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THE RATIO OF THE DYNAMICS OF INTEREST ON LOANS TO THE REAL INTEREST RATE FROM THE POINT OF VIEW OF BANKING SECTORS ITALY, INDIA, MEXICO AND SOUTH AFRICA

Nadiia Viadrova

Department of Banking Business and Financial Technologies, Educational and Scientific Institute
«Karazin Banking Institute» V. N. Karazin Kharkiv National University, Ukraine

Abstract:

The formation and development of stable economic relationships necessitates the consideration of various issues related to banking activities. Based on this, the paper studies the issues of the relationship between interest rates on loans and the real interest rate. For these purposes, data for the banking sectors of Italy, India, Mexico and South Africa are examined. The analysis is based on wavelet coherence estimates. The paper presents various graphs and diagrams that allow one to evaluate the results obtained.

Key words: Analysis, Ratio, Dynamics, Banking sector, Wavelet analysis, Interest rates on loans, Real interest rate

Introduction

The banking sector plays an important role in the economic development of any country, as it ensures the continuous movement of financial resources between various business entities [1]-[3]. At the same time, the banking sector contributes to the accumulation of the necessary volume of resources and their redistribution, both between individual economic agents and between different sectors of the economy [4]-[6]. This allows various economic agents, including the financial sector of the economy, to function and develop stably.

To implement the tasks that arise in the process of functioning of the banking sector, various methods and approaches are used [7]-[16], which operate with a certain set of indicators of banking activity, presented in the form of statistical data series. These data reflect various parameters of the banking sector of the economy, its interaction with business entities, sectors of the economy, the population. The study and analysis of such parameters and indicators of the banking sector allows us to assess the sustainability and stability of their functioning, make forecast assessments of development, consider ways to improve the quality of services provided, and much more.

It should be noted that a certain set of parameters of the banking sector functioning reflects individual areas of implementation of banking services, types of banking activities. Based on the basics of the banking sector functioning, one of its key areas is related to the provision of loans. This type of activity is characterized in general by the volume of loans provided and the interest rate on loans. At the same

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time, the interest rate on loans is interconnected with the real interest rate, which reflects and takes into account the real conditions of inflation [17]-[21]. Analysis of the relationship between the interest rate on loans and the real interest rate allows us to consider and evaluate the effectiveness of banking activities, determine the directions of development of the banking sector of the economy. At the same time, the study of such indicators can be the basis for a comparative analysis of the banking sectors of various economies in their development.

Thus, the main objective of the study is to consider the dynamics of interest rates on loans and real rates from the point of view of the economy of various countries. For these purposes, an analysis of related works was conducted, the dynamics of the corresponding indicators for individual countries was considered, and a mutual analysis of such dynamics was conducted.

Related work

The issues of banking activity analysis are constantly in the sphere of study of various researchers and practitioners. This also concerns the dynamics of the relationship between interest rates on loans and the real interest rate.

M. A. Shokr examines in detail the relationship between the real interest rate, income and bank loans [22]. The main objective of this analysis is to study the effectiveness of monetary policy on bank loans using data from the Egyptian banking sector. For this purpose, the generalized method of moments model is used. The author also examines the impact of monetary policy shocks on bank loans in Egypt. The paper also notes that the real interest rate has a significant impact on bank loans.

G. Dell'Araccia, L. Laeven and R. Marquez analyze the relationship between real interest rates, leverage and banking risk, paying attention to the dynamics of interest rates on loans [23]. The work shows that banks can adjust their capital structures due to the relationship between the dynamics of interest rates on loans and real interest rates. In this case, it is possible to influence the amount of the corresponding banking risk. Thus, the analysis of this correspondence is significant and important in organizing banking activities.

D. Saiti and B. Trenovski examine the impact of loans and interest rates on economic growth based on data from the Republic of North Macedonia [24]. The analysis uses the correlation method and descriptive statistics of variables, tests for stationarity and cointegration. The paper also uses the VECM estimation model for data for the period 2000-2018 [24]. The results show that lending has a positive effect on GDP growth in the short and long term, while real interest rates have a negative effect.

G. B. Eggertsson, R. E. Juelsrud, L. H. Summers and E. G. Wold examine the issue between bank lending and negative nominal interest rates [25]. The paper examines the empirical and theoretical perspectives on the issue. The paper uses data from the banking sector of the Swedish economy. The

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authors consider a model of the pass-through of negative interest rates to interest rates on loans as an identified moment for parameterizing the model and assessing the impact of negative interest rates on general equilibrium [25]. The results of the paper show when negative interest rates are expansionary and when they are not.

W. Bounougou and C. Mawusi analyze the relationship between bank lending margins under negative interest rates [26]. The paper shows that bank margins have decreased in countries where negative rates were introduced. For these purposes, data from 9,638 banks from 41 countries for the period 2009–2018 were analyzed. The authors also emphasize that under negative interest rates, the interest rate on loans decreases faster than the rate on retail deposits. Consequently, the issue of the relationship between interest rates on loans and the dynamics of the real interest rate is key in determining the directions of banking activities.

A brief analysis of the research question shows the possibility of using various tools to conduct the relevant research. At the same time, the object of the research can be data from the banking sectors of different countries. This will allow for comparative analysis and new results.

Interest rates on loans and the real interest rate in the banking sectors of a number of studied economies of individual countries

To conduct the corresponding analysis, we will consider the dynamics of interest rates on loans and the real interest rate in the banking sectors of such countries as Italy, India, Mexico and South Africa (Fig. 1 and Fig. 2). This will allow us to generalize the issue under study in comparison with the development of bank lending in the banking sectors of various countries.

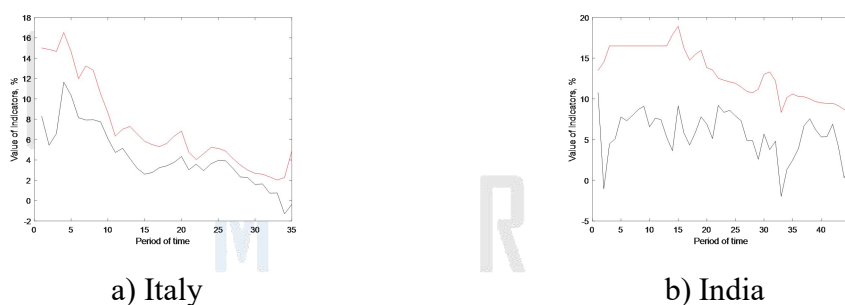
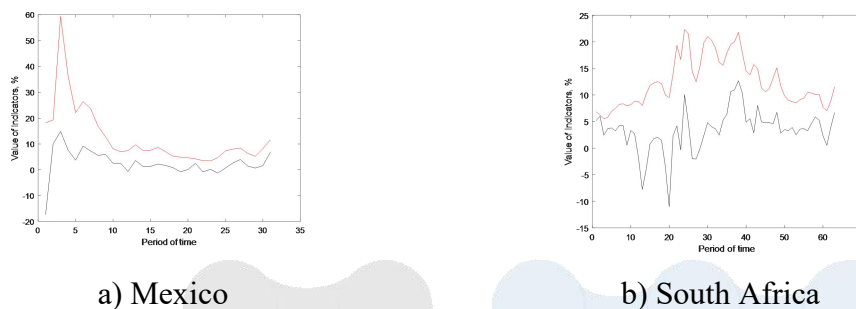


Figure 1: Interest rates on loans and real interest rate in the banking sectors of Italy and India

On Fig. 1 and Fig. 2, the data for interest rates on loans are shown in red, and the data for the real interest rate are shown in black.

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a) Mexico

b) South Africa

Figure 2: Interest rates on loans and real interest rate in the banking sectors of Mexico and South Africa

First of all, it is necessary to note the differences both in the dynamics of individual interest rates from the point of view of the banking sectors of individual countries, and in the dynamics of interest rates on loans and the real interest rate in the context of individual banking sectors of different countries.

The general dynamics of the interest rate on loans and the real interest rate from the point of view of the Italian banking sector, during 1989-2023, is constantly decreasing (Fig. 1a). In some periods of time, the real interest rate has negative values. This is a consequence of the easing of monetary policy, which is typical for periods of crisis. At the same time, the interest rate on loans constantly exceeds the real interest rate, which is typical for all the banking sectors studied. Such excess generally characterizes the costs arising in the banking sectors for servicing such a direction of banking activity as the provision of loans. At the same time, the margin between the amount of interest on loans and the real interest rate from the point of view of the Italian banking sector is also decreasing.

The dynamics of the interest rate on loans and the real interest rate from the point of view of the Indian banking sector also decreases during 1978-2022 (Fig. 1b). However, such a decrease is not significant in comparison with the data on the Italian banking system. At the same time, the dynamics of the interest rate on loans and the real interest rate from the point of view of the Indian banking sector are characterized by strong volatility. At the same time, the dynamics of the real interest rate is more susceptible to such volatility, the values of which in certain periods of time have negative values. At the same time, the values of the margin between the interest rate on loans and the real interest rate from the point of view of the Indian banking sector are also subject to volatility. The highest values of such margin are observed at the beginning and in the middle of the studied period of time.

The dynamics of the interest rate on loans and the real interest rate from the point of view of the banking sector of Mexico, during 1993-2023, are characterized by some stabilization after a significant

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decrease at the beginning of the period under study (Fig. 2a). Here, there is also insignificant volatility of the data under study. The values of the real interest rate in certain periods of time have negative values, which characterizes the presence of problematic periods in economic development, as for other countries under study. The margin between the interest rate on loans and the real interest rate from the point of view of the banking sector of Mexico is gradually leveling out. The highest margin values are observed at the beginning of the period under study.

The dynamics of the interest rate on loans and the real interest rate from the point of view of the South African banking sector, during 1961-2023, are characterized by significant volatility (Fig. 2b). This affects the size of the margin between the corresponding data. At the beginning and in the middle of the analyzed period, the margin values are the highest. In the last third of the analyzed period, the margin values decrease and stabilize. For the South African banking sector data, there are also periods with negative values of the real interest rate.

Thus, in general, despite the differences in the dynamics of the studied data, we can talk about the similarity in the trends of the dynamics between the amount of interest on loans and the real interest rate from the point of view of the banking sectors of various countries. At the same time, the ambiguity of such trends determines the need to compare the dynamics between the studied data series.

Comparative assessment of the mutual dynamics of the studied data

When studying the possibility of solving the problem of conducting a comparative assessment of the mutual dynamics of the data under study, it is necessary to highlight various methods for its implementation [27], [28]. At the same time, among such methods, it is necessary to highlight the ideology of wavelets, where the wavelet coherence method attracts attention. This method has proven itself well in such studies [29]-[36], and allows for the corresponding assessments to be carried out at different time intervals, taking into account the depth of their mutual intersection.

If we have two series of data ($k(t)$ and $d(t)$), each of which reflects the dynamics of an indicator over time t , then we can determine the value of wavelet coherence between the following series of data using the following formula [37]-[39]:

$$Q^2(a, b) = \frac{|\Pi(a^{-1}W_{k(t)d(t)}(a, b))|^2}{\Pi(a^{-1}|W_{k(t)}(a, b)|^2)\Pi(a^{-1}|W_{d(t)}(a, b)|^2)},$$

where:

$W(a, b)$ – values of transverse wavelet spectra,

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a, b – the scale and center of time localization that determine the scale of the wavelet transform,

$k(t), d(t)$ – series of data that we study,

Π – smoothing operator,

$Q^2(a, b)$ – square of the wavelet coherence coefficient. $0 \leq Q^2(a, b) \leq 1$. If these values tend to zero, then we have a weak correlation. Otherwise we have a strong correlation [38], [39].

On Fig. 3 presents estimates of wavelet coherence between data series reflecting the dynamics of interest rates on loans and the real interest rate from the point of view of the banking sector of Italy and India.

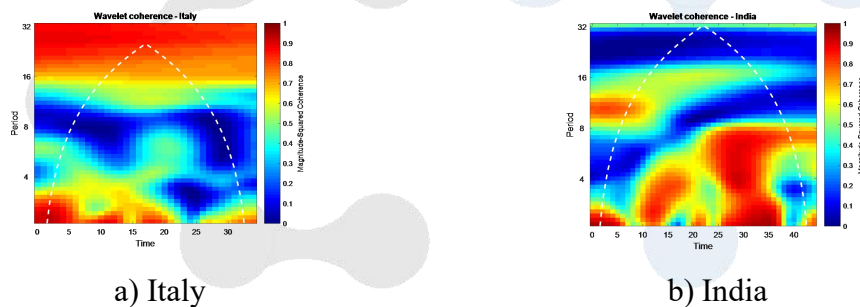


Figure 3: Wavelet coherence estimates for Italian and Indian banking sector data

On Fig. 4 presents estimates of wavelet coherence between data series reflecting the dynamics of interest rates on loans and the real interest rate from the point of view of the banking sector of Mexico and South Africa.

The data presented in Fig. 3 and Fig. 4 reflect the mutual dynamics of the data, which is shown in Fig. 1 and Fig. 2, respectively.

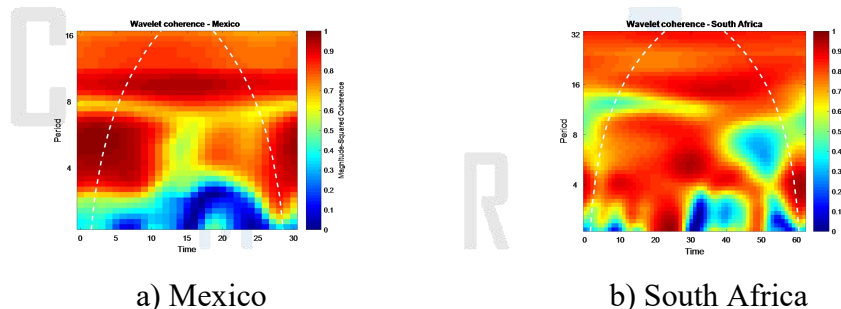


Figure 4: Wavelet coherence estimates for Mexican and South African banking sector data

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Wavelet coherence for the Italian banking sector is characterized by significant and meaningful relationships between the dynamics of interest rates on loans and the real interest rate (Fig. 3a). However, the depth of such relationships is insignificant, which makes it difficult to build forecast models and estimates.

Wavelet coherence for the Indian banking sector is also characterized by significant and meaningful relationships between the dynamics of interest rates on loans and the real interest rate (Fig. 3b). At the same time, the depth of the corresponding relationships is deeper, but fragmentary. This allows us to build limited forecast estimates.

At the same time, the wavelet coherence estimates for the Mexican banking sector on the short-term horizon are minimal and insignificant (Fig. 4a). This makes it difficult to make any short-term forecasts. At the same time, the depth of such estimates is significantly significant and allows us to talk about forecasts for the long-term.

Overall, the wavelet coherence estimates for the South African banking sector are significant and substantial, and have sufficient depth of cross-correlation (Fig. 4b). At the same time, in the last third of the period under study, fragmentation of the significance of such estimates is observed. Nevertheless, there are sufficient opportunities for constructing forecast models for the South African banking sector. Thus, it should be noted that it is advisable to consider wavelet coherence estimates when conducting a comparative analysis between data reflecting the dynamics of interest rates on loans and the real interest rate from the point of view of the banking sector. Such estimates allow us to better understand the mutual dynamics of the data under study and consider other models for their analysis.

Conclusion

The paper examines issues related to the analysis of the relationship between the dynamics of interest rates on loans and the real interest rate from the point of view of the banking sectors of individual countries. Based on a brief literature review, the importance of considering the issue is shown.

For the purposes of analysis, the relevant data for the banking sectors of such countries as Italy, India, Mexico and South Africa are considered. The corresponding data graphs and description are presented. Based on wavelet coherence estimates, the relationship between the dynamics of interest rates on loans and the real interest rate is considered from the point of view of the banking sectors of individual countries. The feasibility of such an analysis is shown.

The results obtained should be used to forecast the development of the banking sector in the provision of credit services.

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