The Short and Long Term Performance Persistence in the Central European Banking Industry

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ABSTRACT

This article investigates the scale of performance persistence in the Central European banking industry. Contrary to the existing literature, we test not only for the short-term performance persistence but we propose also a novel method of analyzing the long-term persistence. Using an extensive dataset, covering the 1992-2009 period, we establish that banks' results are strongly persistent in two-years sub-periods as well as in the long-run. Moreover, we find that the strength of studied phenomenon is not significantly influenced by the macroeconomic environment, banks size and capital base and country-specific factors.

KEY WORDS: performance persistence, banks profitability, emerging economies

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1. Introduction

Performance persistence is one of the most striking and, at the same time, unexplained phenomena in the modern banking. Its existence proves that some banks possess stable competitive advantage. Theoretically this advantage can be attributed to inimitable assets and investment strategies, rare managerial skills, privileged access to retail financing or to a combination of those factors. Performance persistence, independently of its sources, is also a signal of imperfect competition within the banking sector.

In this article we address the question how strong performance persistence is in the Central European banking industry. Contrary to the existing literature, we test not only short-term persistence but we propose a novel

method for assessing long-term persistence. Additionally we analyze the influence of banks' size, their capital base quality, country of origin and macroeconomic conditions on the strength of performance persistence.

The reminder of the text is organized as follows. In section 2 we review the empirical evidence gathered so far. Section 3 presents the methodology and the data set. In sections 4 and 5 we describe, respectively, results obtained for short and long time periods. Section 6 concludes and identifies new research perspectives.

2. Literature review

The literature on banks persistence performance is relatively limited. This is why we will supplement it with works concerning other types of financial intermediaries.

2.1. Banks

The existing studies deal with two problems. First, they investigate the scale of performance persistence

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phenomenon. Second, they aim at identifying principal determinants of financial results persistence. The null hypothesis about the lack of performance persistence in banking was rejected in the context of US, Italian and Polish markets. Berger et al. (2000) using an extensive dataset about American banks prove that in every two-year sub-period between 1969 and 1997 profitability measures are statistically significantly correlated. Moreover, the likelihood of repeating the performance from last year is the highest for banks situated in the upper and lower decile of the profitability distribution. Cebenoyan et al. (2004) obtain similar results as far as short term performance persistence is concerned. The only difference comes down to a fact that their sample was composed of saving banks observed over the shorter time period: 1989-1994. Agostino et al. (2005) apply for the first time the method of stochastic kernel estimation to the analysis of performance persistence. The graphic representation of stochastic kernels in the case of Italian banking suggests an important role of the inertia in the profitability distribution dynamics. Jackowicz (2006), Jackowicz and Kozłowski (2008) establish that performance persistence is also strong in the Polish banking system. Furthermore, they show that performance persistence is influenced by earning management activity conducted by banks and that structural changes in banking system weaken to some degree the financial results dependence in the first years of the 21st century.

The picture of reasons for banks' winning and losing persistence is ambiguous. This ambiguity is partially caused by the important differences in research goals, used methodologies and studied samples. Historically, the first attempt to discover persistence determinants was made by Roland (1997) who compiled data for 1986-1992 period regarding 237 US bank holding companies. The long-term persistence of return on assets in the studied sample is driven by interest income, fee income, and proceeds from investments in securities. In contrast, the short-term persistence correlates with interest cost of deposits. The most extensive study on the persistence determinants in banking was conducted by Berger et al. (2000). They establish that competition impediments have grater impact on losing persistence while informational opacity of banks on winning persistence. However for both kinds of persistence local and macroeconomic shocks remain

an important determinant. The latter observation supports the results of Neely and Wheellock (1997) who positively verify the hypothesis that financial results of US banks between 1946 and 1996 depend on regional and macroeconomic disturbances. Estimation of a probit model by Cebenoyan et al. (2004) for 81 US thrifts reveal that winning persistence is usually accompanied by high charter values and reduced assets risk. In contrast to Berger et al. (2000) findings, regional economic situation for US thrifts is a statistically significant determinant of losing persistence only. The last study from US market, referred here, indirectly shed some light on the role of managerial skill as performance persistence driver. Bao and Edmans (2009) analyze the sample of 15 423 mergers and acquisitions deals announced between 1980 and 2007. Bao and Edmans document that, after controlling for other determinants of deals returns, advising investment banks from the top quintile of return distribution over the past two years outperform the bottom quintile by 1 percentage point over the consecutive two years. They interpret this finding as a proof of valuable managerial skill presence in banking industry.

Performance persistence determinants for European banks were studied by Agostino et al. (2005) and Jackowicz (2009). Agostino et al. (2005) find in the sample of 331 Italian banks that higher overall concentration of ownership and concentration of ownership in the hands of institutional investors make performance persistence more probable. Jackowicz (2009) empirically verified four hypotheses explaining the occurrence of winning and losing persistence in the Polish banking system between 1994 and 2005. It turns out that a major role in increasing the chances of winning persistence and in the diminishing the probability of losing persistence is played by the market power resulting from developed distribution channels. Moreover, informational opacity was positively correlated with winning persistence and negatively with losing persistence.

Analysis of performance persistence determinants in the international context is provided by Goddard et al. (2011) who treat performance persistence of banks as a measure of the intensity of competition. Using data from 65 banking systems, they try to discover the determinants at the country level. In the studied sample the performance persistence is negatively related to the

GDP *per capita* dynamics and positively to the entry barriers and the banking market concentration. The speed of convergence of banks performance toward a long-run equilibrium is slightly slower in wealthy countries than in developing economies. This difference, however, is not statistically significant.

2.2. Other financial intermediaries

Similarly to the banking literature, works analyzing persistence performance of other financial intermediaries concentrate on two topics: the strength of this phenomenon and its determinants. The hypothesis about the dependence of successive financial results was verified mainly for equity funds. However, in the recent years mutual funds investing in debt instruments and hedging funds gained popularity as a subject of studies.

Brown and Goetzmann (1995) observe for US equity funds statistically significant performance persistence in seven two-years subperiods between 1976 and 1988. Interestingly they notice also two subperiods in which the hierarchy of funds results is statistically significantly reversed. Elton et al. (1996) support Brown and Goetzmann' s findings using different methodology as far as the short-term persistence is concerned. Besides, Elton et al. (1996) discover that results in three-years sub-periods are also correlated. The conclusion about the existence of the medium-term persistence was confirmed for equity funds only by Jan and Hung (2004). The widely cited article written by Carhart (1997) advocates short-time nature of the performance persistence phenomenon. Prater et al. (2004) establish that in the period 1996-2000 mean reversal tendency dominates over performance persistence. The results of the newest research projects are more favorable to the hypothesis of performance persistence. Huij and Verbeek (2007) apply Bayesian methods and prove that US equity funds exhibit short-term persistence of results. Kosowski et al. (2006) show that the upper decile of funds is characterized by strong performance persistence.

All studies reviewed above used data from the US market. The performance persistence of equity funds has been, however, analyzed in other countries. Below we present a short description of empirical findings obtained for the: British, Canadian, South African and Central European markets. Fletcher and Forbes (2002)

remark that results of the performance persistence tests in the case of British equity funds are sensitive to the choice of performance measures. Cuthbertson et al. (2008) prove that in Great Britain losing persistence is especially strong. Deaves (2004), in line with the US evidence, shows that Canadian equity funds exhibit short-term persistence of successes as well as failures. The South African equity funds, according to Collinet and Firer (2003), repeat their performance only in short, 6 month intervals Jackowicz and Filip (2009), Filip (2011) observe that in Poland, Czech Republic and Hungary periods of performance persistence are several times more frequent than periods of performance reversal.

The empirical tests generally confirm the existence of performance persistence in the case of mutual funds investing in bonds and short-term debt instruments. Philpot et al. (2000) establish that American funds repeat their results in the two-years periods but not in the five-year periods. Droms and Walker (2006) find that in the majority of the two-years periods under study financial results of funds are statistically significantly persistent or reversed. According to Polwitoon and Tawatnuntachai (2006), the performance persistence strength diminishes as the horizon of analysis increases up to 3 years. Du et al. (2008) remark that performance persistence is a short-term phenomenon and that it is stronger as far as repetitive failures are concerned. The only non-American study of bond funds performance persistence by Silva et al. (2005) prove that this phenomenon exist also on European markets, for example in France, Germany and Spain. Once more losing persistence is stronger than winning persistence.

Hedge funds constitute a third type of non-bank financial intermediaries for which the hypothesis about performance persistence has been verified. Despite the specificity of hedge funds activities, the empirical results obtained for them are surprisingly similar to those reached for equity and bond funds. Agarwal and Naik (2000) conclude that hedge funds persistence is the most pronounced for three month periods and weakens as observation period increases. Capocci and Hubner (2004) support moderately the veracity of hypothesis that hedge funds has tendency to repeat results in consecutive periods. Steri et al. (2009) find that Italian hedge funds exhibit the strongest persistence

performance when their results are measured for one month or three months periods.

The role of manangerial skill in shaping the performance persistence of non-bank financial intermediaries is uncertain. The majority of authors ascribe the persistence to the stability of market trends and investment strategies. This view is upheld for example by Brown and Goetzmann (1995), Carhart (1997), Fletcher and Forbes (2002), Prater et al. (2004), Droms and Walker (2006), Jackowicz and Filip (2009). The hypothesis of differential and valuable managerial skills is supported by a few studies. Chevalier and Ellison (1996) prove that funds' results are positively influenced by the quality of managers education. Philpot et al. (2000) in the case of bond funds and Bers and Madura (2000) for closed-end funds notice that their performance improve as the experience of managers augment. Furthermore, Kosowski et al. (2006) and Cuthbertson et al. (2008) establish that results of the top decile of funds can be explained only by the above average securities picking abilities of managers while the losing persistence is not solely due to the investment misfortunes.

3. Research design and data set

The literature review allow us to conclude that banks' performance persistence in Central European countries is not thoroughly analyzed. The empirical evidence is especially scarce as far as the long-term persistence is concerned. Our article is thus designed to remedy those shortcomings.

In order to test short-term performance persistence we use two standard approaches: non-parametric tests and stochastic kernel estimation. The non-parametric tests are based on so-called contingency tables. For each two-year period the tables provide the number of banks (n_{ij}): winning in both periods (WW), losing repetitively (LL), migrating from the group of winners to the group of losers (WL) and recording a success after a failure (LW). The first test statistics **Z**, following the normal distribution, is calculated according to the formula (1):

$$Z = \frac{\ln CPR}{\mathsf{s}_{\ln CPR}} \qquad (1)$$

where:

$$CPR = \frac{n_{WW} * n_{LL}}{n_{WL} * n_{LW}} \qquad (2)$$

and

$$\mathsf{s}_{\ln CPR} = \sqrt{\frac{1}{n_{WW}} + \frac{1}{n_{LL}} + \frac{1}{n_{WL}} + \frac{1}{n_{LW}}} \qquad (3)$$

As Brown and Goetzmann (1995), Carpenter and Lynch (1999), Tonks (2005) notice, when performance persistence does not exist, the probability of a success or a failure in a given year should be the same for entities classified previously as winners or losers. For that reason the null hypothesis about the banks' results independence in time corresponds to the value of CPR ratio equal to 1. One can reject the null hypothesis when the absolute estimated value Z of statistics **Z** is grater than the critical value. Those critical values are equal to: 1.65, 1.96 and 2.58 for significance levels 10%, 5% and 1% respectively.

The second non-parametric test of persistence performance is a version of well known test for independence (Kanji 2006). The method of calculating **CHI** statistics is provided by equation (4)

$$CHI = \sum_i \sum_j \frac{(n_{ij} - E(n_{ij}))^2}{E(n_{ij})} \qquad (4)$$

where $E(n_{ij})$ mean expected value in a contingency table. The **CHI** variable has an asymptotic *chi-square* distribution. The null hypothesis can be rejected this time if the calculated value *CHI* of the statistics **CHI** is grater than the critical value for a given level of significance and one degree of freedom. Assuming traditional levels of significance 10%, 5% and 1%, we obtain critical values: 2.706, 3.841 and 6.635 correspondingly.

Besides the non-parametric tests, we use for analyzing the short-time performance persistence a stochastic kernel estimation technique developed by Quah (1997) and described in detail in Jackowicz and Kozłowski (2008). The stochastic kernel may be understood as a continuous equivalent of migration matrix. When its graphical representation lies along the line inclined at the angle of 45 degrees to the X-axis, the probability of registering similar financial results in subsequent periods is high. A clockwise rotation of the kernel representation means that differences between winning and losing banks are deepening. A counter-clockwise rotation suggests in turn that profitability of banks converges.

The literature, according to our knowledge, does not propose satisfactory solutions to a problem of measur-

ing long-term persistence. For this reason we develop a novel approach which consist of four steps. First, for each bank in the sample (k=1,….N) we determine the maximal length of the uninterrupted series of performance observations (MAX_DATA_SER$_k$) and the maximal length of the uninterrupted series of successes or failures (MAX_W_SER$_k$ or MAX_L_SER$_k$). In the second stage we calculate the test statistics (**LTP**) which in the case of analyzing winning persistence will be given by the formula (5):

$$LTP = \frac{\sum_{k} MAX\_W\_SER_k}{\sum_{k} MAX\_DATA\_SER_k} \qquad (5).$$

Than we build a theoretical distribution of the **LTP** statistics. We assume that consecutive financial outcomes are independent and that the probability of their occurrence is implied by the adopted definition of a success or a failure. We use a bootstrap technique with 100 000 repetitions. In the fourth, and the final step we compare the value of **LTP** statistics with the 99% confidence interval taken from the theoretical distribution. If the empirical value of **LTP** statistics lies beyond boundaries of the confidence interval, we infer that long-term persistence exists.

Banks in Central Europe actively manage their earnings (Jackowicz and Kozłowski, 2010). Therefore we have decided to analyze the performance persistence phenomenon using two profitability measures. The first one (OROA) is calculated as a quotient of operating income and assets. The second one (ROA) has gross financial income in the numerator instead of operating income. The OROA values are less vulnerable to earnings management than the ROA values.

To control how the decision regarding the definition of a success and a failure affects our results, we introduce two, alternative definitions. The first one – the liberal definition – considers banks as winners when their profitability exceed the median value in a given year. The second one – the restrictive definition – classifies banks as winners or losers when their profitability is, respectively, among 25% of the best or 25% of the worst performances in a specific year. In order to differentiate between the definitions in the remainder of the text, we add to our abbreviations a letter *q* every time we use the restrictive definition.

All bank-specific information used in this article was retrieved from the *Bureau Van Dijk's BankScope* database. From this database, we extracted data on commercial banks operating in Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia between 1992 and 2009. In this manner we have created a sample consisting of over 4 200 bank-year observations.

In the introduction we have stated the research goal in general terms. We develop this goal by formulating 5 hypotheses.

H1: *Short-term performance persistence exists in Central European banking systems.*

H2: *Banks financial results in Central Europe are also persistent in the long run.*

H3: *Performance persistence depends on country-specific factors.*

H4: *The strength of performance persistence phenomenon is influenced by the macroeconomic environment.*

H5: *The intensity of performance persistence differ in the groups of banks identified on the base of their size and capital adequacy.*

Sections 4 and 5 of this article will be dedicated to the verification of those hypotheses.

4. Short-term performance persistence

We start with the analysis of the liberally defined winning and losing persistence. The results of non-parametric tests for the entire sample are presented in Panel A of Table 1. For both performance measures and both test we can reject the null hypothesis stating that banks' results reported in subsequent years are independent. The persistence of OROA values seems to be slightly stronger than of ROA values. Panel B of Table 1 shows the test statistics for individual countries or their groups. The liberally defined short-term persistence exists in all Central European countries under study. Furthermore, the null hypotheses are rejected at the significance levels much better than 1%. In 6 out 8 cases (with the exception of Slovakia and Slovenia) the persistence of OROA values is more pronounced.

In order to investigate the relationship between the short-term liberally defined performance persistence strength and the basic banks characteristics we divide the sample using two criteria. First, in Panel C of Table 1 we classify banks according to their size of operations measured by the quotient of assets and

Table 1. The non-parametric test for performance persistence – the case of the short-term liberally defined persistence

Panel A - the entire sample

WW	LL	LW	WL	Z	CHI
Performance measure: ROA					
1232	1188	330	340	29.41***	992.42***
Performance measure: OROA					
1239	1255	288	312	31.33***	1159.96***

Panel B - the individual countries or their groups

	ROA		OROA	
	Z	CHI	Z	CHI
Baltic States	8.93***	86.05***	11.30***	146.58***
Bulgaria	7.57***	63.66***	9.41***	108.80***
Croatia	12.24***	180.21***	12.13***	176.77***
Czech Republic	10.79***	140.88***	11.65***	177.67***
Poland	12.85***	196.11***	14.30***	267.25***
Romania	8.46***	82.03***	9.57***	111.23***
Slovakia	8.37***	85.55***	7.30***	60.84***
Slovenia	8.22***	77.25***	7.67***	65.67***

Panel C - banks classified according to their size

	ROA		OROA	
	Z	CHI	Z	CHI
Below median	19.45***	482.19***	20.68***	552.69***
Above median	20.43***	541.75***	22.31***	626,21***
Lower quartile	12.93***	220.1***	14.28***	333.39***
Upper quartile	14.62***	358.02***	16.31***	331.43***

Panel D - banks classified according to their equity level

	ROA		OROA	
	Z	CHI	Z	CHI
Below median	20.92***	509.27***	21.51***	542.54***
Above median	20.08***	458.68***	22.21***	589.75***
Lower quartile	14.91***	259.47***	15.81***	304.68***
Upper quartile	13.13***	191.26***	15.37***	279.51***

Panel E - short term persistence in consecutive years

	ROA		OROA		
	Z	CHI	Z	CHI	GDPgrowth
1994	2.03**	4.61**	3.26***	12.33***	2.21
1995	5.50***	34.50***	5.05***	29.03***	4.44
1996	6.79***	52.81***	7.68***	72.25***	3.99
1997	8.05***	79.43***	7.55***	66.34***	3.51
1998	7.07***	57.17***	6.78***	52.06***	2.73
1999	7.04***	55.94***	7.46***	64.20***	2.55
2000	6.29***	43.20***	7.05***	55.36***	4.32
2001	8.04***	75.63***	8.36***	85.26***	4.56
2002	8.03***	75.10***	7.44***	62.30***	4.79
2003	7.98***	73.73***	8.43***	84.94***	5.37
2004	7.79***	69.35***	8.79***	94.33***	6.08
2005	7.07***	55.19***	9.43***	115.54***	6.08
2006	8.50***	87.09***	9.10***	107.70***	7.38
2007	8.91***	98.71***	9.15***	106.90***	6.72
2008	7.84***	70.77***	8.93***	99.63***	2.81
2009	7.77***	69.44***	7.62***	66.38***	-7.60

Source: Own study

***, ** mean that a given test rejects the null hypothesis at the significance level 1% and 5% accordingly.

GDP. Second, in Panel D of Table 1 we approximate the banks' financial soundness applying the ratio of equity capital to assets. Our results indicate that short-term performance persistence is a little bit stronger among bigger banks but it is still extraordinary strong even in the group of 25% of the smallest entities in the sample. In contrast, the equity level does not seem to influence the strength of the studied phenomenon when we examine banks situated below and above the relevant median. Interestingly profitability of banks with the highest equity level is the least persistent. We explain this outcome by the fact that young banking organization are frequently characterized by an important role of equity capital in financing.

Finally, Panel E of Table 1 proves that liberally defined banks performance persistence is insensitive to the changing macroeconomic conditions. Even a remarkable slow-down in 2008 and a negative mean growth rate in 2009 in Central European countries do not alter the situation. The test statistics for 2008 and 2009 are lower but still considerably above the critical values for the 1% significance level. In contrast, the relatively low values of **Z** and **CHI** statistics in 1994 and 1999 are probably due to the small number of observations and the incompleteness of the sample.

When we assess the strength of restrictively understood performance persistence, it is necessary to define two additional states in which banks can end in a given year. The abbreviations NW and NL mean that a bank do not record profitability among 25% of the best or 25% of the worst performers correspondingly. Consequently the analysis is conducted separately for winning and losing persistence. Panel A of Table 2 presents the results obtained for the entire sample. Once again the short-term performance persistence turns out to be very strong. The number of banks repeating restrictively defined successes or failures is more than two times higher than expected assuming results independence in time. For that reason the **CHI** test rejects the null hypothesis at the significance levels much better than 1%. Similarly to the liberally defined performance persistence, the restrictively defined exists in all analyzed countries. Interestingly the losing persistence is somewhat weaker than the winning persistence. This rule applies to 7 out 9 cases in Panel B of Table 2 for both profitability measures.

Table 2. The non-parametric test for performance persistence – the case of the short-term restrictively defined persistence

Contrary to the expectations, the group of smaller banks exhibits generally stronger performance persistence than the group of bigger banks (Panel C of Table 2). As anticipated, banks with a solid capital base (Panel D of Table 2) are more likely to record in subsequent years the profitability among 25% of the top performers. Those banks have also lesser chances to repeat the restrictively defined failure. The null hypotheses about the performance independence in time are rejected, as shown in Panel E of Table 2, in all two-years periods between 1994 and 2009. The test statistics are higher and more stable in the second half of the studied period.

The estimation of stochastic kernel for OROA values confirms the results of the non-parametric tests. The short-term performance persistence in the area of main banking activities is very strong in Central European countries. The ridge of stochastic kernel, as shown in Figure 1, clearly lies along a straight line inclined at the angle of 45 degrees to the X-axis. This shape of the stochastic kernel representation means that banks achieving high values of operating income in relation to total assets in one period are most likely to record similar profitability next year. Only a small group of extreme underperformers has a tendency to improve OROA ratios considerable in a consecutive year. Consequently the lowest part of the stochastic kernel representation in Figure 1 is counter-clockwise rotated.

5. Long-term performance persistence

In the whole sample long-term persistence is very strong. As Figure 3 shows the empirical values of the **LTP** statistics are much higher than the upper boundaries of the corresponding confidence intervals. In practice this observation means that long series of successes or failures are abnormally frequent. As expected, the long-term performance persistence is stronger when we apply the liberal definition of wins and defeats. The manner in which we measure banks performance, however, does not influence the empirical results.

After splitting the sample according to the criterion of banks' countries of origin, the picture of the long-term persistence phenomenon is not so straightforward. As documented by Table 3, the results are sensitive to the

Table 2. The non-parametric test for performance persistence – the case of the short-term restrictively defined persistence

Panel A - the entire sample

Winning persistence	WW_q	WNW_q	NWW_q	NWNW_q	CHI
Performance measure: ROA					
	492	273	271	2189	862.07***
Performance measure: OROA					
	478	266	243	2238	884.24***
Losing persistence	LL_q	LNL_q	NLL_q	NLNL_q	CHI
Performance measure: ROA					
	428	294	299	2204	652.37***
Performance measure: OROA					
	462	279	305	2179	733.87***

Panel B - the individual countries or their groups

	Winning persistence		Losing persistence		
	CHI (OROA)	CHI (ROA)		CHI (OROA)	CHI (ROA)
Baltic States	95.19***	91.76***		68.07***	105.76***
Bulgaria	80.61***	39.25***		53.7***	31.54***
Croatia	175.94***	153.54***		150.21***	103.48***
Czech Republic	101.88***	141.23***		109.41***	86.42***
Hungary	90.13***	88.12***		44.13***	86.24***
Poland	161.98***	190.15***		89.28***	186.88***
Romania	67.6***	62.34***		34.26***	62.16***
Slovakia	39.09***	59.93***		40.21***	51.33***
Slovenia	64.23***	79.36***		40.27***	92.77***

Panel C - banks classified according to their size

	Winning persistence		Losing persistence		
	CHI (OROA)	CHI (ROA)		CHI (OROA)	CHI (ROA)
Below median	643.6***	404.45***		368.85***	401.93***
Above median	389.66***	367.05***		471.06***	359.01***

Panel D - banks classified according to their equity level

	Winning persistence		Losing persistence		
	CHI (OROA)	CHI (ROA)		CHI (OROA)	CHI (ROA)
Below median	466.55***	397.42***		494.23***	374.81***
Above median	643.86***	693.82***		318.92***	273.04***

Panel E - short term persistence in consecutive years

	Winning persistence		Losing persistence		
	CHI (OROA)	CHI (ROA)		CHI (OROA)	CHI (ROA)
1994	8.64***	11.13***		13.86***	8.64***
1995	27.55***	15.34***		11.38***	21.39***
1996	47.15***	37.6***		40.5***	43.23***
1997	19.18***	75.4***		33.14***	33.59***
1998	45.03***	52.56***		25.48***	18.15***
1999	33.55***	56.11***		37.98***	10.95***
2000	47.11***	48.9***		45.87***	35.86***
2001	88.69***	56.92***		72.84***	36.68***
2002	92.12***	51.74***		60.34***	55.66***
2003	43.57***	61.21***		28.9***	60.35***
2004	68.16***	55.67***		89.9***	74.82***
2005	86.74***	59.15***		56.24***	37.78***
2006	85.11***	62.07***		74.36***	62.92***
2007	78.93***	80.01***		72.82***	69.48***
2008	80.06***	45.66***		67.68***	80.06***
2009	59.71***	52.09***		48.32***	61.39***

Source: Own study

*** mean that a given test rejects the null hypothesis at the 1% significance level.
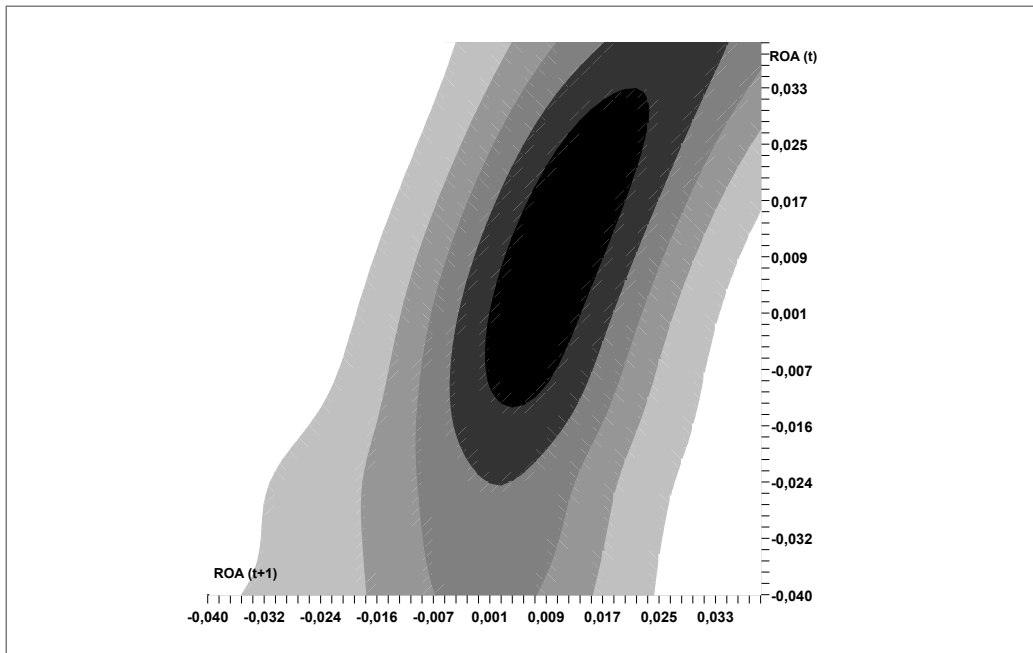
Figure 1. Stochastic kernel for OROA values
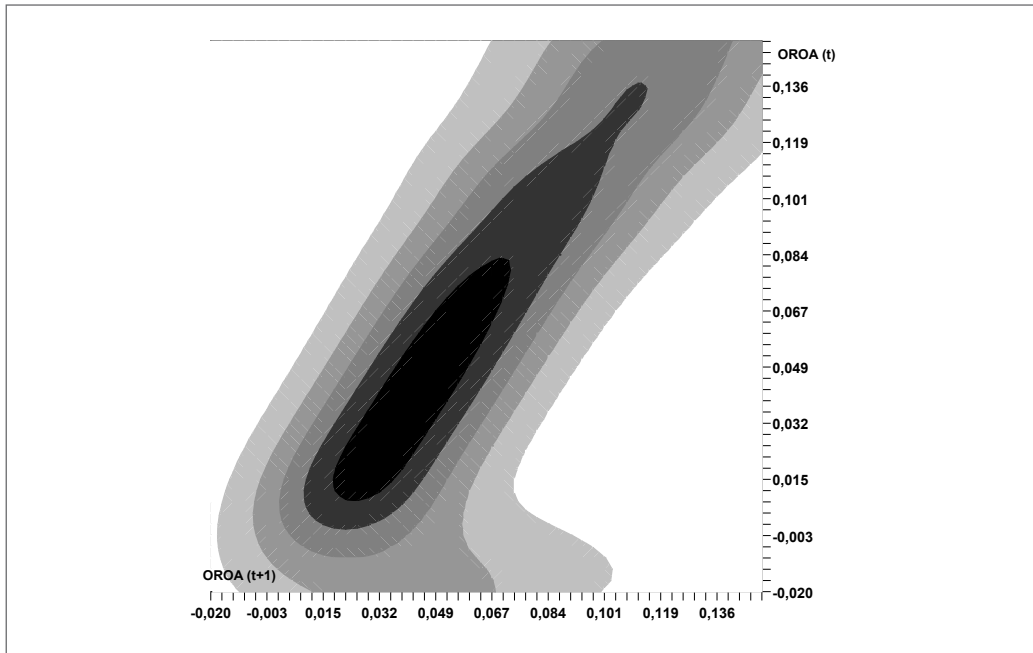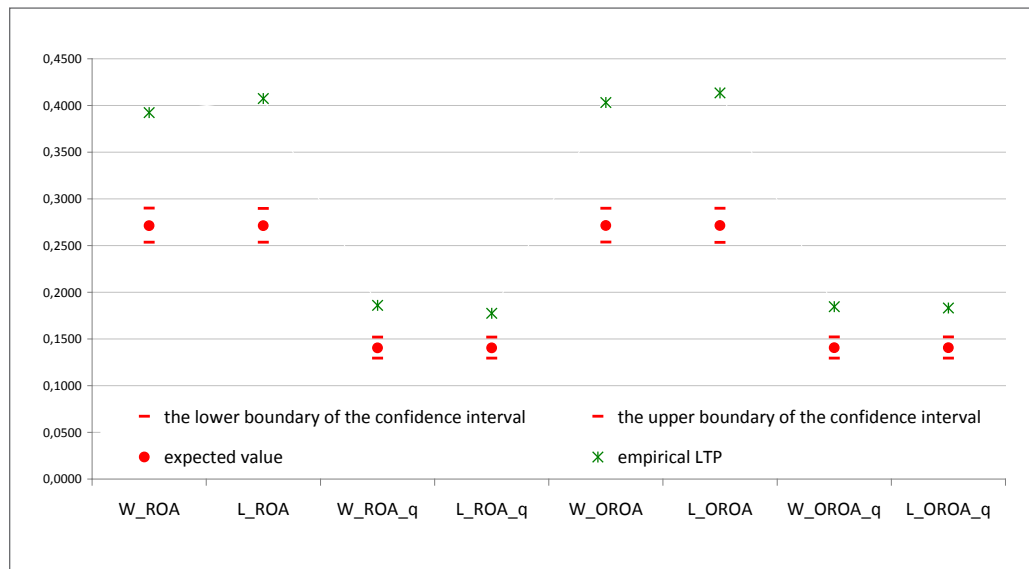
Figure 2. Stochastic kernel for ROA values

Table 3. The empirical values of the LTP statistics and the 99% confidence intervals – individual economies

	W_ROA	L_ROA	W_ROA_q	L_ROA_q	W_OROA	L_OROA	W_OROA_q	L_OROA_q
Baltic states								
the lower boundary of the confidence interval	0.2214	0.2232	0.1107	0.1107	0.2218	0.2218	0.1109	0.1109
the upper boundary of the confidence interval	0.3155	0.3155	0.1679	0.1679	0.3161	0.3161	0.1682	0.1682
empirical LTP	**0.3450**	**0.3782**	**0.1734**	**0.1716**	**0.3697**	**0.3956**	**0.1719**	**0.1830**
Bulgaria								
the lower boundary of the confidence interval	0.2093	0.2093	0.1030	0.1030	0.2172	0.2172	0.1069	0.1069
the upper boundary of the confidence interval	0.3355	0.3355	0.1794	0.1794	0.3483	0.3483	0.1862	0.1862
empirical LTP	**0.3924**	**0.4075**	**0.1859**	**0.1776**	**0.4032**	**0.4135**	**0.1846**	**0.1832**
Croatia								
the lower boundary of the confidence interval	0.2276	0.2276	0.1128	0.1128	0.2281	0.2281	0.1131	0.1131
the upper boundary of the confidence interval	0.3230	0.3230	0.1732	0.1732	0.3236	0.3236	0.1735	0.1735
empirical LTP	**0.3930**	**0.4358**	**0.2140**	**0.1829**	**0.4172**	**0.4055**	**0.2047**	**0.1988**
Czech Republic								
the lower boundary of the confidence interval	0.2205	0.2205	0.1077	0.1077	0.2263	0.2263	0.1105	0.1105
the upper boundary of the confidence interval	0.3308	0.3308	0.1769	0.1769	0.3395	0.3395	0.1816	0.1816
empirical LTP	**0.4308**	**0.4385**	**0.1846**	**0.1897**	**0.4500**	**0.4368**	**0.1947**	**0.1974**
Hungary								
the lower boundary of the confidence interval	0.2156	0.2133	0.1043	0.1043	0.2217	0.2217	0.1084	0.1084
the upper boundary of the confidence interval	0.3175	0.3175	0.1706	0.1706	0.3300	0.3325	0.1773	0.1773
empirical LTP	**0.3412**	**0.3744**	**0.1588**	**0.1706**	**0.3670**	**0.3424**	**0.1774**	**0.1626**
Poland								
the lower boundary of the confidence interval	0.2402	0.2402	0.1193	0.1193	0.2410	0.2410	0.1197	0.1197
the upper boundary of the confidence interval	0.3305	0.3305	0.1772	0.1772	0.3316	0.3316	0.1778	0.1778
empirical LTP	**0.4412**	**0.3782**	**0.2044**	**0.1670**	**0.4479**	**0.4410**	**0.2154**	**0.2017**
Romania								
the lower boundary of the confidence interval	0,2204	0,2204	0,1086	0,1086	0,2285	0,2285	0,1126	0,1126
the upper boundary of the confidence interval	0,3450	0,3450	0,1853	0,1852	0,3576	0,3576	0,1921	0,1921
empirical LTP	**0,3962**	**0,4121**	**0,1853**	**0,1853**	**0,4371**	**0,4437**	**0,1722**	**0,1556**
Slovakia								
the lower boundary of the confidence interval	0,2058	0,2058	0,0988	0,0988	0,2116	0,2075	0,0996	0,0996
the upper boundary of the confidence interval	0,3498	0.3457	0.1852	0.1852	0.3485	0.3485	0.1867	0.1909
empirical LTP	**0.4156**	**0.4156**	**0.1811**	**0.1646**	**0.3859**	**0.4066**	**0.1618**	**0.1743**
Slovenia								
the lower boundary of the confidence interval	0.2028	0.2028	0.0996	0.0996	0.2028	0.2028	0.0996	0.0996
the upper boundary of the confidence interval	0.3274	0.3274	0.1779	0.1779	0.3310	0.3310	0.1779	0.1779
empirical LTP	**0.3879**	**0.4021**	**0.1886**	**0.2100**	**0.3559**	**0.3737**	**0.1708**	**0.1637**

Source: Own study

The letters "W" and "L" inform that we analyze winning and losing persistence respectively. The abbreviations ROA and OROA encodes the types of performance measures we use. The letter "q" means that we adopt the restrictive definition of a success or a failure. The bolded LTP values are those which enable us to conclude that long-term persistence exist.

Figure 3. The expected value of LTP, the confidence intervals for LTP statistics and its empirical value for the whole sample

The letters "W" and "L" inform that we analyze winning and losing persistence respectively. The abbreviations ROA and OROA encodes the types of performance measures we use. The letter "q" means that we adopt the restrictive definition of a success or a failure.

definition of a success or a failure. On the one hand, the use of the liberal definition leads us the conclusion that long-term performance persistence is present in all studied Central Europe economies. On the other hand, the results obtained for the restrictive definition demand more cautious interpretations. When a success or a failure is determined by OROA values long-term winning and long-term losing persistence do not appear in 4 and 5 countries respectively. The number of economies in which long-term performance persistence restrictively defined exists is higher for ROA as a measure of banks' profitability but there are noticeable exceptions (Hungary and Slovakia in the case of winning persistence, Bulgaria, Poland and Slovakia in the case of losing persistence).

6. Conclusions

We have established that in the Central European banking industry the current profitability is strongly affected by the financial results recorded in the previous period. In this manner we have positively verified the H1 about the existence of the short-term performance persistence. When we have tested for the long-term performance persistence, using a novel technique, we have reach the similar conclusions. The only difference lies in the fact that the long-term performance persistence is weaker while we apply the restrictive definitions of a success or a failure. However, there are still grounds to assume the veracity of the H2. The impact of country-specific factors is undetectable when we assess the strength of the short-term performance persistence and very limited at best when we analyze the persistence in the long-run. Those observations generally falsify the H3. The changing macroeconomic conditions sometimes influence the intensity of the short-term performance persistence but they never eradicate this phenomenon, even in the period of crisis. As a consequence we have negatively verified the H4. The size of banks activities and their capital base shape in a few cases the strength of the short-term performance persistence but again they do not create the statistically significant differences between groups of banks. So, there is no evidence to substantiate the H5.

The performance persistence is a striking and stable trait of Central European banking industry. Taking into

consideration our findings, it is necessary to undertake furthers studies. They should concentrate on the determinants of performance persistence. As we mentioned before, theoretically the performance persistence origins can be connected to the market structure, the intensity and the nature of competition, the regulatory distortions, as well as to the banks characteristics, their informational opacity, and the managerial skills.

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