# THE QUANTIFICATION OF THE EUROPEAN INTEGRATION DEGREE OF ROMANIA'S BANKING SYSTEM

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**Abstract**

*There are many methodologies described in the literature for approaching the integration process of financial markets in a given area (a comprehensive study of this subject can be found in Adam K, Jappelli T, Menichini A, Padula M, Pagano M (2002). Financists Emiris (1), Stulz (2), Ferson and Harvey (3) focus their work on the integration of capital markets. Other works look at financial integration from the angle of benefit and cost (4), from a legislative perspective (5, 6), or studying various segments of financial markets (7). In this paper, the subject of convergence is approached first of all by analysing interest rates in the Romanian interbank market, which are on a converging trend to similar values in the EU. In the second part, we propose a model for testing both the mobility of Romanian banking capitals and the European integration process of Romania's banking sector. The model is based on the idea of maximising the Sharpe index in the portfolio theory. Furthermore, knowing that the Romanian economy and its macroeconomic variables have been a function of the American currency more than the European one, we deemed it useful to study whether and to which extent the Romanian banking sector has any converging trend to the American currency market.*

**Keywords:** *financial market integration, interbank interest rate convergence, portfolio yield covariance, Sharpe index, European integration of capital.*

## 1. Introduction

The post-war European construction illustrates the option for regionalisation as opposed to creating a universal state, labelled as globalisation (neo-collectivism, unilateralism). In this evolution we find long-standing disputes between the concept of a "Confederate Europe", the "Europe of Motherlands", of nation states, and a federative European state with a single sovereignty, the "Super-national Federal Europe".

Although it is obsolete in principle, the effects of this controversy are still felt in the institutional discourse of the European construction, with the exception of the Monetary Union, which has its own autonomous institutional balance system.

Unification in banking and finances is based on three complementary elements, according to the European Act (adopted in 1987), namely;

- Freedom of movement of capitals;
- Free cross-border provision of financial and banking services;
- A minimum harmonisation of regulations applied to banking and financial activities.

Taking into account the trends generated by the financial revolution, the reduction in the cyclical nature of financial and currency crises, the upward trends of the weight of capital markets in company funding and the creation of financial conglomerates and supermarkets, as

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well as the prevailing opinion in most European states, there is an opportunity to reconsider the financial and banking regulatory and supervisory structures according to EU practices and regulations.

Economic and monetary integration (an essential goal of Romanian policies, especially European monetary structures), is the subject of this paper.

We deemed it useful to study whether and to what extent the Romanian banking sector still has any convergence trend to the American currency market, given the current financial crisis and the serious problems that the US are facing with sovereign debt, reaching the highest level in the history of America (14,300 trillion dollars).

## Discussion

### 2. Convergence of Interbank Interest Rates

Studying the evolution of interest rates is frequently employed method in showing whether a financial market is following a trend for integration in a certain area, and if the answer is affirmative, at what rate that convergence process is happening. For this analysis, we took into account interbank interest rates for several considerations:

1. Capital operations (as defined by the Currency Regulations, with its subsequent amendments and supplements) carried out by the banks have been free since the second half of 2005;
2. Interbank operations are significant and guiding for the currency market;
3. In Romania, long-term yields (e.g. those related to mortgages loans) are not yet established;
4. The EU zone itself has no full convergence for interest rates on mortgage loans or retail banking (8, 9, 10).

In order to study whether interbank interest rates in Romania are converging to those in the EU zone, we employed the methodology used by Goldberg and Verboven (11). This has the advantage of answering two questions: is the integration process ongoing and, if the answer is yes, at what rate is this process happening? The two authors use an equation of the form:

$$\Delta i_t = \alpha + \beta i_{t-1} + \sum \gamma_k \Delta i_{t-k} + \varepsilon_t \quad (1)$$

Where

I is the interest rate spread (i.e. between BUBOR and EUROIBOR or LIBOR)

$\Delta i_{t-k}$ measures possible series correlations of the error terms

$\varepsilon_t$ represents exogenous shocks

Negative values of β reflect the existence of a convergence process[1] (12), while a β that is equal to zero reflects a lack of convergence. At the same time, the absolute value of β shows the convergence rate. The higher β is (in absolute value), the higher the convergence rate.

Taking into account the large difference between interest rates in RON and those in EUR and USD, the spread was calculated with the following formulae:

- for the BUBOR-EUROIBOR spread

$$\text{spread\_eur} = \frac{1+\text{EUROIBOR}}{1+\text{BUBOR}} - 1 \quad (2)$$

[1] The concept of convergence used in such analyses was "borrowed" from the theory of economic growth (P indicator - convergence). See Durlauf, Steven, Quah (1999)

- for the BUBOR-LIBOR spread

$$\text{spread\_usd} = \frac{1+\text{LIBOR}}{1+\text{BUBOR}} - 1 \quad (3)$$

The regressions of equations (2) and (3) corresponding to the spread between the interbank interest rate for the national currency and the European one, on the one hand, and between the national currency and the American one, on the other hand, lead to the following result:

$\Delta\ \text{spread\_eur}_t = -0.01 - 0.09\Delta\text{spread\_eur}_{t-1} - 0.18\Delta\text{spread\_eur}_{t-1} - 0.17\Delta\text{spread\_eur}_{t-2} - 0.07\Delta\text{spread\_eur}_{t-3}$

$\Delta\text{spread\_usd}_t = -0.02 - 0.10\Delta\text{spread\_usd}_{t-1} - 0.22\Delta\text{spread\_usd}_{t-2} - 0.17\Delta\text{spread\_usd}_{t-2} - 0.07\Delta\text{spread\_usd}_{t-3}$

Therefore there is a process of convergence (β= -0.09) between the interest rate for the Romanian interbank market (BUBOR) and the European one (EUROIBOR), approximately of the same magnitude as between BUBOR and LIBOR (β= -0.10). This result shows that the Romanian interbank market has no "preference" for the European space, and the integration process that has been accelerating since 2000 does not seem to be determined by a particular affinity for the single currency market at the expense of the American dollar.

A possible explanation could be the rather short history of the single currency and the inertia of businesses and the population in changing the structure of their portfolio, as well as negative developments in the Euro area during this period. As regards the rate of convergence, this is approximately at the same value that Adam and co. (8) found in their study in countries of the Euro zone. We should mention that there are some differences between the work of Adam and co. and this paper in the methodology for determining the convergence rate. These differences regard how the spread is calculated and the interbank interest rates chosen (3 months versus one month for this study). What can be worrying is the convergence rate decrease rate shown in table 1.

Evolution of the convergence rate

| Time horizon | β EUR | B USD |
|---|---|---|
| January 2005 - January 2006 | -0.38 | -0.37 |
| January 2006 - January 2007 | -0.18 | -0.19 |
| January 2007 - January 2008 | -0.15 | -0.17 |
| January 2008 - January 2009 | -0.09 | -0.10 |

Furthermore, taking into account the fact that it is becoming increasingly difficult for the inflation rate to decrease when it has fallen under 10%, it is expected that the descending trend given to interest rates by their similar levels in the EU will be increasingly difficult to attain. This result also applies for the convergence process of the interest rates.

## 3. Mobility and European Integration of Romanian Banking Capitals

After studying the convergence between Romanian interbank interest rates and the values of EUROIBOR or LIBOR, we must study the international mobility and European integration in a certain space without having capital mobility, while the reciprocal can be true.

For this, we propose a method that quantifies the level of international mobility and European integration in a certain area of the banking capitals of a country. This method is based on notions of the portfolio theory. Let us consider that at the aggregate banking sector

level, decisions to choose the optimum weight of placements in national currency and foreign currency are made based on maximising the Sharpe index. The resulting value is considered the optimum decision and can show both capital mobility and integration process on a certain area. For this purpose, we will compare the optimum weight of national currency portfolio with the actual value at bank aggregate level. If the two values converge, we can conclude that there is capital mobility, as bank managers place their resources taking into account the criteria of profitability versus risk, with no impediments regarding the geographic location of such placement.

Furthermore, if the optimum value converges to 0.5, we can conclude that there is an integration process (this statement will be proven later). We can also measure the rate of the integration process using the methodology of point 1.

Thus, let:

x= actual weight of national assets in the total banking assets (at aggregate banking system level);

$x^{optimum}$ = optimum weight of national assets in the total banking assets (at aggregate banking system level).

In order to determine xoptimum, let us consider the bank assets as a portfolio consisting of 2 assets: placement in national currency (P1) and placement in foreign currency (P2). Each placement is characterised by average profitability (E1 and E2, respectively) and dispersion (δ1 and δ2, respectively).

let:
P1 (E1, δ1)
P2 (E2, δ2)

The banking asset (P) is a portfolio consisting P1 and P2:

$$P = P1 + P2 \quad (4)$$

but P = P(E,δ)

where:
E = XE1 + (1-X)E2

$$\delta = X^2\delta1^2 + (1-x)^2\delta2^2 + 2x(1-x)\delta12 \quad (5)$$

where δ12 is the covariance between the yields of portfolios 1 and 2

Let us maximise:

$$F = \frac{E}{\delta} = \frac{xE1+(1-x)E2}{\sqrt{x}} \quad (6)$$

After a few computations, we obtain:

$$X^{optimum} = E1(\delta2)^2 - E2\delta12/E2(\delta1)^2 + E1(\delta2)^2 - E1 + E2\delta12 \quad (7)$$

If we have integration over a certain area (assuming that E2 and δ2 are the profitability and risk coordinates for that area), then, according to the law of one price, we have:

$E1 = E2$
$\delta 1 = \delta 2$
$\delta 12 = 1$

Replacing these conditions into formula (7) we obtain, if we have integration:

$X^{optimum} = 0.5$

We notice that finding the optimum solution involves first quantifying the profitability of the external placement, taking into account that in this case the exchange rate has a significant impact on the result.

We started from the formula:

$$E2_t = (1 + r_t^f)CS_{t+1}/CS_t \quad (8)$$

where:

$R_t^f$ – the interest rate for the considered currency;
CS – the exchange rate between national currency and that currency.

Taking into account that the relation of "uncovered interest parity" does not apply (including Romania's case), we started from the assumption that adaptive anticipation characterise Romania's currency market. Therefore:

$$CS_t = CS_{t-1} + \delta(CS_{t-1} - CS_{t-2}) \quad (9)$$

From the relationships (8) and (9) we obtain:

$$E2_t = (1 + r_t^f)CS_t + \delta(CS_t - CS_{t-1})/CS_t \quad (10)$$

Regressing the equation (9), for the two reference currencies (USD and EUR), we obtain the following estimates:

- For EUR[2](13):

$CS_t = 329.13 + 1.00CS_{t-1} + 0.10(CS_{t-1} - CS_{t-2})$

- For USD:

$CS_t = 140.38 + 1.00CS_{t-1} + 0.52(CS_{t-1} - CS_{t-2})$

Therefore, $\delta = 0.10$ for EUR and $\delta = 0.52$ for USD

The values of δ thus determined are replaced successively in formula (10) and then in formula (7) in order to find E2, and then xoptimum (because optimum weight was studied

[2] Estimates were made using a statistical series between January 1999 and April 2005

separately for EUR and USD, we will optain xoptimum_eur and xoptimum_usd, respectively).

Then, using the methodology of point 1, we obtain the following spreads:

$$Spread\_x\_eur = 0.00 - 0.25\ spread\_x\_eur_{t-1} - 0.18\ spread\_x\_eur_{t-1} - 0.34\ spread\_x\_eur_{t-2} + 0.02\ spread\_x\_eur_{t-3}$$

$$Spread\_x\_usd = 0.02 - 0.08\ spread\_x\_usd_{t-1} - 0.03\ spread\_x\_usd_{t-1} - 0.17\ spread\_x\_usd_{t-2} - 0.05\ spread\_x\_usd_{t-3}$$

Where:

$$spread\_x\_eur = 1+x/1+x^{optimum\_eur} -1\} \quad (11)$$

$$spread\_x\_usd = 1+x/1+x^{optimum\_usd} -1\} \quad (11)$$

In conclusion, Romanian banking capitals are characterised by mobility, stronger towards the European single currency than to the American currency (formula 11 gives β-x-EUR = -0.25 β-x-USD = -0.08). As for the integration process, the model currently shows a low degree of integration of the Romanian banking sector, but with high potential to the European space (xoptimum_eur fluctuates around 0.5). These results however should be interpreted as a trend and not ad valorem, because placement decisions of bank managers are not risk-neutral and also take into account banking prudence requirements (e.g: the percentage of placements in foreign currency is not independent of the weight of resources obtained in that foreign currency).

**4. Conclusions**

Starting from the assumption that European integration is a process that is supported not only by Romania's geographic position or its foreign trade (currently over 70% of the exports and over 60% of the imports are with EU partners), but also by the orientation of its political and economic decisions, we can conclude that Romania's banking sector can follow no other path.

European integration of Romania's banking sector must be seen first of all in close connection with the evolution of performance in the real economy. When Romania started its EU accession negotiations in 2000, this meant an improvement of the macroeconomic framework, a resumption of economic growth and a sanitisation of the banking sector. From a legislative viewpoint, due to the existence and implementation of the harmonisation calendar with European regulations, we can conclude that the Romanian banking system is undergoing an integration process. The pace of aligning the system to the European standards is very rapid, which can create difficulties in the implementation of the new regulations, not only for the credit institutions, but also for the central bank itself. However, the benefits of implementing a modern banking legislation, compatible with European standards, clearly exceed the costs of this process.

Aligning the Romanian banking sector to European practices is under way, but the greatest effort is not in accepting the acquis, but in its implementation. In fact, the acquis implementation level is a much more significant indicator of the integration degree and is closely related to the progress of structural reforms.

These reforms have caused (and are still causing) substantial changes in the Romanian banking sector, so that it becomes compatible with the EU requirements. The value of profitability and risk indicators, although it has a higher volatility, shows the potential for continuing structural changes. Direct involvement of banks in the capital market, increasing the presence of other banks with European passport or credit institutions (other than banks) in

the banking market, continuing the concentration process and appearance of a European level player, harsher competition etc., are some of the features that may arise in the following years from the integration efforts. At the same time, an important role in the alignment to European requirements is held by the significant percentage of European capital in the Romanian banking sector and the management that is "imported" this way.

The level and rate of the integration process were tested using either a model that was adapted for this subject or by constructing one based on the portfolio theory. Furthermore, since the affinity towards the American dollar has dominated the Romanian banking world (and to some extent it still persists), in parallel we have studied the integration process to the American currency zone.

The first test shows that there is a convergence process between BUBOR and EUROIBOR, but it has slowed down lately. However, this is normal because a reduction in the inflation rate (and implicitly in the interbank interest rates) becomes increasingly difficult as Romania's inflation goes into single digits. Another observation is that the test does not show whether the convergence is a consequence of the de-inflation efforts of the last few years or a direct effect of a stronger correlation of the interbank currency market with the EU space. It is possible that the first possibility is much more plausible.

The second test starts from a model that is proposed in this analysis, based on maximising the Sharpe index in the portfolio theory. We determined the optimum weight of the aggregate portfolio at the level of the entire banking system that needs to be invested in national assets and it was compared with what actually exists. If the two values converge towards each other, banking capitals are considered to have international mobility, as bank managers place their resources taking into account profitability versus risk criteria, with no impediments regarding the geographic location of such placement. Furthermore, if the optimum value converges to 0.5, it is proven that there is an integration process. The results of the model applied for Romanian banking capitals proved that we can speak of mobility, stronger towards the European single currency space than to that of the American currency. As for the integration process, the proposed model shows a low degree of integration for the Romanian banking sector, but with high potential towards the European space.

In conclusion, the Romanian banking sector has a trend of European integration. However, in order to have a more correct image of the phenomenon, we need to compare the progress and rate of the Romanian integration process with that of the other candidate countries. This way we can have comparative conclusions about the capacity of the Romanian banking system to catch up with the other candidates. At the same time, another subject of discussion in this context is the fact that, while boundaries between the various sectors of the financial market (banking sector, capital market and insurance) tend to be reduced, one must take into account how such interactions can support an evolution of the financial system towards European values.

The current period (since 2009) of economic and financial crisis affecting Romania in an international context that is aggravated by the financial crisis in the US but also in the EU (euro zone) makes Romania not achieve its EU convergence criteria, which extends the timeframe for accession beyond 2015.

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