The Behaviours of the Ukrainian Lending Rate, Deposit Rate, and Intermediation Premium

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A B S T R A C T

Objective: The objective of this article is to investigate the behaviours of the Ukrainian lending rate, deposit rate, and intermediation premium from January 2000 to January 2019, or the post-1999 era.

Research Design & Methods: The Perron's (1997) endogenous unit root test, the Threshold Autoregressive model, and the Threshold Autoregressive Vector Error-Correction model are utilized to investigate the short-run dynamic and the long-run relationship between the commercial banks' lending and deposit rates to evaluate the intermediating function of the Ukrainian lending institution.

Findings: The intermediation premium followed a stationary trend process with a structural break in July 2004. The Ukrainian banks react symmetrically to expansionary monetary policy and contractionary policy or economic shocks that pushed the intermediation premium out of its long-run path. Finally, the Granger-causality from the Ukrainian commercial banks' lending to the deposit rates is unidirectional, indicating the exogeneity of their lending rate from their deposit rate. This exogeneity hinders monetary policy, investment, and economic growth and, hence, social progress.

Implications & Recommendations: The policy-makers should introduce programs to remove exogeneity from the banking sector. Policy prority should focus on rectifying pervasive corruption, which is one of the major causes for the operation of the shadow banking industry leading to the exogeneity in the economy.

Contribution & Value Added: As far as it may be ascertained, there is no similar study; therefore, the methodology and findings of this investigation will close this gap in the literature and significantly contribute to the knowledge and literature.

INTRODUCTION

Historically, theorists such as Schumpeter (1912), Patrick (1966), and McKinnon (1973) articulated that financial intermediation is a critical facilitator for investment and economic growth. By determining the spread between the lending rate and the cost of funds or the intermediation premium, commercial banks play a crucial role in the intermediation process. As argued by Nguyen (2015, p. 2), "In addition to creating interest income to financial intermediaries, the intermediation premium affects the economy's savings, investment and consumption levels and hence the effectiveness of the Central Banks' counter-cyclical monetary policies. Naturally, changes in consumption or investment would change employment, inflation and gross domestic product, which may affect economic development, and social progress."

It is not simple and automatic to channel funds from economic units with surpluses to economic units in need of funds to finance their profitable investment opportunities, even in advanced market economies that operate in transparent environment. This intermediation process depends on such factors as culture, financial and banking regulations, monetary policy, domestic and international political and economic conditions.

Ukraine was the second largest economy in the former USSR, producing four times the GDP of the distant third largest economy of Kazakhstan (CIA's World Factbook, 2019). The Ukrainian economy provided significant quantities of agricultural products such as meat, milk, grain, and vegetables, as opposed to manufactured goods. Ukrainian manufacturing segments consisted of heavy industrial equipment, such as large diameter pipes and vertical drilling apparatuses, while raw materials were supplied to industrial and mining sites of other republics in the former USSR. Unfortunately, since its independence on 24th of August, 1991, Ukraine has experienced severe political and economic turmoil. Currently, the Ukraine's oligarch-dominated economy is supported by significant inflows of remittances.

Based on the country's perceived corruption index score, the Heritage Foundation (2019) placed Ukraine 126th/182th in the 2019 country ranking. The Heritage Foundation further reports that the enforcement of contracts in Ukraine is time-consuming and costly. Furthermore, the judiciary is susceptible to political pressure, corruption, and bribery in most sectors of the economy. Consequently, public confidence in the legal system has waned. In this regard, Neutze and Karatnycky (2017, p. 11) articulate that "We concluded that only significant reduction in the levels of corruption will enable Ukraine to provide the sort of investment climate that would generate large and consistent flows of foreign capital, and prepare the country for its stated ambition of drawing closer to the European Union."

The Ukrainian economy in general, and the banking sector in particular, inherited problems from the collapse of the USSR. Therefore, market economic concepts – such as "competition", "cost", "credit", "deposit", "Investment", and "intermediaries" – were not utilized or given much attention.

Given the aforementioned political and economic turmoil, and the importance of the intermediating function of commercial banks, the objective of this article is to evaluate the behaviours of the Ukrainian lending rate, deposit rate, and intermediation premium from January 2000 to January 2019.

Methodologically, first part of our analysis searches for endogenous variables that account for the possible structural break in the long time series data, so as to avoid the possible misspecification of statistical models. Based on these results, we specify and estimate a Threshold Autoregressive (TAR) model and a Threshold Autoregressive Vector Error-Correction (TAR-VEC) model to scientifically and quantitatively investigate the behaviours of the Ukrainian lending rate, deposit rate, and intermediation premium. As far as we know, there is no such study. Therefore, the methodology and the findings of this investigation will close this gap in research and significantly contributes to the literature.

The following section provides a short review of literature and a brief characterization of the Ukrainian economy and the banking sector. Then comes a description of methodological issues and the specification of the model for investigation. The next section discusses the empirical results. The article ends with concluding remarks.

LITERATURE REVIEW

Previous Studies

From the economic theory perspective, Nguyen (2015, p. 2) argues that market forces are fairly predictable when it comes to how they react to very high and low spreads. In most cases, the market will adjust back to equilibrium spread behaviour in response to either very high or very low spreads. The three major hypotheses commonly used to explain the market equilibrium behaviour are bank concentration, the consumer characteristics, and the consumer reaction. According to several researchers, banks in concentrated or oligopoly markets are quick to raise lending rates when the central bank increases its discounts rates, and then slowly reduce the rates charge to borrowers in response to the drops in the central banks' discount rates (Hannan & Berger, 1991; Neumark & Sharpe, 1992). The consumer characteristics hypothesis views consumers as unsophisticated borrowers so lending institutions adjust rates to widen the spread and increase their profitability since borrower seem less sensitive to rate changes because of possible higher search and switching costs (Calem & Mester, 1995; Hutchison, 1995; Rosen, 2002).

The consumer reaction hypothesis which is proposed by Payne and Water (2008, p. 1357) states that the customer reaction hypothesis suggests that banks are more sensitive to customers reactions if they operate in highly competitive environments, and fear strong negative reactions from customers to lending rate increases. This hypothesis supports the asymmetric adjustment of interest rates in a severe upward manner, which may create an adverse selection problem where higher interest rates attract riskier borrowers into the lending market (Stiglitz & Weiss, 1981). Banks tend to respond cautiously in these situations by not quickly increasing lending rates, but may opt to ration credit in an attempt to minimize the default rates of riskier borrowers.

The foundation for hypothesizing the asymmetric adjustment process between the banks' lending rate and the cost of funds that lending institutions pay their depositors may be attributable to the seemingly opposite effect of the lending market and the counter-cyclical monetary policy over different phases of business cycles. More specifically, during the expansionary phases of business cycles, the stimulus of the counter-cyclical monetary policy would increase the money supply, leading to the lowering of banks' cost of funds,

while the information from that state of the economy would precipitate the lending institutions to resist adjusting their spread between the lending rate and their cost of funds downward. This is based on the expected increase in the risky profiles of loan applicants. Consequently, the basis would increase or widen. By the same logic, we may argue that the spread between commercial banks' lending rates and their cost of funds would decrease or narrow during the contractionary phases of business cycles, while the cost of funds is increasing due to tight monetary policy (Nguyen, 2015).

Even though the interest rate asymmetry is relatively new topic, its literature is quite rich. Examples in the literature on emerging and advanced economies include, Dueker (2000) and Tkacz (2001), who report on the asymmetries in the US prime lending rate in the past. Thompson (2006) indicates asymmetries in the spread between US prime lending and deposit rate. Sarno and Thornton (2003) find asymmetries in the US Treasury securities. Scholnick (1999) shows asymmetries in mortgage rates in New Zealand and Canada. Hofmann and Mizen (2004) report on the asymmetric behaviour of retail rates in the UK.

Moreover, Lim (2001) applies the multivariate asymmetric error-correction model to Australian monthly data from the 1990:01-2000:04 sample period and reports that – in response to positive and negative shocks – interest rate adjustments are asymmetric in the short run but not in the long run. Lim (2001) further posits that banks adjust their loan and deposit rates in response to a change in the bank-bill rate. They reported a faster rate during periods of monetary easing (negative changes) than during periods of monetary tightening (positive changes).

Several other studies find an asymmetric co-integration between bank lending and deposit rates. For instance, Nguyen, Pointer, and Smith (2008) report similar asymmetries in Mexican lending and deposit rates. Nguyen and Islam (2010) find asymmetries in Thai banks' lending and deposit rates. Nguyen and Henney (2013) indicate asymmetries in the US housing mortgage market. Chang and Su (2010) reveal nonlinear co-integration between lending and deposit rates in ten Eastern European countries.

More recently, Karagiannis, Panagopoulos, and Vlamis (2010) find symmetry in the adjustment of Greek retail rates in response to changes in the central bank's rate. In contrast, they found a negative asymmetry for Slovenia in the adjustment of loan and deposit rates in response to changes in the money market rate. As for Bulgaria, they report the negative asymmetry hypothesis in the adjustment of the rate of loans in response to changes in both the central bank and money market rates. Nguyen (2019a) finds that lending rates responded asymmetrically to changes in the Central Bank's policy related rates in the US, Chile, Jamaica, and Mexico, while the adjustments in Bolivia, Colombia, Costa Rica, and Honduras are symmetrical. As for transition economies, Nguyen (2019b) reports that – after being pushed out of their long-run paths by economic shocks or counter-cyclical monetary policy – the lending rates in the US, China, Hungary, Ukraine, and Vietnam adjusted asymmetrically, while the adjustment in Romania is symmetric.

Ukrainian Banking Sector

Today, Ukraine is unable to fulfil its internal financial obligations to regular Ukrainian citizens and service external debts without loans from the International Monetary Fund, the World Bank, other international financial institutions, and countries.

The main problem is the "shadow" economy, which causes significant losses in the government's tax revenues. The tell-tale sign of Ukrainian economic problems is that aggregate consumption is twice as much as the reported income. Moreover, the prices of big-ticket commodities like real estate and automobiles are understated in the markets to avoid taxes. This situation arose due to high taxation on wages and corruption. The taxation problem grew in 2019, when the government levied an 18% personal income tax, a 1.5% military tax, and a 22% corporate tax. Given these relatively high total tax rates and pervasive corruption aiding underground business activities to avoid taxes, a significant volume of the Ukrainian business transactions occur underground. Supposedly, the national budget also suffered from theft by various "programs." For example, exporters fabricated documents to receive refunds for portions of export taxes, which is a program introduced by the government to promote exports.

The Ukrainian banking industry first began its efforts at independent operations in 1988. By 1990, three of the five sectoral banks (Agroprombank, Promstroibank, and the Social Investment Bank) transformed into joint stock companies as Bank Ukraine, Prominvest, and Ukrsotsbank. By the time Ukraine declared its independence, the state owned banks accounted for most of the commercial banking business. During this same period, less than one hundred newly formed independent banks represented a much lower percentage of the country's banking industry (Sochan, 1998).

Sochan (1998) indicated that after the dissolution of the Soviet Union, the Ukrainian banking system formed as a natural entity to fill the void left after the State Bank of USSR no longer had authority in the country to perform banking transactions. State banks formally established under the soviet national banking systemwere liquidated, and the National Bank of Ukraine was formed as the central bank with a two tier system. Under this system the National Bank of Ukraine was the central banks and all newly formed banks would be responsible for performing the commercial banking transactions.

Since 2000, the development of the banking system of Ukraine is being restructured because of decreasing profitability, poor bank operations, and the consolidation of capital. One of the main indicators that characterizes the situation in the banking system of Ukraine is high base rate. This causes high levels of tax rate, which in turn leads to a rise in the interest rates on banks' loans to enterprises and the general population.

Given the aforementioned problems with the banking sector, and the Ukrainian "shadow" economy, this study investigates the behaviours of the Ukrainian lending rate, deposit rate, and intermediation by formulating and testing the following five research hypotheses:

H1:   The Ukrainian intermediation premium is stationary with symmetric adjustments.

H2:   The Ukrainian lending rate Granger causes the deposit rate in the short run.

H3:   The Ukrainian deposit rate Granger causes the lending rate in the short run.

H4:   The Ukrainian lending rate Granger causes the deposit rate in the long run.

H5:   The Ukrainian deposit rate Granger causes the lending rate in the long run.

To test hypothesis 1, a Threshold Autoregressive model is specified and estimated, while a Threshold Autoregressive Vector Error-Correction model is formulated, estimated and the calculated test statistics are used to test hypotheses 2-5. Additionally, Nguyen and Kravchuk (2019, p. 195) articulated that economic shocks are common in most economies

in the age of globalization. And, these shocks are expected to change relationships among long time series data, known as their affect structural breaks. Therefore, economic models should account for structural breaks to avoid possible misspecification of model. This study uses Perron's (1997) endogenous unit root tests to endogenously search for structural break in the data and if a break exists, a dummy variable would be introduced into the model specification processes to properly specify the models.

MATERIAL AND METHODS

Structural Break

To endogenously search for the possibility of any structural break in the commercial banks' lending rate-deposit rate spread, this study utilized Perron's (1997) endogenous unit root test function with the intercept, slope, and the trend dummy to test the hypothesis that the spread has a unit root.

$$SP_t = \mu + \theta DU + \sigma t + \gamma DT + \delta D(T_b) + \beta SP_{t-1} + \sum_{i=1}^{k} \psi_i \Delta SP_{t-i} + \nu_t \qquad (1)$$

In which SP_t is the spread between the commercial banks' lending rate LR_t and the deposit rate, DR_t, or the intermediation premium; $DU = 1$ $(t > T_b)$ is a post-break constant dummy variable; t is a linear time trend; $DT = 1$ $(t > T_b)$ is a post-break slope dummy variable; DT $(T_b) = 1$ $(t = T_b +1)$ is the break dummy variable; and ν_t is a white-noise error term. The null hypothesis of a unit root is stated as $\beta = 1$. The break date, T_b, is selected based on the minimum t-statistic for testing $\beta = 1$ (Perron, 1997).

Threshold Autoregressive Model

To specify the model for the empirical analysis, this study first follows Thompson (2006) to regress the spread, SP_t, on a constant, a linear trend, and an intercept dummy to formally examine the Ukrainian commercial banks' lending rates, the deposit rates, and their spread. The intercept dummy was assigned the value of zero prior to the structural break point and the value of one at the structural break point and thereafter.

$$SP_t = \phi_0 + \phi_1 Trend_t - \phi_2 Dummy_t + \varepsilon_t \qquad (2)$$

In which SP_t is the Ukrainian lending-deposit rate spread, ϕ_g, g = 0, 1, and 2 are coefficients to be estimated. The saved residuals from the above estimated model, denoted by $\hat{\varepsilon}_t$, are then used to estimate the following TAR model:

$$\Delta \hat{\varepsilon}_t = I_t \rho_1 \hat{\varepsilon}_{t-1} + (1 - I_t)\rho_2 \hat{\varepsilon}_{t-1} + \sum \alpha_i \Delta \hat{\varepsilon}_{t-p} + \hat{u}_t \qquad (3)$$

In which $\hat{u}_t \sim i.i.d.(0, \sigma^2)$, Δ denotes the first difference of the variable, and the lagged values of $\Delta \hat{\varepsilon}_t$ are meant to yield uncorrelated residuals. As defined by Enders and Granger (1998), the Heaviside indicator function for the TAR specification is given as:

$$I_t = \begin{cases} 1 & if \ \hat{\varepsilon}_t \geq \tau \\ 0 & if \ \hat{\varepsilon}_t < \tau \end{cases} \qquad (4)$$

Nguyen (2015, p. 7) indicates that, "The threshold value, τ, is endogenously determined using Chan's (1993) procedure, which obtains τ by minimizing the sum of squared residuals after sorting the estimated residuals in ascending order and eliminating the largest and smallest 15% of values. The elimination of the largest and the smallest values assures the $\hat{\varepsilon}_t$ series crosses through the threshold in the sample period."

Nguyen (2015, p. 7) further argues, the specification of this threshold autoregressive (TAR) model permits a degree of autoregressive decay to depend on the state of the commercial bank lending rate-deposit rate spread, i.e. the 'deepness' of cycles. As Nguyen (2015, p. 7) posits, the estimated TAR model empirically shows if the commercial bank lending rate-deposit rate spread tends to revert to the long-run position faster when the spread is above or below the threshold. Therefore, the TAR model reveals whether troughs or peaks persist more when shocks or counter-cyclical monetary policy actions push the commercial banks' lending rate-deposit rate spread out of its long-run equilibrium path. In this model, the null hypothesis that the commercial bank lending rate-deposit rate spread contains a unit root can be expressed as $\rho_1 = \rho_2 = 0$, while the hypothesis that the spread is stationary with symmetric adjustments can be stated as $\rho_1 = \rho_2$."

Threshold Autoregressive Vector Error-Correction Model

If the results of the tests on the above TAR model are positive, this study uses the following Threshold Autoregressive Vector Error-Correction model, specified by Equation (4), (5), and (6), to further investigate the asymmetric dynamic behaviour of the Ukrainian lending rate (LR_t) and deposit rate (DR_t). By adding the ΔLR_{t-1} and ΔDR_{t-1} to Equation (5) and (6) to introduce short-run dynamics into the model, the resulting estimation can be used to study the nature of the Granger causality between the Ukrainian lending rates and deposit rates, short-run and long-term adjustments when the short-run dynamic adjustments are introduced. The statistical nature of the Granger causality will help to empirically evaluate whether and how the lending rates and the deposit rate respond to changes in the intermediation premium precipitated by counter-cyclical monetary policy or economic shocks.

$$\Delta LR_t = \alpha_0 + I_t \rho_1 \hat{\varepsilon}_{t-1} + (1 - I_t)\rho_2 \hat{\varepsilon}_{t-1} + \sum_{i=1}^{n} \alpha_i \Delta LR_{t-i} + \sum_{i=1}^{n} \gamma_i \Delta LD_{t-i} + \hat{u}_{1,t} \qquad (5)$$

$$\Delta LD_t = \alpha_0 + I_t \tilde{\rho}_1 \hat{\varepsilon}_{t-1} + (1 - I_t)\tilde{\rho}_2 \hat{\varepsilon}_{t-1} + \sum_{i=1}^{n} \tilde{\alpha}_i \Delta LR_{t-i} + \sum_{i=1}^{n} \tilde{\gamma}_i \Delta LD_{t-i} + \hat{u}_{2,t} \qquad (6)$$

In which $\hat{u}_{i,t} \sim i.i.d.(0, \sigma^2)$, $i = 1, 2$ and I_t is set in accordance with Equation (4).

Moreover, as indicated by Thompson (2006), the above-specified TAR-VEC model differs from the convention error-correction models by allowing asymmetric adjustments toward the long-run equilibrium. Furthermore, the asymmetric error correctional model replaces the single symmetric error correction term with two error correction terms. Thus, besides estimating the long-run equilibrium relationship and asymmetric adjustment, the model allows for tests of short-run effects (dynamics) between changes in lending rate and deposit rate. In turn, the tests reveal the nature of the Granger causality.

Data and Descriptive Statistics

This study uses the monthly Ukrainian commercial banks' lending rates and deposit rates from January 2000 to January 2019 (2000:01-2019:01) when the data is available. These two time-series data were collected from the database maintained by the International Monetary Fund (IMF.) The IMF is one of the most reputable international financial institutions with its residential experts stationed in membered countries. Moreover, the IMF staff from Washington conduct annual consultations with membered countries. The quality of the economic and financial data provided by membered countries is one of the issues addressed in Article IV of the Annual Consultation Report, approved by the IMF's Board of Directors. Therefore, data extracted from an IMF's database is of high quality and hence very reliable. The commercial banks' lending rate, the deposit rate, and their spread are

denoted by LR_t, DR_t, and SP_t, respectively. Figure 1 displays the behaviour of the commercial bank lending rate, the deposit rate and their spread over the sample period.

As illustrated in Figure 1, the Ukrainian lending rate and deposit rate generally tracked each other fairly well and were closer to each other, resulting in a stable lending-deposit rate spread. Over the sample period, the lending rate and deposit rate oscillate around steep downward trends until the middle of 2004 and then around slightly downward trends until the end of the sample period.
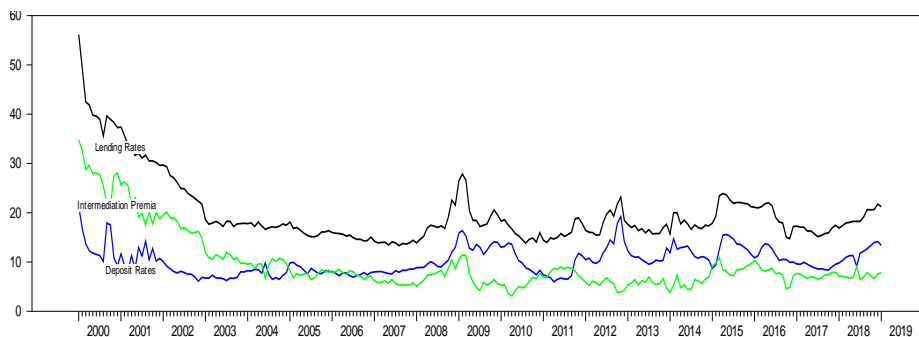

Figure 1. Ukrainian Lending Rates, Deposit Rates, and Intermediation Premia
Source: own calculation based on the monthly data extracted from the International Financial Statistics of the International Monetary Fund.

Moreover, descriptive statistical analysis reveals that the mean Ukrainian lending rate during the sample period was 19.96%, and ranged from 13.31% to 56.19%, with a standard deviation of 6.86%. The mean deposit rate was 10.28%, and ranged from 6.00% to 21.41%, with a standard deviation of 2.75%. Furthermore, the mean lending-deposit rate spread over the sample period was 9.68%, and ranged from 3.12% to 34.78%, with a standard deviation of 6.03%. The correlation between the Ukrainian lending rate and the deposit rate is 48.31%, which is very low. Numerically, for a given level of the lending rate, a monetary policy action or an economic shock causing the deposit rate to decrease would increase the lending-deposit rate spread. The opposite is true if the deposit rate were to change in the opposite direction. The low correlation between these two rates strongly suggests that one of the two rates is exogenous from or does not Granger cause the other rate, which may be discerned by the results of testing hypotheses 2-5.

RESULTS AND DISCUSSION

Results of Perron's Test for Structural Break

The estimation results of Perron's (1997) endogenous unit root tests are summarized in Table 1. The post-break intercept dummy variable, *DU,* is negative; the post-break slope dummy variable *DT*, is positive and they are both significant at the 1% level. The time trend is negative and is significant at the 1% level. The empirical results of these tests suggest that the Ukrainian commercial bank lending-deposit rate spread followed a stationary trend process with a break date on July 2004, which may be attributed to the

intervention in the foreign exchange market and monetary policy stimulations by the Central Bank from the beginning of 2004.

Table 1. Perron's Endogenous Unit Root Test, Ukrainian Data, January 2000 – January 2019

$SP_t = 7.38267 - 5.54140DU - 0.10157t + 0.10195DT + 1.66496D(T_b) + 0.72782SP_{t-1} + v_t$		
(5.3619*) (-5.0390*) (-4.7510*) (4.7598*) (1.6650***) (16.6428*)		
No. of augmented lags: k= 0	Break Date: July 2004	t(α = 1) = -6.2238*

Notes: Critical values for t-statistics in parentheses: Critical values based n = 100 sample for the break-date (Perron, 1997).* and *** indicate significance at the 1% and the 10% levels
Source: own calculation.

Results of the Cointegration Test with Asymmetric Adjustment

The estimation results of Equation (2) are reported in Table 2.

Table 2. Estimation Results, Eq. (2), Ukrainian Monthly Data, January 2000 – January 2019

$SP_t = 18.46461 - 0.01479Trend_t - 9.32802Dummy_t + \varepsilon_t$		
(35.1820*) (-2.6757*) (-10.9067*)		
$ln\ L$ = -624.2207 $\bar{R}^2 = 0.6201$	DW statistic[a] = 0.1445	$F_{(2,226)}$ =187.0673*

Notes: *indicates significance at the 1% level. As articulated by Enders and Siklos (2001, p. 166), in this type of model specification, ε_t may be contemporaneously correlated
Source: own calculation.

Given the estimation results of Equation (2), the estimation results of the TAR model are summarized in Table 3. An analysis of the overall estimation results indicates that the estimation results are devoid of serial correlation and have good predicting power, as evidenced by the Ljung-Box statistics and the overall *F*-statistics, respectively. The calculated statistic $\phi_\mu = 8.7532$ indicates that the null hypothesis of no co-integration, $\rho_1 = \rho_2 = 0$, should be rejected at the 1% significant level, confirming that the Ukrainian commercial banks' intermediation premium is stationary.

Table 3. Unit Root and Tests of Asymmetry, Monthly Data, January 2000 – January 2019

ρ_1	ρ_2	τ	$H_0: \rho_1 = \rho_2 = 0$	$H_0: \rho_1 = \rho_2$	aic	sic
-0.1849*	-0.0994**	0.7422	$\phi_\mu = 8.7532^*$	F = 1.5054	0.6235	0.6990
$Q_{LB\ (12)}$ = 12.0450(0.4421)			$ln\ L$ = -387.8672	$F_{(4,222)}$= 5.6965*	D.W. = 1.9832	

Notes: The null hypothesis of a unit root, $H_0: \rho_{1=}\rho_{2=0}$, uses the critical values from Enders and Siklos (2001, p. 170, Table 1 for four lagged changes and n = 100). *and **indicate the 1% and the 5% levels of significance. The null hypothesis of symmetry, $H_0: \rho_{1=}\rho_2$, uses the standard F distribution. τ is the threshold value determined via the Chan (1993) method. $Q_{LB\ (12)}$ denotes the Ljung-Box Q-statistic with 12 lags
Source: own calculation.

The estimation results further reveal that both ρ_1 and ρ_2 are statistically significant at the 1% level. In fact, the point estimates suggest that the commercial bank lending rate-deposit rate spread tends to decay at the rate of $|\rho_1| = 0.18486$ for $\hat{\varepsilon}_{t-1}$ above the threshold, τ = 0.7422 and at the rate of $|\rho_2| = 0.09939$ for $\hat{\varepsilon}_{t-1}$ below the threshold. Numerically,

the adjustments of the intermediation premium seem to be asymmetric; however, based on the estimated F = 1.5054, the null hypothesis of symmetry, $\rho_{1=} \rho_2$, could not be rejected at any conventional significance level, indicating that adjustments around the threshold value of the commercial banks' intermediation premium are symmetric.

Results of the Threshold Autoregressive Vector Error-Correction Model

The estimation results of the Threshold Autoregressive Vector Error-Correction model are reported in Table 4. In the summary of the estimation results, the partial F_{ij} represents the calculated partial *F-statistics,* with the p-value in parentheses, testing the null hypothesis that all coefficients *ij* are equal to zero. *indicates the 1% significant level of the *t-statistics*. $Q_{LB\ (12)}$ is the Ljung-Box statistics and its significance is in parentheses, testing for the first 12 of the residual autocorrelations to be jointly equal zero. *lnL* is the log likelihood. The overall *F-statistic,* with the p-value in parentheses, tests the overall fitness of the model. The retained estimated coefficients $\alpha_i, \gamma_i, \ \tilde{\alpha}_i, and\ \tilde{\gamma}_i$ are based on the 5% level of significance of the calculated *t-statistics*.

　　An analysis of the overall empirical results indicates that the estimated Equations (5) and (6) are devoid of serial correlation and have good predicting power as evidenced by the Ljung-Box statistics and the overall *F-statistics*, respectively. As to the short-run dynamic adjustment, the calculated partial *F-statistics* in Equations (5) and (6) indicate unidirectional Granger-causality from the Ukrainian lending rate to deposit rate.

Table 4. Asymmetric Error Correction Model, Monthly Data, January 2000 – January 2019

Eq. (5)	**Independent Variables** *Overall $F_{(8,210)}$ = 4.9014(0.0066); lnL= -335.2402; $Q_{(12)}$ = 4.9920(0.9582); $\overline{R}^2$=0.0603*			
ΔLR_t	$\alpha_3 =\alpha_5 =\alpha_6 =\alpha_9 = 0$	$\gamma_1 = \ \gamma_2 = 0$	ρ_1	ρ_2
	Partial F_{11} = 4.5432(0. 0015)	*Partial F_{12} = 0.6090(0. 5487)*	-0.0556	0.0070
Eq. (6)	**Independent Variables** *Overall $F_{(6,208)}$ = 5.8047(0.0000); lnL= -319.8473; $Q_{(12)}$= 18.9220(0.0904); $\overline{R}^2$=0.1187*			
ΔDR_t	$\tilde{\alpha}_6 = \ \tilde{\alpha}_{13} = 0$	$\tilde{\gamma}_1 = \ \tilde{\gamma}_2 = 0$	$\tilde{\rho}_1$	$\tilde{\rho}_2$
	Partial F_{21} = 9.7516(0.0000)	*Partial F_{22} = 2.2674(0.1061)*	0.2325*	-0.0004

Notes: Partial F-statistics for lagged values of changes in the lending rate and deposit rate, respectively, are reported under the specified null hypotheses. $Q_{(12)}$ is the Ljung-Box Q-statistic to test for serial correlation up to 12 lags. *indicate the 1% level of significance; other levels of significance are in the parentheses
Source: own calculation.

　　In addition to revealing the short-run dynamic Granger-causality, the asymmetric error correction model also allows the investigation of the long-run adjustments of the lending rate. Inconsistent with the empirical results of the TAR model, the estimation of Equation (5) indicated that $|\rho_1| > |\rho_2|$ when the short-run factors were incorporated in to the model. However, both ρ_1 and ρ_2 are insignificant at any conventional level. With regard to the long-run behaviour of the deposit rate, the estimation results for Equation (6) also show that $|\tilde{\rho}_1| > |\tilde{\rho}_2|$, after controlling for short-run factors; however, $\tilde{\rho}_1$ is significant at the 1% level, but $\tilde{\rho}_2$ is statistically insignificant even at the 10% level.

DISCUSSION

This investigation used monthly time-series data maintained by the International Monetary Fund over the January 2000 through January 2019 period where the data is available to study how Ukrainian commercial banks set changes in deposit rate that might be precipitated by changes in Central Bank's counter-cyclical monetary policy measures or economic shocks. Descriptive statistics indicated that commercial banks' lending rate, deposit rate, and intermediation premium were very high compared to reported figures for other transitional economies (Nguyen, 2015; Nguyen, Phan, & Williams, 2017; Nguyen, 2018; Nguyen, 2019b). As Figure 1 indicates, over the sample period, the lending rate and deposit rate oscillated around steep downward trends until the middle of 2004 and then around slightly downward trends until the end of the sample period.

Perron's endogenous unit root tests confirmed that the Ukrainian commercial banks' lending-deposit rate spread followed a stationary trend process with a break date of July 2004, which may be attributed to the stimulating monetary policy in the first six months of 2004. More specifically, in their efforts to increase economic growth, the Ukrainian Central Bank intervened into the foreign exchange market. Along with an animation of privatization processes, the Central Bank tried to increase the foreign currency reserves by purchasing international currencies in the interbank market. As a result, during the first nine months of the year, the monetary base grew by 38.2%, compared to 24.3% in the same period in 2003. During this period, the money supply rose by 37.1%, while the corresponding figure for the same period in 2003 was 33.3% (National Bank of Ukraine, 2005).

As to the nature of the relationship between the commercial banks' lending rate and deposit rate, the estimation results for Equation (3) suggested that the null hypothesis of symmetry, $\rho_1 = \rho_2$, could not be rejected at any conventional level of significance. Failure to reject this null hypothesis indicates that adjustments around the threshold value of the commercial banks' intermediation premium are symmetric, which also means failure to reject hypothesis 1. This finding suggests that the Ukrainian lending institutions would respond to the expansionary policy measures or economic shocks in the same fashion as they do with regard to contractionary monetary policy measures.

With regard to time lags in term of months of adjustments, the empirical results for Equations (5) and (6) coincidentally revealed that the longest time lags for α_i is nine months and γ_i is two months; while those for $\tilde{\alpha}_i$, and $\tilde{\gamma}_i$ are thirteen and two months, respectively. Moreover, the partial F-statistics, in Table 4, F_{11} and F_{21} are significant while F_{12} and F_{22} are not significant. Behaviourally, the insignificance of F_{12} indicates that the *null hypothesis H 3* should be rejected, i.e. the Ukrainian deposit rate does not Granger cause the lending rate in the short run. However, the significance if F_{21} suggests that the *null hypothesis H 2* cannot be rejected, i.e. the Ukrainian lending rate does Granger cause the deposit rate in the short run.

These aforementioned hypothesis testing results revealed the unidirectional Granger *causality* from lending rate to deposit rate over the sample period. These findings suggested that changes in the lending rate affected the deposit rate, but the deposit rate was exogenous from the lending rate. These empirical results also suggested that Ukrainian-lending institutions look at their lending rates in the past nine months ($\alpha_i = 9$), but not deposit rates to set their current lending rate. Moreover, as indicated by $\tilde{\alpha}_i = 13$, after a change in the

lending rate pushing the intermediation premium out of its long-run path, the Ukrainian lending institutions took up to 13 months to adjust the deposit rate to the new equilibrium.

Furthermore, the estimation results for Equation (5) – revealing the insignificances of the estimates of ρ_1 and ρ_2 – suggested that the adjustments of the intermediation premium and, hence, the relationship between the lending rate and deposit rate are completed in the short run. More importantly, the insignificance of the estimated coefficient ρ_2 of Equation (5) indicates that the *null hypothesis H 5* should be rejected, i.e. the Ukrainian deposit rate does not Granger cause the lending rate in the long run.

However, the estimation results of Equation (6) revealed that the estimated $\tilde{\rho}_1$ is statistical significance at the 1% level while the estimated $\tilde{\rho}_2$ is insignificant at any conventional level of significance. The finding that the estimated $\tilde{\rho}_1$ is statistically significant indicates that the *null hypothesis H 4* cannot be rejected, i.e. the Ukrainian lending rate Granger causes the deposit rate in the long run.

The uses of the estimation results of the Threshold Autoregressive Vector Error-Correction model to test hypotheses 2-5 above strongly indicates that the *unidirectional Granger causality* from lending rate to deposit rate or the lending rate is exogenous from the deposit rate in the Ukrainian financial markets, which in turn explains the aforementioned low correlation between these two rates in both the short and long run. Moreover, the estimation results of the Threshold Autoregressive Vector Error-Correction model suggested that – when introducing the short-run dynamics to the model above the threshold – the adjustments of the intermediation premium persisted longer; but when the dynamics were below the threshold, the adjustment is completed in the short run.

The high tax rate coupled with pervasive corruption pushed a significant portion of the economy underground, which operates mostly on cash basis to avoid taxes, which leads to losses of tax revenue for the government. In turn, this not only marginalises the intermediating function of the commercial banks but also hinders the flow of foreign direct investments, as foreign companies cannot operate underground.

CONCLUSIONS

Financial intermediation or channelling funds from economic units with surpluses to economic units that need funds for profitable investments was well documented by our study as a critical facilitator for investment and economic growth. Commercial banks play a crucial role in determining the spread between the lending rate and the cost of funds or the intermediation premium. In addition to creating interest income for financial intermediaries, the spread affects the economy's savings, investments, and consumption levels. Changes in consumption or investment influence unemployment, inflation, and gross domestic product, which would improve economic development and social progress.

The research has many implications for Ukrainian economic policies. First, the test results suggest that the intermediation premium follows a stationary trend process with a structural break in July 2004, which may be attributed to the Ukrainian Central Bank's intervention to foreign exchange market in the first six months of that year.

Second, the estimation results of the TAR model revealed that the Ukrainian banks reacted in the same fashion to expansionary monetary policy as they did to contractionary policy or economic shocks that pushed the intermediation premium out of its long-run

path. Moreover, when introducing short-run dynamics to the model, the estimation results indicated that the adjustments of the lending rate are symmetric and completed in the short run when the intermediation is either above or below the threshold.

Furthermore, the calculated partial F-statistics from the estimation of the Threshold Autoregressive Vector Error-Correction Model, reported in Table 4, revealed a unidirectional Granger-causality from the Ukrainian commercial banks' lending to the deposit rates or the exogeneity of their lending rate from their deposit rate. This exogeneity explained the low correlation of 48.31% between Ukrainian lending rate and deposit rate, which strongly indicated that lending institutions in Ukraine did not perform their intermediating responsibility effectively. This exogeneity also hinders the counter-cyclical monetary policy, investment and economic growth and, hence, social progress.

Naturally, the policy recommendation from this empirical finding is that policy-makers should seek to remove this exogeneity in the lending and deposit setting behaviour in the banking sector. Clearly, the priority of the policy should be to rectify the pervasive corruption in the economy. Unfortunately, this recommendation is much easier said than done in emerging and transitional economies, especially in Ukraine.

This empirical investigation used macro-economic data, which is a limitation, as lending and deposit rate-setting behaviours of financial intermediaries may also depend on the characteristics of the depositors, temperaments of the management of these financial institutions, borrowers, and geographical areas of the economy. Thus, a micro-based, firm-level analysis using surveyed data of Ukrainian lending and deposit rates would be a useful complement to this study.

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