DYNAMICS OF RISK, CONCENTRATION AND EFFICIENCY IN TRANSITION ECONOMIES

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INTRODUCTION

The presence of a sound banking sector is important for ensuring that the financial system and economy run smoothly and efficiently as banks play a crucial role in channelling funds from lenders to borrowers with productive investment projects. Over the last two decades the financial systems of the former USSR as well as countries in Central and Eastern European (CEE) have undergone substantial reforms and their impact on the overall economy is now established in the literature.[13]

The aim of this chapter is to compare risk taking behaviour, concentration as well as efficiency in the banking sectors of two groups of countries. The first includes the early transition economies, which have now progressed sufficiently to become members of the European Union (EU), while the second are late transition countries, that is, the former Soviet republics. Countries in group one are: Czech Republic, Estonia, Hungary, Latvia, Lithuania and Poland, and those in group two are: Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyz Republic, Moldova, Tajikistan, Ukraine and Uzbekistan.

We start by reviewing the existing literature, which is followed by describing the methodology and the data source. Then we discuss the results and conclude.

REVIEW OF THE EXISTING STUDIES

Why former Soviet republics

Over the last 25 years, a plethora of studies have focussed on the transition of countries from Central and Eastern Europe from a system of central planning to a market economy. However, the majority of the former Soviet Union republics have been largely ignored due to the paucity of reliable information and these countries are substantially different from the early transition countries in Central and Eastern Europe. There are many reasons for this. Firstly, the former Soviet republics were controlled by the communist regime for more than seventy years. This resulted in the lack of a national collective memory of any other form of economic organisation or institutions in these countries and no experience of managing a domestic market economy prior to the collapse of the Soviet Union in 1991. During the Gorbachev era in the late 1980s, when reforms to establish a market economy took place in the Baltic states of the former Soviet Union and in several countries of Central and Eastern Europe, the other republics of the former USSR did not follow. This provides a sharp contrast to countries such as Hungary, Poland and the former Czechoslovakia, and even to the

Baltic states of the former Soviet Union, which only had a system of central planning for the period following the Second World War until the 1990s. This historical legacy has a huge impact on how quickly a market economy can be established and emphasises the importance of the historical background and initial conditions at the beginning of the transition on the direction and speed of financial sector development and its impact on economic growth.

Second, many former Soviet countries are rich in mineral and energy resources with all the benefits that result in terms of economic growth but also the potential internal conflicts associated with this. Third, some former USSR countries, especially those located in Central Asia, are geographically very extensive and political instability from neighbours such as Afghanistan can be contagious and therefore ensuring economic growth and financial stability is vital to retain social cohesion and sustained development. Finally, the pace of the transition was much slower in the former Soviet countries, excluding the Baltic states.

Table 1 uses more indicators to show that late transition countries are different from early ones. Particularly, the authors use six questions; (1) a country was under socialism more than 65 years; (2) a country is rich in mineral resources; (3) a country is a non-EU member; (4) absence of market economy before World War II (WWII); (5) EBRD's Banking Reform Index is Low; (6) EBRD's Competition Policy Index is Low.

<Table 1>

A country has a score of 1 if the answers to the questions in columns 1-4 are 'yes', otherwise 0. EBRD regularly assesses the transition processes from a planned to a market economy in the former socialist countries and the indices range from 0 to 4 (0 – least market oriented, 4 – advanced). The scores in columns 5-6 are equal to 1 if the relevant EBRD's index is equal to or less than 3,0, otherwise 0.

All of the early transition countries joined the camp of socialism during and after WWII, however, the majority of the former Soviet Republics were part of the USSR before WWII and were under socialism more than 65 years. None of the late transition countries is a member of EU and did not have experience of conducting policy of market economy prior to the collapse of the Soviet Union in 1991. Additionally, all of the late transition countries have equal or lower than 3.0 scores for the relevant EBRD's indices. Thus, late and early transition countries are different and therefore it is interesting to compare them.

Bank Efficiency.

Some studies show that new banks were not as efficient as long established ones and that older banks were found to be more profitable.[25] Similar research on the financial sector in Poland used non-parametric methods to construct a Malmquist Productivity Index, with results suggesting that the quality of bank management and the level of enumeration were important in an assessment of efficiency and competitiveness.[32] Contrary to the earlier studies some

find that foreign banks were on average most efficient and that new banks were more efficient than long established ones in Croatia for the period 1995-2000.[20] Many studies on the banking efficiency in the transition countries show that banks with majority foreign ownership are more efficient than private and state banks.[15, 35, 23, 9, 29, 18.] However, another study finds foreign banks to have higher profit, but lower cost efficiency.[14] Moreover, the efficiency gap between foreign, domestic and state banks is also shrinking over time. Finally, the other study on banking efficiency finds evidence that reform in the sector reform has a positive impact on efficiency.[12]

Market Concentration

The existing literature assumes that high levels of concentration favours companies' collusive behaviour, which ultimately weakens competition in the market and supports the view of a negative link between concentration and competition. However, there are two dominant views on the impact of competition to banks' risk taking behaviour: 'competition-fragility' and 'competition-stability'. Some studies show that greater competition lowers the franchise value of banks, which increases their incentives to take higher risks.[24] By focusing on the deposit market another study concludes that higher levels of competition increases banks' risk of failure.[28] Thus, these results confirm the view of 'competition-fragility.' However, a contrasting result is found that supports 'competition-stability', suggesting that greater competition may contribute to banking sector stability. For example, researchers argue that the loan rates are lower under higher competition which may reduce incentives to allocate resources to riskier projects taking account of moral hazard and adverse selection problems.[10] However, others researchers claim that previous researchers ignore the fact that lower rates (under higher competition) reduce bank revenues from performing loans.[27] Taking this into account they find a U-shaped relationship between competition and the risk of failure for banks, that is, greater competition increases the risk of bank failure in very competitive markets, while decreasing the risk of failure in highly concentrated markets.[27]

Risk

Many studies address the risk taking behaviour of banks but most focus on developed and developing countries.[22, 21] However, banks behave differently under different institutional settings which implies that the results obtained for developed and developing countries may not apply to the transition ones.[7, 8, 19] Furthermore, whilst over the last decades various aspects of the banking sector in transition countries have been studied, risk taking behaviour in the former USSR countries is still limited.[17, 31, 33, 37] Existing studies find no indication of excessive risk taking by specific ownership or size categories of banks.[19] Additionally, some conclude that banks with market power in Central and Eastern Europe tend to take on lower credit risk. Therefore this area provides an opportunity for such research.[1]

METHOD AND DATA

Efficiency is obtained by estimating a profit function and the variables concentration and risk are by construction, which will be explained in more detail in the following sections.

Efficiency

Numerous studies have focused on measuring the efficiency of different sectors and firms in a number of countries, most of which use a production function. Although many different methods have been used, all are based on the transformation function, particularly those that describes a production technology at a firm level. The aim is to maximum value under the available technology, prices or other limitations. Assuming a common set of constraints, the efficiency is measured as the distance between individual production units and the best practice frontier. Different methods used to measure the frontier with the two most popular approaches being parametric and nonparametric modelling. Data Envelopment Analysis (DEA) is a non-parametric approach using linear programming, while econometric models estimate deterministic or stochastic frontier (SF) and is a parametric approach. Both allow the calculation of firm level efficiency.

In this paper SF estimation is used as DEA does not take account of measurement errors and other type of statistical noise, assuming all deviations from the frontier are due to technical inefficiency. Profit efficiency is superior as it simultaneously considers both revenue maximisation and cost minimisation so this is the approach here. The profit efficiency of the bank measures how well profits are maximised with respect to a benchmark, or industry best practice. Following the existing literature an intermediation approach is used to identify input-output variables for the banks in the estimations. The variables are described in Table 2.[15]

    \<Table 2\>

The specifying equation to estimate efficiency levels is the widely used translog functional form for the profit function:

$$ln(Total\ Profit/w_2)=\alpha_0 + \sum_j \alpha_j\ ln\ (y_j)_{it} + \tfrac{1}{2} \sum_j \sum_k \alpha_{jk}\ ln\ (y_j)_{it}\ ln\ (y_k)_{it} + \beta_1\ ln(w_1/w_2)_{it} +$$

$$+ \tfrac{1}{2}\beta_{11}\ ln\ (w_1/w_2)_{it}\ ln\ (w_1/w_2)_{it} + \sum_j \theta_j\ ln\ (y_j)_{it}\ ln\ (w_1/w_2)_{it} + \gamma_t\ ln(control)_t + v_{it} - u_{it} \quad\quad (1)$$

where i and t index the bank and year respectively, and $\alpha_{jk} = \alpha_{kj}$. There are two outputs (y); *total loans* and *total interest bearing funds,* and two input prices (w), namely, *total interest expenses* and *overheads* (Table 2). The profit function is normalised using the input price (overheads) to ensure price homogeneity, following the literature.[6] The model has a control variable (GDP per capita) to account for cross-country heterogeneity.

There are two error terms v_{it} and u_{it}, where the first accounts for statistical noise with a symmetric distribution, and the second has non-negative distribution and reflects bank level inefficiency. There are many assumptions regarding the distribution of u_{it} and we follow the existing literature for parameterization of time effects, where the inefficiency term (u_{it}) is modelled as a truncated-normal random variable multiplied by a specific function of time.[4]

Concentration

The existing literature use various variables to account for concentration and competition in a banking sector. Considering the heterogeneity nature of the banks in our sample we aim to use Herfindahl-Hirschman Indices (HHI) as a concentration variable in our analyses following the existing studies.[11, 26] The index is equal to the squared sum of each banks' market share and thus a higher value implies higher a level of concentration.

Bank Risk Taking

The recent studies use different risk measurements for a banking sector (e.g. credit risk, default risk). Following them we use Z scores as the measure of bank risk as it is monotonically associated with a measure of a bank's probability of failure.[11, 26] Z score is expressed as return on assets (ROA) plus equity-asset ratio (EAR) divided by the standard deviation of return on assets. Since the Z score indicates the distance to insolvency a higher Z score implies that a bank is less risky.[26] This represents a more universal measure of bank risk-taking and has been extensively used in the literature of finance and banking. As the Z score is highly skewed we use the natural logarithm form.[26] Return on assets is calculated as Net Income divided by Total Assets and is taken from the bank financial statements retrieved using Bankscope.

Data

The sample includes only those banks which have at least three years of financial statements in Bankscope for the period 2000-2012. Thus, 254 banks are included.

DISCUSSIONS

The results for the technical efficiency in Table 3 show that two groups of the transition countries do not differ hugely across the research period, however, the variation is higher in the banks of late transition countries. In addition, there is no suggestion that the efficiency has improved in the early transition countries although the variation is higher for the other group of countries.

<Table 3>

HHI is relatively higher in the group of late transition economies indicating a more concentrated market in these countries. However, HHI has significantly decreased in the group of late transition economies with a HHI score of 0.55 in 2000 and 0.29 in 2012. This indicates that the competition in the banking sector improved over the period 2000-2012.

The volatility of the Z score is higher in the group of late transition economies, but banks in the group of the early transition countries take more risks as their Z scores are lower (Table 3). Particularly, the scores in 2000 in both groups of countries were 12.84 (early) and 16.30 (late). However, the score in the group of late transition countries increased to 14.88 (2012), while this decreased to 13.20 (2012). This implies that the countries of early transition economies became very cautious of taking more risks, which may be due to the recent global financial crises. In contrary, the group of late transition economies are taking higher risks recently. This is consistent with economic theory implying that late transition economies are improving their skills of risk assessment.

CONCLUDING REMARKS

This chapter aimed to analyse the dynamics of the efficiency, concentration and risk in the banking sectors of early and late transition economies. This chapter constructed efficiency scores using a SF estimating equation and risk as well as concentration are constructed using Z score and HHI index respectively. The results for the technical efficiency in Table 3 show that two groups of the transition countries do not differ significantly across the research periods, however, the variation is higher in the banks of late transition countries. HHI is relatively higher in the group of late transition economies indicating a more concentrated market in these countries. The volatility of the Z score is higher in the group of late transition economies, but banks in the group of the early transition countries take more risks as their Z scores are lower (Table 3). Additionally, banks in a more competitive banking sector tend to take higher risks to survive and flourish. Moreover, more advanced and less concentrated (more competitive) markets have better risk assessment expertise and are able to take higher level of risk.

Particularly, the banking sectors in both groups of transition countries become less concentrated and tend to increase the level of risk taking towards the end of the research period (Table 3). However, the groups of late transition countries slightly decrease their level of risk taking over the period 2008-2012. This is, perhaps, due to the reason that early transition countries are more integrated to the Western countries and are hit more by the recent global financial crisis. Therefore, they are more cautious of taking risks over periods of financial and economic instability.

Moreover, stronger integration to the world economy, particularly, to more advanced countries help countries improve efficiency in a banking sector. For example, the accession of China into the World Trade Organisation (WTO) speeds the banking reform of Chinese banking sector.[38] In a similar way, to some extent, EU membership helps early transition countries improve their banking sector[i].

Overall, the results are consistent with the economic theory which suggests that banks tend to take higher level of risks in more advanced and competitive markets. Moreover, they have better expertise in risk assessment compared to that of late transition countries. Therefore, even though the levels of risk taking in both groups of transition countries are gradually increasing, the level is higher in the group of early transition countries as the latter has higher level of competition.

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Table 1. Indicators Distinguishing Late Transition Countries

| | More than 65 years under socialism (1) | Rich in mineral resources (2) | Non-EU member state (3) | Absence of market economy before WW II (4) | Low EBRD index (2010) | | Total (7) |
					Banking Reform (5)	Competition policy (6)	
Late Transition							
Armenia	1	0	1	1	1	1	5
Azerbaijan	1	1	1	1	1	1	6
Belorus	1	0	1	1	1	1	5
Georgia	1	0	1	1	1	1	5
Kazakhstan	1	1	1	1	1	1	6
Kyrgyz Republic	1	1	1	1	1	1	6
Moldova	0	0	1	1	1	1	4
Tajikistan	1	0	1	1	1	1	5
Ukraine	1	1	1	1	1	1	6
Uzbekistan	1	1	1	1	1	1	6
Early Transition							
Czech Republic	0	0	0	0	*	*	0
Estonia	0	0	0	0	0	0	0
Hungary	0	0	0	0	0	0	0
Latvia	0	0	0	0	0	0	0
Lithuania	0	0	0	0	0	0	0
Poland	0	0	0	0	0	0	0

A. If the answers to the questions of the columns 1-4 are Yes, then the score is equal to 1, otherwise 0. B. If EBRD indices are equal or less than 3.0 then the score is 1, otherwise 0. C. * - EBRD indices are absent for Czech Republic.

Table 2. Input-Output Variables Used for SF

Variables	Description
Total Profit	Dependent variable and equals to Net Profit after Tax
Output	
Total Loans ($y1$)	This is Gross Loans
Total Interest Bearing Funds ($y2$)	These are the funds banks allocate in other financial institutions' interest bearing accounts
Input Prices	
Total Interest Expenses ($w1$)	These are the expenses of banks for attracting funds (i.e. cost of capital)
Overheads ($w2$)	Administrative and labour expenses (i.e. cost of labour)
Control	
GDP per capita	This is calculated at constant US dollars (2005) and taken from World Bank Development Indicators (2013)

Source: The bank specific variables are taken from the financial statements of the banks (Bankscope).

Table 3. Competition, Risk and Efficiency

Late transition countries					
Competition and risk				Technical efficiency (te)	
Year	HHI	Z score	Banks	scores	Banks
2000	0.55	16.30	42	0.48	33
2001	0.54	20.73	46	0.47	40
2002	0.42	13.36	49	0.45	43
2003	0.47	11.05	60	0.45	52
2004	0.43	12.12	70	0.45	66
2005	0.33	10.31	85	0.45	80
2006	0.31	10.27	89	0.44	84
2007	0.32	11.76	102	0.44	93
2008	0.28	17.98	112	0.42	89
2009	0.30	18.52	119	0.45	76
2010	0.30	17.50	124	0.41	96
2011	0.26	16.91	128	0.41	94
2012	0.29	13.20	108	0.41	93
Early transition countries					
Competition and risk				Technical efficiency (te)	
Year	HHI	Z Score	Banks	scores	Banks
2000	0.34	12.84	39	0.43	36
2001	0.34	12.46	47	0.43	42
2002	0.32	12.81	51	0.46	46
2003	0.30	11.71	58	0.44	55
2004	0.25	13.22	79	0.44	72
2005	0.25	12.23	84	0.42	78
2006	0.24	12.92	92	0.41	84
2007	0.24	11.61	90	0.41	85
2008	0.25	10.71	90	0.43	74
2009	0.24	12.29	103	0.42	63
2010	0.24	13.93	107	0.42	67
2011	0.22	13.27	104	0.42	72
2012	0.22	14.88	96	0.42	76

*Authors' calculations

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[i] In particular EUmembership required the rreduction of state aid (see Hölscher et al. 2014).