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The Lending-Deposit Rate Relationship in Eastern European Countries: Evidence from the Rank Test for Non-linear Cointegration*

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Abstract
This study carries out an examination of the potential non-linear cointegration between the lending and deposit rates of eight Eastern European countries using the non-parametric rank tests proposed by Breitung (2001). Based upon our adoption in this study of the threshold error-correction model (TECM), we find solid evidence of an asymmetric price transmission effect, in both the short term and the long term, between lending and deposit rates. Thus, our results reveal that there are indeed such long-run non-linear cointegration relationships between the lending and deposit rates in these Eastern European countries. Furthermore, we go on to successfully capture the dynamic adjustment of the spread.

1. Introduction

A central bank usually achieves its economic targets by adjusting monetary market interest rates, with the implementation of its monetary policy having direct effects on the spread set and the relationship between the operations and the levels of profitability of banks.

The monetary policy transmission mechanism includes both a credit channel and a money channel, with the former affecting the lending rate and the latter affecting the deposit rate (Arden et al., 2000). The primary purpose behind the manipulation of interest rates by the central bank is an attempt to achieve its target by either raising or lowering interest rates. When the central bank adjusts the interest rate, it does so in the hope that banks will also adjust their lending and deposit rates, which will ultimately lead to an increase in the money supply through the monetary multiplier of the financial market. However, lending and borrowing are the primary areas of business for banks, and also one of their most important sources of stable income. Therefore, when the central bank adjusts the interest rate, banks are unlikely to simultaneously adjust their lending and deposit rates.

Diebold and Sharpe (1990) and Hutchison (1995) refer to a common phenomenon among banks which suggests that when policymakers announce that there is to be an adjustment to the interest rate, banks may actually adjust their lending rates asymmetrically; that is, there may be a tendency for them to raise their lending rates much more rapidly when market interest rates are rising, as compared to the speed at which they are prepared to lower their lending rates when the market rate is declin-

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ing. A comparison of the trends in the lending rate shows that a much greater range is invariably found for increases in the lending rate than for reductions. In other words, downward-sticky lending rates can reduce the effects of expansionary monetary policy.

The asymmetric relationship between lending rates and monetary policy has been studied extensively.[1] Indeed, both Rhee and Rich (1995) and Karras (1996) point to the asymmetric effects of monetary policy on output, whilst Tkacz (2001) also provides some evidence of asymmetry in movements of the prime rate; nevertheless, few studies have examined the relationship between lending rates and deposit rates. One exception is the examination of lending and deposit rates undertaken by Thompson (2006), who indicated that it was only the prime lending rate which was found to adjust to discrepancies in the spread; indeed, banks may well set their lending rate according to a certain “mark-up” relative to the deposit rate. However, if such a mark-up becomes too high or too low, the marketplace will place pressure upon the banking industry to adjust back to some “normal” or equilibrium spread. Ewing et al. (1998) provide evidence to show that the equilibrium spread between the lending rate and the deposit rate certificate is stationary; essentially, a finding of such stationarity implies that the spread returns to its long-run equilibrium position following a shock. If banks have market power, then they could achieve profits that are above the “norm” – that is, a widening of the spread – by slowly adjusting their lending rates back towards falling deposit rates.

However, under such a scenario, it is clear that other competing banks could simply try to ensure that they were the first to adjust their lending rate in order to capture more customers and gain a greater market share. Dueker (2000) nevertheless argues that banks are unlikely to want to be the first to lower their lending rates during cyclical downturns, essentially because of the higher risk of default. Thus, such risk-averse behavior by banks may result in lending rates adjusting asymmetrically to market rate movements (Stiglitz and Weiss, 1981). Several of the prior studies assume that the spread variables, such as the lending-deposit spread, are linear and symmetric;[2] and indeed, the variables used in such studies have tended to be linear. However, increasing numbers of studies are now finding that the adjustments of most economic variables are both non-linear and asymmetric (Enders and Dibooglu, 2001; Reitz and Taylor, 2008). In many cases, economic theory suggests that there are completely non-linear relationships in, for example, “purchasing power parity” (PPP) or the Phillips curve.

It is, nevertheless, clear that the theory is not always capable of providing any precise specification of the functional form, such that non-parametric tools for use in estimation and inference are clearly desirable. The majority of the models adopted in the prior empirical studies (Engle and Granger, 1987; Ewing et al., 1998) addressing the issue of equilibrium have generally failed to take into account the non-linear properties of the adjustment process in the lending-deposit spread; however, as noted by Laxton et al. (1993), both bias and mistakes are increasingly likely when a linear and symmetrical methodology is adopted to test economic variables that are non-linear and asymmetric.

[1] Examples include: Arak et al., 1983; Goldberg, 1984; Levine and Loeb, 1989; Rhee and Rich, 1995; Karras, 1996; and Iregui et al., 2002.

[2] See, for example, Ho and Saunder, 1981; McShane and Sharpe, 1985; and Allen, 1988.

It is worth noting that in the non-linear evidence referred to in the above studies, the tendency has been to adopt parametric residual-based tests in a cointegrational approach to the testing of the relationship between lending and deposit rates. The present study differs from these earlier examples by providing non-linear cointegrational evidence on Eastern European countries based on the non-parametric rank tests developed by Breitung (2001), which demonstrate power in both linear and non-linear frameworks, and which are also applicable to whatever data-generating process of the variables under examination. In contrast, parametric testing procedures assume that the data-generating process is already known in advance, so there is some danger of misspecification if the wrong parametric models are used to characterize the variables of interest. The aim of the present study is to examine whether the lending-deposit rate spreads of Eastern European countries have non-linear long--run relationships towards equilibrium using rank tests. We go on to apply asymmetric error-correction models to describe the dynamic adjustments to the lending--deposit spreads of these Eastern European countries, which may serve as a guideline for macro policy.

The remainder of this paper is presented as follows. The methodology adopted is described in Section 2, followed in Section 3 by our presentation of the empirical results. Finally, the conclusions drawn from this study are presented in Section 4.

2. Cointegration and Non-Linearity Rank Tests

As our preferred alternative to the linear residual-based cointegration tests, we employ the cointegration test based specifically on the Breitung (2001) time-series rank transformation; the reason for such preference is the inconsistency demonstrated by the non-linear functions. In specific terms, in order to test for non-linear cointegration between two time series, y_t and x_t, we consider the following slightly more general form:

$$\varepsilon_t = g\left(y_t\right) - f\left(x_t\right)$$

where $g(y_t) \sim I(1)$, $f(x_t) \sim I(1)$, and $\varepsilon_t \sim I(0)$.

The cointegration tests adopted in the prior studies were generally developed based upon the assumption that $f(x_t)$ is a linear function of x_t. Breitung (2001) has since demonstrated that residual-based linear cointegration tests are inconsistent for some classes of non-linear functions (Sargan and Bhargava, 1983; Phillips and Oularis, 1990). In order to overcome this problem, Breitung proposed a cointegration test based on the rank transformation of the time series. Such rank transformation enables us to get away from the specific functional forms of the cointegrating relationship. One particular advantage of these rank tests is that there is no requirement to be explicit with regard to the exact functional form of the non-linear cointegrating relationship.

The rank test is based on a measure of the squared distance between the ranked series. When the test statistic takes on a value smaller than the appropriate critical value, this provides evidence against the null hypothesis of no cointegration, and in favor of the alternative hypothesis of cointegration, essentially because, in this case, the variables move closely together over time, with not too much drifting apart. Such a test determines whether the ranked series move together over time towards a long--run cointegrating equilibrium, which may be either linear or non-linear.

In his analysis, Breitung (2001) considers $f(x_t)$ to be a non-linear function of x_t, as suggested in recent economic theory. Breitung (2001) defines the ranked series as:

$$R(w_t) = \text{Rank of } w_t \text{ among } (w_1, w_2, \ldots, w_T) \qquad (1)$$

where $w = \{y, x\}$. The basic idea behind these rank tests is that if there is cointegration between the two series, y_t and x_t, the rank sequences tend to have similar evolutionary paths; otherwise the sequences of the ranks will tend to be divergent. The null hypothesis of no (non-linear) cointegration between y_t and x_t is rejected if these tests' statistics are found to be smaller than their critical values.

Breitung (2001) developed the following test statistics, in which y_t and x_t are considered to be mutually series-correlated random walks:

$$\psi_T = \frac{\sum_{t=1}^{T} d_t^2}{T^3 \hat{\sigma}_{\Delta d}^2}$$

(2)

where $d_t = R(y_t) - R(x_t)$, for $R(w_t)$ = Rank of w_t among $(w_1, w_2, \ldots, w_T)$, and $w = \{y, x\}$.

Meanwhile, $\hat{\sigma}_{\Delta d}^2 = T^{-2} \sum_{t=1}^{T} \left(d_t - d_{t-1}\right)^2$ are used to adjust for the potential correlation between the two series under examination. The null hypothesis of no (non-linear) cointegration between y_t and x_t is rejected if these test statistics are found to be smaller than their critical values.[3] The Monte Carlo experiments in Breitung demonstrated a property of superior power in the rank tests, not only in the non-linear case, but also in the linear case.

Whenever the rank test for integration indicates a stable long-run relationship, it is of interest to determine whether the cointegrational relationship is linear or non-linear. In order to identify the linear/non-linear nature of the cointegrational relationship found under the above mentioned rank test, Breitung (2001) further suggested a score test statistic $T R^2$ computed from the following regression:

$$\tilde{\varepsilon}_t = a_0 + a_1 x_t + a_2 R\left(x_t\right) + e_t$$

(3)

where T is the sample size, R^2 is the coefficient of determination of equation (3), and $\tilde{\varepsilon}_t = y_t - \left(\tilde{c}_0 + \tilde{c}_1 x_t\right)$, where $\tilde{c}_0$ and $\tilde{c}_1$ in turn are the least squares estimates from a regression of y_t on a constant and x_t. Under the assumptions that $\tilde{\varepsilon}_t$ is a zero-mean white noise and that x_t is exogenous, the score test statistic $T R^2$ has asymptotic Chi-squared (χ^2) distribution with one degree of freedom. The null hypothesis of linear cointegration, $a_2 = 0$, may be rejected in favor of non-linear cointegration when $T R^2$ exceeds the χ^2 critical value.

The $\tilde{\varepsilon}_t$ are residuals under the null hypothesis, corrected for potential serial correlation and endogeneity using the "dynamic ordinary least squares" (DOLS)

[3] Details on the derivation of these values are provided in Breitung (2001; Table 1).

method of Stock and Watson (1993). Under the null hypothesis, the test statistic is distributed as χ^2 with one degree of freedom. The Monte Carlo simulations carried

Table 1 Descriptive Statistics of the Variables for each Country

Country[a]	Mean	Min.	Max.	S.D.	Skewness	Kurtosis	J-B[b]
Bulgaria							
LR	10.412	7.010	15.430	2.144	0.591	2.154	10.564***
DR	3.096	2.710	3.710	0.242	0.769	3.476	12.964***
Czech Republic							
LR	7.169	5.540	13.680	2.141	1.939	5.849	115.779***
DR	2.714	1.100	8.470	2.123	1.620	4.663	66.335***
Hungary							
LR	11.869	7.000	20.300	3.541	0.814	2.753	13.545***
DR	9.086	3.890	16.770	3.002	0.812	2.936	13.189***
Poland							
LR	12.495	5.430	26.900	6.683	0.534	1.872	12.067***
DR	7.710	2.150	19.700	5.511	0.707	2.137	13.725***
Romania							
LR	35.361	12.920	75.600	18.184	0.402	1.879	9.514***
DR	20.279	4.000	52.100	14.241	0.577	1.973	11.932***
Russia							
LR	19.482	9.200	49.000	11.896	1.232	3.095	30.388***
DR	6.845	3.300	27.300	5.133	2.358	8.003	236.314***
Slovakia							
LR	11.852	6.230	23.930	5.288	1.023	2.585	21.787***
DR	7.140	2.250	18.570	4.534	1.081	2.861	23.453***
Ukraine							
LR	28.906	13.310	71.520	15.886	0.909	2.595	17.340***
DR	11.458	6.140	28.220	5.728	1.308	3.426	35.123***

Notes: [a] LR denotes the lending rate; and DR denotes the deposit rate of the one-month certificate.
[b] J-B refers to the Jarque-Bera test for normality, with *** indicating significance at the 0.01 level.

out by Breitung (2001) show that, for a wide range of non-linear models, the rank tests perform better than their parametric counterparts.

3. Empirical Results

The data used in this study comprise monthly observations on the prime lending rate (LR) and the one-month certificate of the deposit rate (DR) between 1998 and 2007. The data are collected from the International Financial Statistics (IFS). The descriptive statistics of the variables for each Eastern European country under examination are provided in *Table 1*, from which we can see that both the lending and deposit rates of Romania are the highest throughout the sample, whilst the lending and deposit rates of the Czech Republic are the lowest. The Jacque-Bera tests on the Eastern European countries examined in this study show that for all of the variables for each country, the distribution is non-normal.

3.1 Cointegration and Non-linear Tests

The test results in this study are summarized in *Table 2*. For the case of the rank test, we compute the autocorrelation adjusted test statistics, ψ^*. The null hypothesis of this rank test is that the lending and deposit rates are not cointegrated, which is in contrast to the alternative hypothesis that states that the two variables are cointegrated. The null hypothesis is rejected in favor of the alternative hypothesis when

Table 2 Results of the Cointegration and Non-Linearity Rank Tests

Country	Rank Test[a] ψ^*		Linearity Test[b] $T{\cdot}R^2$	
Bulgaria	0.0109	***	8.0986	***
Czech Republic	0.0099	***	2.8112	*
Hungary	0.0123	***	2.9137	*
Poland	0.0126	***	3.0548	*
Romania	0.0097	***	9.6676	***
Russia	0.0104	***	4.1486	**
Slovakia	0.0124	***	10.8920	***
Ukraine	0.0101	***	2.7930	*
Critical Value (%)				
10	0.0232		2.71	
5	0.0188		3.84	
1	0.0130		6.63	

Notes: [a] The rank test is adjusted for autocorrelation. The null hypothesis of the rank test is that no cointegration exists between the lending rate and the deposit rate of the one-month certificate; the alternative hypothesis is that cointegration does exist between the two rates. The null hypothesis is rejected when the critical value exceeds the test statistic.

[b] The null hypothesis of the linearity test is that a linear relationship exists with no cointegration between the lending rate and the deposit rate of the one-month certificate; the alternative hypothesis is that a linear relationship does not exist and cointegration does exist between the two rates. The null hypothesis is rejected when the computed $T{\cdot}R^2$ value exceeds the critical value.

[c] *** indicates significance at the 0.01 level; ** indicates significance at the 0.05 level; and * indicates significance at the 0.1 level.

the critical value exceeds the test statistic; otherwise, the null hypothesis is supported.

As is shown by the ψ^* statistic in *Table 2*, the null hypothesis is rejected for all eight of the Eastern European countries examined in this study because the test statistics are larger than the conventional critical values at the 1 percent significance level. According to the ψ^* statistic, we observe cointegrating relationships between the lending and deposit rates for all eight Eastern European countries. Therefore, this indicates that the rank test employed in this study provides some evidence of the existence of long-run relationships between the lending and deposit rates for all of the Eastern European countries examined.

Based on the cointegrational relationships previously identified above, it is possible to distinguish between non-linear and linear cointegration using the rank sum linearity test developed by Breitung (2001). It is evident from *Table 2* that the null hypothesis of linear cointegration is rejected at all conventional levels; thus, the rank sum linearity test results for the $T\,R^2$ also indicate that the cointegrating relationships can be non-linear.

3.2 Threshold Error-Correction Models

Following the positive finding of a non-linear equilibrium relationship, we use the asymmetric threshold error-correction model (TECM) to capture the short-run and long-run dynamic adjustment processes for the lending rate $(LR)_t$ and the deposit rate $(DR)_t$ of the Eastern European countries.

We apply the Akaike information criterion (AIC) to determine the appropriate lag lengths, with the estimated coefficients determining the speed of adjustment for

Table 3 Results of the Asymmetric Error-Correction Model

Country	Lending/ /Deposit Rate	ρ_1	ρ_2	$\rho_1 = \rho_2 = 0$	$\rho_1 = \rho_2$	Ljung-Box Q-Stat.	
						L-BQ(12)	L-BQ^2(12)
Bulgaria	LR	0.718 (1.617)	–0.126** (-2.269)	7.718**	6.960**	9.728	6.246
	DR	–0.209* (–1.739)	–0.017 (-0.560)	8.034**	6.478*	9.060	4.752
Czech Republic	LR	–0.390*** (-3.726)	–0.062 (1.1645)	7.744**	6.392*	3.872	0.0582
	DR	–0.077*** (-2.661)	0.004 (0.139)	9.241***	7.758**	4.714	0.709
Hungary	LR	–0.011 (-0.115)	–0.214 (-0.682)	7.235**	3.309	6.621	5.575
	DR	0.002 (0.006)	–0.099 (-0.914)	6.447*	1.867	6.399	7.701
Poland	LR	–0.158** (-2.189)	–0.186*** (-3.346)	8.330**	12.310***	29.736	22.374
	DR	0.201*** (3.272)	–0.133 (-1.664)	8.470***	14.242***	29.840	24.753
Romania	LR	–0.807*** (-2.864)	–0.202*** (-4.243)	13.036***	20.599***	32.452	10.451
	DR	0.105** (2.103)	–0.542* (-1.885)	9.312***	13.436***	30.039	10.839
Russia	LR	–0.099*** (-3.086)	–0.126*** (-2.516)	9.365***	4.904	19.887	28.912
	DR	–0.312*** (-5.246)	–0.161 (-1.399)	7.582**	1.730	19.433	15.930
Slovakia	LR	–0.300*** (-5.036)	–0.784*** (-3.195)	20.988***	25.170***	19.960	4.827
	DR	–1.056*** (-6.377)	–0.042 (-0.957)	15.941***	16.156***	16.961	5.738
Ukraine	LR	–0.197*** (-2.385)	–0.127*** (-3.637)	12.464***	3.191	21.242	29.860
	DR	–0.142 (-0.485)	–0.262*** (-2.614)	10.699***	0.202	20.084	21.242

Notes: [a] LR denotes the lending rate; and DR denotes the deposit rate of the one-month certificate.

[b] *** indicates significance at the 0.01 level; ** indicates significance at the 0.05 level; and * indicates significance at the 0.1 level.

[c] L-BQ and L-BQ^2 are the Ljung-Box statistics applied on the standardized and squared standardized residuals respectively.

[d] The null hypothesis of $\rho_1 = \rho_2 = 0$ test follows a non-standard distribution so the test statistics are compared with critical values reported by Enders and Siklos (2001).

[e] The numbers reported of $\rho_1 = \rho_2$ are *F*-statistics of symmetric adjustment. The critical values are taken from Enders and Siklos (2001).

[f] Numbers in parentheses are *t*-statistics.

positive and negative deviations from the fundamental value. We specify and estimate the asymmetric error-correction model of the lending and deposit rates, and the asymmetric TECM, as follows:

$$\Delta(LR)_t = \alpha_1 + \rho_{11} I_t \hat{v}_{t-1} + \rho_{12}(1 - I_t)\hat{v}_{t-1} + A_{11}(L)\Delta(LR)_{t-1} + A_{12}(L)\Delta(DR)_{t-1} + \varepsilon_{1t} \quad (4)$$

$$\Delta(DR)_t = \alpha_2 + \rho_{21} I_t \hat{v}_{t-1} + \rho_{22}(1 - I_t)\hat{v}_{t-1} + A_{21}(L)\Delta(LR)_{t-1} + A_{22}(L)\Delta(DR)_{t-1} + \varepsilon_{2t} \quad (5)$$

where I_t is the Heaviside indicator, α_1 and α_2 are constants, and $A_{ij}(L)$ is the first--order polynomial in the lag operator L. Within the TECM, $|\rho_{11}|$ and $|\rho_{21}|$ are the adjusted speed above the threshold, and $|\rho_{12}|$ and $|\rho_{22}|$ are the adjusted speed below the threshold.

The results from the eight estimated asymmetric error-correction models with a consistent estimate of the threshold value are given in *Table 3*. In most of the Eastern European countries, the threshold model of the null hypothesis of $\rho_{11} = \rho_{12} = 0$ and $\rho_{21} = \rho_{22} = 0$ could be rejected at the 1% significance level, except for Hungary at the 5% significance level. The results show that the lending-deposit spreads of these countries have a non-linear adjustment. Next, for five of the eight Eastern European countries, the null hypothesis of symmetric adjustment is rejected at the 10% significance level at least, except for Hungary, Russia, and Ukraine. The estimated coefficients of $I_t \hat{v}_{t-1}$ and $(1 - I_t)\hat{v}_{t-1}$ determine the speed of adjustment for positive and negative deviations from LR_t and DR_t, respectively. Also, there is evidence that $|\rho_{11}| = |\rho_{21}|$ and $|\rho_{21} = |\rho_{22}|$, implying that the speed of adjustment is faster for positive than for negative discrepancies. Obviously, positive deviations from LR_t and DR_t are eliminated more quickly than negative deviations. For the Czech Republic, the estimation results for the TECM in equation (4) indicate that there is a larger lending rate when the lending-deposit spread is widening ($|\rho_{11}| = 0.390$) (e.g., during an economic downturn when the market rate falls), as compared to a narrowing spread response ($|\rho_{12}| = 0.062$) (e.g., during an economic upturn when the market rate rises). This indicates that for Bulgaria, the Czech Republic, Romania, and Ukraine, the lending rate adjusts faster with a widening spread than with a narrowing spread. In other words, the lending rates of these countries adjust more rapidly under a declining market rate than under an increasing market rate.

Furthermore, for Hungary, Poland, Russia, and Slovakia, we find that the speed of adjustment in the lending rate is faster for a narrowing spread than for a widening spread. That is, the speed of adjustment in the lending rate for these countries is faster when the market rate is rising than when it is declining. However, we find that for Bulgaria, the Czech Republic, Poland, Russia, and Slovakia, the deposit rate adjusts more rapidly when the spread is widening than when it is narrowing. Furthermore, for Hungary, Romania, and Ukraine, the speed of adjustment is found to be faster for a narrowing spread than for a widening spread. We find the adjustment to be significantly faster for changes above a threshold level than for smaller ones. This phenomenon can be explained by the presence of menu costs. In line with international experience, we find that lending rates are characterized by downward rigidity, probably due to the profit-maximizing behavior of banks. We also find that deposit rates adjust more rapidly to upward than to downward shifts. Otherwise, the results in *Table 3* indicate that there are no autocorrelation and heteroscedasticity dependencies for LB-Q and LB-Q^2 statistics of order 12, suggesting that the TECM models are correctly specified.

The model used in this study can provide useful policy guidelines for the central banks of Eastern European countries in their attempts to establish appropriate and efficient monetary policies. Almost all of the adjustments to the short-term lending-deposit rate spreads in the Eastern European countries examined in this study are asymmetric. The empirical support for this notion is that, in Eastern European countries, market forces will provide financial institutions with sufficient discipline to ensure that the institutions asymmetrically adjust both their lending and deposit rates to their long-run equilibrium levels. These findings provide clear recognition of the enormous differences in the banking systems across the various Eastern European countries; for example, it is already widely known that most banks are held privately in the Czech Republic, Russia, and Ukraine, unlike in other countries, where market financing tends to be dominant. Otherwise, the bank concentration hypothesis states that banks are more likely to decrease deposit rates and increase lending rates when they are able to exercise market power and adjust interest rates to their advantage. In other words, when banks operate in a highly competitive environment, they may fear a negative reaction from customers in response to lending rate increases or deposit rate decreases. In the Czech Republic, this phenomenon may be explained by increased competition within the banking sector, in particular after the foreign take-over of major commercial banks via privatization. Otherwise, the Bulgarian banking market is not as concentrated as other European markets and is currently considered to be fairly competitive due to the existence of a considerable number of private banks. Banking sector concentration in Slovakia is higher than the euro area average, although the gap is diminishing. Concentration is also high in Ukraine due to a lack of competition; banks operate inefficiently with high costs and high profit margins, causing large spreads between deposit and loan interest rates. In comparison to the European average, loans and deposits have shorter average terms in Hungary (more than 90% of corporate loans and deposits and household deposits have a repricing period shorter than one year). This is typical of countries with higher inflation and higher interest rate volatility. With the expected decline in inflation and strengthening of economic stability, the duration of loans is expected to become longer, indicating a possible slowdown in the interest rate in the future. Commercial banks in Poland have been able to exert significant market power over their customers with respect to both loans and deposits. In Russia, there is a very strong influence of government policy.

Interest rates play an important role in any economy and are crucial for the decision making of governments, commercial banks, and investors. The observed asymmetric behavior can be interpreted as an indication of different levels of competition, development, and liberalization among the banking systems in the Eastern European Countries.

It is argued that any persistent asymmetry in the short-term lending-deposit spread will result in inefficient monetary policy, ultimately leading to failure to achieve policy targets. Thus, if the central banks of these countries wish to ensure that their monetary policies develop in ways that make them more efficient, they must strive to create the necessary symmetry in the lending-deposit spread. This is why we argue that a stable long-run relationship between lending and deposit rates serves as an appropriate guideline for macro policy.

4. Conclusions

In this study, we set out to investigate the long-run equilibrium relationships that exist between the lending-deposit spreads of eight Eastern European countries using the non-linear rank tests developed by Breitung (2001). This methodology provides stronger evidence than traditional parametric testing of long-run non-linear equilibrium relationships. Furthermore, the asymmetric TECM also indicates that the lending rate adjusts to discrepancies in the lending-deposit spread for virtually all of these Eastern European countries. The evidence of asymmetric adjustment in the spread observed in this study supports the hypothesis that banks are quick to adjust their lending rates when the spread is widening (e.g., during a period of economic downturn when the market rate falls), and it may also explain the diverse effects that monetary policy has on output.

These findings offer new evidence supporting the existence of long-run relationships in the lending-deposit spread, with asymmetric adjustment, in the eight Eastern European countries examined in this study. The model used can provide useful policy guidelines for the central banks of these Eastern European countries in their attempts to achieve more lending-deposit spread stability and to narrow the divergence between lending and deposit rates. The observed asymmetric behavior can be interpreted as an indication of different levels of competition, development, and liberalization among the banking systems in the Eastern European Countries.

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