. Histogram of the duration of unemployment spells (days)



Out of all the 38686 Hungarian unemployment spells of higher educated people, 12205 spells, representing 31.5% ended due to reemployment, 1496 spells, representing 3.9% ended due to participation to active labor market programs (3.4% are involved in labor-market training and 0.4% are fostered employed), 12294 spells representing 31.8% are ended due to expiring the eligibility to receive unemployment allowance), 412 spells, representing 1.1% ended in non-participation on the Hungarian labor market, and 12279 spells, representing 31.7% are censored, because they are without a specified exit rate or with an unclear exit rate to allow me to put them into the above mentioned categories. Empirically we can notice from the figure 2 negative duration dependence between unemployment duration and exit from unemployment for Hungary.

Out of all the 38686 analyzed higher educated people unemployment spells, 36.4% represents men unemployment spells, and 63.6% represents women unemployment spells. The decomposition of higher educated unemployment spells by destination state and gender is presented in table 6. Among higher educated women, 31.4% of unemployment spells end with a transition in employment and these spells have the mean duration of 101.31 days and a median of 70 days. For higher educated men, 31.8% of spells end due to employment, having a mean duration higher with 7 days and a median duration higher with 9 days compared with women. Spells ending in economic inactivity have the longest mean duration in the case of higher educated men.

Table 6. Duration (days) of higher educated unemployment spells by end state and gender

Destination state	Women			Men			Total		
	%	Mean	Median	%	Mean	Median	%	Mean	Median
Reemployment	31.4	101.31	70	31.8	108.49	79	31.5	103.95	73
ALMP	4.6	120.52	89	2.7	129.14	94	3.9	122.69	90
Expiring eligibility for UI	31.8	184.26	120	31.8	186.31	125	31.8	185.01	122
Inactivity	0.9	133.27	102	1.4	404.55	240	1.1	266.99	160
Censored	31.4	-	-	32.3	-	-	31.7	-	-
Total	100	133.43	89	100	147.05	98	100	138.39	91

By age at the time of entry in unemployment, from 38686 higher educated people unemployment spells, 5.5% represents subjects aged in between 21 and 24 years, 47.7% represents subjects aged in between 25 and 34 years, 22.8% are subjects aged between 35-44 years, 17.3% for the 45-54 age group and 6.8% for the 55-64 age group. The distribution of the spells that ended in employment by age groups is the following: 5.5% for the 21-24 age group, 52.9% for the 25-34 age group, 22.3% for the 35-44 age group, 15.6% for the 45-54 age group and only 3.7% for the 55-64 age group. 58.74 days is the mean duration of spells that ended in employment for higher educated people aged in between 21 and 24 years old, 91.08 days for the 25-34 age group, 120.20 days for the 35-44 age group, 131.20 for the 45-54 age group and 136.13 days for the 55-64 age group. From this preliminary descriptive statistics we can notice a clearly positive association between age and duration of unemployment.

The distribution of the analyzed spells and mean duration of unemployment until reemployment occurs by region is presented in table 7.

Table 7. Distribution of the spells by region

Region	Number of spells	Percent	Mean duration of unemployment until reemployment occurs
Budapest	7238	18.7	114.75
Northern Hungary	4245	11.0	102.87
Northern Great Plain	4902	12.7	91.56
Southern Great Plain	4776	12.3	98.01
Central Hungary	3316	8.6	117.82
Central Transdanubia	3977	10.3	105.63
Western Transdanubia	4222	10.9	94.43
Southern Transdanubia	2844	7.4	102.82
Missing System	3166	8.2	-
Total	38686	100.0	-

51.8% from the total analyzed subjects ended their last job due to mutual agreement between them and employer, 15.1% ended their last job due to receiving a regular notice from the employer, 0.7% received an exceptional notice from the employer, 4.7% of them received a notice from the employer during their trial period, 2.3% ended their job by sending a regular notice to the employer, 0.3% sent an exceptional notice to the employer prior quitting the job, 1.6% sent a notice during their trial period to the employer, 21.8% have as a reason for terminating their last job - end of temporary job, 4 subjects has retired due to the old age, 1.6% has the reason of ending their last job - employer's liquidate without legal successor, 1 subjects have “other reasons” for quitting his/her last job, and 0.1% subjects gave up the business. 27 spells don’t have specified the reason of ending their last job.

89.2% from the analyzed subjects have the average wage (used for calculating the unemployment benefit) less than 300000 HUF, 9.2% have the average wage in between 300001 HUF and 600000 HUF, 1.4% have the average wage in between 600001 HUF and 900000 HUF and only 0.3% have the average wage in between 900001 and 1518000 HUF.

93.8% from the total analyzed Hungarian subjects are looking for a white collar job (professional, managerial, or administrative work), and only 6.2% of them are looking for a blue collar job (manual labor).

0.5% from the analyzed subjects are looking for a job as a junior fellow worker, 1.5% are looking for a job as a semi-skilled worker, 4.5% for skilled worker, 9.5% for administrative co-worker, 45.7% are looking for a clerk job, 23.7% are looking for a job as a production manager, 10.8% are looking for a manager job and 0.9% are looking for a number one manager job. There are 1123 spells with the type of job looking for missing.

Out of all the 38686 registered unemployed subjects, 66.3% would expect a salary of less than 100.000 HUF, 24.3% expect a salary in between 1000001 HUF and 200000 HUF, 8.6% expect a salary in between 200001 and 500000 HUF, 0.7% expects a salary in between 500001 HUF and 1000000 HUF and 0.1% expect a salary in between 1000001 HUF and 5000000 HUF. 7 spell have the expected salary for the job looking for unspecified.

5. Results of the empirical analysis

The empirical analysis of my paper is based on a non-parametric estimation and semi-parametric Cox proportional hazard model with fully flexible baselines in a competing risks framework. In the case of a competing risks model, the probability of leaving unemployment is given by the sum of two or more transition probabilities. A transition probability is defined in my study as the probability of going to one of the three potential end destinations for Romanian dataset, or one of the four destinations for the Hungarian dataset. As Gonzalo and Saarela (2000), Addison and Portugal (2003), Jensen and Svarer (2003), Olikainen (2006) pointed out, the transition probabilities are assumed to be independent, conditional on the explanatory variables. In this case, the transition probabilities are considered as a hazard rate for each destination. According to Narendranathan and Stewart (1989) the transition probabilities are estimated as a single risk by treating spells that are finishing into other destinations as right censored spells.

The quantified impact of the explanatory variables on the duration unemployment spells for Romania is presented in table 8, 9 and 10 from Appendix, and for Hungary in table 11, 12, 13 and 14 from Appendix. In my analysis, for the Romanian dataset the reference category is the last category for *gender*, *age at the time of registration, education, region of residence*, *urban/rural area of residence*, *unemployment allowance during the current spell*, *marital status health status*, and the first category for *year of entry into unemployment.* For the Hungarian dataset, the reference category is the last for all explanatory variables; the Enter method was selected. When an explanatory variable is a numerical one, the hazard ration is an estimate of the hazard function change for a unit increase in the *p*-th covariate. For the categorical variables, the coefficient gives the hazard ratio for a specific category compared with a reference category. Out of all 219299 analyzed Romanian spells, only 28.3% ended in reemployment; 26.9% from the total analyzed spells ended due to expiry of eligibility for receiving unemployment allowance, 2.8% spells ended in inactivity and 42% are right censored spells. Out of all 38686 Hungarian spells, 31.5% ended due to reemployment, 3.9% spells ended due to participation to active labor market programs (3.4% are involved in labor-market training and 0.4% are fostered employed), 31.8% are ended due to

expiring the eligibility to receive unemployment allowance), 1.1% spells ended in non-participation on the Hungarian labor market, and 31.7% spells right- censored.

Analyzing the results of the competing-risks analysis we can draw the following conclusions:

- For both Romania and Hungary, the regression coefficient for men spells is positive, meaning an increase of exit to a job hazard rate, compared with the reference category, women. Romanian higher educated women have an 11.6% lower exit to a job hazard rate compared with higher educated men, the reference category. Hungarian higher educated men have an 8.8% higher exit to a job hazard rate, compared with higher educated women. But the median survival time until employment occurs is 409 days for higher educated Romanian women and 430 days for higher educated men. Median survival time until employment occurs is 314 days for higher educated Hungarian men and 323 for women. For both countries the presence of higher education led to a decrease of the gender gap. Romanian higher educated women are most prone to exit from unemployment in inactivity or due to expiry of the UI eligibility; Hungarian higher educated women are most prone to exit from unemployment due to involvement in active labor market programs, or to exit in inactivity. The exit rate due to ALMP is 39.7% lower for Hungarian men compared with women, the reference category. Also, Hungarian men hazard rate of exit in inactivity is 55% lower than women.
- As younger an individual is, as higher is her/his exit to a job rate, in Hungary. However, for Romania, the competing risks specification shows that individuals aged in between 25 and 34 years old are in a better position on the labor market than those aged in between 21 and 24 years old. For both countries we can notice a positive association between age and duration of unemployment spells. Individuals aged in between 21-24 years have a median survival time until employment occurs of 273 days, compared with 457 days, median survival time until employment occurs for those aged in between 55-64 years. For Hungary, median survival time until reemployment is 218 days for 21-24 age group, more than double compared with median survival time of reemployment for the 55-64 age group, and with more than 100 days for the 45-54 age group. For Hungary, all the four age groups have positive coefficients when event is exit in ALMP, meaning an increase of the hazard compared with the 55-64 age group, the reference category. The 21-24, 35-44 and 45-54 age groups are most prone to exit due to ALMP. Regarding the exit due to expiry of UI eligibility, as I expected, for both countries the highest hazard rate belongs to the 21-24 age group. For Romania, individuals aged in between 21-24 years are most prone to exit in inactivity; for Hungary, individuals aged in between 55 and 64 years are most prone to exit in inactivity.
- Marital status does not appear to have a significant influence on the reemployment chances of Romanian higher educated individuals, if we are looking at the confidence intervals. Unfortunately, I did not have information about marital status of the Hungarian higher educated individuals.
- For both Romania and Hungary we can notice disparities between different regions of residence. For 7 regions of Romania I had significance, except Bucharest, when the event is reemployment and the reference category is South-Oltenia region. For Hungary, I had statistical significance just for

Northern Hungary, Central Hungary (10% level), and Central Transdanubia (5% level) compared with Southern Transdanubia. A higher educated individual living in North-East region has the best exit to a job chances, followed by South-Muntenia region and West region. Higher educated individuals living in South-Oltenia region are in the worst position regarding exit to a job probabilities, being most prone to exit in inactivity or due to expiry of the UI eligibility. An individual living in Northern Hungary has a 16.3% lower hazard rate of exit to a job compared with an individual from Southern Transdanubia. A higher educated subject from Central Transdanubia has a 13.9% higher hazard rate of exit to a job compared with a higher educated individual from Southern Transdanubia. The lowest median duration survival time until reemployment occur is 264 days, corresponding to Central Transdanubia region, followed by Northern Great Plain region and Southern Transdanubia, both of them with 292 days median duration survival time until employment occur; the highest median duration survival time until employment occurs is registered by Northern Hungary, with 361 days, followed by Budapest, with 356 days. Regarding the exit due to ALMP, we have four regions with statistical significance when comparing with the reference category. The regression coefficient for Budapest is negative, which means a decrease of the exit due to ALMP compares with the reference category, Southern Transdanubia. A higher educated individual from Budapest has a 44.7% lower hazard rate of exit from unemployment due to participation in ALMP, compared with a higher educated individual from Southern Transdanubia. Also a higher educated individual from Central Hungary has a 30.9% lower hazard rate to exit due to participation in ALMP. Higher educated individuals from Central Transdanubia and Western Transdanubia have 41.6% and 46.9% higher hazard rates of exit from unemployment due to participation in ALMP. Higher educated individuals registered as unemployed from Budapest are most prone to exit from unemployment in inactivity.

- Higher educated individuals living in rural areas have a 12.9% lower exit to a job hazard rate compared with higher educated people from urban area. For the entire dataset of Romania the gap between rural and urban area is even higher; having a higher education led to a decrease of the disparities between urban and rural area. Romanian higher educated unemployed are most prone to exit in inactivity or due to expiry of the UI eligibility. Unfortunately, I did not have any information about the urban or rural area of living for Hungarian higher educated individuals.
- The presence of the unemployment allowance during a spell led to a decrease of the probability to exit in reemployment. Non-UI spells have an exit to a job hazard rate more than double than UI-spells. All the spells that ended due to expiry of the legal period for receiving unemployment allowance are UI spells. And 98% of the spells ended in inactivity are also UI spells. From the histogram of Romanian higher educated unemployed presented in section 4 of my paper we can notice peaks in the unemployment duration that suggest a strong association between exit from unemployment moment and unemployment allowance. A high number of unemployed individuals chose to stay in unemployment until the legal period of receiving UI expires. For Hungary all the analyzed spells are UI spells, thus I could not estimated the

impact of having or not unemployment allowance during the spell for the length of it and exit destinations.

- Romanian higher educated individuals with a disability are disadvantaged on the labor market, compared with those with a normal health condition. Disabled unemployed are most prone to exit from unemployment in inactivity or due to expiry of the legal period for UI. However, having a higher education is reducing the gap between unemployed with a normal health condition and a disabled unemployed. But since the sample of disabled individuals is small, the result has to be interpreted with caution. Unfortunately, I did not have any information about health status of the Hungarian higher educated people.
- The exit rate from unemployment of Romanian higher educated unemployed is sensitive to the economical situation from our country. Median survival time until reemployment occurs is 353 days for all the spells with the start date in 2008, 439 for all the 2009 spells and 344 for 2010 spells. For both 2009 and 2010 year the instantaneous reemployment hazard rate is lower than 1, compared with 2008 year, the reference category. In 2009 and 2010 the impact of economical crises led to negative consequences on Romanian labor market. The spells with the 2009 and 2010 as start year are affected by Government Ordinance OUG no.28/2009, that led to an artificially increase of the unemployment duration.
- For Hungary I tried to estimate the impact of the type of job looking for on the unemployment duration and exit destinations, however, as we can see from the below tables significance is not good, thus we cannot says that this variable has an impact on the hazard rate of individuals, compared with a reference category.

6. Conclusions

The aim of this paper was to analyze factors influencing unemployment spells and exit destinations of higher educated people from Romania and Hungary. The empirical analysis is based on two datasets with anonymous micro-data offered by National Agency of Employment Romania and Institute of Economics, Hungarian Academy of Sciences. As a methodology, I used a Kaplan-Meier non-parametric estimation and semi-parametric Cox proportional hazard model with fully flexible baselines in a competing risks framework. The results of my study show that gender, age and region of residence have a significant impact on the duration of unemployment spells and exit destinations of higher educated unemployed for both analyzed countries. For Romania, the urban or rural area of residence, the presence or absence of the unemployment allowance during the current spell, health status, and entry year in registered unemployment have also a significant impact on unemployment spells and exit destinations of higher educated individuals. The results of my study emphasis also the importance of education in general and higher education in particular; policy makers from both Romania and Hungary has to improve the level of education of unemployed people, since having a higher education decrease the gap between men and women, urban and rural area and the gap between individuals with a normal health condition and disabled people. Also, the results of my study suggest that Romanian and Hungarian

policies to reduce unemployment and to improve employment should be more focused on individuals aged over 35 years and especially on women aged over 35 years.

Acknowledgements

This paper is supported by the Sectorial Operational Programme Human Resources Development (SOP HRD), financed by the European Social Fund and by the Romanian Government under the contract number SOP HRD/89/1.5/S/62988. For Hungary, the administrative dataset of unemployment benefit recipients was created by the Institute of Economics, Research Centre for Economic and Regional Studies, Hungarian Academy of Sciences from the original data provided by the National Employment Service, Budapest, Hungary. Although the IE RCERS HAS made effort to clean the data, it cannot be held liable for any remaining error. The research presented in this manuscript was carried out during my research stage at the Corvinus University of Budapest, Faculty of Economics, Department of Human Resources. I would like to express my deepest gratitude to my supervisor, Professor Gyula Nagy, who gave me continuous and most appreciate guidance. My gratitude goes also to Professor Peter Galasi, Kitti Varadovics and all the other members of the labor market research group from the Institute of Economics, Research Centre for Economic and Regional Studies, Hungarian Academy of Sciences. Any remaining errors in this study are my responsibility. Any further comments will be most appreciated.

REFERENCES

Addison J., Portugal P. (2003) Unemployment duration; Competing and defective risks. Available at: ftp://repec.iza.org/RePEc/Discussionpaper/dp350.pdf.

Atkinson A.B., Micklewright J. (1991) Unemployment Compensation and Labor Market Transitions: A Critical Review, Journal of Economic Literature, 29(4): 1679-1727.

Berkson J, Gage R.P. (1950) Calculation of Survival Rates for Cancer, Proceedings of Staff Meetings of the Mayo Clinic, 25, 270-286.

Blomeyer D., Coneus K., Laucht M., Pfeiffer F. (2009) Initial risk matrix, home resources, ability development and children's achievement. Journal of the European Economic Association, 7(2-3), 638–648.

Bowles S., Gintis H., Osborne M. (2001) Incentive-enhancing preferences: Personality, behavior, and earnings, American Economic Review, 91(2): 155–158.

Böheim R., Taylor M.P. (2000) Unemployment Duration and Exit States in Britain, CEPR Discussion Papers 2500, C.E.P.R. Discussion Papers.

Borsic D. et. al. (2009) Cox Regression Models for Unemployment Duration in Romania, Austria, Slovenia Croatia and Macedonia, Romanian Journal of Economic Forecasting, 2, 81-104.

Ciuca V., Matei M. (2010) Survival analysis for the unemployment duration, Proceedings of the 5th WSEAS International Conference on Economy and Management Transformation, 354-359.

Cutler S.J., Ederer F. (1958) Maximum utilization of the life table method in analyzing survival. J. Chronic Dis. 8, 699-712.

D'Agostino A., Mealli F. (2000) Modeling Short Unemployment in Europe. Institute for Social & Economic Research Working Paper 06.

Dănăcică D., Babucea A.G. (2007) The Role of Education for the Duration of Unemployment in Gorj Country, Studia Universitatis Babes Bolyai – Oeconomica, 52(1): 67-82.

Earle J.S., Pauna C. (1996) Incidence and duration of unemployment in Romania, European Economic Review, 40(3-5): 829-837.

Fagan C., Rubery J. (1996) Transitions between Family Formation and Paid Employment, In International Handbook of Labour Market Policy and Evaluation. Eds. G. Schmid, J. O'Reilly and K. Schömann. Cambridge: Edward Elgar, 348–378.

Fajnzylber P., Lederman D., Loayza N. (1998) Determinants of Crime Rates in Latin America and the World: An Empirical Assessment, Washington DC: The World Bank.

Fedorov L., Sahn D.E. (2005) Socioeconomic determinants of children's health in Russia: A longitudinal Study. Economic Development and Cultural Change, 53(2): 479-500.

Grogan L., van den Berg J. (2000) Determinants of Unemployment in Russia, Journal of Population Economies, 14, 549-568.
Ham J. C, Rea S.A. (1987) Unemployment Insurance and Male Unemployment Duration in Canada, Journal of Labor Economics, 5(3): 325-53.
Heckman, J., Stixrud, J., Urzua, S. (2006), The Effects of Cognitive and Noncognitive Abilities on Labor Market Outcomes and Social Behavior, Journal of Labor Economics, 24(3): 411–482.
Hunt J. (2004) Convergence and Determinants of Non-Employment Durations in Eastern and Western Germany, Journal of Population Economics, 17(2): 249–266.
Jensen P., Svarer M. (2003) Short- and Long Term Unemployment: How Do Temporary Layoffs Affect This Distinction? Empirical Economics, 28(1): 23-44.
Klugman, J., Kolev A. (2001), The role of the safety net and the labor market on falling cash consumption in Russia: 1994-96 a quintile-based decomposition analysis, Review of Income and Wealth (1), 105-124.
Kupets O. (2006) Determinants of Unemployment Duration in Ukraine. Journal of Comparative Economics, 34(2): 228–247.
Lewis G., Sloggett A. (1998) Suicide, Deprivation, and Unemployment: Record Linkage Study, British Medical Journal, 317, 1283-1286.
Mincer J. (1991) Education and Unemployment, NBER Working Paper Nº 3838.
Moffitt R.A. (1999) New Developments in Econometric Methods for Labour Market Analysis. In: Handbook of Labor Economics, Eds. O. Ashenfelter and D. Card. Amsterdam: North Holland.
Mortensen, D. T. (1986) Job search and labor market analysis. In Handbook of Labor Economics, volume 2 of Handbook of Labor Economics, chapter 15, 849–919.
Narendranathan W., Stewart M. (1993) Modeling the Probability of Leaving Unemployment: Competing Risks Models with Flexible Baseline Hazards. Applied Statistics – Journal of the Royal Statistical Society Series C, 42(1): 63-83.
Nivoroyhkin A. (2006) Essays on Unemployment Duration and Programme Evaluation. Available at: http://gupea.ub.gu.se/bitstream/2077/2913/1/gupea_2077_2913_1.pdf.
Nickell S (1979) The Effect of Unemployment and Related Benefits on the Duration of Unemployment, Economic Journal, 89, 34-49.
Ollikainen, V. (2003), The Determinants of Unemployment Duration by Gender in Finland. Available at: http://www. vatt.fi/file/vatt_publication_pdf/k316.pdf.
Pencavel J. (1986) Labour Supply of Men: A Survey. In Handbook of Labour Economics, Vol. I (Eds.) O. Ashenfelter & R. Layard, North-Holland, Amsterdam.
Pike M.C. (1966) Design and Analysis of Randomized Clinical Trials Requiring Prolonged Observation of Each Patient, British Journal of Cancer; 34, 585-612.
Reyher L., Koller M., Spitznagel E. (1980) Employment Policy Alternatives to Unemployment in the Federal Republic of Germany - Issues, Effects on the Labour Market and Costs, London: Anglo-German Foundation for the Study of Industrial Society.
Rubery J. (2008) Women and work in the UK: the Need for a Modernisation of Labour Market Institutions, Women and Employment, Changing Lives and New Challenges, Cheltenham: Edward Elgar.
Stankunas M., Kalediene R., Starkuviene S., Kapustinskiene V (2006) Duration of unemployment and depression: A cross-sectional survey in Lithuania. BMC Public Health, 6, 174-180.
Stetsenko, S. (2003), On the Duration and the Determinants of Ukrainian Registered Unemploy-ment. A Case Study of Kyiv. Available at: http://www.eerc.kiev.ua/research/matheses/2003/Stetsenko_Serhiy/body.pdf.
Wadsworth J. (1991) Unemployment Benefits and Search Effort in the UK Labour Market, Economica 58, 17–34.
Tansel A., Mehmet Tasci H. (2005) Determinants of Unemployment Duration for Men and Women in Turkey. IZA Discussion Paper no. 1258.

APPENDIX

Table 7. Results of the Cox proportional hazard model in a competing-risks framework, event reemployment, Romanian dataset

Variables in the Equation								
	B	SE	Wald	df	Significance	Exp(B)	95.0% CI for Exp(B)	
							Lower	Upper
Women	-.123	.009	201.362	1	.000	.884	.869	.899
Men	Reference category							
Age								
21-24 years	.592	.028	452.334	1	.000	1.807	1.711	1.908
25-34 years	1.015	.026	1512.899	1	.000	2.760	2.622	2.904
35-44 years	.465	.027	306.293	1	.000	1.592	1.511	1.677
45-54 years	.284	.027	114.332	1	.000	1.329	1.261	1.400
55-64 years	Reference category							
Education								
College	-.001	.036	.001	1	.972	.999	.931	1.072
University education	Reference category							
Marital status								
Unknown status	.668	.094	50.506	1	.000	1.950	1.622	2.344
Unmarried	.307	.093	10.808	1	.001	1.359	1.132	1.632
Married	.416	.093	20.069	1	.000	1.517	1.264	1.820
Widowers	.274	.097	8.025	1	.005	1.315	1.088	1.589
Divorced	Reference category							
Region								
North-East	.390	.016	613.768	1	.000	1.476	1.431	1.523
West	.175	.017	103.079	1	.000	1.191	1.151	1.231
North-West	.064	.017	13.748	1	.000	1.066	1.031	1.103
Central	.192	.017	130.493	1	.000	1.211	1.172	1.252
South- East	.097	.019	26.472	1	.000	1.102	1.062	1.143
South-Muntenia	.308	.017	325.733	1	.000	1.361	1.316	1.407
Bucharest- Ilfov	-.020	.018	1.257	1	.262	.980	.945	1.015
South Oltenia	Reference category							
Residence area								
Rural Area	-.138	.012	139.302	1	.000	.871	.852	.891
Urban Area	Reference category							
Unemployment allowance								
Without allowance	.942	.012	5840.821	1	.000	2.566	2.504	2.628
With allowance	Reference category							
Health status								
Without disability	.349	.109	10.222	1	.001	1.418	1.145	1.757
With disability	Reference category							
Entry year in unemployment								
2008	Reference category							
2009	-.518	.010	2441.779	1	.000	.596	.584	.608
2010	-.047	.011	18.079	1	.000	.954	.933	.975

Table 8. Results of the Cox proportional hazard model in a competing-risks framework, event expiry of the legal period for receiving UI, Romanian dataset

Variables in the Equation								
	B	SE	Wald	df	Significance	Exp(B)	95,0% CI for Exp(B)	
							Lower	Upper
Women	.021	.009	5.862	1	.015	1.021	1.004	1.039
Men	Reference category							
Age								
21-24 years	2.009	.029	4828.429	1	.000	7.454	7.043	7.888
25-34 years	1.619	.028	3445.890	1	.000	5.046	4.781	5.326
35-44 years	.490	.028	300.867	1	.000	1.633	1.545	1.726
45-54 years	.169	.029	34.551	1	.000	1.184	1.119	1.252
55-65 years	Reference category							
Education								
College	-.170	.036	22.821	1	.000	.844	.787	.905
University education	Reference category							
Marital status								
Unknown status	.065	.087	.562	1	.453	1.067	.900	1.265
Unmarried	.264	.086	9.499	1	.002	1.302	1.101	1.539
Married	-.007	.085	.006	1	.938	.993	.841	1.174
Widowers	-.085	.089	.908	1	.341	.919	.771	1.094
Divorced	Reference category							
Region								
North-East	-.195	.015	165.743	1	.000	.823	.799	.848
West	-.281	.016	320.627	1	.000	.755	.732	.778
North-West	-.241	.015	246.669	1	.000	.786	.763	.810
Central	-.285	.015	349.321	1	.000	.752	.730	.775
South- East	-.059	.016	13.617	1	.000	.943	.913	.973
South-Muntenia	-.184	.016	133.923	1	.000	.832	.807	.859
Bucharest- Ilfov	-.835	.019	1932.775	1	.000	.434	.418	.450
South Oltenia	Reference category							
Residence area								
Rural Area	.134	.011	159.049	1	.000	1.143	1.120	1.167
Urban Area	Reference category							
Health status								
Without disability	-.029	.109	.072	1	.789	.971	.785	1.202
With disability	Reference category							
Entry year in unemployment								
2008	Reference category							
2009	-.021	.012	2.856	1	.091	.979	.956	1.003
2010	1.303	.013	9444.148	1	.000	3.682	3.586	3.780

Table 9. Results of the Cox proportional hazard model in a competing-risks framework, event inactivity, Romanian dataset

Variables in the Equation								
	B	SE	Wald	Df	Significance	Exp(B)	95,0% CI for Exp(B)	
							Lower	Upper
Women	.851	.034	609.468	1	.000	2.341	2.189	2.505
Men	Reference category							
Age								
21-24 years	.192	.058	11.101	1	.001	1.212	1.082	1.357
25-34 years	-.534	.049	117.666	1	.000	.587	.533	.646
35-44 years	-2.67	.070	1456.787	1	.000	.069	.060	.079
45-54 years	-1.57	.049	1018.147	1	.000	.207	.187	.228
55-65 years	Reference category							
Education								
College	-.167	.112	2.226	1	.136	.846	.679	1.054
University education	Reference category							
Marital status								
Unknown status	-.382	.187	4.186	1	.041	.683	.473	.984
Unmarried	-.483	.179	7.266	1	.007	.617	.434	.877
Married	.106	.176	.366	1	.545	1.112	.788	1.569
Widowers	-.303	.194	2.458	1	.117	.738	.505	1.079
Divorced	Reference category							
Region								
North-East	-.202	.052	15.112	1	.000	.817	.738	.905
West	-.327	.054	36.206	1	.000	.721	.648	.802
North-West	-.233	.053	19.673	1	.000	.792	.714	.878
Central	-.207	.051	16.633	1	.000	.813	.736	.898
South- East	-.149	.056	7.180	1	.007	.861	.772	.961
South-Muntenia	-.121	.053	5.226	1	.022	.886	.798	.983
Bucharest- Ilfov	-.602	.059	102.758	1	.000	.548	.487	.615
South Oltenia	Reference category							
Residence area								
Rural Area	.079	.037	4.553	1	.033	1.082	1.006	1.164
Urban Area	Reference category							
Health status								
Without disability	-.089	.448	.039	1	.843	.915	.381	2.201
With disability	Reference category							
Entry year in unemployment								
2008	Reference category							
2009	.236	.040	34.389	1	.000	1.266	1.170	1.369
2010	1.385	.047	876.052	1	.000	3.993	3.643	4.376

Table 10. Results of the Cox proportional hazard model in a competing-risks framework, event reemployment, Hungarian dataset

Variables in the Equation								
	B	SE	Wald	df	Sig.	Exp(B)	95.0% CI for Exp(B)	
							Lower	Upper
Gender								
Men	.084	.021	16.379	1	.000	1.088	1.044	1.133
Women	Reference category							
Age								
21-24 years	1.491	.067	490.958	1	.000	4.441	3.892	5.067
25-34 years	1.261	.053	557.011	1	.000	3.530	3.179	3.920
35-44 years	.875	.055	250.881	1	.000	2.398	2.152	2.672
45-54 years	.655	.056	136.051	1	.000	1.926	1.725	2.150
55-64 years	Reference category							
Region								
Budapest	-.046	.040	1.333	1	.248	.955	.882	1.033
Northern Hungary	-.178	.045	15.444	1	.000	.837	.765	.914
Northern Great Plain	.002	.043	.002	1	.966	1.002	.921	1.090
Southern Great Plain	-.012	.043	.077	1	.781	.988	.909	1.074
Central Hungary	-.081	.046	3.060	1	.080	.922	.842	1.010
Central Transdanubia	.130	.044	8.966	1	.003	1.139	1.046	1.241
Western Transdanubia	.051	.045	1.288	1	.257	1.052	.964	1.148
Southern Transdanubia	Reference category							
Looking job for								
junior fellow worker	.023	.182	.016	1	.898	1.024	.717	1.462
semi-skilled worker	-.138	.137	1.010	1	.315	.871	.666	1.140
skilled worker	-.128	.117	1.200	1	.273	.880	.699	1.107
administrative co-worker	-.126	.105	1.441	1	.230	.881	.717	1.083
clerk	-.056	.101	.309	1	.578	.945	.775	1.153
production manager	-.015	.102	.022	1	.881	.985	.807	1.202
manager	.028	.104	.072	1	.789	1.028	.839	1.260
number one manager	Reference category							

Table 11. Results of the Cox proportional hazard model in a competing-risks framework, event – involvement in active labor market programs, Hungarian dataset

Variables in the Equation								
	B	SE	Wald	df	Sig.	Exp(B)	95.0% CI for Exp(B)	
							Lower	Upper
Gender								
Men	-.506	.065	60.481	1	.000	.603	.530	.685
Women	Reference category							
Age								
21-24 years	.862	.185	21.607	1	.000	2.367	1.646	3.404
25-34 years	.485	.141	11.903	1	.001	1.624	1.233	2.139
35-44 years	.719	.141	25.851	1	.000	2.053	1.556	2.708
45-54 years	.696	.142	24.078	1	.000	2.005	1.519	2.648
55-64 years	Reference category							
Region								
Budapest	-.592	.123	23.328	1	.000	.553	.435	.704
Northern Hungary	.089	.123	.515	1	.473	1.093	.858	1.391
Northern Great Plain	.152	.120	1.592	1	.207	1.164	.919	1.474
Southern Great Plain	-.109	.124	.767	1	.381	.897	.703	1.144
Central Hungary	-.370	.139	7.103	1	.008	.691	.527	.907
Central Transdanubia	.348	.119	8.580	1	.003	1.416	1.122	1.787
Western Transdanubia	.385	.119	10.395	1	.001	1.469	1.163	1.856
Southern Transdanubia	Reference category							
Looking job for								
junior fellow worker	.379	.635	.356	1	.551	1.461	.420	5.076
semi-skilled worker	.678	.454	2.231	1	.135	1.970	.809	4.794
skilled worker	.890	.408	4.762	1	.029	2.435	1.095	5.417
administrative co-worker	.663	.389	2.907	1	.088	1.941	.906	4.158
clerk	.624	.382	2.670	1	.102	1.866	.883	3.942
production manager	.582	.383	2.305	1	.129	1.789	.844	3.792
manager	.471	.388	1.472	1	.225	1.602	.748	3.429
number one manager	Reference category							

Table 12. Results of the Cox proportional hazard model in a competing-risks framework, event – expiry of the legal period for receiving UI, Hungarian dataset

Variables in the Equation								
	B	SE	Wald	df	Sig.	Exp(B)	95.0% CI for Exp(B)	
							Lower	Upper
Gender								
Men	.054	.021	6.775	1	.009	1.056	1.014	1.100
Women	Reference category							
Age								
21-24 years	2.506	.059	1801.880	1	.000	12.257	10.918	13.761
25-34 years	1.461	.048	918.056	1	.000	4.311	3.922	4.738
35-44 years	1.087	.050	477.154	1	.000	2.965	2.689	3.268
45-54 years	.759	.048	247.742	1	.000	2.137	1.944	2.349
55-64 years	Reference category							
Region								
Budapest	-.277	.039	49.882	1	.000	.758	.702	.819
Northern Hungary	-.013	.042	.092	1	.762	.987	.909	1.073
Northern Great Plain	.166	.041	16.593	1	.000	1.181	1.090	1.279
Southern Great Plain	-.085	.041	4.245	1	.039	.918	.847	.996
Central Hungary	-.244	.046	28.471	1	.000	.784	.716	.857
Central Transdanubia	-.155	.044	12.328	1	.000	.856	.785	.934
Western Transdanubia	-.161	.045	12.651	1	.000	.851	.779	.930
Southern Transdanubia	Reference category							
Looking job for								
junior fellow worker	.379	.175	4.691	1	.030	1.461	1.037	2.060
semi-skilled worker	.337	.135	6.260	1	.012	1.400	1.076	1.823
skilled worker	.239	.121	3.922	1	.048	1.270	1.002	1.609
administrative co-worker	.227	.111	4.184	1	.041	1.255	1.010	1.561
clerk	.256	.108	5.676	1	.017	1.292	1.047	1.596
production manager	.205	.108	3.598	1	.058	1.228	.993	1.519
manager	.166	.110	2.276	1	.131	1.181	.951	1.466
number one manager	Reference category							

Table 13. Results of the Cox proportional hazard model in a competing-risks framework, event – non-participation, Hungarian dataset

Variables in the Equation								
	B	SE	Wald	df	Sig.	Exp(B)	95.0% CI for Exp(B)	
							Lower	Upper
Gender								
Men	-.799	.119	44.773	1	.000	.450	.356	.568
Women	Reference category							
Age								
21-24 years	-2.19	.351	39.221	1	.000	.111	.056	.221
25-34 years	-3.09	.169	337.161	1	.000	.045	.033	.063
35-44 years	-4.18	.312	179.234	1	.000	.015	.008	.028
45-54 years	-3.29	.226	212.810	1	.000	.037	.024	.058
55-64 years	Reference category							
Region								
Budapest	.371	.263	1.981	1	.159	1.449	.865	2.428
Northern Hungary	.022	.310	.005	1	.942	1.023	.557	1.877
Northern Great Plain	.109	.329	.110	1	.740	1.115	.585	2.125
Southern Great Plain	.253	.301	.708	1	.400	1.288	.714	2.321
Central Hungary	.526	.281	3.511	1	.061	1.692	.976	2.931
Central Transdanubia	.484	.288	2.829	1	.093	1.623	.923	2.852
Western Transdanubia	.612	.278	4.838	1	.028	1.844	1.069	3.182
Southern Transdanubia	Reference category							
Looking job for								
junior fellow worker	-.665	1.069	.387	1	.534	.514	.063	4.182
semi-skilled worker	-.745	.642	1.345	1	.246	.475	.135	1.672
skilled worker	-.121	.469	.066	1	.797	.886	.353	2.222
administrative co-worker	-.271	.367	.546	1	.460	.762	.371	1.566
clerk	-.187	.307	.371	1	.542	.829	.454	1.514
production manager	-.174	.311	.315	1	.574	.840	.457	1.544
number one manager	-.227	.316	.518	1	.472	.797	.429	1.479
number one manager	Reference category							

PROSPECTIVE MANAGERS ABOUT CULTURAL DIMENSIONS AND LEADERSHIP STYLES: A COMPARISON BETWEEN ROMANIA AND SLOVENIA

Doina CATANĂ [*]
Technical University of Cluj-NapocA, Romania

Danijel PUČKO
University of Ljubljana, Slovenia

Abstract. The article contributes to the body of knowledge about the prospective managers's (i.e. business and engineering students) view on actual cultural practices in their social environments, value systems they possess and the best leadership styles. The main research questions concern the similarities and differences between Romanian and Slovenian students in: 1) perception of existing cultural practices; 2) held value systems and 3) preffered leadership styles. The authors also look for signs of certain convergence in the future cultural practices and leadership styles between the compared countries in the future. Our findings show: 1) relevant statistically significant differences for six out of nine cultural practices; 2) relevant differences for five out of nine cultural expectations (values); 3) same rank for Charismatic (value-based) and Team oriented leadership styles. There are signals that enable us to expect that prospective managers in both (transitional) countries will implement positive changes in their cultural dimensions. Still, the Romanians will be more radical in doing this than their Slovenian counterparts.

JEL Classification: M14, M19

Keywords: cultural practice, value system, leadership style, Romania, Slovenia.

1. Introduction

The GLOBE research project, initiated at the Wharton Business School in the early 1990s, which investigates business leadership worldwide, became a basis for developing a worldwide GLOBE community. Its main research objective was to determine the extent to which the practices and values of business leadership are universal and the extent to which they are specific to a specific

[*] Corresponding author. Address: Technical University of Cluj-Napoca, Faculty of Electrical Engineering, 26 G. Baritiu street, 400027 Cluj-Napoca, Romania. E-mail: Doina.Catana@eps.utcluj.ro, Tel: +40264401420

country or a cluster of countries (House et al. 2004). The findings show that there are both, cultural universal attributes as well as culturally contingent attributes, enabling the formulation of implicit leadership theories in several cultural environments (House et al. 2004). The GLOBE research results are based on empirical surveys carried out among current middle managers from 61 countries (Chhokar et al. 2007).

The GLOBE STUDENT project was initiated in 2008. It is organized as rather permanent project, which attracted researchers from seven Central European countries: Austria, Czech Republic, Germany (as former Eastern Germany), Poland, Romania, Slovakia and Slovenia at the beginning. Researchers from the stated countries have already produced first research results. By building on the research findings of the GLOBE research, we assume that future managers will be recruited out of today's university students. Therefore, the GLOBE STUDENT research project focuses on prospective managers.[1]

Here our purpose is to contribute to the body of knowledge about the cultural dimensions of the Romanian and Slovenian society in which future managers are raised, about their value system and their probable future leadership styles based on our research findings from a specific angle. We explore how the perceived cultural dimensions and leadership styles differ between the two countries and whether we can expect some convergence in those variables in the future. We are aware that Romania and Slovenia are Central European countries, but in many aspects different.

Descendents of Roman colonizers of ancient Dacia, Romanians lived in three neighbouring Autonomous principalities: Valahia, Moldova and Transylvania, from Middle age to the modern époque. The first attempt to unify the three provinces was performed by Michael the Brave (1599-1600) in his willingness to remake the unity of ancient Dacia.

The name Romania was adopted in 1862, after the foundation of national state through unification of Valahia and Moldova (1859). It should be mentioned that during the long era of Ottoman domination of South East Europe (XIV-XIX centuries), recognizing the Sultan as their suzerain and by paying annual tribute, Valahia and Moldova avoided an occupation by Ottomans and the islamization (Hitchins 1994). Treaty of Berlin (13 July 1878) recognized Romania's independency. On March 14 - 26 1881, Carol I (of the house of Hohenzollern-Sigmaringen) was crowned as king of Romania and declared Romania a kingdom. The proclamation of the unification of all Romanian territories followed the end of the World War I (1918). Today's Romania territory was configured at the end of World War II. King Michael I was forced to abdicate the throne, the monarchy was abolished and replaced with Romania People's Republic. Between 1944 and August 1958, Romania was occupied by the Soviet troops and communism became the political ideology.

---

[1] We express our gratitude to the GLOBE community, which provided us with the theoretical background questionnaire items and many empirical insights, but especially to all research participants in the GLOBE STUDENT project. R. Lang from Chemnitz University of Technology coordinates the project. For the present article, data has been collected by T. Čater (University of Ljubljana, Slovenia), Gh. A. Catana (Technical University of Cluj-Napoca, Romania) and the authors of this article.

After Ceausescu became the General Secretary of Romanian Communist Party, the second half of the 1960s was a hopeful period of relaxed control on public and cultural expression, but after 1971 the full control was restored and the short period of liberalization ended (Niessen, 2005). Ceausescu's dictatorship was one of the toughest in Eastern Europe. After the collapse of communist regimes in Europe, Romania became a democratic Republic. It has a surface of 238.390 square kilometres, a population of 19.042.936 inhabitants and a GDP/capita of 8862.9 current USD. Almost 90% of population is Romanian. The dominant religion is Eastern Christian Orthodoxy. Romanian language belongs to the group of Romanic languages.

Historically, the current territory of Slovenia was part of many different states, including Roman Empire and the Holy Roman Empire, followed by the Habsburg Monarchy. Slavs from the East came to this territory in the sixth century, founding the king Samo' tribal confederation. Later it became the independent duchy of Carantania for a short period and then a vassal duchy under a rule of Bavarians. At the end of the First World War, the Slovenes exercised self-determination for the first time by co-founding the Kingdom of Slovenes, Croats and Serbs. During the Second World War, the kingdom was transformed into the People's (later Socialist) Federal Republic of Yugoslavia that belonged to the Soviet bloc of communist countries. In the 1948, a split with Stalin happened and Yugoslavia went on its independent way, developing the system of workers' self-management. Slovenia was one of six federal republics in the Yugoslav federation. After the dissolution of the Socialist Yugoslavia in 1991, Slovenia became independent state (a democratic Republic) for the first time in its history. The country has a surface of 23.009 square kilometres and a population of 2.048.488 inhabitants with two small national minorities: Hungarian and Italian. Approximately 83 % of inhabitants consider themselves Slovenes in the 2002 census. Roman Catholicism is the most prevalent religion. Protestantism also markedly influenced the development of the Slovenian identity in the past. Nominal GDP/capita amounts to USD 23,009. Slovene language belongs to the group of Slavic languages.

Both countries are members of NATO and EU. Romania is nearly 11 times bigger regarding the number of inhabitants than Slovenia. Our research sample (agreed upon in advance for the whole GLOBE STUDENT project) includes business and engineering students on undergraduate and graduate levels. The presentation of the empirical findings will be systematized by offering answers to the following research questions:

1) How are the Romanian students' perceptions of current cultural practices different from the perceptions of the students from Slovenia?
2) How the Romanian students' values differ from the values of students in Slovenia?
3) Which leadership styles are preferred by the Romanian students and do they differ from the styles preferred by the Slovenian ones?
4) Could we expect that a certain convergence in future cultural practices and future leadership styles will materialized between these two countries?

The article is structured in six steps. After this introduction, a concise review of the relevant literature on cultural dimensions and managerial leadership styles is offered in part two, followed by a short description of the research methodology in part three. In part four, we present the empirical findings of our study which is

based on the assumption that future managers will mostly come from two broad fields of university studies, i.e. business and engineering. In part five, the research results are discussed, followed by a conclusion in part six.

2. Literature review

Anthropologists do not agree about the precise meaning of culture (Schneider and Barsoux 2003). Some definitions include everything from law and religion to art, while others concentrate on specific "value orientations". Margaret Mead proposed to understand culture as "shared patterns of behaviour", while Claude Levi-Strauss and Clifford Geertz defined it as "systems of shared meaning or understanding" (Schneider and Barsoux 2003, p. 22). Trompenaars (Zagoršek 2004, p. 59) defines it as the way people resolve dilemmas emerging from universal problems, particularly in connection with relationships, time, and the external environment. Management scholar Ed Schein defines culture as "a set of basic assumptions – shared solutions to universal problems, of external adaptation (how to survive) and internal integration (how to stay together) – which have evolved over time and are handed down from one generation to the next" (Schneider and Barsoux 2003, p. 22). The GLOBE researchers explain culture as shared motives, values, beliefs, and identities, events that result from common experiences of members of collectives and are transmitted across age generations (House et al. 2002).

Because of the wide heterogeneity of explanations what culture really is, researchers have problems when trying to measure existing cultures? Hofstede's research was probably the first that discovered through his well-known empirical survey carried out among the employees of the IBM's subsidiaries in 1971 in many countries the characteristics of national cultural dimensions (a cultural dimension is defined as set of cultural attributes identified in empirical research). His research avoided Romania at first, but Slovenia as a part of Yugoslavia at that time was included. Therefore, he found cultural dimensions, valid for Slovenia too. He was able to present research findings for Slovenia for only four of his five dimensions i.e. Power Distance, Individualism, Masculinity and Uncertainty Avoidance (http://geert-hofstede.com/slovenia.html). Later Hofstede carried out his study for Romania too (http://geert-hofstede.com/romania.html).

The GLOBE researchers decided to use a number of cultural attributes focused on shared modal values of collectives for measurement purposes. These values are expressed in response to questionnaire items in the form of judgments of what should be. Values represent what is expected or hoped for in a society, not what is actually materialized. Therefore the other measurement of culture, i.e. modal practices, is based on indicators that assess »what is«, or »what are« common behaviours, institutional practices, proscriptions and prescriptions (House et al. 2002). This distinction, made by GLOBE, between "values" and "practices" is a relative one. Philosophically speaking, a good practice is a learned value. Any good practice was at some point a value.

The GLOBE researchers based their assessment of culture on a psychological/behavioural tradition, which assumes that shared values are incorporated in behaviours, policies and practices. Because of the empirical research needs they operationalize culture in nine cultural dimensions. These dimensions are: 1) Uncertainty Avoidance, 2) Power Distance, 3) Collectivism 1

(societal Collectivism), 4) Collectivism 2 (in-group/family Collectivism), 5) Gender Egalitarianism, 6) Assertiveness, 7) Future Orientation, 8) Performance Orientation, and 9) Human orientation (House et al. 2002). It is known that the first six dimensions are rooted in cultural dimensions defined originally by Hofstede (1991). Future Orientation was derived from Kluckholn & Strodtbeck (Kluckholn & Strodtbeck, 1961), and Performance Orientation from McClelland (McCleland, 1985) (House et al. 2002).

Values are relatively stable and are not changing quickly (Ule 2003).The values in the social system, which are resistant to change, are by Williams (1979) those, which are "high in centrality, pervasive, and supported by powerful sanctions and high consensus and supporters of these values hold positions of high prestige and authority". Such values are rather stable but according to the European Values Survey might especially change when one generation succeeds another (Keating et al. 2002). Psychologists (Musek 2003, Mead 1998, Helson, Jones, Kwan 2002) warn us that people's values do change during their life cycle. In youth period, hedonistic values prevail, later on the values of power become more important, and finally, moral values and self-actualization take the primacy.
Many management scholars try to prove that a direct relationship exists between culture and leadership styles. They argue that specific cultural traditions, values, beliefs and norms, which are the cornerstones of culture, have a direct impact on leadership (House et al. 2002). Values motivate people and normatively lead their behaviour, interests, thoughts and actions (Musek 2003). A leadership style might be perceived as a reflection of certain societal culture, meaning that cultural values influence the leadership practices (Kopelman et al. 1990).

Leadership is another phenomenon, which has no well-accepted unified definition. Zagoršek (2004) presented the plenitude of leadership theories. Each of them tries to explain leadership somehow differently. One of them defines leadership as an influence process between a leader and followers where the leader influences, motivates, and facilitates the activities of an organizational group toward goal achievement through mostly no coercive means (Zagoršek 2004). Kotter (1990) defines leadership as ability to influence, motivate and direct co-workers towards the goals achievement. GLOBE definition of organizational leadership is not much different from the stated ones and says that it is "the ability of an individual to influence, motivate and enable others to contribute toward the effectiveness and success of the organizations of which they are members" (House et al. 2002, p. 5).

GLOBE empirically identified 21 first order and six second order leadership styles (dimensions) from a large pool of theoretically defined leadership traits and behaviour patterns. The six styles are (House et al. 2004, p. 14, Steyrer et al. 2008, p. 365): 1) charismatic/value based leadership, 2) team-oriented leadership, 3) participative leadership, 4) Human-oriented leadership, 5) Autonomous leadership, and 6) Self-protective leadership. A charismatic/value-based leadership reflects the ability to inspire, to motivate, and to successfully demand high performance outcomes from others, based on firmly held core values. Team-oriented leadership emphasizes effective team building, resulting in mutual support and the creation of a common purpose. Participative leadership develops a high level of involvement of subordinates in making and implementing decisions. Human-oriented leadership is described as developing high degree to which leaders in organizations or societies encourage and reward individuals for being

fair, altruistic, friendly, generous, caring, and kind to others. Autonomous leadership refers to independent and individualistic leadership, whereas Self-protective leadership describes leadership behaviour that is self-centred, status conscious, procedural and conflict inducing.

GLOBE research findings regarding leadership styles have shown that some of them are seen as good and effective or bad and unwanted in all countries and regions, while others are more culturally contingent (Lang et al. 2010). Bakacsi et al. (2002) as GLOBE project co-investigators applied GLOBE's methodological approach on samples of the Eastern European cluster of countries at the turn of the century. Slovenia was included in this cluster, but Romania was not. They identified key societal cultural dimensions and attitudes toward different leadership styles for Slovenia based on Slovenian middle managers' sample (Brenk Klas was investigator from Slovenia). Zagoršek focused in his research on the issue of universality versus cultural contingency of leadership and used samples of MBA students for his research from six countries, Slovenia was one among them (Zagoršek 2004). He identified the characteristics of four Hofstede's cultural dimensions for each of the chosen countries and attitudes towards GLOBE's leadership styles. Prašnikar et al. (2008) carried out a comparative research focused on culture of managers and future managers (i.e. MBA students) in Russia, Serbia and Slovenia, but their research approach was not based on the GLOBE questionnaire and he did not include Romania too. Interact and Gallup Romania replicated of Hofstede's survey in Romania in 2005 (Luca 2005). Author studied cultural dimensions of Romanian middle managers (2012) too.

There were two empirical research published as far as we are aware that tested potential differences in perceptions of managers and students (i.e. future managers by the assumption). Keating et al. (2002) investigated whether managers and students of Ireland and Austria share the same perceptions of culture using the GLOBE societal culture questionnaire. Their findings were in favour of the conclusion that in Ireland and Austria no significant differences exist between managers and students from individual country regarding their perceptions of practice, but that on the other hand they found quite significant differences of perceptions regarding practices between two countries. The differences found in perceptions regarding values were much smaller between all four groups of respondents. Author (2012) noticed significantly higher mean scores among students in perceiving Power Distance, Family Collectivism and Gender Egalitarianism. They also found significantly higher mean scores among the students in expectations concerning Human Orientation, Performance Orientation, Family Collectivism, Uncertainty Avoidance, Future Orientation and Institutional Collectivism. Overall, they assert that changes will occur in Romanian societal culture dimensions, as compared samples expressed same expectation for a society concerned with higher Future Orientation, Institutional Collectivism, Performance Orientation, In group/Family Collectivism II, Gender Egalitarianism and Assertiveness and with much lower Power Distance.

3. Research methodology

Most variables of our study were defined and taken out of the GLOBE research project (House et al. 2004). The relevant GLOBE questionnaire was used with some modifications required because of having students and not managers as

respondents in our survey. We used a translated version of the adapted questionnaire into relevant domestic languages. Regarding scales used in the questionnaire the respondents were asked to express their agreement with a given statement using a seven-point Likert type scale (from 1 = strongly disagree, to 7 = strongly agree). Answering questions in the second and fourth part of the questionnaire demanded from respondents to assign to the stated attributes appropriate number of points from the same seven-point scale according to their assessment of the importance of the stated attribute. The last part of the questionnaire collected some demographic information from respondents.
Research population was defined as business and engineering students studying at the University of Ljubljana in Slovenia and the following three universities in Romania: Technical University of Cluj-Napoca, Petru Maior University and Babes-Bolyai University.

Business and engineering students were chosen based on the assumption that the future generation of middle managers will mostly come from these two fields of study. Table 1 shows joint sample structure of our respondents, which gave us usable data.

Table 1: Joint respondents' sample structure

Country	Total number of respondents	Respondents from business studies	Respondents from engineering field
Romania	427	166	261
Slovenia	300	150	150
Total	727	316	411

Respondent's population consists of 51% male and 49 % female students. 58.6 % of the respondents were from the first study degree and the rest were from the second degree. Surveys were carried out in the second part of the year 2008 or first half of the year 2009. We did not use original GLOBE scales, because the GLOBE student team calculated, Cronbach Alpha for each scale to prove if the scales are reliable and found that Cronbach Alpha could be increased if certain items were excluded or different items are used. By doing so it created the SELF-scales for individual constructs, but not for all of them.

We processed the collected empirical data by using SPSS 18. First, a descriptive statistical analysis was carried out for each of the two countries' samples. In the second step, significant differences in mean values for chosen cultural dimensions as practices and as values between Romania and Slovenia were investigated. Finally, significant differences in mean values for different leadership styles and leadership traits and skills between Romania and Slovenian sample were identified. Research results were later shortly discussed.

4. Research findings

The research results will be classified into three groups: namely: 1) differences between Romanian and Slovenian students perceptions of current cultural practices; 2) differences in Romanian and Slovenian students' values; 3)

differences between the preferred leadership styles as well as leadership traits and skills of Romanian and Slovenian students.

4.1. Differences in perceptions of the current cultural practices

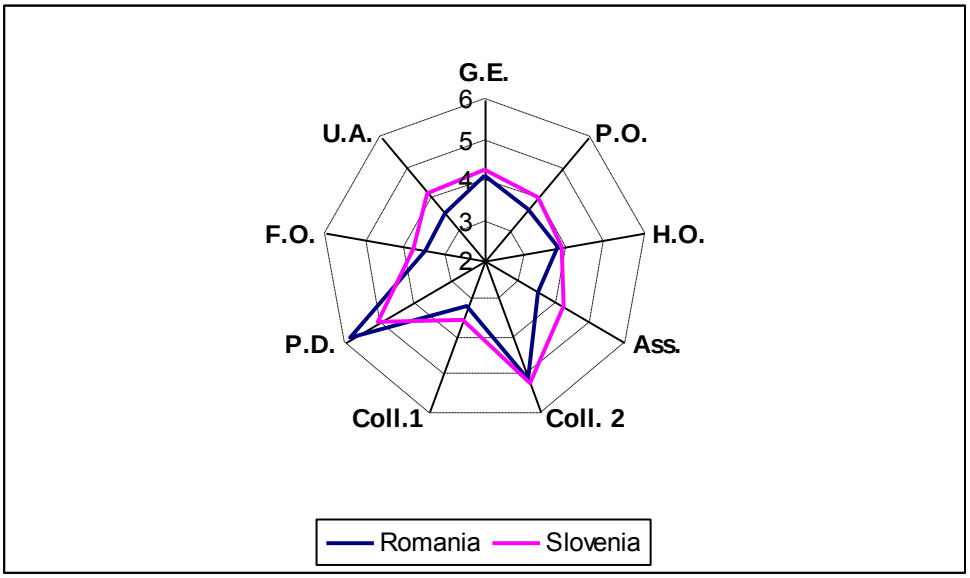
We used nine GLOBE SELF cultural constructs representing society, *as it is* (i.e. actual cultural dimensions or culture-related practices) and computed mean values for each construct for Romanian and Slovenian sample. The results are shown in Table 2 and Figure 1.

Table 2: Assessed mean values of actual cultural dimensions in Romania and Slovenia

Dimension	G.E.	P.O.	H.O.	Ass.	Coll. 2	Coll.1	P.D.	F.O.	U.A.
Romania	4.08	3.66	3.83	3.51	5.13	3.21	**5.81**	3.44	3.49
Slovenia	**4.24**	**4.04**	**3.97**	**4.24**	**5.22**	**3.54**	5.03	**3.79**	**4.19**
Absolute difference	-0.16	-0.38	-0.14	-0.73	-0.09	-0.33	0.78	-0.35	-0.70
Sig.(2-tailed)	0.167	0.000	0.355	0.000	0.811	0.000	0.000	0.000	0.00

Legend: G.E = Gender Egalitarianism; P.O = Performance Orientation; H.O = Human Orientation; Ass = Assesrtiveness; Coll.2 = Collectivism 2; P.D. = Power Distance; F.O = Future Orientation; U.A. = Uncertainty Avoidance

Figure 1. Differences in perceiving the actual cultural practices



Legend: G.E = Gender Egalitarianism; P.O = Performance Orientation; H.O = Human Orientation; Ass = Assesrtiveness; Coll.2 = Collectivism 2; P.D. = Power Distance; F.O = Future Orientation; U.A. = Uncertainty Avoidance

There are a few perceived cultural practices that are quite similar in both countries if we look at the computed absolute differences in assessed mean scores. Statistical tests of differences of the stated means confirm our conclusion. On applying the t-test of differences between assigned mean scores for these two

independent samples, we find that relevant differences are statistically significant for six out of nine cultural dimensions ($p < 0.05$) (Performance Orientation, Assertiveness, Institutional Collectivism, Power Distance, Future Orientation and Uncertainty Avoidance).

The Slovenian students perceive existing cultural practices according to five dimensions (Performance Orientation, Assertiveness, Institutional Collectivism, Power Distance, Future Orientation and Uncertainty Avoidance) as present more decisively in Slovenia than their counterparts in Romania. The Romanian respondents believe that Power Distance is on a higher level in the Romanian practice than the Slovenian respondents assessed it for their environment.
According to these research results, it is hard to argue that existing Romanian cultural practice is quite similar to the Slovenian one.

4.2. Differences in expectations (values system)

The similar nine GLOBE's cultural constructs representing society, as it should be (i.e. cultural dimensions, which students believe in) were used to find out which value systems future managers appreciate the most. The computed mean score values for those variables are presented in Table 3 and the differences between them, in Figure 2.

Romanian students' perceptions of future cultural dimensions in Romania differ in five out of nine value orientations from the perceptions of their counterparts in Slovenia. Table 3 shows that assessed mean scores for many individual cultural dimensions in Slovenia are in absolute terms apparently quite different from the relevant mean scores computed for the Romanian sample, but statistical tests discovered that four value orientations do not differ significantly.

.

Table 3: Assessed mean scores for expectations (cultural values) by the Romanian and Slovenian students

Dimension	G.E.	P.O.	H.O.	Ass.	Coll.2	Coll. 1	P.D.	F.O.	U.A.
Romania	5.38	5.89	5.90	3.00	5.88	5.05	2.43	5.42	6.32
Slovenia	5.50	5.78	5.27	3.45	5.69	4.54	2.78	5.17	5.53
Abs. diff.	-0.12	0.11	0.63	-0.45	0.19	0.51	-035	0.25	0.79
Sig.(2-tailed)	0.933	0.575	0.000	0.000	0.287	0.00	0.00	0.105	0.000

Legend: G.E = Gender Egalitarianism; P.O = Performance Orientation; H.O = Human Orientation; Ass = Assesrtiveness; Coll.2 = Collectivism 2; P.D. = Power Distance; F.O = Future Orientation; U.A. = Uncertainty Avoidance

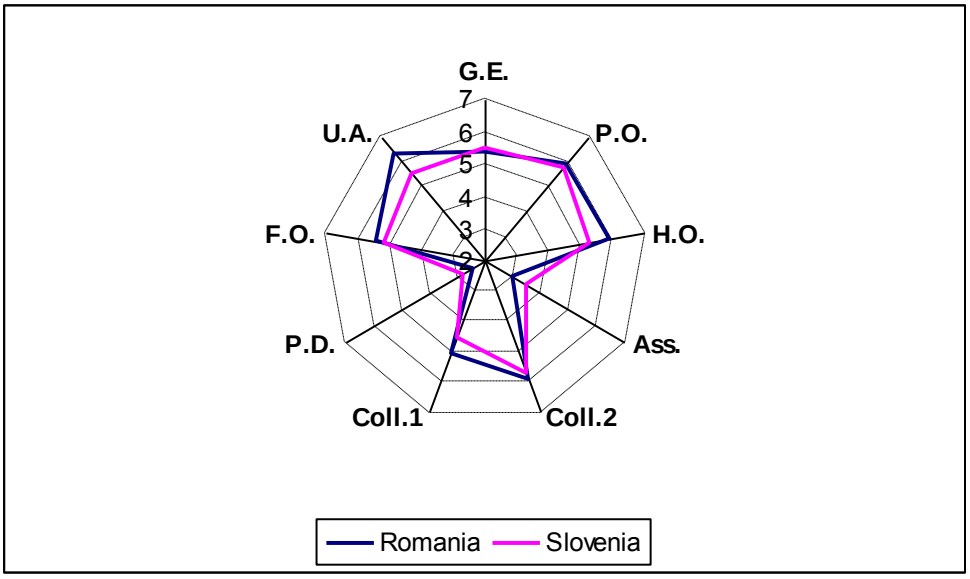
Dimension of Human orientation, Assertiveness, Institutional Collectivism, Power Distance and Uncertainty Avoidance seem to be evidently different between the two samples. On the other hand, we discovered that both groups of future managers perceive Gender Egalitarianism, Performance Orientation, In group Collectivism and Future Orientation similarly

These conclusions are based on the computed 2-tailed significance levels, shown in Table 3. According to the computed p-values, the Romanian and Slovenian students offer some ground for a prediction that future cultural practices in these two countries will make a step further in the process of a convergence. On

comparing the findings for existing cultural practices (Table 2) and for the future ones (Table 3) the progress in the convergence process could be expected in having additionally commonality in one additional cultural dimension in these two countries. Both countries will have similarities in four out of nine cultural value systems (i.e. Gender Egalitarianism, Performance Orientation, In group Collectivism and Future Orientation). Somehow, unexpectedly they will not keep the same attitude towards Human Orientation in spite that they share the similar attitude towards this orientation currently.

If we compare mean values in Table 2 and 3, we are able to find out that the prospective Romanian managers will be more radical in implementing cultural dimensions of Performance Orientation, Human Orientation, Family/In group Collectivism, Institutional Collectivism, and Future Orientation even on higher levels than Slovenians intend to do. The Romanians will try to diminish Assertiveness and Power Distance dimension on levels that will be even lower than the Slovenians ones. The prospective managers in both countries predict that they will even increase the Uncertainty Avoidance level (the Romanians even more radically than Slovenes) what is probably not a move in the right direction. The identified four similar future cultural dimensions, which might be common to both countries could lead to a conclusion that a certain slight homogenization of cultures of these two countries could be expected in the near future.

Figure 2. Differences in cultural expectations (values)



Legend: G.E = Gender Egalitarianism; P.O = Performance Orientation; H.O = Human Orientation; Ass = Assesrtiveness; Coll.2 = Collectivism 2; P.D. = Power Distance; F.O = Future Orientation; U.A. = Uncertainty Avoidance

4.3. Differences between the preferred leadership styles

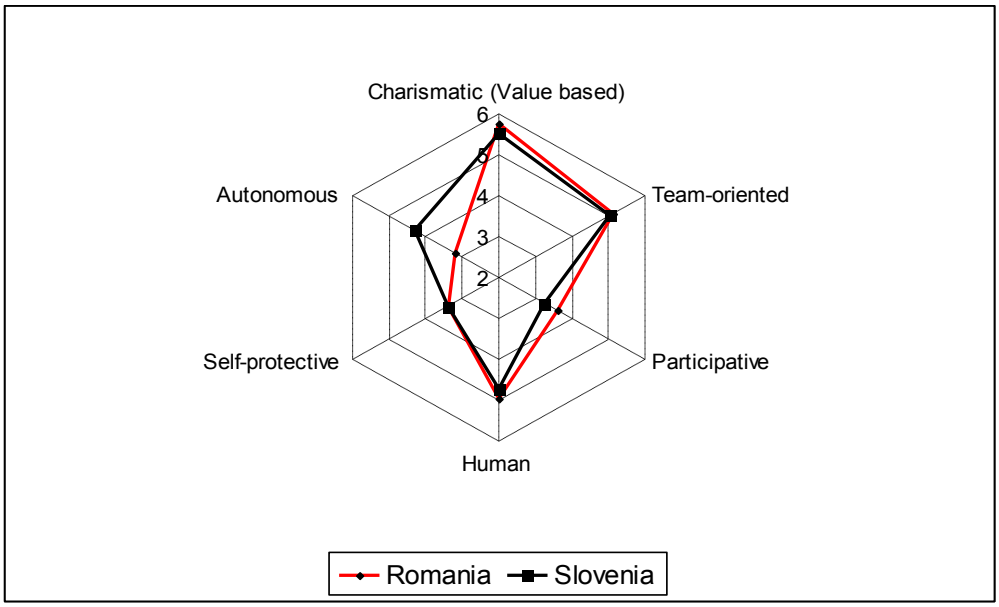
The computed mean scores for the set of attributes determining each leadership construct (style) are presented in Table 4.

Table 4: Computed mean scores for individual leadership styles in Romania and Slovenia (GLOBE SELF scales)

Style	Charismatic (Value based)	Team-oriented	Human	Participative	Self-protective	Autonomous
Romania	**5.74**	**5.13**	**4.97**	**3.60**	3.40	3.18
Slovenia	5.50	5.03	4.73	3.26	3.40	**4.33**
Absolute. difference	0.24	0.10	0.24	0.34	0.00	-1.15
Sig. (2-tailed)	0.000	0.0034	0.0006	0.000	1.000	0.000

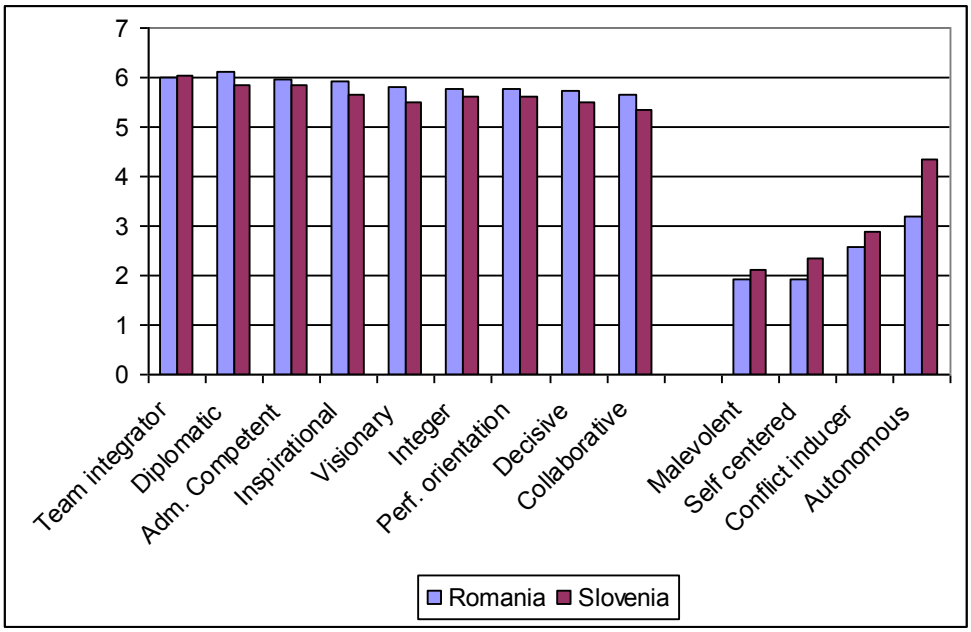
The Table does not show big absolute differences between mean scores for individual leadership styles. Statistical testing for relevant differences in mean scores between both groups shows that our first impression is not correct. The Romanian students record significantly higher mean scores for four leadership styles. They do have the same attitude towards the Self-protective style as the Slovenians and appreciate much less the Autonomous leadership style than the Slovenian counterpart (See Figure 3).

Figure 3: Comparison of the mean scores assigned by the Romanian and Slovenian students to different leadership styles (second order styles)



Out of 21 first order leadership styles, the same nine were chosen as the most important by our groups of respondents. In the same time, both groups of respondents placed the same four styles as being the less important for leadership process: Malevolent, Self-centred, Conflict inducer and Autonomous (Figure 4).

Figure 4 The most and the least appreciated leadership styles in the compared samples



5. Discussion

Our empirical results show that the perceptions of existing cultural practices, expectations, as well as preferred leadership styles in the compared samples significantly differ.

1. In the field of cultural practices, similarities are present in three cases, while significant differences exist in the rest of six practices. It is hard to explain these significant differences between Romania and Slovenia. Two decades of transition from previous somehow different socialist socio-economic systems (one with extreme central planning and the other with workers self-management characteristics) might be too short period for reaching a higher level of harmonization of the existing cultures. Differences in general historic and cultural backgrounds might offer partly an explanation for those differences too. One might explain that the more intensively present (according to assessments) Collectivism 1 (i.e. Institutional Collectivism), Future Orientation, Gender Egalitarianism, Human Orientation, Performance Orientation and Uncertainty Avoidance in Slovenia are rooted in previous self-management culture, which prevailed in socialist Yugoslavia. However, we are not able to explain a higher level of Assertiveness by such factors. The concept of Assertiveness originates (in part) from Hofstede's cultural dimension of masculinity versus femininity (Den Hartog, 2004). It is seen as part of the masculinity dimension and includes aggressive, tough, and

competitive way people deal with others. GLOBE study (where respondents were middle managers) found the mean score of 4.00 for Assertiveness for the Slovenian actual cultural practice, which is between the highest mean score of 4.89 identified for Albania and the lowest mean score of 3.38 for Sweden. The relevant mean score of 4.59 found for the »what it should be«, belonged among the ten countries with the highest average score (Den Hartog 2004). Autor (2012) on a sample of 216 middle Romanian managers found a lower mean score for the actual practice of Assertiveness: 3.56 (relatively closed to the lowest GLOBE mean score of this cultural dimension). The managers consider it should increase to 4.08. Same study revealed the student sample perceived an almost similar mean score for Assertiveness (3.51), expecting an increase of the society's ability to sustain and defend own point of view (expectation mean value 4.01).

The Slovenian middle managers assessed the level of Assertiveness in actual practice somehow lower than the Slovenian students in our survey did. The students as respondents believe that the Assertiveness level should be lower (compare relevant mean scores in Table 2 and Table 3), but on the other hand Slovenian middle managers liked to have it significantly higher (their mean score being of 4.59 in comparison with the Slovenian students mean score of 4.09). Of course, one should not forget that these two surveys were carried out in different periods and on different samples. What we might add to these findings as some kind of evaluation is that our survey indicates a trend in the CE region because we found that similarly as the Slovenian future managers the Romanian future managers also wish to have lower level of Assertiveness in their society in the future.

Hofstede found in his research (Hofstede 2002) very high level of Uncertainty Avoidance (mean score of 6.16) as an existing cultural dimension in Slovenian environment. GLOBE study in 1990s identified a relevant mean score of 3.78 for Uncertainty Avoidance for Slovenian practice, but a belief (as a value) that it should be at the level of 4.99 (De Luque and Javidan 2004). Hofstede found a high level of Uncertainty Avoidance in Romania (index equal to 90 – the highest index value might be 100). Interact and Gallup Romania discovered a high level of Uncertainty Avoidance (index equal to 61) for Romania (Luca 2005). Author found in their study of the Romanian middle managers (2012) that they assessed the current Uncertainty Avoidance in the Romanian practice with a mean score of 3.92. Our survey produced the assessed level of existing Uncertainty Avoidance practice in Slovenia with the computed mean score of 4.19 and the wanted level described by the mean score of 4.55. These results suggest the conclusion that Romanian and Slovenian managers in the socialist past worked in a culture which had a very high level of Uncertainty Avoidance. In the 1990s, managers assessed that the start of transition brought a rather radical reduction in this actual cultural dimension in the country, but they wished to live in a society with much higher level of Uncertainty Avoidance. The Romanian and Slovenian prospective managers seem to share common conviction that they will seek a higher level of Uncertainty Avoidance in the future. They will seek more orderliness, consistency, well-defined structures, formalized procedures and laws to cover situations in their daily lives.

According to Hofstede, Collectivism combined with strong Uncertainty Avoidance produces an explosive mixture: strong Uncertainty Avoidance stands for intolerance of others, of “what is different, is dangerous” which is not far from nationalism (Hofstede 2002, p. 99). Therefore, we cannot assess positively the

identified predicted changes in the stated cultural dimension neither in Slovenia nor in Romania.

2. When comparing the cultural dimensions as values (expectations) we found significant differences in five cases (Table 3). If we can assume that a certain slight harmonization of value dimensions in those two countries could be expected (namely four common value dimensions are predicted in a comparison with three common cultural practices currently present), it is not a firm ground for arguing that some essential convergence in this regard will happen. In spite of the stated discovered significant differences in value systems in quantitative sense between the Romanian and Slovenian samples, we do see positive changes that will most probably happen. Those changes might be called qualitative. If we consider the changes in the value dimensions' levels which both groups of future managers want to materialize (compare Table 2 and 3), we might notice that both groups want to improve (increase) the level of the following six value dimensions in comparison with the value dimensions implemented in the current practice: Collectivism 1 and 2, Human Orientation, Future Orientation, Gender Egalitarianism and Performance Orientation, as well as to diminish the level of Assertiveness and Power Distance. Are those predicted changes a common movement in the direction of convergence in the qualitative sense? Indirectly the convergence process might be seen in the fact that the Romanian mean scores for most current cultural dimensions were identified as being on the worse level than the Slovenian comparative mean scores, but the expectations got from Romanians mostly higher levels than from Slovenians These more radical predicted changes in Romania could be seen as a logical reaction on the unacceptable (worse as it is in Slovenia) current situation. It should be understood as another move in the direction of cultural systems' harmonization.

3. Positive "predicted" changes in the majority of cultural dimensions in both countries should have influence on the applied leadership styles' improvements. We discovered that the Romanians, according to the assigned mean scores to individual leadership styles, would be more eager to implement the "progressive" styles (Charismatic, Team-oriented, Participative, and Human) and to reduce "old-fashioned" (Autonomous) than the Slovenians. Is it really a direct consequence of the differences in value orientations or is it again some kind of the reaction on existing (bad) leadership practices (the latter we did not research)? If the answer on the last question is affirmative then we should see in these expected changes a certain process of convergence again.

A shocking finding is that Participative leadership style is less appreciated by both samples. The stakeholders' theory of the firm, which is more and more popular, assumes an increased participation in organizations of all stakeholders. Why do not the Romanian and Slovenian prospective managers see a need for a more important role of the Participative leadership style therefore? The relevant findings of the GLOBE study from the 1990s show that Slovenian middle managers as respondents appreciated the Participative style much more (the mean score of 5.42). It is interesting that Zagoršek got in his research in 2004 using the GLOBE questionnaire and having Slovenian MBA students as respondents exactly the same mean score (i.e. 5.42) for the Participative leadership style as was obtained in the GLOBE study. Therefore, our Slovenian respondents surprisingly assess the last stated leadership style as less adequate. Researchers usually relate Team-oriented, Participative, and Human-oriented leadership styles as those which

support the classic human relations theory, according to which group orientation and considerate, participative leadership foster goal identification, and so reduce resistance and withdrawal tendencies in organizations (Steyrer et al., 2008). Is the identified unpopularity of the Participative leadership style (at least) among Slovenian future managers some kind of a reaction on "official" socialist/communist values of workers participation in management or enthusiasm for a self-management in the region in the past that comes with quite a time lag?

Charismatic and Team-oriented leadership styles will be apparently the most appreciated leadership styles among Romanian and Slovenian future managers (see computed mean scores in Table 4). Charismatic/Value based style builds on inspiration, motivation, and high performance requirements as well as on core values. These two leadership styles got the highest mean scores among all researched styles in the GLOBE study of Slovenian managerial environment too (Bakacsi et al., 2002). Slovenian middle managers as respondents in the stated study, carried out in the 1990s, assigned even slightly higher mean score of 5.69 to Charismatic/Value based style and of 5.91 to the Team-oriented style than Slovenian students as respondents did in our survey.

On the other side, Malevolent, Self-centered, Conflict inducer leadership styles seem to have less chances to be applied frequently in managerial practices in the future.

There were no statistical significant differences in assessing the importance of first order leadership styles in only three out of twenty one styles, namely: Team integrator, Administratively skilful and Integrity. Such findings might suggest that there are nearly no commonalities in views on what is a good leader's attributes (styles) among the prospective managers in compared countries. Still, both respondents' groups share the same nine top appreciated first order leadership styles and the four ones that are appreciated the less. It might mean that both countries will develop leadership styles, which will not be qualitatively so much different as the statistical analysis suggest. We might expect that differences will persist in degree (quantitatively), but not in the "substance".

6. Conclusions, limitations and future research

Our research findings offer specific answers on the research questions, which we posed in the introduction. We discovered that:

- The Romanian future managers perceive actual cultural practices in their environment rather differently from their counterparts from Slovenia. Two decades of transition from socialist/communist socio-economic systems were apparently not long enough periods for achieving a higher level of harmonization of existing cultures.
- Relevant value systems held by the Romanian and Slovenian future managers are still significantly different, but slightly less than existing cultural practices.
- The Romanian students have (statistically) significant different attitudes towards individual leadership styles from their counterparts in Slovenia.
- There are signals that enable us to expect that future managers in both (transitional) countries will implement positive changes in their cultural dimensions. The Romanians will be more radical in doing this than their Slovenian counterparts.

- The Romanian and Slovenian students would like to have higher level of Uncertainty Avoidance than it is currently present. The Romanians even intend to achieve an extreme increase in its future actual level. These changes cannot be assessed as changes in the right direction.
- Three cultural dimension, i.e. Collectivism 2 (Family/In group Collectivism), Human orientation and Gender Egalitarianism are "universal" as far as the two countries are concerned at present, but there are signals that changes will happen towards a slight further harmonization in their cultures (the four cultural dimensions are discovered which will become "universal" for both countries: Gender Egalitarianism, Performance Orientation, Collectivism 2 and Future Orientation).
- Improvements in the level of Collectivism 1 and 2, Future Orientation, Gender Egalitarianism, Performance Orientation, Human orientation, Power Distance and Assertiveness could be expected in both countries in the future.
- The prospective managers in both countries appreciate Charismatic/Value-based and Team-oriented leadership styles the most and Malevolent, Self-centered and Conflict inducer styles the less. Such commonalities might contribute to further mutual economic co-operation and regional internationalization.
- Certain commonalities in opinion about the traits and skills a good leader should have exist among prospective managers in the both countries (in qualitative and less in quantitative sense) which might contribute to further successful internationalization in business fields.
- Cultural orientation of the Romanian prospective managers will be still in many regards different from the Slovene ones. The last finding is more valid in the sense of degree (of differences) than in the qualitative (substantive) sense.
- Some policy measures and educational programs are needed to achieve changes in those value orientations of future managers, which we discovered as not wishful and positive (for example attitudes towards Uncertainty Avoidance in both countries, attitudes towards Assertiveness by Slovenian future managers and attitudes towards participative leadership style by the future managers in both countries).
- Dissemination of our research findings among the acting managers in both countries (and even wider) can contribute to a more efficient management practices in the region.

Our research findings have at least a few serious limitations. We are aware that assuming that business and engineering students will be a core part of the future managers' population in the Romania and Slovenia is risky. Our comparisons with research findings, which other researchers produced, based on different samples and in different periods might be problematic. Our negligence of any deeper search for explanatory variables is certainly a serious limitation of our present study. In spite of those limitations, we still believe that our research findings offer certain insights into the relevant issues. These insights might be useful for acting managers. They can understand better differences on this ground in a managerial behaviour in the region as well as be able to make decisions more efficiently having such knowledge.

A further research should be focus on studying cultural practices and value systems as well as leadership styles in several directions. One should study possible differences in respondents relevant perceptions based on sub segments of our survey respondents (for example only business students or only graduate students, male respondents or female respondents etc.). A confrontation of our research findings with the research results of a wider sample of CE countries will be fruitful for better explanations of our empirical findings. We hope that our research group will achieve that in not so distant future. Later systematic research verifications how recent predictions would be realized in our two countries and the whole CE region will be needed too.

REFERENCES

Bakacsi G., Takacs S., Karacsonyi A., Imrek V. (2002) Eastern European cluster: tradition and transition, Journal of World Business, 37(1): 69-80.

Chhokar S.J., Brodbeck C.F., House J.R. (2007) Culture and Leadership Across the World, Lawrence Erlbaum Associates, Publishers, New York.

De Luque S.M., Javidan M. (2004) Uncertainty Avoidance. In: House R.J., Javidan M., Dorfman P.W., Gupta P.W. (Eds) Culture, Leadership, and Organizations: The GLOBE study of 62 societies. Thousand Oaks: Sage, pp: 602-654.

Den Hartog N.D. (2004) Assertiveness. In: House R.J., Javidan M., Dorfman P.W., Gupta P.W. (Eds) Culture, Leadership, and Organizations: The GLOBE study of 62 societies. Thousand Oaks: Sage, pp: 395-437.

Helson R., Jones C., Kwan Y.S.V. (2002) Personality Change Over 40 Years of Adulthood: Hierarchical Linear Modeling Analyses of Two Longitudinal Samples, Journal of Personality & Social Psychology, 83(3): 752-766.

Hitchins K. (1994) Rumania 1866-1947, Oxford: Oxford University Press.

Hofstede G. (1991) Cultures and organizations: Software of the Mind. London: McGraw Hill.

Hofstede, G. (2002) Images of Europe: past, present and future. In: Warner M. and Joynt P. (Eds) Managing Accross Cultures. Issues and perspectives, Second United Kingdom: Thomson, pp: 89-102.

House R., Javidan M., Hanges P., Dorfman P. (2002) Understanding cultures and implicit leadership theories across the globe: an introduction to project GLOBE, Journal of World Business, 37 (1): 3-10.

House R.J., Javidan M., Dorfman P.W., Gupta P.W. (Eds) (2004) Culture, leadership, and organizations: The GLOBE study of 62 societies. Thousand Oaks: Sage.

Keating A.M., Martin S.G., Szabo E. (2002) Do managers and students share the same perceptions of societal culture? International Journal of Intercultural Relations, 26(6): 633-652.

Kluckhohn F.R., Strodtbeck F.L. (1961) Variations in Value Orientations. New York: Harper Collins

Kopelman R.E., Brief A.P., Guzzo R.A. (1990) The Role of Climate and Culture in Productivity. In: Schneider B. (Ed) Organizational Climate and Culture. San Francisco: Jossey-Bass, 282-318.

Kotter J.P. (1990) What Leaders Really Do.? Harvard Business Review, May-June, 103-111.

Lang R., Catana A., Catana D., Steyrer J. (2010) Impacts of Motives and Leadership Attributes of Entrepreneurs and managers on Followers' Commitment in Transforming Countries: A Comparison of Romania, East Germany and Austria. Unpublished paper

Luca A. (2005) Studiu Despre Valerile si Comportamentul Romanesc din Perspectiva Dimensiunilor Culturale dupa Metoda lui Geert Hofstede. Interact. Available at http://anatolbasarab.files.wordpress.com/2010/05/studiu_hofstede5.pdf

McClelland D.C. (1985) Human Motivation. Glenview,Il., Scott, Foresman

Mead R. (1998) International management: Cross-Cultural Dimensions. Malden: Blackwell Publishers Ltd.

Musek J. (2003) Raziskovanje vrednot v Sloveniji in vrednotni univerzum Slovencev. Available at htpp://www..prihodnost-slovenije.si/up-rs/ps.nsf/krf/6E9D?OpenDocument

Niessen J.P. (2005) Romania. In Frucht, R., (Ed) Eastern Europe: an introduction to the people, lands and culture, vol. 1, ABC Clio Inc., 735-790.

Prašnikar J., Pahor M., Vidmar Scetlik J. (2008) Are national Cultures Still Important in International Business? Management, 8(2): 1-26.

Schneider C.S., Barsoux J-L. (2003) Managing across cultures. Harlow: FT Prentice Hall
Slovenia, at http://en.wikipedia.org/wiki/slovenia (27.9.2011)
Steyrer J., Schiffinger M., Lang R. (2008) Organizational commitment – A missing link between leadership behavior and organizational performance? Scandinavian Journal of management, 24(4): 364:374
Ule M. (2003) Spremembe vrednot v družbi tveganj, available at http://www.prihodnost-slovenije.si/up-rs/ps.nsf/krf/96997D6B515C0960C1256E940046C55B?
Williams R.M. (1979) Change and stability in values and value systems: A socilogical perspective. In: Rokeach M. (Eds.) Understanding Human values: Individual and societal, New York: Free Press.
Zagoršek, H. (2004) Universality versus cultural contingency of leadership: a comparative study of leadership practices in six countries, Ph. D. diss. Ljubljana: University of Ljubljana, Faculty of Economics.
*** GDP per capita by country, available at: http://knoema.com/pjeqzh#Romania
*** Comisia Centrala pentru recensamantul populatiei si al locuintelor. Comunicat de presa (2 Februarie 2012), Recensamantul populatiei si al locuintelor, available at: http://www.recensamantromania.ro/wp-content/uploads/2012/02/Comunicat_ DATE_PROVIZORII_RPL_2011_.pdf
*** What about Slovenia? available at: http://geert-hofstede.com/slovenia.html
*** What about Romania? available at: http://geert-hofstede.com/romania.html

THE TOTAL FACTOR PRODUCTIVITY OF THE FOUR LARGEST BANKS IN SOUTH AFRICA: PRELIMINARY EVIDENCE FROM INDEX NUMBERS METHODOLOGY

Gerhardus Van Der WESTHUIZEN *
North-West University, South Africa

Denis LAWRENCE
North-West University, South Africa

Abstract. The purpose of this paper is to estimate and compare the efficiency of the four largest banks in South Africa. The total factor productivity of the four largest banks was estimated and the multilateral total factor productivity indexes of the four banks compared. Nedbank had the highest productivity level, followed by Standard, ABSA and FRB. All four banks experienced various strategic changes during the sample period (1994 to 2010), as well as considerable changes in the banking arena in South Africa. The changes in the banking arena included the first substantial rewrite of the Banks Act and Regulations since 1990, following the adoption of the international guidelines known as Basel II which took effect on 1 January, 2008, the introduction of the National Credit Act in 2007, as well as the financial sector charter. These changes as well as the strategic changes combined with changes in input volumes resulted in changes in output volumes, which impacted on total factor productivity levels. The result of the Global Financial Crisis is evident in the decline in total factor productivity during the period, 2008-2010.

JEL classification: C50, C61, D24, G21, L21

Keywords: banks performance, bank inputs/outputs, total factor productivity, multilateral total factor productivity, index numbers

1. Introduction

Over the past number of decades, various studies, covering various countries were undertaken to estimate the relative efficiency (productivity) of banks. A large number of these studies applied quantitative techniques like Data

* Corresponding author. Address: North-West University, Vaal Triangle Campus, PO Box 1174, VANDERBIJLPARK, 1900, South Africa, Tel: +27 (83) 747 6157, E-mail: profgertvdwesthuizen@gmail.com

Envelopment Analysis (DEA) or Stochastic Frontier Analysis (SFA) in order to estimate the various types of efficiency, like technical efficiency, cost efficiency, scale efficiency and allocative efficiency.

DEA effectively estimates the frontier by finding a set of linear segments that bound (or envelop) the observed data, combining all the input and output data on the firm into a single measure of productive efficiency, which lies between zero (meaning the firm is totally inefficient) and one (which signals that the firm is fully efficient). SFA involves specifying the functional form of the frontier and then estimating its unknown parameters using econometric techniques. Some other studies applied the DEA-type Malmquist total factor productivity to examine productivity growth and the contributors to productivity change.

These performance studies were at both the firm/corporate level (e.g. Drake (2001); Seiford and Zhu (1999); Devaney and Weber (2000); Berger and Humphrey (1997); Halkos and Salamouris (2004); Mendes and Rebello (1999); Luo (2003); Resti (1997); van der Westhuizen (2008); van der Westhuizen and Oberholzer (2009); Matthews and Zhang (2010); Chang *et al*. (2012)), and at the branch level (e.g. Sherman and Ladino (1995); Sherman and Gold (1985); Vassiloglou and Giokas (1990); Oral and Yolalan (1990); O'Donnell and van der Westhuizen (2002); van der Westhuizen and Oberholzer (2003); Oberholzer and van der Westhuizen (2004); and van der Westhuizen (2012)).

Another technique that can be applied to estimate bank efficiency is the use of Total factor productivity (TFP) indices. According to Coelli *et al*. (2005:6) TFP indices are applied to aggregate time-series data and provide measures of technical change and/or TFP and it assumes that all firms are technically efficient. DEA, on the other hand, is most often applied to cross-section data and provide measures of relative efficiency among the firms included in the sample. DEA does not assume that all firms are technically efficient and can be applied to measure both technical change and efficiency change in the case of panel data. Multilateral TFP indices can also be used to compare the relative productivity of a group of firms at one point in time (Coelli *et al.* 2005:6).

The purpose of this paper is to estimate and compare the total factor productivity (TFP) of the four largest banks in South Africa. The South African financial sector is dominated by four large banks, namely ABSA, First National Bank, Nedbank and Standard Bank. According to the BA 900 reports (Department of Bank Supervision, 2009) these four banks control over 84% of total deposits and assets in South Africa. The contribution of this paper is that, to our knowledge, this will be the first attempt to estimate the total factor productivity (TFP) of the four largest South African banks. The remainder of this paper is as follows: In Section 2 total factor productivity is discussed. The data and the model are discussed in section 3 while the results are presented in section 4. The paper is concluded in section 5.

2. Total factor productivity

For single-input single-output firms, TFP is almost always defined as the output-input ratio. The TFP of a multiple-output multiple-input firm is commonly defined as the ratio of an aggregate output to an aggregate input (O'Donnell,

2008:7). If Q_{nt} denotes the aggregate output and X_{nt} denotes the aggregate input of firm n in period t, then the TFP of the firm in that period is:

$$TFP_{nt} = \frac{Q_{nt}}{X_{nt}} \quad (1)$$

The associated index number that measures the TFP of firm n in period t relative to its TFP in period 0 is:

$$TFP_{n0/nt} = \frac{TFP_{nt}}{TFP_{n0}} = \frac{Q_{nt} / X_{nt}}{Q_{n0} / X_{n0}} = \frac{Q_{n0,\,nt}}{X_{n0,\,nt}} \quad (2)$$

where $Q_{n0,nt} = Q_{nt}/Q_{n0}$ is an output quantity index and $X_{n0,nt} = X_{nt}/X_{n0}$ is an input quantity index. Thus, TFP growth can be viewed as a measure of output growth divided by a measure of input growth (O'Donnell, 2010a:1).

According to Lawrence (2003:9-10) growth rates for individual outputs and inputs are weighted together using revenue and cost shares, respectively. This means that the TFP index is essentially a weighted average of changes in output quantities relative to a weighted average of changes in input quantities. This is necessary because most banks have a diverse range of outputs (e.g. loans, investments, interest income, non-interest income) and an equally diverse range of inputs (e.g. deposits, operating expense, fixed assets). Calculating TFP requires a means of adding together these diverse output and input quantities into measures of total output and total input quantity. Changes in the TFP index give an indication of how the amount of total output that can be produced from a unit of total input changes over time. TFP indexes are a relatively simple and robust technique for measuring changes in relative efficiency over time and they can be formed from a small number of observations (Lawrence, 2003:10). Econometric cost and profit functions, on the other hand, require much longer time series to allow sufficient degrees of freedom to facilitate estimation. TFP indexes also provide maximum detail on year–to–year changes in performance but allow the flexibility to form smoothed trend rates of change over time.

According to Lawrence (2003:11) the main advantage of the index number approach to the measurement of TFP is its reproducibility. This means that different investigators will obtain the same productivity estimates, provided that they use the same data and use a 'superlative' or flexible index number formula to aggregate up the data. There are, however, a number of differences that will lead to different estimates of TFP. Different econometricians may choose different functional forms for the production function, the dual unit profit function or the dual unit cost function. Different econometricians may choose different break points for splines (differential time trend variables), while different econometricians may choose alternative stochastic specifications and methods of estimation.

TFP indexes have a rigorous grounding in economic theory. According to Diewert and Lawrence (1999:9), the economic and the axiomatic approaches are the two commonly used approaches to the problem of finding the 'best' functional forms for the TFP index. The economic approach selects index number formulations on the basis of an assumed underlying production function. This approach also assumes price taking and profit maximising behaviour on the part of producers. The axiomatic approach specifies a number of desirable properties an

index formulation should possess. Potential indexes are then evaluated against four specified properties and the index that passes the most tests would be preferred for the analysis. Only the Fisher index method passes all four tests.

If applied properly, TFP indexes place a discipline on the analyst to ensure that the data used balances. This means, firstly, that price times quantity equals the dollar value for each output and input, secondly that the sum of input costs equals total cost, and lastly that the sum of output revenues equals total revenue. This discipline is absent with other techniques such as data envelopment analysis that only use quantity information. Like any quantitative method, TFP indexes have limitations as well as advantages. A limitation is the fact that TFP indexes are a non–parametric technique they cannot produce confidence intervals and other statistical information. An advantage of TFP indexes is that they can be applied in the need to aggregate heterogeneous outputs and inputs and the need to estimate the annual physical input and cost of capital goods.

Aggregation is an inevitable part of making any modelling exercise tractable and TFP indexes provide a consistent framework within which this can be done. To make sure that businesses' decisions are being accurately modelled it is necessary to calculate the annual physical input and cost of capital. These key input variables are a fundamental component of producers' decision–making processes, particularly in a capital intensive network industry.

Statistical methods provide useful information, and are best suited to larger data sets where the data errors and inconsistencies have largely been eliminated. In the early stages of developing performance measurement databases and frameworks, there is a strong case for using a non–parametric technique. This enables the ready identification of likely data problems while not distorting the results for other observations. This can be useful particularly where there are a limited number of observations available. Plotting TFP index results provides a ready way of identifying unexpected results that may be less easy to identify in econometric approaches.

3. Multilateral total factor productivity

According to Lawrence (2003:52) the advantages of the standard TFP indexes include the following:

- indexing procedures are simple and robust;
- they can be implemented when there are only a small number of observations;
- the results are readily reproducible;
- they have a rigorous grounding in economic theory;
- the procedure imposes good disciplines regarding data consistency; and
- they maximise transparency in the early stages of analysis by making data errors and
- inconsistencies easier to spot than using some of the alternative techniques.

For benchmarking purposes it is necessary to extend the time series indexing methods to include analysis of productivity levels as well as growth rates. Caves, Christensen and Diewert (1982:73-79) developed the multilateral translog TFP (MTFP) index measure to allow comparisons of the absolute levels as well as growth rates of productivity. It satisfies the technical properties of transitivity and

characteristicity which are required to accurately compare TFP levels within panel data. According to Lawrence (2003:54-55) the Caves, Christensen and Diewert (CCD) multilateral translog index is given by:

$$\log (TFP_m/TFP_n) = \Sigma_i (R_{im}+R_i^*) (\log Y_{im} - \log Y_i^*)/2 - \Sigma_i (R_{in}+R_i^*) (\log Y_{in} - \log Y_i^*)/2 - \Sigma j (S_{jm}+S_j^*) (\log X_{jm} - \log X_j^*)/2 + \Sigma j (S_{jn}+S_j^*) (\log X_{jn} - \log X_j^*)/2 \quad (1)$$

- where R_{im} is the revenue share of output *i* for firm *m*,
- S_{jm} is the cost share input *j* for firm *m*,
- Y_{im} is the quantity of output *i* for firm *m*,
- X_{jm} is the quantity of input *j* for firm *m*,
- R_i^* (S_j^*) is the revenue (cost) share averaged over all utilities and time periods, and
- $\log Y_i^*$ ($\log X_j^*$) is the average of the log of output *i* (input *j*).

Two outputs (loans and investments and deposits and current accounts) and three inputs (capital, comprising of land and buildings and other fixed assets, operational expense and labour) are used in the application. The formula in (1) gives the proportional change in MTFP between two adjacent observations (denoted *m* and *n*). An index is formed by setting some observation (usually the first in the database) equal to one and then multiplying through by the proportional changes between all subsequent observations. The result will be a full set of indexes. The index for any observation then expresses its productivity level relative to the observation that was set equal to one. However, this is merely an expositional convenience as, given the invariant nature of the comparisons, the result of a comparison between any two observations will be independent of which observation in the database was set equal to one.

Using Formula (1) thus results in comparisons between any two observations m and n being both base–firm and base–year independent. Transitivity is satisfied since comparisons between the two firms for 1994 will be the same regardless of whether they are compared directly or via, say, one of the other firms in 2010. An alternative interpretation of this index the benefit is that it compares each observation to a hypothetical average bank with output vector *log Yi**, input vector *log Xj**, revenue shares *Ri** and cost shares *Sj**.

The multilateral TFP index has some important advantages. It is a robust technique which is relatively insensitive to data errors. It does not require a large number of observations and it provides information on productivity levels as well as growth rates. The multilateral TFP index can be readily communicated to non–technical audiences.

4. Model and data

Financial statement data, at year-end from 1994 to 2010, were obtained from the McGregor BFA (2012) database of listed companies' financial statements.

The aggregate descriptive statistics (values in thousands of rand, the South African currency) for the four largest South African banks are presented in Table 1.

Table 1: Descriptive statistics – aggregate of the four largest South African banks (R,000)

Variable	Mean	Std dev	Minimum	Maximum
Loans and Investments	246,892,110	197,473,065	9,475,000	710,523,000
Deposits and current accounts	256,443,356	193,776,375	3,567,576	843,815,000
Labour costs	6,245,776	4,430,003	1,242,000	19,542,000
User cost of capital	2,645,281	2,057,451	77,292	9,499,205
Operating costs	5,446,451	4,072,597	759,871	18,093,000

Limited agreement exists in the banking literature on defining outputs, inputs and prices for the inputs. Favero and Papi (1995:388) identify five approaches to input and output specifications. The production approach, the intermediation approach and the asset approach, are all related to different functions carried out by banks. Inputs and outputs are broadly classified according to approach as follows:

Approach	Services produced	Outputs	Inputs
Production	Deposit accounts Loan services	Number of accounts Transactions processed	Capital Labour (Excluding interest cost)
Intermediation	Intermediation Transform/transfer financial resources	Loans Financial investments	Large deposits Purchased funds
Asset	Variant of intermediation approach	Assets – Loans	Deposits Purchased funds
User cost	Not related to macroeconomic functions by banks	Net contribution to bank revenue determine nature	Net contribution to bank costs determine nature
Value added	Not related to macroeconomic functions by banks	Share of value added	Share of value added

According to Resti (1997:224), a pivotal issue throughout the whole literature based on stock measures of banking products is the role of deposits. On the one hand, it is argued that they are an input in the production of loans (intermediation or asset approach). Yet, other lines of reasoning (value-added approach or user cost approach) suggest that deposits themselves are an output, involving the creation of value added, and for which the customers bear an opportunity-cost.

In this study a hybrid variant of the production approach was adopted and the following model was specified:

Outputs: y_1 = Loans and investments
y_2 = Deposits and current accounts

Inputs: x_1 = Capital (Land and buildings and other fixed assets)
x_2 = Operating expenditure
x_3 = Labour (Number of full time equivalent)

Output prices: p_1 = Index of interest received
p_2 = Index of interest paid

Input prices: w_1 = User cost of capital
w_2 = Producer price index
w_3 = Total labour cost/x_3

To calculate the multilateral indices, price and quantity series are needed for each output and input. The value of output is measured by the total amount of loans and investments, and the total amount of deposits. For the price of loans and investments a 2000-based index of the interest received was used and for the price for deposits a 2000-based index of the interest paid was used. The value of input is measured by the total amount of the user cost of capital, the total cost of (non-labour) operating expenditure and the total cost of labour employed. For labour, the number of employees was available so the price was calculated as the total labour cost divided by the number of employees. The user cost of capital consists of average annual depreciation plus an annual eight percent opportunity cost on capital.

Loans and deposits, were specified as outputs by, inter alia, Rangan *et al.* (1988), Aly *et al.* (1990), Berger and Humphrey (1991), Olivei (1992), Matthews and Zhang (2010), Fiordelisi and Molyneux (2010), and Sufian (2011). Investments, combined with some other variables, were specified as an output by, inter alia, Elyasiani and Mehdian (1990, 1992), English *et al*. (1993), Faveri and Papi (1995), Chen (1998). Capital (in some or other form) and labour were specified as inputs by, inter alia, Rangan *et al.* (1988), Aly *et al*. (1990), Elyasiani and Mehdian (1990, 1992), Berg *et al.* (1993), Favero and Papi (1995), Hunter and Timme (1995), Wheelock and Wilson (1995), Fiordelisi and Molyneux (2010), and Sufian (2011). The input variable, operating expenditure, was applied by Charnes *et al*. (1990), Chen (1998), and Stavarek (2002).

5. Results

The results reported here should be treated with caution. These banks differ with regard to their organisational structures and services provided. They also underwent considerable changes during the sample period, which include, inter alia, mergers, takeovers, acquisitions, and various other strategic, accounting and reporting changes. The banking and economic environment also changed

during this period with the introduction of the National Credit Act in 2007 and the Global Financial Crisis (GFC) since 2007/2008. These significant changes make it hard to compare like with like both over time and across banks. While the use of data covering such a heterogeneous sample period is not ideal these data are all that are currently available and have been used in this initial analysis. Future work will focus on refining bank data to ensure more like with like coverage in terms of bank functions and reporting both over time and across banks.

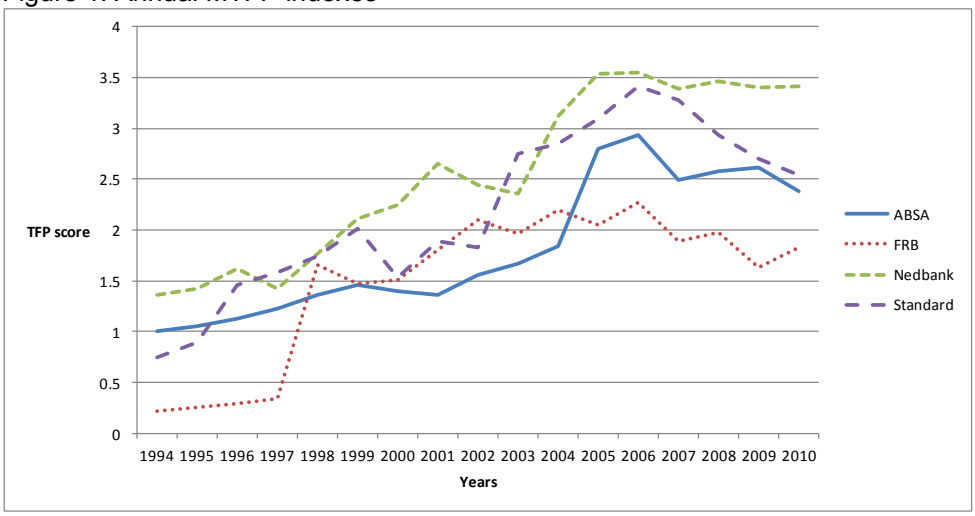
The software package TFPIP Version 1.0 by Coelli (1996) is purpose-build to measure TFP and has been used in this paper to generate estimates of multilateral total factor productivity. Comparison of observations in panel data sets requires some basic consistency requirements such as transitivity to be met. Transitivity states that the direct comparison between observations *s* and *t* should yield the same result as an indirect comparison of the two observations through a third (or more) observation(s) *r*. As noted above, multilateral TFP index number comparisons satisfy this consistency requirement.

Figure 1 presents the multilateral TFP indexes for the four banks, covering the sample period, 1994 to 2010. From Figure 1 we see that Nedbank was the best performer in terms of TFP levels. The growth in TFP during 1995 and 1996 was contributed to by growth of 39 per cent in loans and investments during 1996 and a growth of 28 per cent in deposits and current accounts during 1995. In 1988 Nedbank merged with Permanent Building Society to form NedPerm Bank, and in 1995 Perm (a wholly owned subsidiary of Nedcor) split its operations into Permanent Bank and Peoples Bank. During 1997 Syfrets merged with UAL Merchant Bank and Nedbank Investment Bank division to form the listed Nedcor Investment Bank and the bank experienced a negative growth of 7 per cent in deposits and current accounts, followed by a growth of 59 per cent in deposits and current accounts and a growth of 21 per cent in loans and investments during 1998. Until 2002 the bank annually experienced a positive growth in both outputs. In 2002 the merger between Nedcor and BoE took place. In 2003 the new Nedcor Group was formed combining Nedcor, BoE, Nedcor Investment Bank and Cape of Good Hope Bank and in the same year the growth in loans and investment dropped by 24 per cent and the bank again experienced a negative growth in deposits and current accounts. Since 2004 the situation improved when the bank experienced positive growth in loans and investments (exceeding 15 per cent per annum) as well as in deposits and current accounts. This positive growth was supported the structural and strategic changes in the group that were implemented to restore the performance of the group and lay a foundation for sustainable growth into the future. R5 Billion was raised in rights issue (Nedbank, 2012). However during 2009 the bank experienced negative growth in loans and investments (6 per cent) and hardly any growth in deposits and current accounts (1 per cent). At the end of the sample period the bank again experienced positive growth in both loans and investments (11 per cent) and deposits and current accounts (5 per cent).

Standard Bank was the second best performer in terms of TFP levels. The steep increases in TFP during 1995, 1996 and 2003 were, inter alia, caused by 278, 174 and 117 per cent increases respectively, in loans and investments. These substantial changes may have been caused by the acquisition in 1994 of Standard Chartered's banking activities in The Isle of Man, and the establishment

of a broker-dealer in New York, Standard New York Inc. The increase in TFP during 2001 may be caused by a joint increase in loans and investments (38 per cent) and deposits and current accounts (40 per cent), coinciding with the establishment of Standard Bank (Mauritius) Offshore Banking Unit (Standard Bank, 2012). During 2008 and 2009 the bank experienced a decline in loans and investments (8 per cent in 2008 and 1 per cent in 2009) and during 2009 a decline in deposits and current accounts (9 per cent). Interesting to note is that the bank, over the sample period, experienced the highest increase in operational costs in 2008 (32 per cent) and in 2009 (35 per cent).

Figure 1: Annual MTFP indexes



ABSA was the third best performer in terms of TFP levels. The growth in TFP during 1995-1996 was contributed to by, inter alia, growth in loans and investments (17 per cent) and during 1996 a growth in loans and investments (24 per cent) as well as a growth in deposits and current accounts (18 per cent). During the period 1997-2001 there has been a moderate negative growth in TFP because of a relative low growth in loans and investments (between 3 and 10 per cent) and ended with a negative growth in loans and investments (2 per cent). During 2001 the bank also experienced a relatively high growth in labour cost (16 per cent) and operational expense (17 per cent), which contributed toward the decline in TFP. The moderate growth in TFP since 2001 was inter alia driven by growth in loans and investments (15 per cent in 2002 and 14 per cent in 2003) as well as growth in deposits and current accounts (27 per cent in 2002). During 2005 Barclays Bank Plc of the United Kingdom acquired a controlling stake in the ABSA Group (De Villiers, 2008:iv). This contributed toward a growth in TFP during and after this period. The bank also experienced a 10 per cent growth in loans and investments as well as a 40 per cent growth in deposits and current accounts. In 2005, ABSA experienced a 113 per cent growth in labour cost as well as a 102 per cent growth in operational expense. This was caused by accommodating the

acquisition of the controlling stake by Barclays Bank Plc in the ABSA Group. The decline in TFP in 2007 is because of a low growth in loans and investments (2 per cent) and a negative growth in deposits and current accounts (9 per cent). The growth in 2008 was contributed by a 42 per cent growth in loans and investments as well as a 19 per cent growth in deposits and current accounts. During the period 2009-2010 the bank experienced lower growth in loans and investments (23 per cent in 2009 and 10 per cent in 2010) and a negative growth of 11 per cent in deposits and current accounts in 2009 and only 1 per cent growth in deposits and current accounts in 2010.

From the figure it is clear that First Rand Bank (FRB) was not able to reach the same level of TFP as the other three banks. The bank reached its highest TFP during 2006. At the end of the sample period FRB had the lowest TFP level. The steep increase in TFP between 1997 and 1998 was caused, inter alia, by a 130 per cent increase in loans and investments and a 1 254 per cent increase in deposits and current accounts. This can be explained by the fact that in 1998 the financial services interests of Rand Merchant Bank Holdings and Anglo American were merged to form FirstRand Limited. In the process, FNB was delisted from the JSE on 22 May 1998 to become a wholly-owned subsidiary of FirstRand, which was listed on the JSE on 25 May 1998. On 30 June 1999, the banking interests of FirstRand formally merged into a single entity to form FirstRand Bank. FNB, WesBank and RMB now trade as divisions of FirstRand Bank (First Rand, 1998: 8-12). Between 1999 and 2002 FRB experienced a substantial increase (ranging between 81 per cent and 23 per cent) in loans and investments. In 2007, 2009 and 2010, FRB experienced sharp decreases in loans and investments, accompanied by the doubling of operating costs during 1999, which contributed to the decline in TFP during these years. The decline between 2006 and 2007 was caused by a 66 per cent increase in labour costs, a 63 per cent increase in operational costs and a decrease of 41 per cent in loans and investments during 2007. The reason for this may be related to the introduction of the National Credit Act during 2007.

It is evident that, during this period, the banking scene experienced considerable changes. Banks saw the first substantial rewrite of the Banks Act and Regulations since 1990, following the adoption of the international guidelines known as Basel II which took effect on 1 January, 2008 (Booysen, 2008:6). Banks also saw the introduction of the National Credit Act in 2007, as well as the financial sector charter.

The annual growth in TFP for the four banks is depicted in Table 2. The results are presented for three periods; for the entire sample period, for the period 1994 to 2008 and for the period 2008 to 2010. The reason for the disaggregation of the sample period is to firstly estimate the TFP over the sample period, and then to estimate the growth in TFP up to the start of the global financial crises, and then to estimate the TFP growth since the global financial crises. Starting with the entire sample period, it is clear that FRB experienced the highest annual growth in TFP (13 per cent), followed by Standard (8 per cent). ABSA experienced the lowest annual growth in TFP (5 per cent) while in the case of Nedbank, the annual growth was marginally better (6 per cent).

Table 2: Annual growth in TFP

	ABSA	FRB	Nedbank	Standard
1994 – 2010	5.0%	13.0%	6.0%	8.0%
1994 – 2008	7.0%	15.0%	7.0%	11.0%
2008 – 2010	-4.0%	-4.0%	-1.0%	-7.0%

For the period 1994 to 2008, FRB again recorded the highest growth in TFP (15 per cent), with Nedbank recording the lowest growth in TFP (7 per cent). The second best performer was Standard with a growth of 11 per cent in TFP, and in the third place was ABSA with a growth of 7 per cent in TFP. During this period all four banks experienced higher annual growth in TFP, but since the start of the global financial crisis all four banks recorded negative annual TFP growth, with Standard recording the highest negative annual growth of 7 per cent, followed by ABSA (-4 per cent), FRB (-4 per cent) and Nedbank (-1 per cent). It is evident that the global financial crisis impacted substantially on the productivity of the South African banks.

6. Conclusions

Various studies have been done to estimate the efficiency or productivity of South African banks, but this is the first study to estimate the total factor productivity (TFP) of the four largest South African banks.

During this sample period there were considerable changes in the banking arena. Banks saw the first substantial rewrite of the Banks Act and Regulations since 1990, following the adoption of the international guidelines called Basel II which took effect on 1 January, 2008. Banks also saw the introduction of the National Credit Act in 2007, as well as the financial sector charter. Some banks went through substantial restructuring and strategic changes.

FRB experienced the lowest TFP level at the end of the sample period. Strategic changes supported by high growth in loans and investments as well the high growth in deposits and current accounts contributed toward TFP during the sample period. On some occasions steep increases in labour costs and operational expense caused a decline in TFP.

The second best performer with regard to TFP levels at the end of the period was Standard Bank. The high growth in TFP was caused by various acquisitions at different times, and was also driven by high growth in loans and investments, and deposits and current accounts. Declines in TFP during certain years were, inter alia, caused by high increases in operational costs and labour costs.

Nebank had the highest TFP level at the end of the period. The bank experienced a considerable number of acquisition and mergers during the sample period. These strategic decisions, supported by high growth rates in loans and investments, and deposits and current accounts drove the annual growth in TFP. During much of the sample period the bank was performing only marginally better than ABSA although its TFP level has held up better than ABSA's since the onset of the GFC.

ABSA as the third best TFP levels performer at the end of the period underwent one major change during the sample period, when in 2005 Barclays Bank Plc of the United Kingdom acquired a controlling stake in the ABSA Group. During that year the bank experienced a 113 per cent growth in labour cost as well as a 102 per cent growth in operational expense. During some years downward trends in TFP were caused by declines in loans and investments and deposits and current accounts.

The influence of the global economic crisis on the banking sector as well as the introduction of the National Credit Act in 2007 is also evident in the negative growth in TFP for the period 2008-2010.

References

Aly H.Y., Grabowsky R., Pasurka C., Rangan, N. (1990) Technical, scale and allocative efficiencies in US banking: an empirical investigation, The Review of Economics and Statistics. May, 211-218.

Berg S.A., Førsund F.R., Hjalmarsson L., Souminen M. (1993) Banking efficiency in the Nordic countries, Journal of Banking and Finance, 17, 371-388.

Berger A.N., Humphrey D.B. (1991) The dominance of inefficiencies over scale and product mix economies in banking, Journal of Monetary Economics, 28, 117-148.

Berger A.N., Humphrey D.B. (1997) Efficiency of Financial Institutions: International Survey and Directions for Further Research, European Journal of Operational Research, 98, 175-212.

Booysen S. (2008), Annual Review 2008, Park Town. The Banking Association South Africa.

Caves D.W., Christensen L.R., Diewert W.E. (1982) Multilateral Comparisons of Output, Input, and Productivity Using Superlative Index Numbers, The Economic Journal, 92, 73–86.

Chang T-P., Hu J-L., Chou R.Y., Sun L. (2012) The sources of bank productivity growth in China during 2002 – 2009: A disaggregation view, Journal of Banking and Finance, http://dx.doi.org/10.1016/j.jbankfin.2012.03.003.

Charnes A., Cooper W.W., Haung Z.M. (1990) Polyhedral cone-ratio DEA models with an illustrative application to large commercial banks, Journal of Econometrics, 46, 213-227.

Chen T. (1998) A study of bank efficiency and ownership in Taiwan, Applied Economic Letters, 5(10), 613-617.

Coelli T.J. (1996) TFPIP Version 1.0: Total Factor Productivity Index (Computer) Program, available at www.uq.edu.au/economics/cepa/.

Coelli T.J., Rao D.S.P., O'Donnell C.J., Battese G.E. (2005) An Introduction to Efficiency and Productivity Analysis, Springer, New York.

Department of Bank Supervision. (Various years): DI 200 Reports and BA 120 Reports, wwwapp.resbank.co.za/sarbdata/ifdata/periods.asp?type=DI200.

Devaney M. and Weber W.L. (2000) Productivity growth, market structure, and technological change: evidence from the rural banking sector, Applied Financial Economics, 10, 587-595.

De Villiers W. (2008) Critical success factors in mergers with specific reference to the ABSA/Barclays transaction, Unpublished MBA thesis, Stellenbosch University.
Diewert W.E., Lawrence D. (1999) Measuring New Zealand's Productivity, The Treasury Working Paper 99/5, Wellington.
Diewert W.E., Nakamura A.O. (2003) Index number concepts, measures and decompositions of productivity growth, Journal of Productivity Analysis, 19, 127-159.
Drake L. (2001) Efficiency and productivity change in UK banking, Applied Financial Economics, 11, 557-571
Elyasiani E., Mehdian S.M. (1990) A non-parametric approach to measurement of efficiency and technological change: The case of large US commercial banks, Journal of Financial Services Research, July, 157-168.
Elyasiani E., Mehdian S.M. (1992) Productive efficiency performance of minority and non-minority owned banks: a non-parametric approach, Journal of banking and finance, 17, 349-366.
English M., Grosskopf S., Hayes K., Yaisawarng S. (1993) Output, allocative and technical efficiency of banks, Journal of Banking and Finance, 17, 349-366.
Favero C.A., Papi L. (1995) Technical Efficiency and Scale Efficiency in the Italian Banking Sector: a non-parametric approach, Applied Economics, 27, 385-395.
First Rand (1998) Annual Report. Available on www.firstrand.co.za. (Accessed 25 June 2012.)
Fiordelisi F., Molyneux, P. (2010) Total Factor Productivity and shareholder returns in banking, Omega, 38: 241-253.
Halkos G.E., Salamouris D.S. (2004) Efficiency measurement of the Greek commercial banks with the use of financial ratios: a data envelopment analysis approach, Management Accounting Research, 15(2): 201-224.
Hunter W.C., Timme S.G. (1995) Core deposits and physical capital: a re-examination of bank scale economies and efficiency with quasi-fixed inputs, Journal of Money, Credit and Banking, February, 165-185.
Lawrence D.A. (2003) Regulation of Electricity Lines Businesses, Analysis of Lines Business Performance: 1996 – 2003. Report prepared for Commerce Commission, Wellington, New Zealand, 19 December.
Luo X. (2003) Evaluating the profitability and marketability efficiency of large banks: An application of data envelopment analysis, Journal of Business research, 56(8): 627-635.
Matthews K., Zhang N. (2010) Bank productivity in China, 1997 – 2007: Measurement and convergence, China Economic Review, 21, 617-628.
McGregor (2012) BFA database (Information available at www.mcgregorbfa.com/pages/researchdomain.aspx).
Mendes V., Rebelo J. (1999) Productive Efficiency, technological change and Productivity in Portuguese Banking, Applied Financial Economics, 9(5), 513-521.
Nedbank (2012) Nedbank Group History. Available at www.nedbankgroup.co.za/aboutHistory.asp. (Accessed on 25 June 2012.)

Oberholzer M., Van der Westhuizen G. (2004) An empirical study on measuring profitability and efficiency of bank regions, Meditari (Accounting Research). 12, 165-178.

O'Donnell C.J. (2008) An Aggregate Quantity-Price Framework for Measuring and Decomposing Productivity and Profitability Change. Centre for Efficiency and Productivity Analysis Working Papers WP07/2008. University of Queensland. http://www.uq.edu.au/economics/cepa/docs/WP/WP072008.

O'Donnell C.J. (2010a) DPIN Version 1.0: A Program for Decomposing Productivity Index Numbers. Centre for Efficiency and Productivity Analysis Working Papers WP01/2010, University of Queensland.

O'Donnell C.J., van der Westhuizen G. (2002) Regional comparisons of banking performance in South Africa, The South African Journal of Economics, 70(3): 485-518.

Oral M., Yolalan R. (1990) An Empirical Study on Measuring Operating Efficiency and Profitability of Bank Branches, European Journal of Operational Research, 46, 282-294.

Rangan N., Grabowsky R., Aly H.Y., Pasurka C. (1988) The technical efficiency of US banks, Economics letters, 28, 169-175.

Resti A. (1997) Evaluating the cost-efficiency of the Italian Banking System: What can be learned from joint application of parametric and non-parametric techniques, Journal of Banking and Finance, 21, 221-250.

Seiford L.M., Zhu J. (1999) Profitability and marketability of the top 55 U.S. commercial banks, Management Science, 45(9): 1270-1288.

Sherman, H.D. and Gold, F. (1985) Bank Branch Operating Efficiency. Evaluation with Data Envelopment Analysis, Journal of Banking and Finance, 9, 297-315.

Sherman H.D., Ladino G. (1995) Managing Bank Productivity Using Data Envelopment Analysis (DEA), Interfaces, 25, 60-73.

Standard Bank. (2011) Annual Integrated Report 2011. Historical Overview. Available on www.standardbank.com (Accessed 25 June 2012)

Stavarek D. (2002) Comparison of the relative efficiency of banks in European transition economies, Proceedings of the D.A. Tsenov Academy of Economics 50th Anniversary Financial Conference, Svishtov, Bulgaria, April, 955-971.

Sufian F. (2011) Banks total factor productivity change in a developing economy: Does ownership and origins matter?, Journal of Asian Economics, 22, 84-98.

Van der Westhuizen G., Oberholzer M. (2003) A model to compare bank size and the performance of banks by using financial statement analysis and data envelopment analysis, Management Dynamics: Contemporary Research, 12(4): 18-26.

Van der Westhuizen G. (2008) Estimating technical and scale efficiency and sources of efficiency change in banks using balance sheet data: A South African study, Journal for studies in Economics and Econometrics, 32(1): 23-45.

Van der Westhuizen G., Oberholzer M. (2009) The role of interest income and noninterest income on the performance of four large South African banks, Studia Universitatis Babes Bolyai Oeconomica, 54(2): 100 -114.

Van der Westhuizen G. (2012) Change in the composition of bank income and its effect on the changes in the efficiency of bank regions, International Business and Economics Research Journal, 11(6): 631-646.

Vassiloglou M., Giokas D. (1990) A Study of the Relative Efficiency of Bank Branches: An Application of Data Envelopment Analysis, Journal of the Operational Research Society, 41(7): 591-597.

Wheelock D.C., Wilson P.W. (1995) Evaluating the efficiency of commercial banks: Does our view of what banks do matter, Review, Federal Reserve Bank of St Louis, July/August, 39-52.

THE CURRENT STATUS OF RESEARCHES ON INTELLECTUAL CAPITAL: A QUALITATIVE APPROACH

Nicoleta Maria IENCIU [*]
Babeș-Bolyai University of Cluj-Napoca, Romania

Abstract. The purpose of this study is to introduce the reader in the sphere of research on intellectual capital by performing a qualitative analysis of the prestigious international journals existed within literature on one hand and on the other hand of the published articles within these journals. Using the institutional approach in analyzing the journals' ranking we have analysed the lists of the three types of important institutions that have published ranking lists for the reference journals in economic field, and in particular, accounting. The results of our study emphasize that the field of research on intellectual capital is poorly developed, only a few journals publishing articles related to this type of capital. The present paper is distinguished by the analysis of several variables analyzed within articles and journals.

Keywords: qualitative analysis, intellectual capital, prestigious journals, ranking journals, articles, institutional approach

JEL Classification: M49

1. Introduction

In the classical theory of economics, capital is one of the three factors of production, in addition to land and labour, and refers in particular to buildings, equipment, machinery etc., used for the production of other goods. The use of the term *„capital"* alongside with *„intellectual"* evidences the presence of such a capital, different from the financial and physical capital (Jianu and Brătianu, 2007). This concept *„intellectual capital"* has been initially and soundly defined and argued by Thomas A. Stewart, one of the editors from the famous American *Fortune* magazine. According to him, intellectual capital is that intangible capital representing the sum of everything each employee knows to do in a company and which can be used for developing its competitiveness (Stewart, 1997).

Specialists belonging to various fields of expertise, such as management, accounting, economics, information technology, sociology, psychology, education

[*] Corresponding author. Address: Babeș-Bolyai University, Faculty of Economics and Business Administration, 58-60 Teodor Mihali Street, 400591 Cluj-Napoca, Romania, Tel: 0040745249709, E-mail: nicoleta.ienciu@econ.ubbcluj.ro

and development, attempted to define intellectual capital as precisely as possible (Bontis, 2002). Regarding our research perspective, the most relevant is the accounting perspective according to which intellectual capital is the economic value of a company, as given by groups of intangible elements such as *structural capital* (software systems, information system, distribution networks and supply chains), *human capital* (human resource) and *relational capital* (existing relations between the company and various categories of users), elements which generate economic benefits for a company when considered as a whole (Ienciu, 2012).

Literature defines intellectual capital by reference to its ability to generate future benefits (Ordonez of Pablos, 2004), profit (Harrison and Sullivan, 2000 Sullivan, 2000), value (Edvinsson and Malone, 1997; Rastogi, 2003) and wealth (Kannan and Aulbur, 2004, Stewart, 1998), being considered as "intellectual material that has been formalized and captured to produce a valuable asset" which if is managed well can generate future benefits (Bernhut, 2001). Therefore, we hereby evidence that there is presently no generally accepted definition associated with the concept of intellectual capital, due to the large number of existing definitions, presented from various perspectives and depending upon the areas of activity this capital operates within (Ienciu and Matiș, 2011).

Publishing articles in renewed journals provides prestige to the researchers and presents them with opportunities to move up in the academic environment. In the literature, the quality of journals has arisen the interest of many researchers (Haslam *et al*., 2008; Raffournier and Schatt, 2010; Bonner *et al*., 2006) from different points of view. Thus, the structure, the reputation and the prestige of the academic environment (Schwartz *et al*., 2005), the members thereof (Brinn and Jones, 2008) and the related institutions (Tinker, 2006) represent specific topics of discussion and analysis, some of them being debated in the current literature. Moreover, during recent times, more and more recourse is being given to the development of quality researches, able to generate value for the knowledge in the field. The primary objective of this paper is to create an image on what intellectual capital is, from the point of view of accounting researches, objective which we have pursued throughout three distinct parts. The first part of this paper introduces the methodological aspects at the base of our study, followed in the second part by an analysis of existing studies in the field of intellectual capital between 2006 and 2010 and a qualitative type approach of the results incurred from our research. The final part of the paper points out the main conclusions drawn and the future researches outlined in the area of intellectual capital.

2. Research design

The present study highlights a theoretical approach through which we have conducted a qualitative type analysis with the help of certain variables / data collected from the content of articles published in prestigious journals, internationally acknowledged, using as methods of research the data collection and processing, the results interpretation.

In order to determine the general selection criterion for journals we have used the institutional approach in analyzing the journals' hierarchy and

acknowledgment systems. For this purpose, we have taken over and processed information regarding the journals hierarchy systems (journal rankings) supplied by:

(1) The important university centres of the world, as part of a common Excellence in Research for Australia (ERA), issued by the Australian Research Committee, 2010;

(2) The National Centre of Scientific Research (CNRS), which published a list of journals ranking in June 2010, France.

(3) The Association of Business Schools (ABS), in a guide referencing the quality of academic journals, version 4, March 2010, England;

By analyzing the lists of the three types of institutions / organizations that have published ranking lists for the reference journals in economic field, and in particular, accounting, we have selected three classes of journals relevant to the considered field of research. Thus, for the first class we have selected for analysis a number of 25 journals, for the second a number of 26 journals and for the third class a number of 29 journals.

Considering that the academic world includes other relevant journals for our research theme, we have added to the three classes mentioned above two additional categories:

(1) journals specific for the intellectual capital and accounting fields; we have only considered one journal in this category, as representative for accounting, interfacing with human resources problematic;

(2) journals included in Social Science Citation Index (ISI journals) others than already included in the other clusters, from which we have only selected two journals

After preparing the list of journals corresponding to each category, we have selected among them, the common journals, adding the ones specific for each category, not previously analyzed, and thus resulting the final list of journals taken into consideration for our analysis.

Each journal has been classified depending on the ranking given by the responsible institution. Therefore, having in view the first list of journals, published by ERA, we have selected the journals depending on *rank A** and *A* from the published list. According to the classification preformed by the major university centers within ERA, there are a total of five categories of values for classification of journals, out of which we have selected the journals belonging to the first two categories, as they are considered high quality and prestigious journals in the given classification.

Based on the same criterion we have also selected the journals included in the second list, published by CNRS, the only difference being the labels given to journal rankings by comparison to the previous list. CNRS classifies the journals into four value categories, depending on their qualitative level. Using the same reasoning applied previously, we have selected the journals for our analysis from the first two value categories, *rank 1* and rank *2* from the published list and depending on the repetitive character of the journals in accordance to the previously created list (journals classified according to ERA).

In reference to the last drafted list, the ABS classified journal's list, we have selected for our analysis the journals classified depending on *Grade four* and *Grade three* in the published list and the repetitive character of the journals, in

accordance to the already created lists. We have considered two categories of journals - *Accounting* and *Finance* – because inter-disciplinary journals in accounting are included in other categories as well (e.g. finance, business history, management etc.). The specific criteria considered for the other two clusters of journals are as follows:
(1) Journal specific to our field of research, selected in accordance to the connection between the research theme (intellectual capital / human capital) and the accounting field, and due to the fact that it is the only accounting journal dedicated to human resources;
(2) ISI journals, relevant to the approached theme, which we have selected according to the connection between the research theme (intellectual capital / human capital), accounting field and the representativity of these journals for the scope of research. Moreover, these journals include articles on intellectual capital / human capital unlike the other ISI quoted journals included in above presented lists. Within these journals we have analyzed their content in relation to the articles treated inside, on the subject of intellectual capital / human capital (IC/HC). The selection criteria for the articles were based on one hand, on key words searches related to the theme of IC/HC in each article title, abstract, text or references, and on the other hand, on manual searches in the article content. Following these searches, we have prepared a preliminary list of articles compliant to the conditions mentioned previously. Moving on to the next phase of the analysis, we have revised the list of selected articles (116 selected articles) and we have considered useful for our analysis only those articles presenting information related to IC/HC, thus eliminating those with a simple mentioning of the term IC/HC in the text or in the references. The period of analysis was represented by the last 5 years wherein specialized articles in the field of IC/HC have been published, starting with 2006 and until 2010, because we intended to evidence the most recent articles existing in this field of research.

3. Qualitative analysis of intellectual capital within prestigious international journals

The qualitative type analysis of the results we have obtained from the use of content assessment of journals and articles was performed based on all considered variables. In this sense, we have had in view nine variables to be analyzed in the journals, such as: origin/regionalization of the journal, total number of issues, average number of annual issues, total number of articles published during our analyzed period (2006-2010), number of articles published in a single issue, total number of IC/HC articles published during our analyzed period (2006-2010), number of IC/HC articles published in a single issue, the research trend of the journal and character thereof.

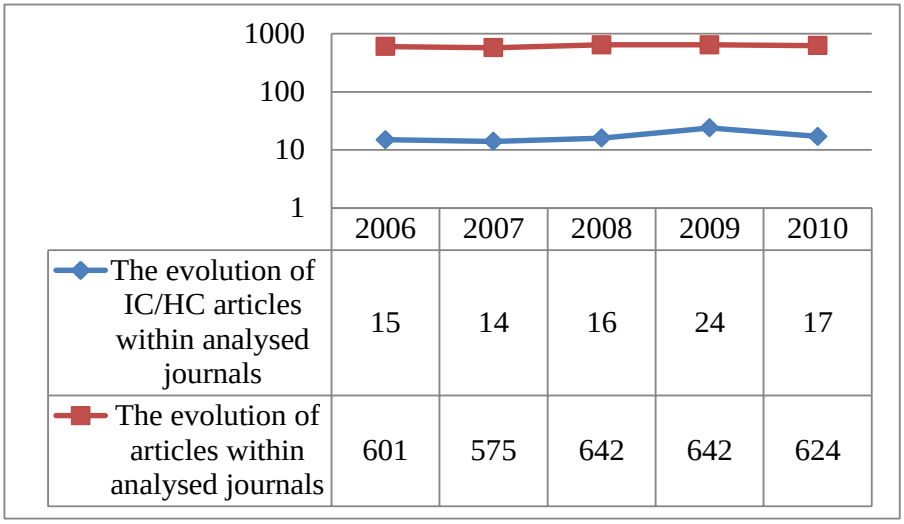
In the articles we have also analyzed, from a qualitative point of view, the following eight variables: the journal wherein the articles is included, the development of the conceptual framework, the introduced specialized literature, the statement of whether evaluation methods are used or not, the type of conducted research, the name of the first author and university he/she belongs to, the names of co-authors and the universities they belong to, and the most quoted article amongst the analyzed sample.

3.1. Analysed variables within journals

With reference to the first analyzed variable, the origin of the journal, out of the 21 journals under scrutiny, most of them are published in the USA (8 journals), then in the UK (6 journals), Australia (5 journals) and Europe (2 journals). The total and average number of issues was 492 between 2006 and 2010, 98.40 in average per year, respectively. The journals *Accounting, Organization and Society, Critical Perspectives on Accounting* and *Review of Quantitative Finance and Accounting* have recorded the largest number of issues between 2006 and 2010, with an average number of 8 issues per year.

Within the journals under analysis, there have been 3,084 articles published on various research subjects, 601 of them in 2006, 575 in 2007, 642 in 2008 and 2009, respectively, and 624 in 2010, thus resulting an average number of 6.30 articles per issue. Based on a manual search, we have analyzed the title of each article mentioning or making reference to our field of research. Following such analysis, we have determined the number of IC/HC relevant articles having been published between 2006 and 2010. Most articles are published in 2009 - 24 articles, then comes 2010 – 17 articles, 2008 - 16 articles, 2006 - 15 articles, and in 2007 the least number of articles, 14. By referring the number of IC/HC articles to the total number of articles published in a single issue, we resulted in an average number of 0.17 IC/HC articles in one single issue. In the below graphic one may notice that the evolution of the number of articles being published in our selection of journals is constant, with small deviations from one year to another, while the evolution of articles on the subject of IC/HC shows an ascending trend in the first 4 years of our analysis period, but changes in 2010 (Figure 1).

Figure 1. The number of published articles between 2006-2010



	2006	2007	2008	2009	2010
The evolution of IC/HC articles within analysed journals	15	14	16	24	17
The evolution of articles within analysed journals	601	575	642	642	624

By means of the journal's research trend, we have classified the analyzed articles in the categories of mainstream, mixt and critical research trends. Most journals are part of the mixt research trend (15 journals), combining joint elements of mainstream and critical research trends, followed by the critical research trend (4 journals) and the mainstream research trend (2 journals).

As to the last variable analyzed in the journals, the character of the journal, we have considered in our analysis generalist type of journals, publishing articles on various subjects, including IC/HC and also non-generalist journals or specific journals mostly focused on a certain research subject. The difference between the two types of journals is very small, 11 of the participating journals are generalist and 10 of them are non-generalist.

3.2. Analysed variables within articles

Switching to a more systematic approach and on the basis of the journals' content analysis, we have resorted to a detailed analysis of the variables related to our research. Following our performed analysis, we have reached to a series of results which represent the contents of the following paragraphs.

With regard to the journals having published more IC/HC articles between 2006 and 2010, we would state that the *Journal of Human Resource Cost & Accounting* (JHRCA) has published approximately 51% of the total number IC/HC articles we have analyzed, i.e. 44 articles. This is considered normal, because this journal is entirely dedicated to human resources, unlike the other analyzed journals that treat other research subjects as well. Would we to relate this variable to the previously analyzed variable "*the journal's origin"*, we would mention that JHRCA has its origin in Europe, for which reason, the rate of articles relevant for our chosen research area is much larger than in all journals from the other regions in our study altogether. Such aspect makes us state that researches relevant to our area of interest have their origin in Europe, and their general framework of development and contribution to researches in the field are more thoroughly studied in Europe.

On another side, most of the analyzed articles develop the conceptual framework of IC/HC, thus offering information connected to the definition of the IC/HC concept, its structural dimensioning, conceptual boundaries, classifications and other related defining elements. Therefore, out of the 86 analyzed articles, 51 (approximately 60% of the total considered articles) provide information connected to the mentioned aspects and relevant for our research subject.

Unlike the previous variable, which can be found in the majority of the analyzed articles, the evaluation models variable, considered for the present research, is present in a very small number of articles, approximately 6% (5 articles) of the total number.

Another variable considered for our study is the existence of a detailed and deep analysis of specialized literature. As a result of our research, we have noticed that such an analysis is found within 84 articles, with a weight of 97.86%, most of which refer to the existing knowledge in this field. This situation can be deemed normal given the general writing approach of a scientific article in the field of accounting. From the point of view of typology of approaches, the quantitative

approaches are predominant in the analyzed studies, with a proportion of 93.02%. Therefore, 80 articles from the total 86 we have analyzed, give much more importance to quantitative researches then the qualitative ones.

Should we refer to research trends, we would notice that the predominant one is the positive / normative current, found in most of the articles we have studied. As far as the authors and co-authors of the analyzed articles are concerned, we suggest preparing the following reference tables, in order to explain more easily such variables:

Table 1. Frequency of the authors within articles

Author(s)	Number of articles
Robin Roslender	4
Suresh Cuganesan	3
Christian Nielson	2
Indra K. Abeysekera	
J-L.W. Mitchell van der Zahn	
Janice Loftus	
John Dumay	
Md Habib-Uz-Zaman Khan	
Subhash Abhayawansa	

Table 2. Frequency of the co-authors within articles

Author(s)	Number of articles
James Guthrie	4
Joanna Stevenson	3
Indra K. Abeysekera	
Lucia Rodrigues	
Inderpal Singh	2
J-L.W. Mitchell Van der Zahn	
John A. Purcell	
Maria Martensson	
Richard Pike	
Tadanori Yasano	

We would mention that during our analysis period, 2006 – 2010, Robin Roslender from the University of Heriot-Watt, in Edinburgh, UK, followed at short distance by Suresh Cuganesan from the Macquarie University of North Ryde, in Australia, which have written the largest number of articles during the period we have considered, by comparison to other researchers in the field. The most frequently encountered co-authors have been: James Guthrie from the University of Sydney, Australia; Johanna Stevenson from the Stirling University in Scotland, UK; Indra K. Abeysekera from the University of Sydney, Australia and Lucia Rodrigues from the Minho University in Braga, Portugal.

Also, the most illustrative studies having been most frequently quoted in an IC/HC article are:

Table 3. Cited articles

Author(s)	Citations
Guthrie & Petty 2000	9
Sveiby 1997	6
Edvinsson & Malone 1997	5
Beattie & Thomson 2007	3
Brennan 2001	
Bukh at al 2005	
Hermanson 1963	
Bontis 2003	2
Flamholtz 1971	
Flamholtz 1974	
Jan-Erik Grojer 2001	
Mouritsen 2006	

We would notice that most quoted articles are making reference to articles having been published before the period considered for analysis, for which reason we believe these articles are deemed as a valuable source of information for current research and represent a starting point for new researches.

6. Concluding remarks and future research

This analysis provide us the possibility of understanding the research level existing at international level on the subject of intellectual capital, the importance given to researches in this field helping us to create a marker on these aspects which have not been debated in depth throughout time, and also to determine the present stage of researches in connection to intellectual capital. Having in view the obtained results we state that it is poorly developed. Studies conducted until now are very few by comparison to the number it should have existed until now in the literature, which demonstrates that this field of research is still in its early stage, as most studies approach general descriptive aspects.

Just like for any other scientific endeavor, there is a series of limits and perspectives for our research that should be presented depending on the approached aspects throughout the endeavor. We therefore consider that at the level of our conducted study, the analyzed variables have been few, determining us to envision in the future the analysis of more similar variables, both in the analysis of journals and articles. Also, the period for analysis included only 5 years, between 2006 and 2010, meaning that in the future we will try to conduct our analysis for a larger number of years in order to obtain a comparative trend of contributions to the status of knowledge in the area of intellectual capital and thus to increase the relevance of the study.

Acknowledgements

This work was possible with the financial support of the Sectoral Operational Programme for Human Resources Development 2007-2013, co-financed by the European Social Fund, under the project number POSDRU/107/1.5/S/76841 with the title *"Modern Doctoral Studies: Internationalization and Interdisciplinarity".*

Appendix 1

Journals' list

1	Abacus: a Journal of Accounting and Business Studies
2	Accounting and Business Research
3	Accounting Auditing and Accountability Journal
4	Accounting History
5	Accounting Horizons
6	Accounting Review
7	Accounting, Business and Financial History
8	Accounting, Organizations and Society
9	Advances in Accounting : a Research Annual
10	Behavioral Research in Accounting
11	British Accounting Review
12	Contemporary Accounting Research
13	Critical Perspectives on Accounting
14	Journal of Accounting and Economics
15	Journal of Accounting and Public Policy
16	Journal of Accounting Auditing and Finance
17	Journal of Accounting Education
18	Journal of Accounting Literature
19	Journal of Accounting Research
20	Journal of Business Finance and Accounting
21	Journal of Management Accounting Research
22	Management Accounting Research
23	Review of Accounting Studies
24	The European Accounting Review
25	The International Journal of Accounting
26	Comptabilité Controle Audit
27	Accounting Forum
28	Financial Accountability and Management
29	Review of Quantitative Finance and Accounting
30	Journal of Human Resource Cost and Accounting
31	Australian Accounting Review
32	Asia-Pacific Journal of Accounting and Economics

REFERENCES

Bernhut S. (2001) Measuring the value of intellectual capital, Ivey Business Journal, 65(4): 16-20.

Bonner S.E., Hesford J.W., Van der Stede W.A., Young S.M. (2006) The most influential journals in academic accounting, Accounting, Organization and Society, 31(7): 663-685.

Bontis N. (2002) World Congress of Intellectual Capital Readings, Butterworth-Heinemann/KMCI Press, Boston, MA.

Brinn T., Jones J.M. (2008) The determinants of a successful accounting manuscript: Views of the informed, Accounting Forum, 32, 89-113.

Edvinsson L., Malone M.S. (1997) Intellectual Capital: Realizing your Company's True Value by Finding its Hidden Brainpower, Harper Business, New York.

Harrison S., Sullivan P. (2000) Profiting from intellectual capital: learning from leading companies, Journal of Intellectual Capital, 1(1): 33-46.

Haslam N., Ban L., Kaufmann L., Loughnan L., Peters K., Whelan J., Wilson S. (2008) What makes an article influential? Predicting impact in social and personality psychology, Scientometrics, 76(1): 169-185.

Ienciu N.M. (2012) A longitudinal analysis of intellectual capital, Analele Univesității din Oradea, Științe Economice, pp. 1655-1660.

Ienciu N.M., Matiș D. (2011) A theoretical framework of intellectual capital, Journal of Business Research, 11(2): 131-136.

Jianu I., Brătianu C. (2007) Dinamica semantică a conceptului de capital intelectual, available at: www. managementmarketing.ro, București.

Kannan G., Aulbur W. (2004) Intellectual capital: measurement effectiveness, Journal of Intellectual Capital, 5(3): 389-413.

Ordonez de Pablos P. (2004) Measuring and reporting structural capital: lessons from European learning firms, Journal of Intellectual Capital, 5(4): 629-647

Raffournier B., Schatt A. (2010) Is European Accounting Research Fairly Reflected in Academic Journals? An Investigation of Possible Non-mainstream and Language Barrier Biases, European Accounting Review, 19(1): 161-190.

Rastogi P.N. (2003) The nature and role of IC – rethinking the process of value creation and sustained enterprise growth, Journal of Intellectual Capital, 4(2): 227-48.

Schwartz, B.N., S. Williams, P.F. Williams (2005) US doctoral students' familiarity with accounting journals: insights into the structure of the US academy, Critical Perspectives on Accounting, 16, 327-348.

Stewart T.A. (1997) Intellectual Capital, Nicholas Brealey Publishing, London.

Stewart, T.A. (1998) Intellectual Capital – The New Wealth of Organizations, Nicolas Publishing, London.

Sullivan, P. (2000) Value-Driven Intellectual Capital – How to Convert Intangible Corporate Assets into Market Value, John Wiley and Sons, New York, NY.

Tinker T. (2006) Editorial: Accounting journal assessment exercise, Accounting Forum, 30, 195-208.

COMBINED FORECASTS - STRATEGY TO IMPROVE THE MACROECONOMIC FORECASTS ACCURACY IN ROMANIA

Mihaela BRATU (SIMIONESCU) *
Academy of Economic Studies, Romania

Abstract. In this article, the accuracy of forecasts for inflation rate, unemployment, exchange rate and GDP index provided by Institute of Economic Forecasting (IEF) and National Commission of Prognosis (NCP) was assessed for the forecasting horizon 2004-2011. The hypothesis that combined forecasts is a suitable strategy of improving the predictions accuracy was tested. Only for the unemployment rate the combined forecasts based on IEF and NCP evaluations performed better than the initial forecasts. For inflation and exchange rate Dobrescu model of IEF provided better predictions, but the combined ones were more accurate than NCP expectations. The Dobrescu model predictions combined with ARMA static respectively dynamic forecasts and NCP estimations combined with ARMA static prognosis, respectively Dobrescu forecasts using EQ scheme for unemployment on a horizon of 2 years (2010-2011) improved the accuracy of forecasts made by both institutions, the combined predictions based on Dobrescu predictions and ARMA static ones using OPT scheme being the most accurate, according to U1 Theils' statistic.

JEL Classification: C51, E24, E31

Keywords: macroeconomic forecast, combined forecasts, accuracy, error, static/dynamic forecast, prediction

1. Introduction

In addition to economic analysis, the elaboration of forecasts is an essential aspect that conducts the way of developing the activity al macroeconomic level. But any forecast must be accompanied by macroeconomic explanations of its accuracy. The purpose of this evaluation is related to different aspects: the improvement of the model on which the forecast was based, adjustment of government policies, the planning of results. Basically, accuracy evaluation in this context refers directly to the degree of trust conferred to the prediction. Although the literature on forecasting methods and techniques used in describing the evolution of an economic phenomenon is particularly rich, surprisingly, few researchers have dealt with the methods used

* Corresponding author. Address: Academy of Economic Studies, Bucharest, Faculty of Cybernetics, Statistics and Economic Informatics, mihaela_mb1@yahoo.com

to improve the measurement of forecast uncertainty. The aspect is important, because the macroeconomic predictions must not be easily accepted, taking into account the negative consequences of macroeconomic forecasts failures, consequences that affect the state policies. The decisions of economic policy are based on these forecasts. Hence, there is an evident interest of improving their accuracy.

Bratu (2012) recommended some empirical strategies used to improve the predictions accuracy. Combined forecasts are utilized in order to increase the degree of accuracy. These forecasts can be built using linear combinations, where the coefficients are identified using the previous predictions and forecasts made starting from the correlation matrix. The regression models could also be used for large data sets of forecasted and registered values. We can also keep the value of an accuracy indicator registered in the past for the next forecasts.

2. Combining forecasts - strategy to improve the forecasts accuracy

Combined forecasts are an important technique used to improve the forecasts accuracy. Clark and McCracken (2009) showed that the combined forecasts of recursive predictions and rolling ones improved often the accuracy by minimizing the mean squared forecast error. Wallis (2011) analyzed the effects of experts' data on the combinations of point forecasts and the properties of strategies of combining predictions. For density forecasts the logarithmic method provided better results than the simple linear one. Genrea, Kenny, Meylera and Timmermann (2013) made forecasts combinations starting from SPF predictions for ECB and using performance-based weighting, trimmed averages, principal components analysis, Bayesian shrinkage, least squares estimates of optimal weights. Only for the inflation rate there was a strong evidence of improving the forecasts accuracy with respect to the equally weighted average prediction.

We checked this hypothesis of improving the accuracy using combined predictions for the forecasts based on the most used combination approaches:

- optimal combination (OPT), with weak results according to Timmermann, (2006);
- equal-weights-scheme (EW);
- inverse MSE weighting scheme (INV).

Bates *et al.* (1969) considered two predictions p1;t and p2;t, for the same variable Xt, derived h periods ago. If the forecasts are unbiased, the error is calculated as: $e_{i,t} = X_{i,t} - p_{i,t}$. The errors follow a normal distribution of parameters 0 and σ_i^2. If ρ is the correlation between the errors, then their covariance is $\sigma_{12} = \rho \cdot \sigma_1 \cdot \sigma_2$. The linear combination of the two predictions is a weighted average: $c_t = m \cdot p_{1t} + (1-m) \cdot p_{2t}$. The error of the combined forecast is: $e_{c,t} = m \cdot e_{1t} + (1-m) \cdot e_{2t}$. The mean of the combined forecast is zero and the variance is:

$\sigma_c^2 = m^2 \cdot \sigma_1^2 + (1-m)^2 \cdot \sigma_{2t}^2 + 2 \cdot m \cdot (1-m) \cdot \sigma_{12}$. By minimizing the error variance, the optimal value for m is determined (m_{opt}): $m_{opt} = \frac{\sigma_2^2 - \sigma_{12}}{\sigma_1^2 + \sigma_2^2 - 2 \cdot \sigma_{12}}$.The individual forecasts are inversely weighted to their relative mean squared forecast error (MSE) resulting INV. In this case, the inverse weight (m_{inv}) is: $m_{inv} = \frac{\sigma_2^2}{\sigma_1^2 + \sigma_2^2}$. Equally weighted combined forecasts (EW) are gotten when the same weights are given to all models.

2.1. The assessment of forecasts accuracy

In literature, there are several traditional ways of measurement, which can be ranked according to the dependence or independence of measurement scale. The most utilized measures of forecasts accuracy, recalled by (Fildes &Steckler, 2000, p. 8), are:

- Mean error (ME)

$$ME = \frac{1}{n} \sum_{j=1}^{n} e_X(T_0 + j, k)$$

- Mean absolute error (MAE)

$$MAE = \frac{1}{n} \sum_{j=1}^{n} \left| \; e_X(T_0 + j, k) \; \right|$$

- Root Mean Squared Error (RMSE)

$$RMSE = \sqrt{\frac{1}{n} \sum_{j=1}^{n} e_X^2(T_0 + j, k)}$$

These measures of accuracy have some disadvantages. For example, RMSE is affected by outliers. If we have two forecasts with the same mean absolute error, RMSE penalizes the one with the biggest errors.

- Mean absolute percentage error

The percentage error is given by: $p_t = \frac{e_t}{X_t} \cdot 100$

The most common measures based on percentage errors is the mean absolute percentage error (MAPE), which is:

MAPE = average ($|p_t|$)

- Mean relative absolute error

  It is considered that $r_t = \frac{e_t}{e_t^*}$, where e_t^* is the forecast error for the reference model.

The mean relative absolute error (MRAE) is computed as:

MRAE= average ($|r_t|$)

- The relative RMSE

  The relative RMSE is calculated as:

$$rel\_RMSE = \frac{RMSE}{RMSE_b}, where\ RMSE_b$$

is the RMSE of "benchmark model"

U Theil's statistic is calculated as U1 and U2 and it is used to make comparisons between forecasts.

Notations used:

r- the registered results

f- the forecasted results

t- reference time

e- the error (e=r-f)

n- number of time periods

$$U_1 = \frac{\sqrt{\sum_{t=1}^{n}(r_t - f_t)^2}}{\sqrt{\sum_{t=1}^{n} r_t^2} + \sqrt{\sum_{t=1}^{n} f_t^2}}$$

A value of U_1 closer to zero implies a higher accuracy.

$$U_2 = \sqrt{\frac{\sum_{t=1}^{n-1}(\frac{f_{t+1} - r_{t+1}}{r_t})^2}{\sum_{t=1}^{n-1}(\frac{r_{t+1} - r_t}{r_t})^2}}$$

If U_2 =1=> the same accuracy for the two predictions

If U_2 <1=> the prediction to compare more accurate than the naive one

If U_2 >1=> the prediction to compare more accurate than the naive one.

Recent studies target accuracy analysis using as comparison criterion different models used in making predictions or the analysis of forecasted values for the same macroeconomic indicators registered in several countries. Ericsson (1992) shows that the parameters stability and mean square error of prediction are two key measures in evaluation of forecast accuracy, but they are not sufficient and it is necessary the introduction of a new statistical test.

Considering the AR (1) process, which is represented as $y_t = \beta y_{t-1} + u_t$, Hoque, Magnus and Pesaran (1988) show that for small values of β the prediction mean square error is a decreasing function in comparison with the number of forecast periods. Granger and Jeon (2003) consider four models for U.S. inflation: a univariate model, a model based on an indicator used to measure inflation, a univariate model based on the two previous models and a bivariate model. Applying the mean square error criterion, the best prediction made is the one based on an autoregressive model of order 1 (AR (1)). Applying distance-time method, the best model is the one based on an indicator used to measure the inflation.

Ledolter (2006) compares the mean square error of ex-post and ex ante forecasts of regression models with transfer function with the mean square error of univariate models that ignore the covariance and show superiority of predictions based on transfer functions.

Teräsvirta, van Dijk and Medeiros (2005) examine the accuracy of forecasts based on linear autoregressive models, autoregressive with smooth transition (STAR) and neural networks (neural network-NN) time series for 47 months of the macroeconomic variables of G7 economies. For each model is used a dynamic specification and it is showed that STAR models generate better forecasts than linear autoregressive ones. Neural networks over long horizon forecast generated better predictions than the models using an approach from private to general.

Heilemann and Stekler (2007) explain why macroeconomic forecast accuracy in the last 50 years in G7 has not improved. The first explanation refers to the critic brought to macroeconometrics models and to forecasting models, and the second one is related to the unrealistic expectations of forecast accuracy. Problems related to the forecasts bias, data quality, the forecast process, predicted indicators, the relationship between forecast accuracy and forecast horizon are analyzed.

Ruth (2008), using the empirical studies, obtained forecasts with a higher degree of accuracy for European macroeconomic variables by combining specific sub-groups predictions in comparison with forecasts based on a single model for the whole Union. Gorr (2009) showed that the univariate method of prediction is suitable for normal conditions of forecasting while using conventional measures for accuracy, but multivariate models are recommended for predicting exceptional conditions when ROC curve is used to measure accuracy. Dovern and Weisser (2011) used a broad set of individual forecasts to analyze four macroeconomic variables in G7 countries. Analyzing accuracy, bias and forecasts efficiency, large discrepancies between countries and also in the same country for different variables resulted.

In Netherlands, experts make predictions starting from the macroeconomic model used by the Netherlands Bureau for Economic Policy Analysis (CPB). For the period 1997-2008 was reconstructed the model of the experts macroeconomic variables evolution and it was compared with the base model. The conclusions of Franses, Kranendonk and Lanser (2011) were that the CPB model forecasts are in general biased and with a higher degree of accuracy.

Clark and Ravazzolo (2012) compared, in terms of accuracy, the forecasts based on Bayesian autoregressive model and Bayesian vector autoregressive one with volatility that is variable in time. The most important macroeconomic variables were chosen for USA and England, the results showing a better accuracy of predictions based on AR and VAR with stochastic variance.

Clements and Galvao (2012) proved using empirical data that a mixed data-frequency sampling (MIDAS) approach can improve the accuracy of inflation and GDP growth predictions at short horizons (less than one year).

Many studies in literature refer to the combining of two methods based on the same model (such as eg bayesian mediation model), but a combination between model predictions and expert assessments was rarely proposed.

3. Evaluation of macroeconomic forecasts accuracy in Romania

In this study we evaluate the accuracy of forecasts made by principal institutions in Romania for some important macroeconomic indicators: Institute for Economic Forecasting (IEF) and National Commission of Prognosis (NCP). The variables for which predictions were made are: inflation rate, unemployment rate, GDP index and average exchange rate (RON/EUR). We consider the values of forecasted indicators of National Commission of Prognosis for 2004-2011. Some of the indicators mentioned above are calculated for the forecasts. The values of ME show the underestimation tendency of inflation. Moreover, MAE has the same value, showing the persistence of this underestimation.

ME indicator shows an underestimation of the values that were forecasted using Dobrescu model for the annual inflation rate, unemployment rate and exchange rate (RON/EUR). We got an overestimation of the forecasted values for GDP deflator and GDP index. The low value of RMSE indicates a small variability in errors data series.

For unemployment and export rate the value of U1 statistic is the nearest to 1, fact that indicates a high accuracy. For the inflation rate and index of private consumption the predictions have a very low degree of accuracy.

The forecasts for inflation, unemployment and average exchange rate are better than those based on a naïve model, unlike the ones for GDP index.

The error represents only 0,7% from the registered value of exchange rate while MAPE for unemployment rate is very high with a deviation of 184,21% from the real value.

Table 1. Indicators of forecasts accuracy in 2004-2011

Indicators for predictions based on Dobrescu model	Inflation rate	Unemployment rate	GDP index	Exchange rate RON/EUR
RMSE	0.0282	0.2367	0.1446	0.0307
ME	0.0075	0.0958	-0.1215	0.0078
MAE	0.0231	0.0971	0.1252	0.0276
MAPE	0.0212	1.8421	0.1057	0.007
MASE	0.1680	0.7614	0.9808	0.1995
U1	0.013	0.7338	0.0664	0.0039
U2	0.7389	0.1561	1.4298	0.0973

Indicators for NCP predictions	Inflation rate	Unemployment rate	GDP index	Exchange rate RON/EUR
RMSE	0.0171	0.0223	0.1467	0.0611
ME	-0.8287	0.0198	-0.116	-0.0182
MAE	0.1006	0.0198	0.1228	0.0502
MAPE	0.1499	0.3962	0.1213	0.0133
MASE	0.14206	0.2862	1.759	0.0067
MRAE*	0.3627	0.4624	-0.727	-0.0067
U1	0.1186	0.1641	0.6311	0.0078
U2	0.4014	1.9491	0.9671	0.2098
Rel_RMSE*	0.6063	0.0942	1.0145	1.9902

Source: own computations using the data provided by IEF
** Compared to Dobrescu model*

The positive value of ME indicator shows an underestimation of NCP unemployment rate of 0.0198 percentage points, for the rest of the variables being overestimated. The errors variability is low, the RMSE having values less than 0.15 percentage points. The labour market reacted immediately at the crises from 2009 by increasing the unemployment rate, but also by the moderation of salaries annual rate of growth. The accuracy of forecasts based on Dobrescu model is low for all the analyzed variables, but the predictions for the inflation rate and unemployment rate are better than those based on naive models. Excepting the forecasts for GDP index, the values for MASE suggest better predictions than those based on the random walk. The lowest value according to the real value was registered for the exchange rate, the deviation being 1.33% from the effective value. The highest value is got for the unemployment rate, with a gap weight of 39.62%, the value of MAPE. NCP provided forecasts with a higher degree of accuracy than those got using Dobrescu model for the following indicators: inflation, unemployment and exchange rate.

For inflation, which recorded only positive rates of growth in the analyzed period, naive model have to extrapolate the latest trend. If Moore had proposed the comparison to projections based on an extrapolation method, the development of VAR and ARIMA models, impose their use as benchmark models. A value of U less than one indicates lower forecast errors than those from the naïve model. The same conclusion is reached when it is calculated the scale error proposed by Hyndman and Koehler. The data series for the annual inflation rate has two unit roots, applying a transformation to get a stationarized data series (ri). The Box-Jenkins procedure was used for 1990-2009 and the transformed inflation rate follows an ARMA(1,1) process: $ri_t = 1{,}059 \cdot ri\_s_{t-1} + 0{,}918 \cdot \varepsilon_{t-1} + \varepsilon_t$. For 1990-2010 we got the following model: $ri_t = 1{,}04 \cdot ri\_s_{t-1} + 0{,}9996 \cdot \varepsilon_{t-1} + \varepsilon_t$.

Table 2. One-year-ahead predictions based on ARMA models and accuracy indicators

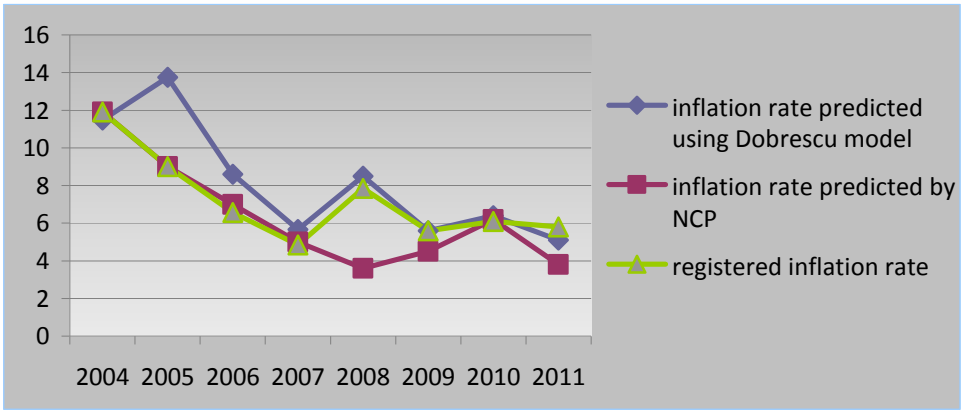
Year	Inflation rate (%)	Unemployment rate (%)
2010	3.153	6.187
2011	9.847	5.892

Accuracy indicators– one-step-ahead forecasts	Inflation rate	Unemployment rate
RMSE	0.0353	0.0065
ME	-0.0055	0.0006
MAE	0.0349	0.0065
MAPE	-0.1077	-0.0041
MASE	7.275	1.3593
MRAE*	4.7368	0.6506
U1	0.2666	0.0537
U2	14.0884	0.4076
Rel_RMSE*	1.2542	0.2324

Source: own computations using the data provided by IEF
** Compared to Dobrescu model*

On horizon 2010-2011, the ARMA model generates an overestimation of the inflation rate and an underestimation of the unemployment rate. The accuracy is rather low, the inflation forecasts being better than those based on a naïve model. The unemployment rate predictions based on a MA(1) model have a higher accuracy than those based on a naïve model or those got using Dobrescu model, fact described by the values less than 1 for MRAE and rel_RMSE. The random walk process determined better predictions than ARMA models.

Figure 1. Short run forecasts of the inflation rate (2004-2011)



Source: graph based on the data provided by IEF and NCP

The graphic above shows that until 2007 the NCP provided more accurate inflation rate forecasts while after the mentioned year the predictions based on Dobrescu model were better.

The data series for the unemployment rate has two unit roots, applying a transformation to get a stationarized data series (ru). Unemployment rates from 1990 to 2009 in Romania follow a MA(1) process: $r\_unemployment = 11{,}56 + e_t + 0{,}9244 \cdot e_{t-1}$. For 1990-2010 we got the following model:

$$r\_unemployment = 7{,}536 + e_t + 0{,}947 \cdot e_{t-1} + e_t .$$

We used two forecasting techniques: ex-post (used for dynamic forecasts) and ex-ante forecasts used for static forecast. *Dynamic forecast (forecast dynamics)* forecast the value in period *t + 1* only based on data up to time *t,* then, for all periods that are already projected using data from period *t + 1. Static forecast (forecast still)* makes forecasts based only on registered data.

A dynamic forecasting was made in EViews for horizon 2010-2011. The ex- post technique was applied first, using the first 19 values of the unemployment rate for the model and the rest for prediction. Ex-ante technique of forecasting is based on all values.

EViews Program displays a set of indicators to evaluate the model reliability:

- *RMSE (Root Mean Squared Error),* which must have a small value as possible;
- *MAE (Mean Absolute Error)* ;
- *MAPE (Mean Absolute Percent Error)*, which, in this case, has a relatively low value;
- *Theil's inequality coefficient* (takes values in (0,1), a value close to 0 indicating a good adjustment; in this case has a low value, so, the adjustment is very good);

- *Bias Proportion* has to be small (in this case is quite large);
- *Variance Proportion* has to be as small; in this case is rather close to 0;
- *Covariance proportionate* is desirable to be as large as possible; in this case it is 0 for the dynamic prediction and close to 0 for the static one.

To make a comparison of forecasts characteristics, the loss-function values are analyzed- root mean squared error (RMSE), which calculates the forecast deviation from the actual values recorded. It is estimated that a prediction is much closer to the real evolution as much as RMSE value is lower. Static forecast is superior to the dynamic one for unemployment rate which follows a MA (1), because of the lower value of RMSE.

Table 3. Dynamic and static predictions in EViews and indicators of accuracy

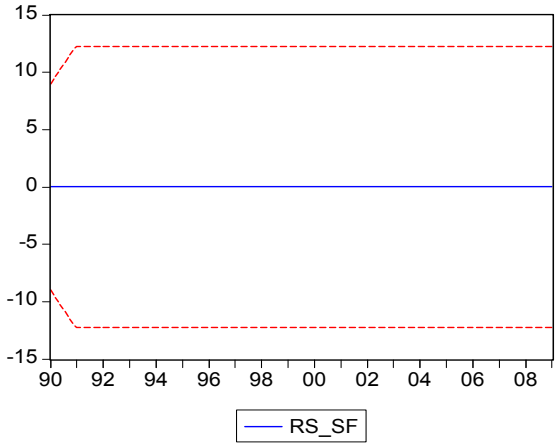
Unemployment rate (%)		
Year	Static forecasts MA (1)	Dynamic forecasts MA(1)
2010	5.7	5.8
2011	7.3	7.5

Accuracy indicators– one-step-ahead forecasts	Static forecasts	Dynamic forecasts
RMSE	0.0164	0.0173
ME	-0.004	-0.0055
MAE	0.016	0.0165
MAPE	-0.1017	-0.1278
MASE	3.3333	3.4375
MRAE*	2.3784	2.6491
U1	0.1298	0.1352
U2	1.0538	1.1171
Rel_RMSE*	0.585048	0.616978

Source: computations using predictions based on own models
Compared to Dobrescu model

Figure 2. Dynamic and static prediction in EViews (2010-2011)

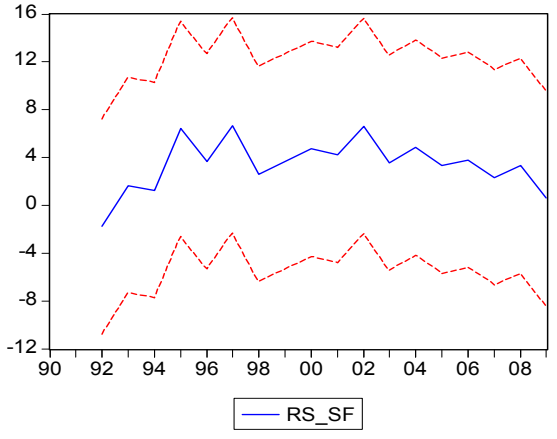
Dynamic prediction



Forecast: RS_SF
Actual: RS_S
Forecast sample: 1990 2009
Included observations: 18

Root Mean Squared Error	8.006178
Mean Absolute Error	7.433333
Mean Abs. Percent Error	94.44444
Theil Inequality Coefficient	1.000000
Bias Proportion	0.862019
Variance Proportion	0.137981
Covariance Proportion	0.000000

Static prediction



Forecast: RS_SF
Actual: RS_S
Forecast sample: 1990 2009
Included observations: 18

Root Mean Squared Error	4.405615
Mean Absolute Error	4.015810
Mean Abs. Percent Error	49.57959
Theil Inequality Coefficient	0.366694
Bias Proportion	0.830870
Variance Proportion	0.039856
Covariance Proportion	0.129274

The static forecast is slowly superior to the dynamic one. Analyzing the values for U1, U2 and rel_RMSE, we got that the predictions based on random walk and Dobrescu model have a higher degree of accuracy.

We combined the forecasts based on Dobrescu macromodel with those based by NCP and we made comparisons using U1 and U2 indicators for 2004-2011. The predictions were built using the three scheme and the accuracy measures are presented in Table 4.

Table 4. U1 and U2 statistics for combined forecasts (2004-2011)

Variable	Scheme	U1	U2
inflation rate	OPT	0.0875	0.7559
	INV	0.0831	0.6255
	EW	0.0936	0.8479
unemployment rate	OPT	0.1665	1.4467
	INV	0.1601	1.3688
	EW	0.1621	1.3934
GDP index	OPT	0.0672	1.8367
	INV	0.0672	1.8367
	EW	0.0672	1.8367
exchange rate	OPT	0.0068	0.1788
	INV	0.0045	0.1133
	EW	0.0061	0.1581

Source: own calculations using Excel

In the category of combined forecasts, those based on INV scheme are the most accurate for all the selected variables. The predictions for inflation rate and exchange rate are better than the naïve ones. The combined forecasts are better than NCP ones for the inflation rate and the exchange rate, but Dobrescu model provided more accurate predictions for these variables. For the unemployment rate, the combined forecasts were the most accurate for the horizon 2004-2011. For the GDP index the predictions of the two institutions are better than the combined ones.

The predictions based on Dobrescu model and NCP expectations for the unemployment rate using the three schemes are denoted by C1, C2 and C3. Comparisons are made with the accuracy of the two institutions predictions. For the forecasts of the unemployment rate (2010-2011) made using Dobrescu model the U1 value is 0.122 and U2 is 1.391. The values of the two statistics for NCP forecasts are 0.117, respectively 1.327, with a slow superiority of NCP expectations. The values of U1 and U2 used in making comparisons are presented in Table 5.

Table 5. U1 and U2 statistics for combined forecasts of unemployment rate (2010-2011)

Type of combined forecast	Scheme	U1	U2
Dobrescu predictions + NCP forecasts	OPT	0.1177	1.3224
	INV	0.1183	1.3421
	EQ	0.1166	1.3224
Dobrescu predictions + ARMA static forecast	OPT	0.1044	1.1780
	INV	0.1055	1.1832
	EQ	0.1080	1.1780
Dobrescu predictions + ARMA dynamic forecast	OPT	0.1087	1.2482
	INV	0.1096	1.2347
	EQ	0.1133	1.2482
NCP predictions + ARMA static forecast	OPT	0.1188	1.2553
	INV	0.1172	1.3267
	EQ	0.1146	1.2553
NCP predictions+ ARMA dynamic forecast	OPT	0.1181	1.3102
	INV	0.1172	1.3273
	EQ	0.1188	1.3102
C1+ ARMA static forecast	OPT	0.2363	1.4576
	INV	0.1463	1.6848
	EQ	0.1321	1.4576
C1+ ARMA dynamic forecast	OPT	0.2179	1.5277
	INV	0.1492	1.7260
	EQ	0.1372	1.5277
C2+ ARMA static forecast	OPT	0.3179	1.4421
	INV	0.1417	1.5982
	EQ	0.1326	1.4421
C2+ ARMA dynamic forecast	OPT	0.2712	1.5151
	INV	0.1456	1.6524
	EQ	0.1378	1.5151
C3+ ARMA static forecast	OPT	0.2823	1.4462
	INV	0.1428	1.6215
	EQ	0.1324	1.4462
C3+ ARMA dynamic forecast	OPT	0.2487	1.5184
	INV	0.1464	1.6721
	EQ	0.1376	1.5184

Source: own calculations using Excel

The combined predictions of Dobrescu model forecasts and NCP values and each of these predictions combined with static/dynamic ARMA predictions generated more accurate values than the predictions provided by the Institute of Economic Forecasting. C3 predictions and the combined ones of NCP and ARMA static forecasts in the equally weighted scheme are better than the NCP expectations and even better than Institute of Economic Forecasting results. The Dobrescu predictions combined with ARMA ones in the two variants (static and

dynamic) improved the accuracy of the two institutions predictions. The combined forecasts based on Dobrescu predictions and ARMA static ones using OPT scheme improved the most the accuracy of initial expectations of the unemployment rate for 2010-2011. However, all the forecasts are less accurate than the naïve ones, because of values greater than one for U2 statistic.

4. Conclusions

Forecast performance evaluation is an important indicator of the extent to which projections made accomplished their purpose to be closer as much as possible of the registered values. Forecasts accuracy in Romania for some important macroeconomic indicators was evaluated for each an institution specialized in the elaboration of forecasts, and comparisons were made showing the superiority of forecasts made by National Commission of Forecasting.

In conclusion, macroeconomic forecasts evaluation is necessary to inform the public about the way in which state institutions predicted the economic phenomenon. Further, according a certain degree of reliability by studying the results, in the future the public attention will focus on a particular institution in accord with the criterion of forecasts accuracy.

The research should continue in order to find the better strategy to improve the forecasts accuracy. The combined predictions are a suitable strategy of increasing the accuracy only for some cases. The unemployment rate combined forecasts performed better than the predictions provided by NCP and IEF on the horizon 2004-2011. The inflation rate and exchange rate combined predictions are better only than the NCP expectations.

The Dobrescu model predictions combined with ARMA static respectively dynamic forecasts and NCP estimations combined with ARMA static prognosis, respectively Dobrescu forecasts using EQ scheme for unemployment on a horizon of 2 years (2010-2011) are very good strategies of improving the accuracy of predictions made by both institutions. The combined forecasts based on Dobrescu predictions and ARMA static ones using OPT scheme improved the most the forecasts accuracy.

Finally, assessing and improving the forecasts accuracy is an important problem for researchers. The combined predictions are a possible strategy of growing the accuracy, but this should be tested on the real data. However, there is no guarantee that a specific combined forecast will continue in the future to provide the best accuracy.

REFERENCES

Bratu M. (2012) Strategies to Improve the Accuracy of Macroeconomic Forecasts in USA, LAP LAMBERT Academic Publishing

Clark T., McCracken M. (2009) Improving forecast accuracy by combining recursive and rolling forecasts, International Economic Review, 50(2): 363-395.

Clark T.E., Ravazzolo F. (2012) The Macroeconomic Forecasting Performance of Autoregressive Models with Alternative Specifications of Time-Varying Volatility, FRB of Cleveland, Working Paper No. 12-18.

Clements M.P., Galvao A.B. (2012) Macroeconomic Forecasting with Mixed Frequency Data: Forecasting US output growth and inflation, The Warwick Economics Research Paper Series (TWERPS) from University of Warwick, Department of Economics, no. 773.

Dovern J., Weisser J. (2011) Accuracy, biasedness and efficiency of professional macroeconomic forecasts: An empirical comparison for the G7. International Journal of Forecasting, 27 (2): 452-465.

Ericsson N. (2001) Forecast Uncertainty in Economic Modeling, MIT Press, Cambridge, p. 68-92.

Fildes R., Steckler H. (2000) The State of Macroeconomic Forecasting. Lancaster University EC3/99, George Washington University, Center for Economic Research, Discussion Paper No. 99-04.

Franses P.H., Kranendonk H. C., Lanser D. (2011) One model and various experts: Evaluating Dutch macroeconomic forecasts, International Journal of Forecasting, 27(2): 482-495.

Genrea V., Kenny G., Meylera A., Timmermann A. (2013) Combining expert forecasts: Can anything beat the simple average?, International Journal of Forecasting, 29(1): 108–121.

Gorr W.L. (2009) Forecast accuracy measures for exception reporting using receiver operating characteristic curves. International Journal of Forecasting, 25(1): 48-61.

Granger C.W.J., Jeon Y. (2003) Comparing forecasts of inflation using time distance. International Journal of Forecasting, 19(3): 339-349.

Heilemann, U., Stekler, H. (2007) Introduction to “The future of macroeconomic forecasting”. International Journal of Forecasting, 23(2): 159-165.

Hoque A., Magnus J.R., Pesaran B. (1988) The exact multi-period mean-square forecast error for the first-order autoregressive model, Journal of Econometrics, 39(3): 327-346.

Ledolter J. (2006) Increase in mean square forecast error when omitting a needed covariate, International Journal of Forecasting, 23(1): 147-152.

Ruth K. (2008) Macroeconomic forecasting in the EMU: Does disaggregate modeling improve forecast accuracy ?. Journal of Policy Modeling, 30(3): 417-429.

Teräsvirta T., van Dijk D., Medeiros M.C. (2005) Linear models, smooth transition autoregressions, and neural networks for forecasting, macroeconomic time series: A re-examination. International Journal of Forecasting, 21(4): 755-774.

Wallis K.F. (2011) Combining forecasts - forty years later, Applied Financial Economics, 21(1-2): 33-41.

http://www.cnp.ro/ (National Commission of Prognosis)

http://www.insse.ro/ (National Institute of Statistics)

http://www.insse.ro/ (Institute of Economic Forecasting)

WHAT PROPERTIES DO CLIPPED DATA INHERIT FROM THE GENERATING PROCESSES?

Adrian BUZ, Cristian LITAN *
Babeș-Bolyai University of Cluj-Napoca, Romania

Abstract. We analyze the way three important properties are inherited from the generating process to the hard limited one. These properties are stationarity, Markov property and ergodicity. We discuss the implications of our results and proofs in the context of the literature of binary processes modeling with economic applications.

JEL Classification: C10

Keywords: binary time series, hard limiting, stationarity, Markov property, ergodicity

1. Introduction

The literature in the fields of economics, finance, engineering and biology extensively use data that are sequential in time, discrete-valued and correlated. Among this type of data, the binary time series are probably the most commonly used, and their modeling and forecasting are important for many applications.

There is a variety of methods to model binary time series. Lomnicki and Zaremba (1955) and Kedem (1980) model binary data as the truncation at zero of an underlying process (such binary time series are also called hard limited or clipped data). While Lomnicki and Zaremba (1955) consider as underlying the k^{th} difference of a Gaussian process, in Kedem (1980) this process is Gaussian autoregressive (AR(p)) and the underlying data are available.[1] Jacobs and Lewis (1978), (1981) approach the subject based on the methodology involved by Box and Jenkins (1970) for continuous stationary time series, therefore proposing the discrete autoregressive-moving average models.

Like Lomnicki and Zaremba (1955) and Kedem (1980) do, Keenan (1982) also assumes that the binary time series inherits a certain structure from an underlying continuous process. Therefore, in Keenan (1982) the binary data are

* Corresponding author. Adress: Babeș-Bolyai University, Faculty of Economics and Business Administration, Department of Statistics Forecasts Mathematics, 58-60 Teodor Mihali street, room 231, 400591 Cluj Napoca, Romania, E-mail: adrian.buz@econ.ubbcluj.ro

[1] In Kedem's work the estimates of the parameters of the autoregressive underlying process are obtained as functions of certain runs and subsequences in the associated clipped processes.

generated by an underlying real-valued, strictly stationary process, and a response function. This procedure includes thresholds and truncations as special cases. Keenan (1982) proves that for every strictly stationary binary time series there exists an underlying process and a response function to generate it. Moreover, every strictly stationary binary time series can be viewed as being generated through a response function, or alternatively by a truncation at zero. Keenan (1982) also finds that, for predicting a future value of a binary process obtained through a response function from a Gaussian AR(1), it suffices to treat the binary time series as a Markov chain.

An interesting approach to model binary dependent variables is provided by the economists that try to forecast the probability that a recession hits at a given month. The standard yield-curve based recession forecasting model is a simple probit that uses predictive information like the spread between short and long-term interest rates. Estrella and Mishkin (1998) find that this standard model is useful for forecasting U.S. recessions a year (or less) ahead.

Chauvet and Potter (2005) extend the probit model in the sense that they assume there exists a latent continuous stochastic process such that a recession hits whenever this unobserved process exceeds zero, while when it is below zero, there is an expansion. Besides the dependence on the spread between short and long-term interest rates, the latent process is also autoregressive, which implies serial dependence in the hard limited binary time series. Moreover, the variance of the innovation process of the latent variable is a time varying parameter (which was introduced due to the assumed existence of multiple breakpoints across business cycles).

Kauppi and Saikkonen (2008) change the latent variable approach for one in which the binary series of recessions and expansions is a first-order Markov chain, with transition probabilities varying as a function of the regressor (the lagged yield curve). The model can be trivially extended to attain higher-order Markov chains (see Kauppi (2008)). To increase the order of the process, one can also employ autoregressive formulations for the modeling of the dependence of the conditional probability $P(y_t = 1 | I_{t-1})$ on lagged values of the binary time series y_t (see Rydberg and Shephard, 2003, Kauppi and Saikkonen, 2008, and Kauppi, 2008).

Other approaches to deal with binary time series are offered by the information theory. Starting with Cover's (1975) two fundamental problems on backward and forward estimation, there is a long string of literature providing non-parametric methods for stationary and ergodic binary processes (see for example Ornstein (1978), Morvai, Yakowitz and Gyorfi (1996), Morvai, Yakowitz and Algoet (1997), etc.). Regarding the forward estimation, it was proved that this is not possible at all future values of the time (see Gyorfi, Morvai and Yakowitz (1998)). However, Morvai and Weiss (2003) present a simple consistent procedure to make such a prediction infinitely often, at carefully selected stopping times chosen by the algorithm.

Since many economic models of interest explain certain observable decisions/actions by the unobservable behavior of a latent variable, we focus in this note on binary time series that are obtained by hard limiting an unobservable underlying process. The contribution is two-folded. First, we analyze the way three important properties are inherited from the generating process to the hard limited one. These properties are stationarity, Markov property and ergodicity; in many

economic instances the latent variable can be assumed to have at least one of them. Second, we discuss the implications of our results and proofs in the context of the above mentioned literature of binary processes modeling with economic applications.

The paper is organized as follows. In Section 2 we introduce the notation and the terminology, Section 3 presents the results and the proofs, and in Section 4 we discuss the results and draw the conclusions.

2. Notation and terminology

Consider some continuous real-valued stochastic process $\{V_n\}_{n=0}^{\infty}$ (one-sided). For any time series realization $\{V_n\}_{n=0}^{\infty}$, we can construct a corresponding binary time series $\{D_n\}_{n=0}^{\infty}$ in the following way: $D_n = 0$ if $V_n < 0$ and $D_n = 1$ if $V_n \geq 0$. In this case, we say that the time series $\{D_n\}_{n=0}^{\infty}$ is obtained by hard limiting from the original time series $\{V_n\}_{n=0}^{\infty}$. Denoting $(-\infty, 0)$ by $C(0)$ and $[0, \infty)$ by $C(1)$, the corresponding stochastic process $\{D_n\}_{n=0}^{\infty}$ has the property that the probability of the event $(D_{n_1} = d_1, D_{n_2} = d_2, ..., D_{n_j} = d_j)$ is the same with the probability of the event $(V_{n_1} \in C(d_1), V_{n_2} \in C(d_2), ..., V_{n_j} \in C(d_j))$, for every j in N and for every sequence of time indexes $(n_1, n_2, ..., n_j)$ in N^j, respectively every sequence $(d_1, d_2, ..., d_j)$ in $\{0,1\}^j$.

We denote by $X \overset{d}{=} Y$ the fact that two random variables are distributionally identical, respectively the notation $(X_n)_n \overset{d}{=} (Y_n)_n$ is used to denote the fact that two stochastic processes induce the same distribution over the sequence space $(S \times S \times ..., \mathrm{S}^{\infty})$, where X_n, Y_n take values in S, (S, S) is a measurable space and S^{∞} is the product sigma-field. The notation $\Pr(\cdot)$ will be used to denote the probability distribution of a given random variable over the corresponding measurable space. The notions of strict and weak stationarity are used in the sense of the standard definitions that can be found in Hamilton (1994). The standard definition of ergodicity for strictly stationary processes that we use, it may be learnt from Breiman (1992) or Durret (1996) (it involves the triviality of the invariant sigma-field). Furthermore, all the above mentioned references may be consulted for a formal definition of Markov processes.

Nevertheless, terminology, definitions and properties corresponding to the notions of stationarity, ergodicity, respectively Markov property, appear transparently within the proofs of the current note. Other notation and terminology used in the paper are relegated to the chapter of results; each such item is explained at the point at which it is specifically needed in the proofs.

3. Results

The next proposition contains the main results of this note. It states which of the properties in discussion is inherited from the generating continuous process to the binary one obtained by hard limiting.

Proposition. *Consider the binary stochastic process* $\{D_n\}_{n=0}^{\infty}$ *generated by hard limiting from the continuous stochastic process* $\{V_n\}_{n=0}^{\infty}$. *The following assertions hold:*

(1) If $\{V_n\}_{n=0}^{\infty}$ *is strictly stationary, then* $\{D_n\}_{n=0}^{\infty}$ *is strictly stationary.*

(2) There exists $\{V_n\}_{n=0}^{\infty}$ *weakly stationary such that* $\{D_n\}_{n=0}^{\infty}$ *is not weakly stationary.*

Restrict now to the case of a strictly stationary process $\{V_n\}_{n=0}^{\infty}$. *Then, the following assertions hold:*

(3) ***(after Keenan (1982])*** *There exists* $\{V_n\}_{n=0}^{\infty}$ *first-order autoregressive process such that* $\{D_n\}_{n=0}^{\infty}$ *is not a Markov chain.*

(4) If $\{V_n\}_{n=0}^{\infty}$ *is ergodic, then* $\{D_n\}_{n=0}^{\infty}$ *is ergodic.*

Proof. We provide a separate proof for each point:

(1) The proof is trivial if one starts from the following remarks: for all $(d_1, d_2, ..., d_j)$ in $\{0,1\}^j$, k in N, and $(n_1, n_2, ..., n_j)$ in Z^j we have that

$$\Pr(D_{n_1} = d_1, D_{n_2} = d_2, ..., D_{n_j} = d_j) =$$

$$\Pr(V_{n_1} \in C(d_1), V_{n_2} \in C(d_2), ..., V_{n_j} \in C(d_j));$$

$$\Pr(D_{n_1+k} = d_1, D_{n_2+k} = d_2, ..., D_{n_j+k} = d_j) =$$

$$\Pr(V_{n_1+k} \in C(d_1), V_{n_2+k} \in C(d_2), ..., V_{n_j+k} \in C(d_j)).$$

Moreover, from the strict stationarity of $\{V_n\}_{n=0}^{\infty}$, $(V_{n_1}, V_{n_2}, ..., V_{n_j}) \overset{d}{=} (V_{n_1+k}, V_{n_2+k}, ..., V_{n_j+k})$. The details are left to the reader.

(2) We shall exploit the fact that, if $\{V_n\}_{n=0}^{\infty}$ is weakly stationary, then the finite sequence $(V_n, V_{n+1}..., V_{n+k})$ does not need to have the same distribution function for each n and fixed k. In fact, when $k = 0$, we can have a different distribution function for each V_n, however the mean and the variance should remain constant as n varies.

Just to ease on the reader, consider the very particular case when $\{V_n\}_{n=0}^{\infty}$ is such that each V_i and V_j are independent for $i \neq j$. Therefore, all the serial correlations are fixed (to zero). Since we also have to fix the first two moments for every V_n, an obvious way to construct a counterexample is to choose each V_n from a family of distributions characterized by at least three parameters. Thus, for every $n = 2 \cdot k + s$, s in $\{0,1\}$, consider V_n as distributed according to the following continuous (triangular) probability density function:

$$\begin{cases} 0, \ if \ x < a_s \\ \dfrac{2 \cdot (x - a_s)}{(b_s - a_s) \cdot (c_s - a_s)}, \ if \ a_s \leq x \leq c_s \\ \dfrac{2 \cdot (b_s - x)}{(b_s - a_s) \cdot (b_s - c_s)}, \ if \ c_s \leq x \leq b_s \\ 0, \ if \ x > b_s \end{cases}$$

Choose the scalars a_s, b_s, c_s such that $-\sqrt{6} < a_s < 0$, $b_s = -\frac{1}{2} \cdot a_s + \sqrt{6 - \frac{3}{4} \cdot a_s^2} > 0$, $c_s = -a_s - b_s = -\frac{1}{2} \cdot a_s - \sqrt{6 - \frac{3}{4} \cdot a_s^2} < 0$. The mean and the variance of V_n when $n = 2 \cdot k + s$, s in $\{0,1\}$, are given by the following relationships: $E(V_n) = \dfrac{a_s + b_s + c_s}{3} = 0$, respectively $Var(V_n) = \dfrac{a_s^2 + b_s^2 + c_s^2 - a_s \cdot b_s - a_s \cdot c_s - b_s \cdot c_s}{18}$, and the latter relationship can be further calculated to get $\dfrac{a_s^2 + b_s^2 + a_s \cdot b_s}{6} = \dfrac{\left(b_s + \frac{1}{2} \cdot a_s\right)^2 + \frac{3}{4} \cdot a_s^2}{6} = 1$. Therefore, we have that for each n, $E(V_n) = 0$ and $Var(V_n) = 1$, respectively for every $i \neq j$, $Cov(V_j, V_j) = 0$. Hence, $\{V_n\}_{n=0}^{\infty}$ is weakly stationary.

Consider $\{D_n\}_{n=0}^{\infty}$ obtained by hard limiting the continuous process $\{V_n\}_{n=0}^{\infty}$. The marginal distribution of D_n is given by $\begin{pmatrix} 0 & 1 \\ 1 - p_n & p_n \end{pmatrix}$, where $p_n = \Pr(V_n \geq 0)$. It can be easily checked that the distribution function of V_n, when $n = 2 \cdot k + s$, s in $\{0,1\}$, is given by:

$$\begin{cases} 0, \text{ if } x < a_s \\ \dfrac{(x-a_s)^2}{(b_s-a_s)\cdot(c_s-a_s)}, \text{ if } a_s \le x \le c_s \\ 1-\dfrac{(b_s-x)^2}{(b_s-a_s)\cdot(c_s-a_s)}, \text{ if } c_s \le x \le b_s \\ 1, \text{ if } x > b_s \end{cases}$$

Therefore, if $n = 2\cdot k + s$, s in $\{0,1\}$, then:

$$E(D_n) = p_n = \Pr(V_n \ge 0) = 1 - \Pr(V_n < 0) = \frac{b_s^2}{(b_s-a_s)\cdot(b_s-c_s)} =$$

$$= \frac{\left(-\frac{1}{2}\cdot a_s + \sqrt{6-\frac{3}{4}\cdot a_s^2}\right)^2}{2\cdot\left(-\frac{3}{2}\cdot a_s + \sqrt{6-\frac{3}{4}\cdot a_s^2}\right)\cdot\sqrt{6-\frac{3}{4}\cdot a_s^2}}$$. On the interval $(-\sqrt{6},0)$, the function $h(a) = \frac{\left(-\frac{1}{2}\cdot a + \sqrt{6-\frac{3}{4}\cdot a^2}\right)^2}{2\cdot\left(-\frac{3}{2}\cdot a + \sqrt{6-\frac{3}{4}\cdot a^2}\right)\cdot\sqrt{6-\frac{3}{4}\cdot a^2}}$ is not constant. Hence, there can be found $a_0 \ne a_1$ such that $h(a_0) \ne h(a_1)$. Then, $E(D_{2\cdot k+1}) \ne E(D_{2\cdot k})$ and we can conclude that the binary process $\{D_n\}_{n=0}^{\infty}$ is not weakly stationary.

(3) Keenan (1982) offers arguments for the fact that a binary process obtained through a response function from an underlying Gaussian first-order autoregressive process, is not in general a Markov chain. We organize here such arguments in a proof for the case when the binary process is generated by hard limiting.[2]

Step (3).1: Start with a Gaussian AR(1) process $V_n = \rho\cdot V_{n-1} + \varepsilon_n$, where ε_n is $N(0,\sigma)$, independent with respect to any ε_m, $m \ne n$, and $\rho \in (0,1)$. Then $E(V_n) = 0$ and $Var(V_n) = \frac{\left(1-\rho^2\right)}{\sigma^2}$. Choose σ such that $\sigma = \sqrt{1-\rho^2}$, hence $Var(V_n) = 1$. The correlation structure of the process $\{V_n\}_{n=0}^{\infty}$ is $\{\rho^j\}_{j=1}^{\infty}$. Consider $\{D_n\}_{n=0}^{\infty}$ obtained by hard limiting. Then, according to the results in Gupta (1963), for any

[2] Lemma 3.1 in Keenan (1982) states that any binary process generated through a response function from an underlying strictly stationary process can be viewed as being generated by hard limiting; therefore, the proof we give here closely follows the arguments in Keenan (1982).

(d_0, d_1, d_2) in $\{0,1\}^3$ we have that

$$\Pr(D_{s+1} = d_1, D_s = d_0) = \frac{1}{4} + (-1)^{d_1+d_0} \cdot \frac{\arcsin(\rho)}{2 \cdot \pi};$$

$$\Pr(D_{s+2} = d_2, D_{s+1} = d_1, D_s = d_0) =$$

$$= \frac{1}{8} + (-1)^{d_1+d_0} \cdot \frac{\arcsin(\rho)}{4 \cdot \pi} + (-1)^{d_2+d_1} \cdot \frac{\arcsin(\rho)}{4 \cdot \pi} + (-1)^{d_2+d_0} \cdot \frac{\arcsin(\rho^2)}{4 \cdot \pi}.$$

Step (3).2: Suppose by contradiction that $\{D_n\}_{n=0}^{\infty}$ is a Markov chain. Using the Markov property, we have that:

$$\Pr(D_{s+2} = 0, D_{s+1} = 0, D_s = 0) =$$

$$\Pr(D_{s+2} = 0 \mid D_{s+1} = 0) \cdot \Pr(D_{s+1} = 0 \mid D_s = 0) \cdot \Pr(D_s = 0).$$

Moreover, we have that:

$$\Pr \Pr(D_{s+2} = 0, D_{s+1} = 0) = \Pr(D_{s+2} = 0 \mid D_{s+1} = 0) \cdot \Pr(D_{s+1} = 0)$$

$$\Pr(D_{s+1} = 0, D_s = 0) = \Pr(D_{s+1} = 0 \mid D_s = 0) \cdot \Pr(D_s = 0).$$

From the strict stationarity of $\{D_n\}_{n=0}^{\infty}$:

$$\Pr(D_{s+2} = 0, D_{s+1} = 0) = \Pr(D_{s+1} = 0, D_s = 0);$$

$$\Pr(D_{s+1} = 0) = \Pr(D_s = 0).$$

Hence $\Pr(D_{s+2} = 0 \mid D_{s+1} = 0) = \Pr(D_{s+1} = 0 \mid D_s = 0)$.

Step (3).3: Now we can write:

$$\Pr(D_{s+2} = 0, D_{s+1} = 0, D_s = 0) = \Pr(D_{s+1} = 0 \mid D_s = 0)^2 \cdot \Pr(D_s = 0)$$

and $\Pr(D_{s+1} = 0, D_s = 0) = \Pr(D_{s+1} = 0 \mid D_s = 0) \cdot \Pr(D_s = 0)$.

Therefore,

$$\Pr(D_{s+2} = 0, D_{s+1} = 0, D_s = 0) \cdot \Pr(D_s = 0) = \Pr(D_{s+1} = 0, D_s = 0)^2$$

and from the results of Gupta (1963) on the probabilities of bivariate and trivariate normal orthants and the fact that $\Pr(D_s = 0) = \frac{1}{2}$, we obtain $\frac{1}{2} \cdot \left[\frac{1}{8} + \frac{\arcsin(\rho)}{2 \cdot \pi} + \frac{\arcsin(\rho^2)}{4 \cdot \pi}\right] = \left[\frac{1}{4} + \frac{\arcsin(\rho)}{2 \cdot \pi}\right]^2$, which can be further reduced to $\arcsin(\rho^2) = 2 \cdot \frac{\arcsin(\rho)^2}{\pi}$. Thus, for any ρ in $(0,1)$ that does not satisfy the equation $g(\rho) = \arcsin(\rho^2) - 2 \cdot \frac{\arcsin(\rho)^2}{\pi} = 0$, we obtain a contradiction. A

simple numerical simulation of the shape of the function $g(\cdot)$ on the interval $(0,1)$ shows that the set of the zeros of this function is finite, hence, for almost all values of ρ in $(0,1)$, $\{D_n\}_{n=0}^{\infty}$ is not a Markov chain. (In order to give an example of an open interval on which the function $g(\cdot)$ is different from zero, pick a small enough neighborhood around $\rho_0 = \frac{\sqrt{2}}{2}$ and notice that $g(\rho_0) \neq 0$, together with the fact that $g(\cdot)$ is continuous.)

(4) We start the proof with a lemma that brings us to the basic setup of the ergodic theory (details can be found in Durret (1996)).

Lemma. *Consider an arbitrary strictly stationary stochastic process* $\{Y_n\}_{n=0}^{\infty}$ *and the corresponding probability space* $(\Omega, F, \Pr)$*, where* Y_n *takes values in* S, (S, S) *is a measurable space,* Ω *is defined by* $S \times S \times \ldots$, $F = \mathsf{S} \times \mathsf{S} \times \ldots$ *is the product sigma-field, and* $\Pr$ *is the distribution induced by* $\{Y_n\}_{n=0}^{\infty}$ *on the sequence space* $(S \times S \times \ldots, \mathsf{S} \times \mathsf{S} \times \ldots)$. *Then, there exists a strictly stationary process* $\{X_n\}_{n=0}^{\infty}$ *with the following properties:*

(a) $(X_n)_n \overset{d}{=} (Y_n)_n$;

(b) There exists $\varphi : \Omega \to \Omega$ *a* $\Pr$ *-preserving map (i.e.* $\Pr(\varphi^{-1}A) = \Pr(A)$ *for all* $A \in F$*) and* X *an* F *-measurable function such that for all* n, $X_n(\omega) = X(\varphi^n \omega)$ *(* φ^n *represents the* n^{th} *iterate of* φ*).*

Step (4).1: We now show how the lemma applies to $\{V_n\}_{n=0}^{\infty}$ and $\{D_n\}_{n=0}^{\infty}$. Consider the probability space $(\Omega, F, \Pr_v)$, where Ω = R×R×…, $F = B \times B \times \ldots$ is the sigma field generated by the countable cartesian product of Borel sigma fields B, and $\Pr_v$ is the probability measure induced by $\{V_n\}_{n=0}^{\infty}$ on (Ω, F). Consider as well the shift operator $\varphi : \Omega \to \Omega$, $\varphi(\omega_0, \omega_1, \ldots) = (\omega_1, \omega_2, \ldots)$ and the F -measurable function $X : \Omega \to \mathsf{R}$, $X(\omega) = \omega_0$, for $\omega = (\omega_0, \omega_1, \ldots)$ in Ω. Since $\{V_n\}_{n=0}^{\infty}$ is strictly stationary, then φ preserves $\Pr_v$. The stochastic process $\{X_n\}_{n=0}^{\infty}$ defined by $X_n(\omega) = X(\varphi^n \omega)$ is strictly

stationary and distributionally identical to $\{V_n\}_{n=0}^{\infty}$, i.e. $(V_n)_n \overset{d}{=} (X_n)_n$. In the same manner as for $\{V_n\}_{n=0}^{\infty}$, we associate to $\{D_n\}_{n=0}^{\infty}$ the probability space $(\Omega', F', \Pr_d)$ and the stochastic process $\{Y_n\}_{n=0}^{\infty}$ with $(D_n)_n \overset{d}{=} (Y_n)_n$. Because $\{D_n\}_{n=0}^{\infty}$ is generated from $\{V_n\}_{n=0}^{\infty}$ by truncation at zero, we can consider that:

- $\Omega' = S \times S \times ...$, where $S = \{0,1\}$;
- F' is the sigma field included in $\Sigma(S) \times \Sigma(S) \times ...$ with the following properties:
  - For all A' in F', we have that $\bigcup_{(d_0, d_1 ...) \in A'} C(d_0) \times C(d_1) \times ...$ is in F;
  - If A' is such that $\bigcup_{(d_0, d_1 ...) \in A'} C(d_0) \times C(d_1) \times ...$ is in F, then A' should be in F';
- $\Pr_d$ is the probability measure induced by $\{D_n\}_{n=0}^{\infty}$ on (Ω', F');
- $\Pr_d$ has the property that for all $A' \in F'$, $\Pr_d(A')$ is equal with $\Pr_v(\bigcup_{(d_0, d_1 ...) \in A'} C(d_0) \times C(d_1) \times ...)$.

We define $Y_n(d) = X'(\varphi'^n d)$, where $\varphi' : \Omega' \to \Omega'$ is the shift operator, respectively $X' : \Omega' \to \mathsf{R}$, $X(d) = d_0$, for $d = (d_0, d_1, ...) \in \Omega'$.

Step (4).2: We shall prove that if A' is invariant with respect to φ', i.e. $\varphi'^{-1} A' = A'$, then $A = \bigcup_{(d_0, d_1 ...) \in A'} C(d_0) \times C(d_1) \times ...$ is invariant with respect to φ. First notice that $A \in F$ because $C(d_0) \times C(d_1) \times ... \in F$ for any $(d_0, d_1, ...)$ and $A' \in F'$ is countable. Second, suppose that $\omega \in A$. Then it exists $(d_0, d_1, ...) \in A'$ such that $\omega \in C(d_0) \times C(d_1) \times ...$, which means that $\varphi\omega \in C(d_1) \times C(d_2) \times ...$. Because A' is invariant, then $(d_1, d_2, ...) \in A'$. Therefore, using the definition of A, we obtain that $\varphi\omega \in A$, and thus $A \subseteq \varphi^{-1} A$ because ω was arbitrary chosen in A. Third, suppose now that $\varphi\omega \in A$, which implies $\varphi\omega \in C(d_1) \times C(d_2) \times ...$ for some $(d_1, d_2, ...) \in A'$. Because A' is invariant, then both $(0, d_1, d_2, ...)$ and $(1, d_1, d_2, ...)$ are elements of A'. The first entry ω_0 of ω belongs either to $C(0)$ or to $C(1)$, and hence

$\omega \in \bigcup_{d_0 \in \{0,1\}} C(d_0) \times C(d_1) \times \ldots$, further implying that $\omega \in A$, which proves that $A \supseteq \varphi^{-1} A$ because ω was arbitrary chosen in Ω such that $\varphi\omega \in A$. Therefore, taking into consideration all the three arguments above, $A = \varphi^{-1} A$, meaning that A is invariant with respect to φ.

Step (4).3: In the above setup, the fact that $\{V_n\}_{n=0}^{\infty}$ ($\{D_n\}_{n=0}^{\infty}$) is ergodic directly translates into the fact that φ (φ') is ergodic, i.e. $\Pr_v(A) \in \{0,1\}$ ($\Pr_d(A') \in \{0,1\}$), for any invariant set $A \in F$ ($A' \in F'$) with respect to φ (φ'). Suppose that φ is ergodic. Consider some set $A' \in F'$ invariant with respect to φ'. Construct $A = \bigcup_{(d_0, d_1 \ldots) \in A'} C(d_0) \times C(d_1) \times \ldots$. Since A' is invariant, then A is invariant. Because φ is ergodic, then $\Pr_v(A) \in \{0,1\}$. However, $\Pr_d(A') = \Pr_v(A)$, which means that $\Pr_d(A') \in \{0,1\}$. Therefore, φ ergodic implies that φ' is ergodic, which ends our proof.

Remark. *The proof of the point* (2) *can be easily adapted to allow for non-zero correlations between different lags of the generating stochastic process. Therefore, the family from which the piecewise-linear probability density functions are chosen should be characterized by a number of parameters greater than the number of correlations that are fixed plus two (corresponding to the mean and variance, which are fixed as well).*

4. Conclusions

For certain models and methodologies of time series analysis it is sufficient to work under the assumption of weak stationarity. Especially when applying time series analysis to economics and finance, it is usually the case that stationarity is understood as covariance-stationarity (see also Hamilton 1994, page. 46, chapter III). As one could notice in the introduction, there are especially in economics and finance many instances in which the process is unobservable and only the hard limited series is observed.

The proof of the second point of the proposition, together with the remark, suggest that the assumption of weak stationarity of the underlying unobservable process may have no implications for the forecasting of the observable hard limited binary series. In the proof provided here the mean of the binary process can take any value from the interval $\left[0, \frac{1}{2}\right]$. The proof can be easily modified in the direction suggested by the remark such that, besides the one dimensional probability, higher dimensional ones (e.g. two, three, etc.) can take any value in some continuous intervals. The straightforward message of the second point of the proposition is the

following: in order to be able to say something based on the hard limited binary series, about an underlying unobservable process, one should have in mind strictly stationary (economic or finance) phenomena.

Regarding the third point of the proposition, it turns out that even when the latent variable is a Markov chain, the probability distribution of the hard limited time series depends on its whole history. This point was also suggested by Kedem (1976) and Keenan (1982), who prove as well that for estimating the dynamics of a binary process obtained either by clipping or through a response function from a Gaussian AR(1), it is enough to consider the binary series behaving like a Markov chain. The proof we give here shows that the non inheritance of the Markov property is a generic problem. Moreover, it is easy to adapt the proof and see that if the variance of the error term of the underlying process is allowed to change over time, then the dynamics of the hard limited process may become very complex (and it may not suffice to consider that it behaves like a Markov chain). The same happens if the dynamics of the latent process includes, besides the autoregressive term, exogenous variables. Therefore, our results suggest that the recession forecasting probit model with a latent autoregressive variable cannot be usually estimated by simple procedures, but computationally demanding ones (see for instance Chauvet and Potter (2005), who apply Bayesian numerical methods).

Finally, the last point of the proposition suggests that if there are reasons to believe (based on the economic theory, for example) that the underlying unobservable process is strictly stationary and ergodic, then the hard limited time series can be assumed ergodic. Ergodicity is a very important property in economics and finance since it insures that time averages for different moments are converging in probability (as available no. of periods T becomes very large) to the common moment (of a given order) for the whole stationary stochastic process. For example, for the first moment which is the mean, it insures that the time average of a single realization is converging to the common mean of the stochastic process. In this context, a possible strategy to forecast future values of hard limited processes (coming from economics and finance) is to investigate to what extent there can be applied the non-parametric methods proposed by the information theory.

AKNOWLEDGMENTS

Adrian Buz acknowledges financial support provided from programs co-financed by the European Social Fund under the Sectoral Operational Program Human Resources Development, contract POSDRU 6/1.5/S/3 – „Doctoral studies: through science towards society". Cristian Litan acknowledges financial support by CNCSIS-UEFISCSU, project number PN II-RU 415/2010. All possible errors are of the authors.

REFERENCES

Box G.E.P., Jenkins G.M. (1970) Time Series Analysis, Forecasting, and Control". Holden-Day, San Francisco.

Breiman L. (1992) Probability. Society for Industrial and Applied Mathematics, Philadelphia.

Chauvet M., Potter S. (2005) Forecasting Recession Using the Yield Curve. Journal of Forecasting, 24 (2): 77-103.

Cover T.M. (1975) Open problems in Information Theory. IEEE Joint Workshop on Information Theory, New York: IEEE Press, 35–36.

Durret R. (1996) Probability: Theory and Examples. Duxbury Press, Belmont, CA.

Estrella A., Mishkin F.S. (1998) Predicting U.S. recessions: Financial variables as leading indicators. Review of Economics and Statistics, 80(1): 45–61.

Gupta S.S. (1963) Probability Integrals of Multivariate Normal and Multivariate t. Annals of Mathematical Statistics, 34(3): 792-828.

Gyorfi L., Morvai G., Yakowitz S. (1998) Limits to consistent on-line forecasting for ergodic time series.IEEE Transactions on Information Theory, 44(2): 886-892.

Hamilton J.D. (1994) Time Series Analysis. Princeton University Press, New Jersey.

Jacobs P.A., Lewis P.A.W (1978) Discrete Time Series Generated by Mixtures. I. Correlation and Runs Properties. Journal of the Royal Statistical Society, Ser. B, 40(1): 94-105.

Jacobs P.A., Lewis P.A.W. (1981) Discrete Time Series Generated by Mixtures. II. Asymptotic Properties. Journal of the Royal Statistical Society, Ser. B, 40(2): 222-228.

Kauppi H. (2008) Yield-curve Based Probit Models for Forecasting U.S. Recessions: Stability and Dynamics. HECER Discussion Paper no. 221, University of Turku, RUESG and HECER.

Kauppi H., Saikkonen P. (2008) Predicting U.S. Recessions with Dynamic Binary Response Models. Review of Economics and Statistics, 90(4): 777-791.

Kedem B. (1976) Sufficient statistics associated with a two-state second-order Markov chain. Biometrika, 63(1): 127-132.

Kedem B. (1980) Estimation of the Parameters in Stationary Autoregressive Process after Hard Limiting. Journal of the American Statistical Association, 75(369): 146-153.

Keenan M.D. (1982) A Time of Series Analysis of Binary Data. Journal of the American Statistical Association, 77(380): 816-821.

Lomnicki Z.A., Zaremba S.K. (1955) Some Applications of Zero-One Processes. Journal of the Royal Statistical Society, 17(2): 243-255.

Morvai G., Yakowitz S., Algoet P. (1997) Weakly convergent nonparametric forecasting of stationary time series. IEEE Transactions on Information Theory, 43(2): 483-498.

Morvai G., Yakowitz S., Gyorfi L. (1996) Nonparametric inferences for ergodic, stationary time series. Annals of Statistics, 24(1): 370–379.

Morvai G., Weiss B. (2003) Forecasting for stationary binary time series. Acta Appl. Math., 79(1-2): 25–34.

Ornstein D.S. (1978) Guessing the next output of a stationary process. Israel Journal of Mathematics, 30(3): 292–296.

Rydberg T., Shepard N. (2003) Dynamics of Trade-by-trade Price Movements: Decomposition and Models. Journal of Financial Econometrics, 1(1): 2-25.

Guide for authors

The articles can be written in **English, French or German.**
Before being accepted for publication, the articles must be sent as document in Microsoft Word by email to **oeconomica@econ.ubbcluj.ro**, in two copies printed on paper and on a CD (Word only) on the address:

Studia UBB, Oeconomica
58-60 Teodor Mihali street, room 231
400591 Cluj-Napoca, Romania

In the first stage, **before being accepted for publication**, the articles will be presented in the following way:

(1) The text: between 10 and 20 printed pages, numbered, recto only, A4 format, all margins 2 cm, characters Arial 11, and spacing 1.5.

(2) The first page (which will be eliminated for the double blind evaluation, by one of the Advisory Board members, anonymous) must include the title of the article, the author's name, his/her complete coordinates (professional address, phone, e-mail) and potential thanks for technical and/or financial help. The title must be precise, clear and in agreement with the main theme of the manuscript. The authors must make sure that they cannot be identified when reading the manuscript.

(3) The second page will contain the title of the article and an abstract (in English) of 5-10 lines, that should present the main results of the article. The summary must inform the reader about the content of the article. The summary must be followed by the JEL Classification and by 3-6 keywords in English which best define the article.

(4) The text will start properly on page 3.

(5) In the introduction, the author must present the relevance of the article for the respective field and must refer to the main results obtained by other authors concerning the subject. The conclusions must summarize clearly the results and the consequences.

(6) The presentation of the bibliographical references:
- In the text the references quotes will appear between brackets, with the name and the publication date, e.g.: (Denicolo, 2000).
- For two co-authors they will use for example (Dixit and Stiglitz, 1977).
- In the case of three or more than three authors, only the first will be mentioned, under the form (Brooks et al, 1998).

- If two references have the same author and the same publication year, they will be differentiated through letters (McFadden, 1984a). These letters will also appear in the bibliography.

At the end of the article the references will be presented as follows:

Periodicals:

Wojcik C. (2000) Alternative Models of Demand for Automobiles, *Economics Letters*, 68(2): 113-118.

Books:

Biswas T. (1997) *Decision-making under Uncertainty,* Macmillan Press, London.

Working papers:

Musu I. (1995) Transitional Dynamics to Optimal Sustainable Growth, *Fondazione ENI Enrico Mattei Working Paper no. 5095*.

Paper presented at conferences:

Nainggolan K. (1996) Indonesian Agriculture under a Free Trade Regime, *ASAE Conference, Bali Indonesia, 6 - 9 August*, 18p.

Quotes of personal works:
If the author wants to make reference to one or several personal works, it is essential that the used formulation preserve his anonymity. In the first sent version, before being accepted for publication, if the quotation of a personal work is absolutely necessary, the author may use the formulation (author, 2001) both in the text and in the bibliography. The bibliographical references will be completed after the article is accepted for publication.

(7) After the article is accepted for publication, the final and complete version of the article must be sent on a CD or by e-mail. The article will be written in Microsoft Word.

(8) *Studia UBB, Oeconomica* requires the exclusivity of the article. The same article mustn't be proposed simultaneously to other journals.