THE IMPACT OF LEHMAN BROTHERS ON ROMANIAN BANKS LISTED ON BVB

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1. Introduction

The ongoing global financial crisis, with its historic dimensions, will have a lasting impact on the world economy, the worldwide distribution of influence and power and, above all, on banks.

The recent crisis was like a bank run, but it didn't quite fit. The following features describe a model of the recent crisis ought to capture:

- The withdrawal of funds was done by financial institutions (in particular, money market funds and other banks) at some core financial institutions (I shall call them "core banks" for the purpose of this column) rather than by depositors at their local banks;
- The troubled financial institutions held their portfolios in asset-backed securities (most notably tranches of mortgage-backed securities and credit default swaps) rather than being invested directly in long-term projects;
- These securities are traded on markets;
- There is a large pool of investors willing to purchase securities. For example, in the 2008 financial crisis, newly issued US government bonds were purchased at moderate discounts and the volume on stock markets was not low;
- Nonetheless, investors were willing to buy the asset-backed securities during the crisis only at prices that are low compared to standard discounting of the entire pool of these securities;
- The larger the market share of troubled financial institutions, the steeper the required discounts.

While financial institutions in the US are at the heart of the problem, Romanian banks face strikingly similar problems which shows just how deeply interconnected national financial systems have become.

Romanian banks have been hit nearly as strongly as their American peers by losses from subprime mortgage investments, leveraged loans, failed financial hedges and, increasingly, by a surge in conventional credit losses.

All in all, banks on both sides of the Atlantic so far have had to cope with combined writedowns of more than USD 1 tr in this crisis – and the IMF reckons they will even have to take USD 1.3 tr more. Consequently, the market values of US and European banks have fallen to just a fraction of their precrisis levels: both the DJ US Banks Index and its European counterpart, the DJ Stoxx 600 Banks Index, have declined by about two thirds since the onset of the crisis on August 9, 2007, already taking into account a recovery since early March.

In response to the crisis, governments are seeking to establish new rules that make future financial crises less likely and the financial system more resilient. They have already taken and will take further measures to address obvious weaknesses in the regulatory framework and in the instruments and

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methods used by bank supervisors. While this is an ongoing process in which neither the scope of reform nor the extent of collaboration between authorities in Europe and America has as yet been defined, the discussion centers on several areas in which significant changes seem likely:

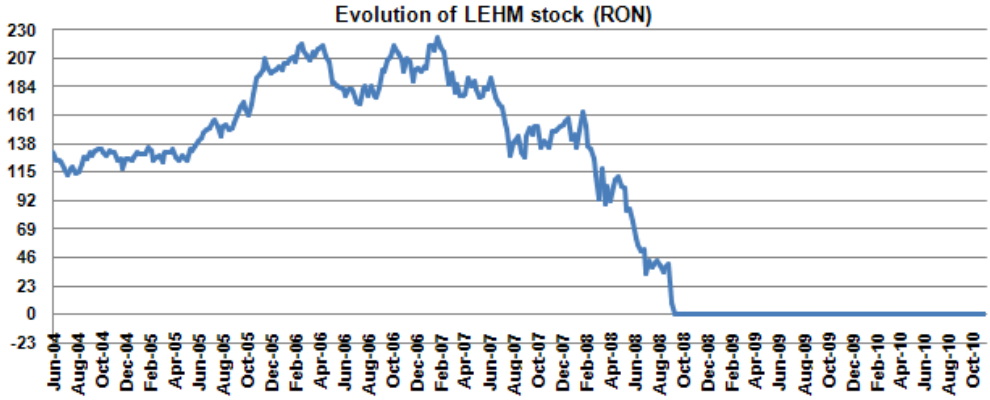
- Banks will be required to hold larger capital buffers (for a more comprehensive discussion of capital levels);
- As a consequence of market developments and regulatory changes, simple, standardized products will gain at the expense of more complex products which will become less attractive due to, stricter product approval processes (incl. the possibility of an outright ban), extensive disclosure requirements for issuers and higher capital requirements for investors in such products;
- Securitization will become less attractive. Investors and regulators demand that banks have “more skin in the game”, i.e. retain some credit risk on their own books, making the whole transaction more expensive. Similarly, investors in securitized risk are set to face higher capital charges. Overall, this new and additional regulation will result in a renaissance of more traditional business models. Banks will be less able to achieve growth and will, hence, on average also be less profitable than previously.

2. The methodology of research

In this article we intend to examine if changes in securities of Lehman Brothers (LEHM) has an impact on Romanian banks securities listed on the stock exchange before and after the collapse of the giant. The period examined is between the 9 June 2004 to 31 October 2010, the time interval is divided into two samples (the point of rupture was seen on September 15, 2008) before collapse and after collapse. Thus the first sample includes 206 observations, and the second 109 observations. We have used the weekly stock market rate (expressed in RON) for the analyzed banks. Data for Lehman Brothers stock is taken from the Datastream database, and the evolution of Romanian banks securities is taken from the database www.bursanoastra.ro by using Metastock program. Data were processed using Eviews program by applying the ARCH / GARCH model.

Lehman, the fourth largest U.S. investment bank, held on May 31, 2008, assets of USD 639 billion and debts of USD 613 billion. Thus, the institution with a 158-year-old went bankrupt in the credit market crisis in the U.S., having survived two world wars and the collapse of hedge fund Long Term Capital Management. Lehman Brothers’ collapse will remain an epic event in the history of financial crisis. On September 15 2008, the day the financial giant made public its downfall, was the peak of the crisis and a starting point for snowballing dramatic events in the financial world. Few days after the failure, Japanese-based Numura Holdings took over the bank’s operations in Asia for 525 million dollars. British-based bank Barclays is now the full owner of LB’s activity in America and Europe. Figure 1 shows the evolution of the stock bank. It can be seen from the graph that the LEHM security value is lower during September 2008 - present.

Figure no.1: Evolution of Lehman Brothers stock during June 2004 – October 2010

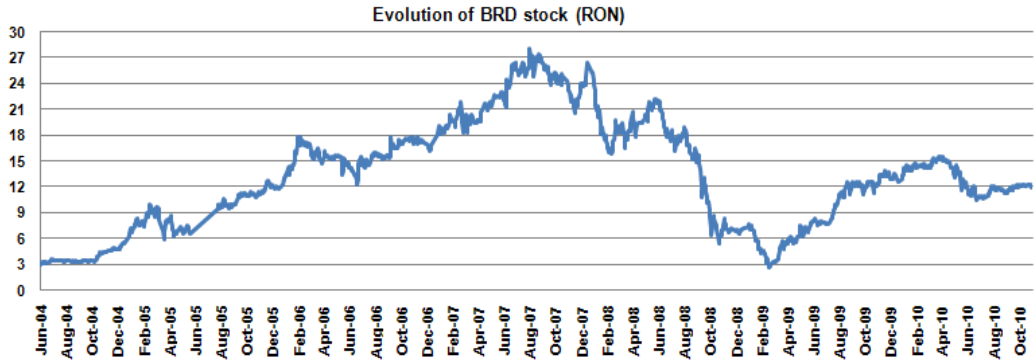


Source: DataStream

Romanian banking system has only four banks listed on the Bucharest Stock Exchange: Banca Transilvania (TLV), the Romanian Bank for Development (BRD), Carpathian Commercial Bank (BCC) and Erste Group Bank (EBS) (our empirical study does not include EBS, whereas was introduced at the Bucharest Stock Exchange only in February 2008).

BRD is the second bank in the Romanian banking sector, by total assets, holding a market share of 14.1% (in 2009). In addition, BRD is one of the main companies listed on the Bucharest Stock Exchange (in 2001) with a share of approximately 20.16% of the BET index. Société Générale holds a stake of 58.32% of BRD share capital since 2004. Figure 2 shows the evolution of BRD stock. Maximum rate was registered on 8 August 2007 (28.1002 RON) and the minimum value on 24 February 2009 (2.722 RON).

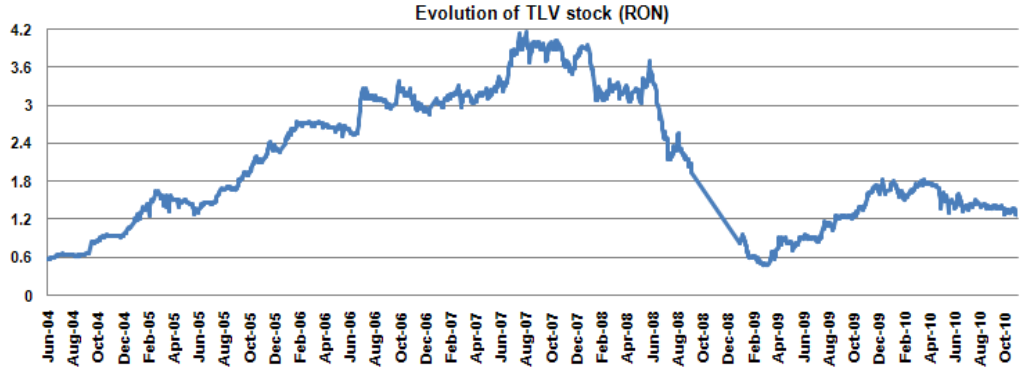
Figure no.2: BRD stock during June 2004 – October 2010



Source: www.bursanoastra.ro

TLV holds 8th place in the Romanian banking system, by total assets, with a market share of 5.9% (in 2009). Since 1997, the TLV is listed on the Bucharest Stock Exchange with a share of about 19.94% of the BET index. Figure 3 shows the evolution of TLV title. Highest quotation was registered on 8 August 2007 (RON 4.1561) and the minimum on 3 March 2009 (RON 0.48237).

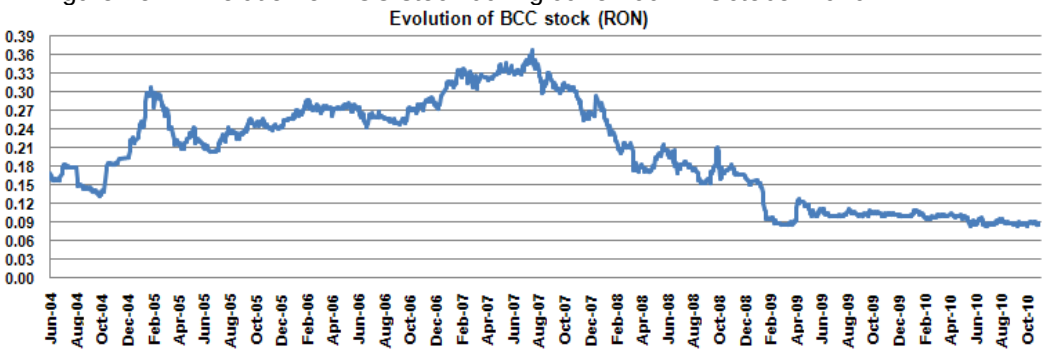
Figure no.3: Evolution of TLV title during June 2004 – October 2010



Source: www.bursanoastra.ro

In terms of total assets, BCC falls into the category of small banks with a market share estimated at about 1%. The bank is present on the Bucharest Stock Exchange, in Class I since 2004. Figure 4 shows the evolution of BCC stock. Maximum rate was registered on 23 July 2007 (RON 0.3689) and minimum on 25 May 2010 (RON 0.0833).

Figure no.4: Evolution of BCC stock during June 2004 – October 2010



Source: www.bursanoastra.ro

3. ARCH/GARCH model

In traditional approach of Box-Jenkins, forecasts are based on the average conditional variable $E(Y_t / Y_{t-1}, Y_{t-2}, ...)$. ARCH-type approach takes into account, in preparing forecasts, the information contained in the conditional variance process, too. It is specific to variable variance time series (nonstationary relative to the variance). The analysis of long-term financial and economic variables often reveals that the variance varies over time. ARCH type models are a class of popular models in finance (the evolution of inflation, interest rates, return on assets). High volatility appears sometimes in periods of political or economic turmoil or in response to some specific events.

The first step in modeling conditional variance was made by Engle in 1982, which proposed an ARCH type model. The ARCH model building should be considered by taking in account two separate equations: one for the conditional mean (equation of evolution of asset returns) and one for the conditional variance (volatility equation).

Initially conditional variance was expressed as a weighted average of squared residuals, actually by taking in account the past shocks; it takes the shape of an ARCH (p). Bollerslev (1986) suggested a mixed form of processes analogous to autoregressive - moving average (consecrate notation - GARCH). The GARCH (p,q) model, proposed by Bollerslev (1986), has the following specification:

$$r_t = \beta_o + \sum_{i=1}^{m} \beta_{1,i} L^i r_t + \sum_{j=1}^{n} \beta_{2,j} L^j \varepsilon_t + \varepsilon_t$$

$$\varepsilon_t \approx N(0, h_t)$$

$$h_t = \alpha_0 + \sum_{i=1}^{p} \alpha_{1,i} L^i h_t + \sum_{j=1}^{q} \alpha_{2,j} L^j \varepsilon_t^2$$

where:

r_t is an ARMA (m, n) process or a Random Walk model (when $\beta_{1,i} = 0, i = \overline{1,m}$ and $\beta_{2,j} = 0, j = \overline{1,n}$);

h_t (volatility) is an ARCH (q) and GARCH (p) process;

α_1 parameters are the persistence of volatility;

α_2 parameters represents the volatility responsiveness to market shocks.

To avoid an explosive process (explosive volatility), it must satisfied the condition:

$$\sum_{i=1}^{p} \alpha_{1,i} + \sum_{j=1}^{q} \alpha_{2,j} < 1$$

In addition, the coefficients of ARCH and GARCH terms must be below one and positive. Interpreted in a financial context, this model describes how an agent tries to predict volatility for the next period based on long-term average (α_0) of the variance, the previous variance (GARCH term) and information on the volatility seen in the previous period (ARCH term). If the prior period asset return was unexpectedly large in absolute terms, he will increase the expected variance in the future. The model accepts the phenomena of volatility clustering, where large changes in the evolution of financial assets are likely to continue big variations of its. If in the prior period, the asset return was unexpectedly large, in absolute terms, the financial analyst will increase the expected variance in the future.

Tests made on mature financial markets have shown response rate of exchange rate volatility generally lower than 0.25 and a degree of permanence of its higher than 0.7. GARCH model was later extended to relax some assumptions or to incorporate the impact of performance asymmetry of financial assets or to separate the trend volatility and short-term volatility.

4. Results

To study the impact of LEHM stock on Romanian banks stock, we have used the model GARCH (1,1).

The equations are as follows:

LEHM=C(1)+C(2)*BRD+C(3)*TLV+C(4)*BCC

GARCH = C(5) + C(6)*RESID(-1)^2 + C(7)*GARCH(-1)

4.1. Before the Lehman Brothers collapse

GARCH model was applied over 206 observations during June 9, 2004 - September 14, 2008.

Table 1 shows that the highest returns are obtained by LEHM title preceded by BRD and TLV stocks. Although, for the first analyzed period, the Romanian stock market was on an upward trend, the returns of BCC title are negative. Skewness (a measure of asymmetry of the distribution of the series around its mean) is negative for all stocks, indicating that the distribution has a long left tail. Distribution of LEHM, BRD and TLV titles is leptokurtic (Kurtosis value is greater than 3), but the distribution is flattened for BCC title (Kurtosis value is less than 3). Jarque-Bera test rejects the probability of the null hypothesis, so none of the series is normally distributed.

Table no.1: Descriptive statistics of banks returns before the collapse

	LEHM	BRD	TLV	BCC
Mean	4.956121	2.581695	0.82394	-1.411371
Median	5.019743	2.781928	1.004471	-1.361018
Maximum	5.411267	3.295103	1.40397	-1.025509
Minimum	2.228883	1.146407	-0.560629	-1.99391
Std. Dev.	0.431359	0.595463	0.521203	0.237856
Skewness	-2.511359	-1.112266	-1.210658	-0.60602
Kurtosis	12.16561	3.168432	3.430465	2.49626
Jarque-Bera	937.6107	42.71852	51.91261	14.78731

The evolution of LEHM stock has a significant positive impact on the TLV and BCC stock, table 2. In other words, if LEHM stock is on an upward trend, then the TLV and BCC titles will follow the same trend. The impact of LEHM stock on BRD title is negative (significant), in other words, the two titles vary in the opposite direction.

Table no.2: The impact of LEHM stock on the Romanian banks securities before the collapse

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	8.667348	0.111520	77.72041	0.0000
C(2)	-0.959416	0.060280	-15.91611	0.0000
C(3)	0.868185	0.068587	12.65819	0.0000
C(4)	1.329914	0.026904	49.43212	0.0000

4.2. After the Lehman Brothers collapse

GARCH model was applied over 109 observations during September 15, 2008 - October 30, 2010.

Following the collapse of the giant, LEHM has negative returns. The returns of BCC stock remain negative. Thus, these two titles are no longer of interest for investors (table 3). Even if the financial crisis deepens, the mean returns of BRD and TLV titles remain positive. Skewness is positive for LEHM and BCC titles (distributions of the series have a long right tail), and for TLV and BRD stock, the indicator remains negative. Distribution of BCC and BRD titles is leptokurtic, but the distribution of LEHM and TLV stocks is platikurtic. The Jarque-Bera test rejects the probability of the null hypothesis in the case of Romanian banks, but is acceptable in the case of american bank (the series is normally distributed).

Table no.3: Descriptive statistics of banks returns after the collapse

	LEHM	BRD	TLV	BCC
Mean	-1.550598	2.268573	0.184058	-2.227747
Median	-1.548897	2.445819	0.32756	-2.290084
Maximum	-0.286746	2.735698	0.585183	-1.309474
Minimum	-2.593431	1.073705	-0.703464	-2.448097
Std. Dev.	0.474991	0.388651	0.346958	0.226197
Skewness	0.237603	-1.011727	-0.936401	1.684797
Kurtosis	2.515761	3.362162	2.880934	5.357233
Jarque-Bera	2.090564	19.19094	13.79281	76.80281

According to table 4, the evolution of LEHM stock has a positive impact on all Romanian bank titles, but the impact is not significant. The impact of LEHM stock on BRD is insignificant, but on BCC and TLV titles, the impact is less significant.

Table no.4: The impact of LEHM stock on the Romanian banks securities after the collapse

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	-1.664471	0.412697	-4.033159	0.0001
C(2)	0.238259	0.150400	1.584167	0.1132
C(3)	0.392729	0.167287	2.347631	0.0189
C(4)	0.248514	0.123024	2.020042	0.0434

The estimates of ARCH and GARCH coefficients in the conditional variance equations are significant at conventional levels in most cases. Sensitivity to past own conditional volatility (GARCH-term) appears to be significant for all series at the 1percent level. Our estimation results suggest also that the current conditional volatility of stock returns in Romanian banks depends as well on past shocks affecting return dynamics, since ARCH-terms are highly significant for all series. Moreover, the ARCH coefficients are relatively small in size, which indicates that conditional volatility does not change very rapidly. However, the GARCH coefficients are large, indicating gradual fluctuations over time.

5. Conclusions

No doubt, the banking sector is undergoing significant changes as a result of the financial crisis. It will become a less “fashionable” and even more heavily regulated industry with greater state involvement, increased investor scrutiny and substantially higher capital levels. This will lead to lower growth, lower profits and lower volatility for banks than during the past few decades – a trend that is exacerbated by the expected lack of major growth drivers, at least for some time. Romanian banks might well face the proverbial lean years due to low loan growth, higher credit losses and weaker revenues from capital-market activities. And while consolidation should continue, albeit with a very different focus, the topic of the day may be re-nationalization and a re-orientation towards domestic markets rather than financial globalization and market integration.

Besides, one should not underestimate another, more general effect: the vast destruction of confidence in banks and of their reputation. This may not have painful consequences in the short run as the demand for banking services is relatively inelastic. In the longer run, however, banks could feel strong negative repercussions. These might e.g. include a fundamental aversion to banks' interests on the part of policymakers as well as difficulties to recruit talented staff due to the lower incentives banks can offer and because of lower overall prestige of jobs in finance. It will therefore be one of the greatest challenges for banks – apart from adjusting to a profoundly changed business environment – to repair their public reputation as soon as possible and regain the trust of clients, policymakers and the general public.

We can say that a significant impact on reducing Romanian bank securities was prompted by the current economic situation (international financial crisis) and less by the bankruptcy of the American bank Lehman Brothers.

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