Financial Stability, Trade Openness and the Structure of Banks’ Shareholders

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FINANCIAL STABILITY, TRADE OPENNESS AND THE STRUCTURE OF BANKS’ SHAREHOLDERS

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Abstract:
The adverse effect of financial crises upon the world’s economies represented the background for the development of a wide economic literature on financial stability. The assessment of this phenomenon stands for a complex exercise, as many techniques can be used for this purpose. Such a technique is the construction of an aggregate financial stability index which allows for a comparison between financial systems stability. Based on an aggregate index and on a panel of data, we show that, for several Eastern European Countries, the financial stability is largely influenced by the trade openness and by the quality of banks’ shareholders. Our conclusion highlights the fact that the countries with less trade openness and with private shareholders banks prove a better resistance to financial stress.

Keywords: financial stability, financial crisis, aggregate index, trade openness, banks’ shareholders, financial integration.

JEL Classification: C33, F36, F43, G01.

1. Introduction
Systemic financial stability became one of the authorities’ major concerns after the 2007 subprime crisis. This concept can be defined as the financial system capacity to carry out appropriately its functions during an undetermined period, by correcting the imbalances frequently occurring in its operational mechanisms. The quantitative assessment of financial system stability, a multidimensional concept, is at the same time complex and difficult. Beside the common methods, such as early warning systems, stress tests or discriminant analysis, a distinct technique lately approached is the construction of an aggregate financial stability index (AFSI), which covers both aspects related to financial systems development and vulnerability, as well as to banking institutions soundness. Several attempts to build an AFSI are highlighted in literature, some of them allowing for accounting data, others focussing on market data and another part combining the origin of the indicators included in the index structure. By means of such an index, we demonstrate, based on a sample of six East-European countries (namely Bulgaria, Estonia, Hungary, Romania, Slovak Republic and Slovenia) for the period 1998-2008 that the financial stability level is negatively correlated with the economy’s trade openness and with the asset share of state-owned banks. A wide range of control variables were used in this case: GDP growth rate, foreign direct investments, unemployment rate, GDP gap, nominal short-term interest rates and final demand. This paper has the following structure: the first section provides an overview of the literature related to the aggregate index construction methods, then we focus on the analysis of the stability level within the East-European countries, the third section presents the results of the econometric tests and, finally, the findings are pointed out.

2. Aggregate financial stability index literature overview
An indicator represents an observable variable used to describe a phenomenon which is difficulty seized. Nevertheless, a multidimensional economic phenomenon like financial stability can only be analyzed by means of a synthetic index which aggregates different so-called “basic” indicators.

In order to be included into the index composition, the individual indicators’ values must be normalized¹. The next step in the index construction is the aggregation of individual values. We can

¹ Several normalization methods can be taken into account, as none of them is satisfactory enough: the statistical normalization, the empirical normalization, the axiological normalization and the mathematical normalization.
choose either to give the same importance to all the variables or to apply different weights based on decision making criteria or on statistical calculations.

The standard procedure consists in giving the same weight to all the variables which are included in the aggregate index. Another possibility is to transform the variables in percentiles, using their sample cumulative distribution function. A third weighting technique identified in the literature is the factor analysis. Finally, the credit weights approach considers the variables by the relative size of each market to which they pertain.

We can thus discover various techniques used to build a financial stability index. One simple method is that enabling a mechanic comparison between the individual stability indicators characterizing different financial systems and it consists of a hierarchy of individual indicators values (the aggregate index components). The inconvenience of this non-parametric method comes from the minimum differences between the values of the indicators having the same weight within the aggregate index.

The aggregate index can also be built as a weighted average of individual indicators [see Gersl and Hermank, (2006), and Roubaah (2008)]. In a recent study about the Romanian financial system stability, made in order to assess the opportunity of Romania’s accession to the eurozone, we have also used an individual indicators weighted average [Albulescu, (2008)].

A third method consists in the construction of an aggregate index, based on daily financial markets data [Illing and Liu, (2003); Nelson and Perli, (2005); Hanschel and Momin, (2005); and Schweizerische Nationalbank, (2006)]. Experts from the Netherlands Central Bank had an original approach to the construction of the index [van den End, (2006)]. The “financial stability conditions index” was built based on indicators characterising monetary conditions, namely: interest rates, effective exchange rate, real estate prices, stock prices, solvency of financial institutions and volatility of financial institutions stock index. The innovation of this index resides in the introduction of some upper and lower critical limits to take into account the potential non-linear effects.

The last method is represented by the construction of an AFSI by calculating the default rate for the entire financial system using the Merton approach [van den End and Tabbai, (2005)]. A similar index assessing the systemic risk, based on the stochastic distribution of individual financial institutions default, was also proposed by Čihák (2007). The advantage of this method is the interconnection between financial perturbations and business cycle.

In the following section we will describe the construction method of an AFSI for the Eastern-Europe financial system, using the standard procedure. We take into consideration individual variables which characterise not only the economy’s vulnerability and the banking sector’s soundness, but also the financial sector development (very important for an emerging country).

3. The assessment of financial systems stability in Eastern Europe

In order to build an AFSI for the six East European countries, namely Bulgaria, Estonia, Hungary, Romania, Slovenia and Slovak Republic, we used annual data. These countries have recently adopted the euro or are on the verge of adopting it.

As normalization method, we mainly use the mathematical method. The benchmark is represented by the indicators corresponding to the euro zone. This way, the aggregate stability index enable a comparison, from the financial stability point of view, between the countries in the euro zone and the countries which have recently adhered to it or which are on the verge to access to the EMU. The indicators’ normalization is carried out as follows:

\[ I_{jn} = IF(I_{jn} > I_{ZER}; 1; I_{jn} / I_{ZER}) \]  \hspace{4cm} (1)

where: \( I_{jn} \) the value of the indicator \( i \) of the country \( j \) at the moment \( t \), \( I_{ZER} \) the value of the indicator \( i \) corresponding to the euro zone at the \( t \) moment, and \( I_{jn} \) is the normalized value of the indicator.

This method enables the normalization of each indicator associated to the analyzed countries, depending on the value registered in the same year for the indicator corresponding to the euro zone. The normalized values enter the interval \((0;1]\).

We use the empirical method as a normalization method when the data related to the euro zone are not available.
\[ I_{en} = \frac{I_{it} - \text{Min} (I_g)}{\text{Max} (I_g) - \text{Min} (I_g)} \]

where: \( I_{it} \) represents the indicator \( i \) of the country \( j \) at the \( t \) moment, \( \text{Min}(I_g) \) et \( \text{Max}(I_g) \) represents the minimum value and respectively the maximum value registered by the indicator \( i \) of the country \( j \) for the analyzed period (1998-2008) and \( I_{en} \) is the normalized indicator.

The empirical method does not take into account the indicators related to the euro zone, but it retains the worst and the best of the values reached by the corresponding indicator for the whole period in all the analyzed countries. The normalized indicators receive values within the interval [0;1]. This method is used mainly to normalize the financial soundness indicators. The individual indicators, grouped into the composite stability indexes which reflect the dimension of the financial stability (financial development, vulnerability and banking soundness), are presented in Table 1².

**Table 1. Individual indicators for financial stability analysis and the normalization methods**

<table>
<thead>
<tr>
<th>Individual indicators</th>
<th>( I_{ij} )</th>
<th>Normalization</th>
<th>Composites index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market capitalisation / GDP</td>
<td>( I_{d1} )</td>
<td>mathematical</td>
<td>Financial Development Index (FDI)</td>
</tr>
<tr>
<td>Total credit / GDP</td>
<td>( I_{d2} )</td>
<td>empirical</td>
<td></td>
</tr>
<tr>
<td>Interest spread</td>
<td>( I_{d3} )</td>
<td>mathematical</td>
<td></td>
</tr>
<tr>
<td>Banking reform &amp; interest rate liberalisation</td>
<td>( I_{d4} )</td>
<td>mathematical</td>
<td></td>
</tr>
<tr>
<td>Inflation rate</td>
<td>( I_{d5} )</td>
<td>mathematical</td>
<td></td>
</tr>
<tr>
<td>General budget deficit (% GDP)</td>
<td>( I_{d6} )</td>
<td>empirical</td>
<td></td>
</tr>
<tr>
<td>Current account deficit (% GDP)</td>
<td>( I_{d7} )</td>
<td>empirical</td>
<td></td>
</tr>
<tr>
<td>REER excessive depreciation or appreciation (Reserves / Deposits) / (Note &amp; coins / M2)</td>
<td>( I_{d8} )</td>
<td>mathematical</td>
<td></td>
</tr>
<tr>
<td>Loans as a percentage of deposits</td>
<td>( I_{d9} )</td>
<td>mathematical</td>
<td></td>
</tr>
<tr>
<td>Deposits / M2 (variation %)</td>
<td>( I_{d10} )</td>
<td>mathematical</td>
<td></td>
</tr>
<tr>
<td>Non-performing loans / Total loans</td>
<td>( I_{d11} )</td>
<td>empirical</td>
<td></td>
</tr>
<tr>
<td>Own capital ratio (Own capital / Total assets)</td>
<td>( I_{d12} )</td>
<td>empirical</td>
<td></td>
</tr>
<tr>
<td>Regulatory capital / Risk weighted assets</td>
<td>( I_{d13} )</td>
<td>empirical</td>
<td></td>
</tr>
<tr>
<td>ROA</td>
<td>( I_{d14} )</td>
<td>empirical</td>
<td></td>
</tr>
<tr>
<td>Liquidity Ratio (Liquid assets / Total assets)</td>
<td>( I_{d15} )</td>
<td>empirical</td>
<td></td>
</tr>
<tr>
<td>Financial Soundness Index (FSI)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The selected indicators (a total of 16) are often used in financial stability literature. Due to the fact that banking sector stands as the sector with the most significant importance within the financial system, most indicators refer to credit institutions.

In order to analyze the financial system development level, we took into consideration the indicator “market capitalisation to GDP”, indicator reflecting the development of the capital market, because this market knew a continuous ascending trend during the last years in Eastern Europe.² We took also into consideration the “total credit to GDP”. The highest this level is, more developed and more mature the banking system is considered. The “interest spread”, calculated as the difference between the average lending rate and the average borrowing rate, represents another indicator which

² Another possibility is to formulate the financial stability index based on different business activity blocks, namely the stock market, bonds market and banking sector [Hadad et al., (2007)].

³ The interpretation of this indicator must be careful because an exponential increase of market capitalisation can reflects a financial bubble.
reflects the system’s development. In the context of increased competition and penetration of important financial groups Eastern European banking market, the interest spread shows a decreasing trend, even if a few years ago its level was quite high. An increased interest spread can point out financial instability periods when the credit institutions undertake additional protection measures against potential risks. The last indicator in this category reflecting the financial system development is an indicator calculated by the European Bank for Reconstruction and Development (EBRD), indicator which shows the status of banking reforms and the interest rate liberalisation.

The starting-point in assessing financial vulnerability is represented by the analysis of the indicators that the International Monetary Fund (IMF) presents in its country reports. In this set of indicators we can distinguish a group which characterizes the macroeconomic stability and another group which describes the credit activity. The first indicator retained in this category is the “inflation rate” which represents a macroeconomic vulnerability indicator. A sustainable level of this indicator increases the investors’ confidence and it is very important for the financial stability. Another macroeconomic indicator which describes the government performance is the “general budget deficit to GDP”. If the budget deficit is high, the investors lose their confidence in the government’s capacity to ensure a future sustainable economic growth. The third vulnerability indicator is the ratio “current account deficit to GDP”. An important current account deficit shows a macroeconomic imbalance which supposes a future correction, affecting the financial stability. The next indicator is the excessive appreciation or depreciation of the real effective exchange rate (REER). A considerable volatility of the REER shows that the economy undergoes major corrections by means of the exchange rate. The banks reserves represent a guarantee related to the bank’s capacity to respond to severe money withdrawals. At the same time, the liquidity preference is important because the stronger the cash payments preference manifests, more significant the increase of withdrawals probability is. To highlight these assumptions, we have retained as indicator the ratio between “reserves to deposits” and “note & coins to M2”. The last two vulnerability indicators retained in our analysis have the capacity to issue signals about an eventual financial crisis. The credit boom which is not accompanied by a deposits’ expansion shows a potential imbalance within the financial system (the confidence in the national currency diminishes). The “deposits to money supply – M2” ratio reflects the relation between savings and consumption.

The third category of selected indicators is related to financial system soundness. These indicators are proposed and used by the international financial institutions in assessing financial system soundness exercises. The first soundness indicator is represented by the “NPL to total loans ratio” and reflects the loans quality. The second indicator in this category – “own capital to total assets” – reveals the banking system capitalization level. The third indicator, “regulatory capital to risk weighted assets ratio”, also characterizes the banking sector capitalization, but the most important information offered by this indicator is related to banking institutions’ solvability. The “return on assets” (ROA) is the next soundness indicator retained in our analysis. Its value is relatively high for the East-European banking institutions, but this situation can be considered normal for a transition country. A higher level of the ROA reflects a more profitable and sounder banking system. Finally, we took into consideration the “liquidity ratio” (liquid assets / total assets), indicator calculated by the IMF in its country reports, on annual basis. The liquidity index offers important information on financial system stability. Better the banking institutions’ liquidity, better their capacity to cope with the shortage of liquidities on the market.

The AFSI for each country is calculated as an arithmetic mean of the data available for the 16 normalized individual indicators (the standard procedure):

\[ AFSI = \frac{\sum_{j=1}^{3} I_{yj}}{16} \]  

Thus, we have:

\[ \sum_{j=1}^{3} I_{yj} = \sum_{j=4}^{7} I_{yj} + \sum_{j=8}^{12} I_{yj} + \sum_{j=13}^{16} I_{yj} \]
and we reach the following formula:

\[
IASF = \frac{4I_{10}}{16} + \frac{7I_{16}}{16} + \frac{5I_{16}}{16}
\]

where: \( I_i \) are the composite indexes (\( I_{10} \) – financial development index FDI; \( I_{16} \) – financial vulnerability index FVI and \( I_{16} \) – financial soundness index FSI).

The evolution of the aggregate stability index of each country is presented in Figure 1.

![Figure 1. The evolution of the AFSI in the Central and East European Countries](image)

**Source:** author’s calculations

Some conclusions can be drawn in respect of the evolution of different financial stability aggregate indexes. First of all, an improvement of the financial stability can be noticed in all the considered countries, during the analyzed period. Then, a stronger convergence can be observed, except for the last years (2007 and 2008). This means that the financial stability of the analyzed systems was differently affected by the financial crisis. Except for Hungary and Slovenia, all the other countries experienced a reduction of the aggregate stability index in 2008\(^4\). The countries which acceded to the euro zone – Slovenia in 2007 and the Slovak Republic in 2009 – have a higher financial stability level, while the countries whose accession to the EU occurred only in 2007 (Romania and Bulgaria), show a lower value of the AFSI. The most considerable deterioration of the stability level was reached by Romania and Bulgaria (a decrease of the index of about 8% as compared to the previous year).

However, in order to perform a more detailed analysis, it is necessary to observe the progress of each composite index. Thus, the evolution of financial development indexes is presented in Figure 2.

\(^4\) Hungary registered a slight improvement of its financial stability during this year, but the result is strongly influenced by the reduction of the budgetary deficit and by the inflation rate. In spite of the fact that its index progresses, this country asked for the IMF support in the context of the economic and financial crisis.
Figure 2. The evolution of FDI in the Central and East European Countries

Source: author’s calculations

Romania and Bulgaria dispose of a financial sector less developed than the financial sectors of the other East European countries, but these gaps significantly diminished in 2007. The Estonian financial sector is the most developed, getting near the average of the Union. The divergent evolution in 2008 is largely influenced by the credit activity and by the stock exchange capitalization.

But, an analysis very important for the stability is the analysis of the financial vulnerability indicators. We have previously seen that the vulnerability index offers the most important signals concerning the deterioration of the financial system stability. The Figure 3 shows the trend of the financial vulnerability indicators.

Figure 3. The evolution of FVI in the Central and East European Countries

Source: author’s calculations

The figure above highlights the same finding, because starting with 2005, the analyzed countries financial systems vulnerability accentuates. In this case, we also notice an indicators convergence, except for 2008, when some financial systems became more vulnerable than others in the context of the break out of the economic crisis. If the macroeconomic fundamentals and the credit activity knew an improvement in countries such as Slovenia and Hungary, there are some other countries (Romania, Bulgaria and the Slovak Republic) whose financial systems became more vulnerable in front of external shocks. The financial stability of these countries was not too affected due to the soundness of the banking sector.
The last composite index (FSI) is relatively stable during the second part of the analyzed period, except for the last year. If the soundness of the Romanian and Slovak banking institutions was quite poor during 1998-2000, after the sector’s reform, the financial soundness indicators knew values superior to those reached by other countries, at least in Romania. In 2007, we notice a high convergence of these indicators which however degrade due to the considerable credit expansion and to the stronger competition on the markets of the analyzed countries.

We can observe at the same time a more important reduction of the financial soundness index in Hungary and in Slovenia. For Slovenia, the results are significantly influenced by the data availability (only the capitalization and the profitability indicators are available). The FSI shows the higher convergence level among the analyzed composite indicators. This can be explained by the fact that a prudential regulation harmonization process occurred at European level.

![Figure 4. The evolution of FSI in the Central and East European Countries](image)

**Source:** author’s calculations

In conclusion, it appears that the countries which are already part of the euro zone have a higher financial stability and a better resistance to shocks. The impact of the crisis affected in a different manner the analyzed countries\(^5\). If in the less developed countries, such as Romania and Bulgaria, the vulnerability indicators were the indicators which mainly deteriorated, Slovenia and Hungary made efforts in order to diminish the macroeconomic imbalances. In these countries, the situation of the banks knew an unfavourable turn.

But there are also others factors which influenced the financial stability trend in these countries. The trade openness can represent a transmission channel for financial stress. Thus, the countries which have a large flux of imports and exports with the partner countries are more exposed to international turbulences. Another factor which may influence the financial stability is the quality of banks’ shareholders. Moreover, the private banking institutions have a better incentive to monitor risks than the state owned ones.

3. The Results of the Econometric Tests

Using a panel of data for the six mentioned countries, we test the influence of trade openness and of shareholders’ quality upon financial systems stability (financial stability is assessed by means of the aggregate index – afsi). The trade openness (trade) is measured by the share of trade in the GDP. The shareholders’ quality is reflected by the asset share of state-owned banks (assob).

A wide set of control variables are used in the econometric model. Their interpretation and the coefficients’ sign are presented in Table 2.

**Table 2. Control variables**

\(^5\) Even if it seems premature to analyze the crisis impact on the financial stability of Central and East European countries, we can obtain some information related to the evolution of the AFSI in 2008.
The variables are extracted from EBRD and Eurostat databases. The tested equation is:

\[ afSi_t = c + \alpha_{\text{trade}} + \beta_{\text{assob}} + \lambda \cdot Z_t + \varepsilon_t \]  

(6)

where: the \( c \) is the constant, the \( Z_t \) is the vector of the control variables and \( \varepsilon_t \) are the errors of the model.

The results of the econometric tests are presented in the table below:

**Table 3. Econometric results**

<table>
<thead>
<tr>
<th>Dependent variable: ( \text{afSi}_t )</th>
<th>Coefficient</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>( c )</td>
<td>0.774147***</td>
<td>0.040771</td>
</tr>
<tr>
<td>( \text{trade} )</td>
<td>-0.073484**</td>
<td>0.029834</td>
</tr>
<tr>
<td>( \text{assob} )</td>
<td>-0.000872***</td>
<td>0.000428</td>
</tr>
<tr>
<td>( \text{gdp gr} )</td>
<td>0.011972***</td>
<td>0.003636</td>
</tr>
<tr>
<td>( fli )</td>
<td>-0.010924***</td>
<td>0.002534</td>
</tr>
<tr>
<td>( \text{unem} )</td>
<td>-0.005742***</td>
<td>0.001589</td>
</tr>
<tr>
<td>( \text{gdp gap} )</td>
<td>-0.005974***</td>
<td>0.001822</td>
</tr>
<tr>
<td>( \text{ustrir} )</td>
<td>-0.003704***</td>
<td>0.000574</td>
</tr>
<tr>
<td>( fli )</td>
<td>-0.003772</td>
<td>0.002335</td>
</tr>
<tr>
<td>( R^2 )</td>
<td>0.712000</td>
<td>1.519112</td>
</tr>
<tr>
<td>Observations:</td>
<td>66</td>
<td></td>
</tr>
<tr>
<td><strong>Note:</strong> <em>, ** and *** mean statistic relationship significant at 10%, 5% respectively 1% (t-statistic).</em>*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

We can observe that the coefficients are significant, having the expected sign. One exception is represented by the final demand (at 2000 prices), whose coefficient is not significant. The explanatory power of the model is good, but the Durbin-Watson test shows that the errors of the model may not be independent (this can be a problem when performing the testing with the classic OLS method). That is why we present the errors correlation matrix (Table 4).

**Table 4. Errors correlation matrix**

<table>
<thead>
<tr>
<th>resid bu</th>
<th>resid es</th>
<th>resid hu</th>
<th>resid ro</th>
<th>resid sv</th>
<th>resid sk</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.000000</td>
<td>0.406466</td>
<td>-0.189918</td>
<td>0.465298</td>
<td>0.028752</td>
<td>0.082219</td>
</tr>
<tr>
<td>resid es</td>
<td>0.406466</td>
<td>1.000000</td>
<td>0.290371</td>
<td>0.091531</td>
<td>0.190139</td>
</tr>
<tr>
<td>resid hu</td>
<td>-0.189918</td>
<td>0.290371</td>
<td>1.000000</td>
<td>-0.653577</td>
<td>0.112194</td>
</tr>
<tr>
<td>resid ro</td>
<td>0.465298</td>
<td>0.091531</td>
<td>-0.653577</td>
<td>1.000000</td>
<td>-0.444807</td>
</tr>
<tr>
<td>resid sv</td>
<td>0.028752</td>
<td>0.190139</td>
<td>0.112194</td>
<td>-0.444807</td>
<td>1.000000</td>
</tr>
<tr>
<td>resid sk</td>
<td>0.082219</td>
<td>0.181578</td>
<td>0.185340</td>
<td>-0.208713</td>
<td>0.345068</td>
</tr>
</tbody>
</table>
As it can be seen, the errors are not strongly correlated in order to require the use of the SUR method. Consequently, based on the outcomes of the performed econometric tests, we can assert that the countries trade openness and the banks shareholders’ quality influence the financial systems stability.

4. Conclusion

The use of an AFSI for the assessment of the financial sectors’ stability became an usually practice during the last years. Based on this technique which enables different comparisons in term of financial stability, we demonstrated that the trade openness and the banks shareholders’ quality influence the Eastern European countries financial systems stability.

Thus, more intense the commercial exchanges grow, more exposed the financial systems are to international turbulences. Moreover, the state participation to the banking institutions shareholding has a negative impact on financial systems stability.

5. References


