Comparison of Bank Financial Stability Factors in CIS Countries

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Abstract

We develop the model for estimating the default probabilities of banks for Russia, Belarus, Kazakhstan and Ukraine using banking statistics from 2005 to 2013. We find that a binary logit regression works best. In addition, macroeconomic and institutional factors significantly improve model accuracy. The results indicate that there are significantly different sources of risk in banking in the considered banking systems. These results are useful for agents operating with CIS banks.

Keywords: Probability of Default, Banks, CIS, Russia, Belarus, Ukraine, Kazakhstan.

1. Introduction

Development of Russian economy is closely associated to integration with post-Soviet states. Signed in 1991 Commonwealth of Independent States (CIS) as well as Customs union of Belarus, Kazakhstan and Russia are fundamental for Russian international relations. Both unions are persistently important political and trade partners of Russia. As fig. 1 shows, between 2005 and 2011 trade turnover of Russia more than doubled, but CIS share was almost unchanged.

Development of banking systems in CIS countries was striking different since 1991. Further integration is impossible without close interaction of local banking systems. At the same time counterparty risk is much higher in international banking. In crisis periods like 2008 – 2009 the issue is especially important to handle. So in this paper we build a model to:

- Measure financial stability of particular CIS banks.
- Compare the sources of risks in banking across CIS.

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Section 2 and 3 provide overview of the banking sectors of core CIS members and literature respectively. Next section discusses data and model used. Sections 5 and 6 represent the model estimation approach and results. The Final chapter concludes.

2. Banking industry overview

In this research we consider the most important partners of Russia in politics and trade in CIS: Kazakhstan, Belarus and Ukraine over the period from 2005 to 2013.

Local banking systems of contemporary CIS countries are successors of the Soviet banking system which consisted on several state–owned banks. However each CIS county has unique peculiarities of banking system development. We will consider some examples.

Russia. Since 2000 there has been intensive growth in the Russian banking system. 35 Russian banks were among the Top 1000 World Banks by total assets in prosperous 2000s. However drastic growth in the sector caused overheating with a resultant upturn in bad debts, when recession shook the world economy in 2008. Russia still has about 900 banks, although the number has almost halved over the period from 1998 to 2014. State participation is significant in Russian banking system, foreign ownership is very low. The banking sector is quite concentrated with 5 banks holding about half of sector assets.

Ukraine. The banking sector of Ukraine is two-tied represented by National bank of Ukraine and about 170 commercial banks. State participation in the banking sector is moderate. At the same time the share of foreign banks in the sector is significant (over 40%). Majority of banks deliver services to both corporate and retail customers. During the crisis in 2008 – 2009 the Ukrainian banking sector was hit by 14.8% drop in national GDP. Banks experienced huge losses. Later the banking industry revived but was hit second time by political instability.

Belarus. In 2004 – 2008 the banking sector of Belarus was boosting. The country managed to overcome crisis in 2008 – 2009 without significant distortions. However expansionary fiscal and monetary policy with exchange rate fixed led to huge current account deficit and downturn in 2011. The industry is highly monopolized, there are 30 banks overall. Top 10 banks control over 90% of assets in the sector. State share of bank ownership is about 65-70%. The remainder is shared among foreign banks (Russian banks are dominant here).

Kazakhstan. The local banking sector was rapidly developing before the global crisis shook the Kazakh economy in 2007 which spoilt bank assets and profitability. Banking system has not still gained pre-crisis size and scale. There are about 40 banks in the banking industry with high concentration (15 largest banks manage over 90% of assets). Foreign participation in the banking sector is about 20%, government influence is limited. Fig. 2 compares some key characteristics of the considered economies.
To some up, CIS economies have one starting point in 1991 but have unique paths of development. Proper indication of risk sources is essential for further integration of the banking systems. The probability of default (PD) is an integral measure of its financial stability. Factor decomposition of default probability provides a good insight into key risk sources selection and comparison.

3. Brief literature review

Approaches to developing Early Warning Systems (EWS) for the banking system, as well as determinants of bank financial distress in the developed world, have been investigated in numerous papers and are summarized in Bluhm et al. (2010)\(^1\). Mainly, this review will cover the experience of developing countries and Russia, and take the national banking industry peculiarities into consideration.

Generally speaking, balance sheet structure and other financial characteristics of banks, such as bank size and capitalization, are the most meaningful predictors of defaults\(^2\). The former is usually measured as a bank's total assets on a logarithmic scale. There are many points in support of the crucial importance of this factor:

- Bank’s total assets significant in the majority of models\(^2,3\).
- In emerging markets, larger banks are better able to sustain and control the credit risk of long-term lending\(^4\).
- Ceteris paribus, large banks have a higher insolvency risk than the small ones\(^5\).
- Large banks with complex balance sheets are not always adequately disciplined, engaging in operations that are too complex for the CBR\(^6\).

The second variable is capitalization and used to assess the capital adequacy of banks; it is calculated as a proportion of a bank's capital to its total assets. This index defines a bank's coverage of risks against its own resources. This is why a low capital adequacy ratio is suspicious from a regulator's point of view: banks with moderate capitalization shift future potential losses to clients and have a free-hand in taking excessive risk. However, debt financing has its merits: overcapitalized banks are usually run inefficiently, which may result in more non-working assets\(^7\). Consequently, a U-shaped relationship between PD and the bank capital adequacy ratio is expected. According to the EWS for the Russian banking sector in Lanine et al. (2006)\(^8\), greater capitalization of a bank diminishes its PD; whereas, bank size has no significant impact on its PD.

The next determinant of PD is a bank's liquidity position. Liquid assets are required to meet deposit outflows when they occur. Consistent with Lanine et al. (2006)\(^8\), the positive effect of liquidity exhaustion on the odds of default is theoretically and empirically confirmed. To capture liquidity risk, a ratio of non-government
securities-to-bank assets was employed. The problem is to test whether or not a very liquid position worsens a bank's financial statement, as a result of lower profitability or higher market risks incurred.

In line with the literature, the inclusion of macroeconomic and institutional factors improves In Bock et al. (2012)\(^9\), the authors examined the determinants of non-performing loans in developing countries with panel data analysis. Their results underscored the significance of the GDP growth rate for empirical research in banking. In Mannasoo and Mayes (2009)\(^{10}\), this variable was regarded as a forward-looking factor for future bank insolvency. Parameters reflecting the stage of the economic cycle were discussed in Karminsky et al. (2005)\(^3\). They came to the conclusion that GDP growth rate, export-to-import ratio, and conditions of trade, are among the most reliable predictors of bank failure in the long-run.

The other important factor is institutions; many researchers define bank ownership type (fig. 2) as the dominant factor for its performance. For example, while Fungacova and Solanko (2009)\(^5\) concluded that foreign-owned banks show relatively high PDs, Micco et al. (2007)\(^{11}\) showed that foreign banks achieve better operational results than others in developing countries.

Clarke et al. (2007)\(^{12}\) reveal three principal factors that negatively-affect banks' stability scores in the developing world. Furthermore, Micco et al. (2007)\(^{14}\) explained that state banks hire excess employees, carry vast administrative expenses, and are less profitable than the others. Nevertheless, governments always support a state bank in cases of financial distress. These banks also traditionally enjoy wider access to the interbank lending market.

Banks change their risk profile after the introduction of the Deposit Insurance System (DIS)\(^5\). As a result, depositor motivation to monitor bank performance was discouraged, and banks adopted risky investment policies to increase profits and offered higher interest rates on savings to attract clients. This led to the problem of moral hazard in banking.

Another essential institutional factor of a bank’s PD is competition. Using a panel data model analysis Fungacova and Weill (2009)\(^{13}\) found supporting evidence that banks with higher market power are more financially stable. The authors also claim that in a competition profile, the location of a banking business might also influence default occurrences.

4. Data and model

4.1. Data

The initial step to develop a PD model is to define default; however, there is no common opinion in the literature. For example, we should distinguish between true defaults, voluntary license revocations and failures due to legal reasons. So, the indicators of default in our model are exhausted capital sufficiency and inability to satisfy creditors' claims.

We used bank-specific statistics provided by local Central banks of the CIS countries for the period from 2005 to 2013. The data collected from regulators have good coverage of the banking sectors in Russia, Ukraine, Belarus and Kazakhstan.

4.2. Model

This section briefly illustrates how to use a logit model to predict defaults. The binary dependent variable default equals one if an observation is classified as insolvency, and zero if otherwise. The model is able to estimate a bank's PD directly in the form:

\[ P(\text{default} = 1) = \Lambda (\mathbf{x} \ast \mathbf{\beta}), \]

s. t.
\[
\begin{align*}
    &\{ P(\text{default}=1) \to 1 \text{ if } x \ast \beta \to \infty \\
    &P(\text{default}=1) \to 0 \text{ if } x \ast \beta \to -\infty \}
\end{align*}
\]

where \( \Lambda(x \ast \beta) = \frac{\exp(x \ast \beta)}{1 + \exp(x \ast \beta)} \) is a function taking values between 0 and 1; \( x \) is a vector of \( n \) regressors (i.e., \( x \ast \beta = \beta_0 + \beta_1 \ast x_1 + \beta_2 \ast x_2 + \cdots + \beta_n \ast x_n \)). We will estimate individual regressions for each country to check the adequacy of the model used and risk factors in each country.

It is important to note that the regression coefficient sign is useful to judge the influence of the relevant variable on a probability of default:

\[
\frac{\partial \Lambda(x \ast \beta)}{\partial x_i} \ast \Delta x = \lambda(x \ast \beta) \ast \beta \ast \Delta x, \text{ where } \lambda(f(x)) > 0.
\]

For additional details on this topic, please see Greene (2007)\(^{14}\). Next the pooled model will be run to compare sources of risk in CIS countries and test if they are different. Approaches to PD model building for Russia are shown in detailed in Karminsky and Kostrov (2014)\(^{15}\).

5. Model estimation

In the next stage, we will carry out a factor selection process to cover the main risks of banking in CIS countries.

- **Business Risk**
  Financial troubles immediately result in a sharp decline in a bank's capital. This is why the Capital-to-Total assets ratio will be exploited as a factor in the PD model. This ratio also shows how much "skin in the game" the bank has.
  
  No commercial company with permanent losses can be successful in the long-run. A typical profitability measure for all businesses, a Balance profit-to-Total assets ratio, was used.

- **Credit Risk**
  Asset quality is a dominant factor of future profits and losses calculated by the ratio of Non-performing loans-to-Total loans.

- **Market and Liquidity Risks**
  We will use Non-government securities-to-Total assets ratio to assess both liquidity and market risks management carried in a bank.

Next the model will be improved with macroeconomic and institutional variables.

6. Expected model estimation results

The model for Russia has already been discussed in Karminsky and Kostrov (2014)\(^{15}\). So we explicitly state the obtained results for Russia and forecast for other considered CIS countries.

- **Capitalization:** Capital-to-Total assets ratio
  Over- and under-capitalized banks exhibit higher default probabilities in Russia. We expect close results for other CIS countries. At the same time the relation could be linear with lower default probability and for banks with higher capitalization. The ratio should be definitely important for Ukrainian banks with enormous loss of capital and financial stability in 2008-2009.

- **Profitability:** Balance profit-to-Total assets ratio
  Russian banks with extremely high or low profitability score higher default rate risks. Naturally, poor banks lack sufficient funds to meet obligations. A bank with unusually high earnings could take excessive risk, which
leads to an increase in PD. Moreover, in efficient markets, it is impossible to maintain outstanding profitability without bearing commensurate financial risk. We expect consistent results for other countries. The factor will probably be less significant for Belarus with state predominance in local banking markets. The effect is expected to be sharper for Ukraine with the most competitive banking sector.

Bank size: Natural Logarithm of Total assets.

Small, as well as large, banks in Russia have a higher risk of insolvency. So, the "too big to fail" thesis does not hold in our paper. It is important for researchers to bear in mind that, without nonlinearity in the final model, the factor is not significant at all. The result for other CIS countries is hardly predictable. Good performance of big banks could always be due to adequate business model caught by other ratios, independent of size itself.

Credit quality: Non-performing loans-to-Total loans in the economy ratio.

Russian Banks with a considerable amount of bad debt are less stable, as supposed. The same story will probably be observed in other countries. The most dramatic effect will probably be observed in Ukraine with the outrageous share of non-performing loans (NPL). In this case bank probability of default is very sensitive to marginal changes in NPL. The reverse story is observed for Belarus with good payment discipline and low NPL.

Liquidity and market risks: Non-government securities-to-Total assets ratio.

Russian banks with a higher proportion of corporate securities in assets carry a higher risk of a price slump in the market. This probably holds for other economies. Indeed, substantial investments in non-government securities might have no relation to liquidity management; it is probably the result of an aggressive investment policy, which causes higher PDs.

We also expect significance of macroeconomic and institutional factors. We forecast that separate models will be highly significant for individual countries as well as the combined model. Also we will obtain insight into differences in risk sources across countries.

7. Conclusion

In this paper, we will develop a PD model for Russia, Ukraine, Belarus and Kazakhstan. We expect to confirm that bank-specific financial statistics, together with macroeconomic and institutional data, provide invaluable information to predict the PD of a bank. Banks with a weak balance structure, operating in hostile macroeconomic and institutional environment are less stable.

Due to the differences in banking system structure, regulations and development the sources of risk and weaknesses are quite different. This should be taken into account by those who make business with CIS banks. Also this is a point for further integration between CIS economies.

References