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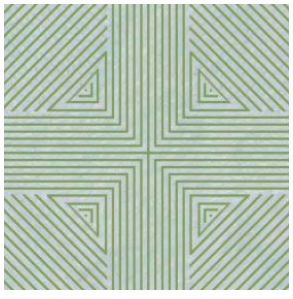

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BANKING COMPETITION AND FINANCIAL STABILITY: EVIDENCE FROM CIS COUNTRIES

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Banking Competition and Financial Stability[1]:

Evidence from CIS countries

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Abstract

The study provides empirical analysis of the cross-country relationship between a direct measure of competitive conduct of banking system and financial system in CIS[5] countries during the period from 2001 to 2013. We determine the level of banking competition by using Panzar and Rosse H-statistic. Estimation results from Logit probability analysis reveal that the level of competition does not significantly affect the probability of banking crisis in such countries. However, a number of macroeconomic and institutional factors have a significant influence in financial stability. According to empirical results, higher inflation increases the probability of a banking crisis. On the other hand, credit growth decreases the probability of banking crisis in the investigated countries. These results are robust to the methodology when the interaction of concentration and h-statistic is used. The institutional factors have significant influence on preventing banking crises. Specifically, improvement in government effectiveness decreases the probability of banking crisis.

JEL Classification: G21, D41

Keywords: Banking competition, concentration, competition-stability, competition-fragility, h-statistics, financial stability

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[5] Some of CIS (Commonwealth of Independent Countries) are excluded from this study due to fact that, we could not access sufficient data of these countries. Included countries are: Azerbaijan, Armenia, Belarus, Georgia, Lithuania, Kazakhstan and Russia

I. Introduction:

Maintaining financial stability of the banking system is one of the main goals of the central banks. One of the factors affecting the stability of financial systems is the extent of competition. However, studies examining the effect of competition to the stability do not have a clear answer whether much competition is in favor of financial stability or not. From the point of view of researchers such as Marcus (1984), Charletti and Hatmann (2003), competition brings fragility to the financial system. They argue that more competition deteriorates market power, decreases profit margin and encourages banks to take more risks. However, recent literature argues for the opposite view, stating that much competition brings stability. Further, the availability of multiple data has enabled researchers to conduct tests for various groups of countries. Using cross-country data, Schaeck et al. (2006) and Boyd et al. (2006), found empirical evidence that more competitive banking systems have lower likelihoods of bank failure and longer time to crisis.

Existing empirical investigations based on cross-country data do not include CIS countries as group, due to the lack of sufficient observations in the time they conducted the research. However, there is a need to find empirical evidence on relationship between a direct measure of banking competition and banking system fragility in CIS countries. CIS countries have similarities in their economies as they switched from socialist system to open market economy. Therefore, most of the banks entered to the market in the late 1990s and thereafter. . Over the time, banking industry is considered as the crucial component of financial system and the regulatory framework in these countries has evolved. The presence of foreign banks in the banking market of these countries has also increased, although there are still restrictions in some of the countries. On the other hand, government ownership of the banks still remains in some countries. In order to continue the structural development and reforms in the banking systems of these countries, it is important to determine the necessary extent of competition.

Thus, this study raises important questions: How the extent of competition changed over time in the selected countries? Is more competition needed to achieve more stable banking system in such countries? If not, which factors significantly affect financial stability in CIS countries?

First, the study will determine the level of competition in CIS countries' banking system over the period 2001-2013. The next step will be examining the relationship between competition and financial stability of these countries simultaneously controlling for macroeconomic and institutional factors. This study will contribute to the existing literature by adding empirical evidence in the direction of the relationship between competition and financial stability in studied countries. Furthermore, the research uses the most

recent data for multiple countries to include the recent trends in the banking system. Last, but not least, the study will consider additional regulatory variables not included in the previous literature.

II. Previous Literature

The literature that is used for this study can be categorized in two parts. First, we will review the literature devoted to measurement of banking competition in individual and multiple countries. Later, the literature investigating the relationship between competition and financial stability will be discussed.

Measurement of banking competition

The main approaches used to investigate banking competition are structural and non-structural approaches. Structural approach applies concentration ratios or indexes (such as Herfindahl-Hirschman index) to determine competitive trends in banking market. It is based on Structure-Conduct-Performance paradigm (SCP) which has originally been developed by Mason (1939) and Bain (1951). SCP implies one-way causal relationship in the following sequence: from industry structure to firm conduct, and from firm conduct to industry performance. As a result, SCP tries to infer the degree of competition of an industry from its structural features. According to their results, high level of concentration in banking industry damages competition and causes market collision. However, Claessens and Leaven (2004) and Schaeck et al. (2006), show that competition may be considered as a property of conduct rather than structure.

To overcome this problem, non-structural measures are used in the measurement of banking competition. According to this approach, behavior of banks is the main indicator in determining their market power. The models used are derived from bank's optimization behavior. Such techniques have been widely used in relevant literature to determine the extent of market competition. Two non-structural models, PR (Panzar and Rosse) and Bresnahan-Lou technique are used for the purpose of measuring banking competition. Their description and use in previous studies are discussed below.

Rosse and Panzar (1977), Panzar and Rosse (1982) and Panzar and Rosse (1987) employed revenue test to determine the extent of banking competition. Their method infers about competitive behavior of banking subjects from the comparative static properties of reduced-form revenue equation which uses firm-level data (Gischer and Stiele, 2009). Under this model, the level of competition is measured by an

indicator, which is called H-statistic[6]. This study will provide more comprehensive information about H-statistic and its calculation in the methodology section. Schaeck, Chiak and Wolfe (2007) claim the superiority of using H-statistic over previously used methods by formal derivation of this indicator from profit maximizing equilibrium conditions. They explain that another advantage of using this measure is its robustness with respect to the market, as H-statistic is calculated based on the characteristics of reduced form revenue equations at the firm level.

Bikker and Haf (2002) studied the relationship between market structure and degree of competition in 23 industrialized European and non-European countries during the period from 1988 to 1998. They used Panzar-Rosse (PR) approach to determine the extent of competition in selected countries. Their study revealed that there was a strong evidence for monopolistic competition in all examined countries. However, there was perfect competition among large banks in some countries. Furthermore, the extent of competition among large and international banks was much stronger than small and local banks. A similar study was conducted by Delis (2010) for a different time period. He studied competitive conditions in Central and Eastern European countries over the period 1999-2006.The paper found a wide variation over the different banking systems. Some of them were described as having significant market power while others are closer to monopolistically competitive banking systems. The study also described the importance of structural and macroeconomic environment in banks' revenue generation.

Furthermore, some of the previous studies investigated specific countries. Hamza (2011) estimated PR model to study market structure in banking industry in Tunisia and determine the level of competition. By using Panel dataset of Tunisian banks for the period from 1999 to 2008, the author found that the banks in Tunisia earned their revenue in the condition of monopolistic competition. They also conducted equilibrium test for the Tunisian banking market and confirmed that Tunisian banking market was in equilibrium.

Park (2011) also used Panzar and Rosse model to test for the effect of market concentration on banking competition in the Korean and Chinese commercial banking markets for the period 1992-2008. According to his results, the increased concentration has not reduced competition in Korea. There was a monopolistic competition for the entire sample in Korean banking market. On the other hand, decreased market concentration has improved the banking competition moderately in China. Chinese banking market was near to oligopoly over the research period.

An alternative technique to measure competition was developed by Bresnahan (1982) and Lau (1982). They show that oligopoly solution concept can be estimated econometrically. They explained the degree

[6] The derivation of the statistics is provided in the methodology section

of market power by rotating the demand curve around the equilibrium point. They stated that if pricing was competitive, rotations would not have effect on the equilibrium. The logic behind this thechnique is that, in competitive markets marginal cost equals to price, whereas in monopolistic markets marginal cost will be equal to perceived marginal revenue of uncompetitive market. Shaffer (2001) used Bresnahan-Lau technique to determine market power and excess capacity in 15 industrialized countries. He explained his choice of Bresnahan-Lau technique over PR methodology with a number of reasons. He argued that PR required samples should be in long-run equilibrium while Bresnahan-Lau had a better ability of the estimated conduct parameter to provide a broader picture of specific oligopoly solution concepts. This concept implies a theoretical basis for a systemic association between market structure and pricing conduct. Shaffer (2001) investigated the competition and the need for the Single Banking License in the selected European nations. The results supported a need for the Single Banking License in the selected European countries as some of these countries were found to experience limited degree of banking market power before the European single banking license.

Some researchers tested for the relationship of banking competition and other factors. There is a view that power in banking may positively affect access to finance. According to Petersen and Rajan, (1995), young firms get better access to finance in concentrated markets, as banks are able to smooth interest rates over the life cycle of firms. They compensate lower interest rates charged to the young firms by higher interest rates charged to older firms. Thus, they are able keep interest rates at the level where moral hazard is not a problem for financing young firms. However, in economy where there are relatively few young firms and the markets are well established concentrated markets will have a distortionary effect on access to finance.

While discussing interest margin determinants, Fungáčová and Poghosyan (2011) showed that foreign bank entry could contribute to the improvement of the competitive environment in the country. They argued that this factor helped to reduce the cost of financial intermediation. This result was also obtained by Barajas et al. (2000) which state that improvement in market competition and enhanced banking sector efficiencies in the case of Columbia led to lower interest margins and better financial information.

Relationship between competition and financial stability

Interest in examining the relationship between competition and the financial stability was initiated by Keeley (1990). He introduced “competition-fragility” approach claiming that increased competition in US banking system eroded financial stability in 1980s. He explained that presence of many banks in the banking system may lead to the excessive risk taking by the banks. The reason for this was that, more

risky loan applications also received financing in case of competitive market. Besanko and Thakor (1993) also argue that banks choose more risky portfolios when competition toughens. On the other hand, banks hold back from risky behavior in the presense of well-strctured risk-based deposit insurance scheme (Cordella and Yeyati,1998; Matutes and Vives, 2000).

The proponents of "competition-stability" approach claim that financial stability may be damaged by increasing market power. Mishkin (1996) argued that concentrated banking systems generally had fewer banks, thus create conditions for excessive risk taking of "too big to fail" banks. In addition, Caminal and Matutes (2002) showed that banks in a monopolistic market tend to create more risky loans and therefore default probability of those loans rises. In the same vein, Nagaraja and Sealey (1995) argue that forbearing regulatory policies are contributing for banks' asset quality to deteriorate. Perotti and Suarez (2002) demonstrate that even though banks may fail due to fierce competition, in competitive market conditions banks will behave more prudently due their incentive to become an acquirer rather than a target in a takeover. Boyd and De Nicolò (2005) showed that there is no trade-off between competition and stability, as an increase in competition may lower interest rates, positively affecting banks' portfolio quality.

Some papers support different elements of both "competition-fragility" and "competition-stability" views. According to the results of the study conducted by Berger et al. (2008), market power increases loan portfolio risk which is consistent with "competition-stability" view. On the other hand, their results also support "competition-fragility" view, as banks with a higher degree of market power also have less overall risk exposure because increased loan portfolio risk may be offset in part by higher equity capital ratios.

Until recently, the literature was available for a single country studies or the comparison of two countries. However, the availability of large-datasets for multiple countries enables us to conduct research for multiple countries to determine the relationship between bank competition and stability for multiple countries with similarities in their economies. Schaeck et al. (2006) studied different groups of countries over the period 1980 to 2003 and found a positive relationship between bank stability and bank competition by using PR methodology to determine the level of competition. In addition, they found that time to crisis was longer in more competitive banking systems. Schaeck, Cihak and Wolfe (2007) conducted a study for 2600 European banks and found that capital ratios were higher in more competitive environments. Beck et al. (2006 a,b) considered some country specific factors in their study.

They determined that banking systems with more barriers to bank entry were more likely to suffer banking distress.

Another research conducted by Claessens and Laeven (2004) estimated competitiveness indicators for a large cross-section of countries (mainly developed and emerging countries, for the list of countries, please refer to page 573 of the study). They found a positive relationship between foreign bank presence in the banking system and banking competition. Following this logic, fewer activity restrictions for foreign banks led to more competitive banking systems. They did not find statistically significant relationship between banking system concentration and competition. However, the results showed that more concentrated baking systems were more competitive. They supported the idea that contestability was a determining factor for competition rather than structure.

To sum up, the existing literature discusses the relationship between "competition-fragility" and "competition-stability" view. While the first approach claims that more competition damages the stability, the proponents of the second view provide empirical evidence that more competition may contribute to the stability of the banking systems. At the same time, by using cross country data and empirical methodologies, studies show that different country specific factors should be considered. Therefore, the influence of competition to financial stability may be different due to country specific factors and institutional environment.

This study intends to enrich the literature by investigating whether more competitive banking systems are more stable in transition countries of former Soviet Union, using the most recent data. At the same time, additional control variables specific to transition countries will be added to avoid the bias in the results for transition countries.

Further research may be conducted to optimize the necessary level of competition (by using H-statistic) for ensuring financial stability (by using crisis dummies). In addition we intend to extend the research to investigate the optimal form of entry and participation of foreign ownership in the banking sector of the selected countries.

III. Data and Summary Statistics

The study includes 7 post-soviet (CIS) countries during the period of 2001-2013. Some CIS countries are excluded due to lack of sufficient data. Descriptive statistics for the entire set of variables is provided in table 1. Appendix to the paper presents detailed explanation of the variables and their definitions. Macroeconomic and institutional variables are obtained from Worldbank database. The source of bank specific variables is BvDBankscope Financials. We made necessary adjustments to imported data. First, all duplicate rows have been deleted in order to avoid double-processing of data. Second, we excluded the data of Central Banks, bank holding companies and non-bank financial institutions as it does not match with our research interests. In addition, we made all necessary corrections to unreasonably large values for the variables due to reporting errors.

Table 1: Descriptive statistics

	Mean	Median	Maximum	Minimum	Std. Dev.
Concentration	0.58	0.57	0.88	0.33	0.13
Credit Growth	0.31	0.27	0.98	-0.10	0.24
GDP Growth	7.02	7.10	34.50	-14.80	6.61
Inflation	9.37	7.00	61.10	-1.10	11.09
H-statistic	0.60	0.61	0.98	0.11	0.20
M2/Total Reserves	2.08	1.89	5.89	0.80	0.94
Political Stability	40.48	38.35	83.65	7.69	20.32
Rule_of_Law_Rank	37.30	35.31	73.93	4.90	19.64
Gov. Effectiveness	41.08	40.67	76.59	9.76	19.96
Terms of Trade	131.12	111.60	250.00	87.10	44.97

Concentration measures the proportion of assets (%) held by three largest institutions in a country, averaged over the sampling period of 2001-2013. **Credit Growth** is the real growth rate of domestic credit to private sector. **GDP Growth** is the rate of real growth of the Gross Domestic Product. **Inflation** is the rate of the change of the GDP deflator. **H-statistic** is a measure of competitiveness in the financial services industry. **M2/Total reserves** measures the ratio of Money and Quasi money to Total reserves. **Terms of Trade** is the change in net barter terms of trade. **Political Stability** reflects perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means. **Rule_of_Law_Rank** reflects perceptions of the extent to which agents have confidence in and abide by the rules of society. **Government effectiveness** reflects perceptions of the quality of governance.

We also use a dummy variable that takes on the value of one if a systemic banking crisis surfaced in the particular year of observation or zero otherwise. Episodes of systemic banking crisis are determined in accordance with the definitions by Demirguc-Kunt and Detragiache (2005). We follow the criteria that non-preforming loans have to reach 10 percent of gross loans to classify a country as having a banking

crisis. Following this classification, 19 banking crisis episodes were recorded between 2001 and 2013 that can be utilized for the logit model. The list of banking crises is provided in table 2.

Table 2: Banking Sector Crises

Country	The periods with NPLs higher than 10%
Azerbaijan	2001-2004
Kazakistan	2002, 2009-2013**
Belarus	2001-2002
Armenia	2001-2002
Lithuania	2009-2013
Georgia	2001
Russia	2009

Source: WorldBank Database
Note: ** No data available for 2001 in Kazakhstan per WorldBank Database

IV. Methodology

As a summary of the analysis on the methods used in previous literature, this study prefers PR H-statistic to measure the extent of market competition. To overcome the problem mentioned in the use of PR methodology, we have also tested for equilibrium in the market to avoid a downward bias in the results.

The Panzar-Rosse Model

The extent of banking competition will be determined over the research period. For this purpose, the empirical test, which is based on comparative static characteristics of reduced-form log-linear revenue equation, formulated by Rosse and Panzar (1977), Panzar and Rosse (1982) and Panzar and Rosse (1987) will be applied. According to this empirical test, the sum of elasticities of gross revenues with respect to each input price, which is denoted by H, is determined from the following equation:

$$R'_i(x_i, n, z_i) - C'_i(x_i, w_i, t_i) = 0 \qquad (1)$$

R'_i and C'_i stand for marginal revenues and costs. x_i refers to the output of bank, n to number of banks, z_i to exogenous regressors of bank's revenue function, t_i to exogenous regressors of bank's cost function, w_i to the vector of k factor input prices. i denotes the relevant indicator of bank i.

Considering all factors mentioned above, for this study, Panzar and Rosse model is written as following:

$$IR_{it} = a_i + \beta_1 labor_{it} + \beta_2 nonint_{it} + \beta_3 fund_{it} + \beta_4 assets_{it} + \beta_5 loanr_{it} + \beta_6 cusdep_{it} + e_{it} \qquad (2)$$

Here, IR_{it} is the ratio of interest revenue to total assets for bank i at time t, "labor" is the unit price of labor, "cap" is capital cost, "fund" is cost of funding, "assets" is the volume of total assets, "loanr" is the ratio of total loans over total assets, "cusdep" is the ratio of customer deposits in total deposits and short term funding. All variables will be taken in natural logarithms to improve goodness of fit and avoid potential simultaneity bias. μ_i and μ_t refers to the vector of selected banks and time-distinct dummies. These variables help to consider fixed effects within the data. Equation (a) will be estimated by using GLS with time dummies. After estimation of parameters, H-statistic will be calculated as a sum of elasticities of revenue by price of input factor, which is expressed by following equation:

$H = \beta_1 + \beta_2 + \beta_3$ *(3)*

According to Panzar-Rosse model, competitive environment in the banking system is determined due to the values of H-statistic:

$H \leq 0$, monopoly in the banking system

$0 < H < 1$, monopolistic competition

$H = 1$, Perfect competition or natural monopoly in a perfectly contestable market

The observations are tested for long-run equilibrium following Delis (2010) which is a critical feature of H-statistic. It is justified on the ground that competitive banking markets will equalize risk-adjusted rate of return across banks to make sure that the rate of return should not be statistically correlated with input prices. In order to do this, equation (a) is run with an alternative variable- return on assets is used as dependent variable. In this case the equation (a) takes the following form:

$$\mathbf{ROA_{it}} = a_i + \beta_1 labor_{it} + \beta_2 nonint_{it} + \beta_3 fund_{it} + \beta_4 assets_{it} + \beta_5 loanr_{it} + \beta_6 cusdep_{it} + e_{it} \quad \textbf{(4)}$$

After running this equation, H-statistic for equation (4) is calculated in similar way:

$H_e = \beta_1 + \beta_2 + \beta_3$ *(5)*

In this case, $H_e=0$ means that the observations are in long-run equilibrium.

Logistic Probability Analysis

In order to determine the probability of a systemic banking crisis in the banking markets, logistic probability model will be applied following Demirguc-Kunt and Detragiache (2005) and Schaeck et al (2006). In each period, a country is either experiencing a crisis or not. The probability that a crisis will occur at a particular time in a particular country is assumed to be a function of n explanatory variables X (i,t). The explanatory variables in this model will be discussed below. We denote a dummy variable as P (i,t), it takes the value of one when a banking crisis occurs in country i and time t and a value of zero

otherwise. $\mathbb{B}$ is a vector of unknown coefficients and F(β'X(i,t)) is the cumulative probability distribution function evaluated at β'X(i,t). Therefore, the log-likelihood function of model is:

$$LnL = \sum_{t=1\ldots T}\sum_{i=1\ldots n}\{P(i,t)\ln[F(\beta' X(i,t))] + (1 - P(i,t))\ln[1 - F(\beta' X(i,t))]\}$$

Here, P(i,t) is the dependent variable that equals one if crisis occurred or zero otherwise, β denotes a factor of n unknown coefficients, and F(β'X(i,t) denotes the cumulative probability distribution function evaluated at β' X(i,t). X(i,t) refers to the explanatory variables, i refers to country and t to time. Following Demirguc-Kunt and Detragiache (2005), Beck, Demirguc-Kunt and Levine (2006) and Schaeck et al. (2006), we will use following explanatory variables: " competition, measured by "H-statistic", concentration", GDP growth, inflation, M2 to total reserves, credit growth, rule of law, political stability, "government effectiveness. To control for nonlinear relationship we also include the interaction of competition and concentration. Definitions of these variables refer to those used in the study held by Schaeck et al. (2006). Furthermore, this study will add rule of law and regulatory quality from world governance indicators of World Bank as explanatory variables.

V. Results

5.1 Panzar and Rosse Estimation

Average H-statistic is provided for the studied countries in table 3. We confirm that banking markets are in equilibrium by following Delis (2010). Using data for the period 2001-2013, we compute H-statistic by including all commercial, savings and co-operative banks across a sample of 7 countries included in this study. Table 3 shows that all countries have a monopolistic competition. Summary statistic shows that the results do not deviate significantly over time. The next question of interest is how the monopolistic competition affected financial stability in these countries.

Table 3. Average H-statistic for CIS countries

Country	H-statistic	Median	Maximum	Minimum	St. Dev
Azerbaijan	0.57	0.57	0.81	0.35	0.16
Armenia	0.44	0.48	0.66	0.11	0.18
Belarus	0.70	0.74	0.87	0.50	0.11
Georgia	0.60	0.67	0.91	0.11	0.28
Kazakstan	0.59	0.58	0.85	0.35	0.16
Lithuania	0.81	0.82	0.98	0.62	0.10
Russia	0.55	0.57	0.74	0.38	0.11

H-statistic (H) for each country in the sample using the Panzar and Rosse method.

5.2 Logit estimation results

According to the results, indicators that significantly affect financial stability are **credit growth rate, inflation and institutional factors**. Results from table 1 indicate that inflation increases the probability of a banking crisis significantly at the 10 percent significance level. This is consistent with academic literature, which argues that high inflation is used as an early warning indicator of a banking crisis. Credit growth decreases the probability of a banking crisis in studied countries, which is statistically significant at 1 percent level. This might be explained by the fact that banking system has improved in dealing with credit portfolio over time, as the CIS counties were establishing their banking system from zero after the Soviet Union collapsed. Alternatively, this may be explained with the fact that dependent variable is an NPL dummy taking value one when the ratio of Non-performing loans (NPL) to total loans exceeds 10%. If the credit growth exceeds the NPL growth, the share of NPL in total loans will decrease. It should be mentioned that we have taken into account the possibility of the newly created loans becoming overdue in the next period by re-running regression with the second lag of credit growth in specification 3. As results of specification 3 in the table 4 shows the sign of coefficient for credit growth is still negative leading us to conclude that high credit growth has been accompanied with improvement in loan underwriting standards in observed countries.

In addition, decrease of government effectiveness increases the probability of a banking crisis. Surprisingly, improvement in rule of law rank leads to a banking crisis according to the results. This can be explained with the fact that, as the rule of law rank improves, more non-performing loans are recognized in accordance with appropriate standards.

Moreover, the variables mentioned above are also significant when the level of concentration is controlled for. We include the interaction term between banking competition and concentration due to possible spurious correlation between the two. Similar to previous specification, both indicators are not significant in this estimation either. Similar to specification 1, Inflation enters with positive sign at 10 percent significant level in specification 2. Credit growth is also significant at 5 percent significance level in second specification. Government effectiveness and rule of law rank are also significant at 10 percent significance level. Results are also robust to crisis period as the estimation is performed with the dummies for the crisis years. We agree that there may be some bias in the results as there were many inappropriate and missing values in the data for selected countries from Bankscope and Worldbank database. However, we did our best to make necessary corrections to data before importing it to the model. We believe that our main results hold as they are consistent with relevant literature.

Table 4: Logit probability analysis

	(1)	(2)	(3)
Constant	-1.90	2.08	1.25
	(-0.68)	(0.29)	(0.38)
H-statistic	1.94	-4.98	2.02
	(0.85)	(-0.44)	(0.67)
M2 to toal reserves	0.20	0.17	0.91
	(0.33)	(0.30)	(1.17)
GDP Growth	0.02	0.01	-0.10
	(0.24)	(0.11)	(-1.03)
Inflation	0,07	0.07	0.02
	(1.81)*	(1.86)*	(0.29)
Concentration	-1.41	-9.09	-8.34
	(-0.42)	(-0.70)	(-1.49)
Credit Growth	-5.85	-5.67	-3.95
	(-2.63)***	(-2.50)**	(-1.70)*
Government Effectiveness	-0.05	-0.05	-0.07
	(-1.59)*	(-1.43)*	(-1.74)*
Political Stability	-0.02	-0.02	-0.07
	(-0.51)	(-0.46)	(-1.06)
Rule of Law Rank	0.08	0.08	0.14
	(1.76)*	(1.78)*	(1.94)**
H-statistic*Concentration		12.32	
		(0.62)	
Observations	70.00	70	
Number of crises	14.00	14	
Akaike Info Criterion	1.05	1.07	
McFadden R^2	0.24	0.24	

We estimate logit model for the period 2001-2013 in CIS countries. The dependent variable in the logit models is a dummy variable that equals one if a crisis observed or zero otherwise. All explanatory variables in the model are lagged one period to avoid simultaneity problems. Significant levels of 1, 5 and 10 percent are indicated by ***, ** and *.

VI. Conclusion

We investigated the influence of banking competition on financial stability by using Panzar and Rosse methodology and logistic probability analysis. We analyzed data on banking statistics, macroeconomic and institutional variables from CIS countries. Our results show that there is no statistically significant relationship between banking competition and financial stability in selected countries. Instead, estimation results show that macroeconomic and institutional indicators are more significant to banking system stability.

Inflation is a precursor for banking system failures. Moreover, credit growth has positively affected the financial stability as the banking systems in these countries have gained some experience since they switched from planned to market economies. From the institutional indicators, government effectiveness positively affects banking system stability. The paper also controlled for the degree of concentration to check if likelihood of a system crisis changes. The results did not change significantly. Therefore, results are consistent with previous literature that competition and concentration are different from each other.

There is a need to improve institutional environment in such countries. To do this, all banks should be treated equally and avoided from special treatment that may damage transparency in banking markets. Also, regulations and the communication of policy makers have to be transparent and in timely manner for proper intermediation of the banking systems.

Future studies are expected to investigate further the effect of foreign ownership on financial stability and to determine preferred structure of bank ownership. The motivation for such a study is that some of CIS countries have barriers for entries to the banking system and high government ownership. Furthermore, other methods of determining banking competition may be used to check if the results are the same. Further researches may be conducted on the effect of globalization and consolidation trends in the banking systems to the banking fragility of such countries.

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APPENDIX A

Definitions of Variables and Data Sources

Variable	Definition	Source
H-statistic	Variable that captures the competitiveness of the banking industry whereby $H \leq 0$ indicates monopoly equilibrium; $0 < H < 1$ indicates monopolistic competition and $H = 1$ indicates perfect competition	Claessens and Laeven (2004)
Crisis (Dependent variable)	Dependent variable is a dummy that takes on the value of one if a systemic banking crisis surfaced in the particular year of observation or zero otherwise. Episodes of systemic banking crisis is determined in accordance with the definitions by Demirguc-Kunt and Detragiache (2005)	World Bank Indicators, Demirgüc-Kunt and Detragiache (2005)
GDP growth (real)	Rate of growth of the gross domestic product	World Bank Development Indicators
Inflation	Rate of change of the GDP deflator	World Bank Development Indicators
Credit growth	Growth rate of Net Domestic Credit	World Bank Development Indicators
Terms of trade	Change in the net barter terms of trade	World Bank Development Indicators
Concentration	Proportion of total assets held by the 3 largest institutions in a country, averaged over the period 1988–2003	Schaeck et al. (2006) and bankscope
Political Stability	Reflects perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, the indicator is percentile rank among all countries (ranges from 0 (lowest) to 100 (highest) rank).	World Bank Worldwide Governance Indicators
Rule_of_Law_Rank	Reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, the indicator is a percentile rank among all countries (ranges from 0 (lowest) to 100 (highest) rank).	World Bank Worldwide Governance Indicators
Government effectiveness	Reflects perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. The indicator is percentile rank among all countries (ranges from 0 (lowest) to 100 (highest) rank)	World Bank Worldwide Governance Indicators
IR	Ratio of interest revenue to total assets	Bankscope
Labor	The unit price of labor, which is ratio of personal expenses to total assets	Bankscope
Capital cost	Cost of capital, which is ratio of total non-interest expenses after personal expenses to total assets	Bankscope
Assets	Volume of total assets	Bankscope
Loan_r	Ratio of total loans to total assets	Bankscope
Cost of funding	Ratio of total interest expenses to total customer deposits	Bankscope
ROA	Return on Assets	Bankscope