

11

Risk Taking by Banks in the Transition Countries

Rainer Haselmann¹ and Paul Wachtel²

¹University of Mainz, Jakob-Welder Weg 4, 55128 Mainz, Germany

²Stern School of Business, New York University, 44 West 4th Street, New York, NY 10012, USA

Although the performance and privatisation of transition banks have been widely studied already, little is known about their risk-taking and risk management activities. We use a new European Bank for Reconstruction and Development (EBRD) survey data set of banks to examine risk taking by banks in the transition countries. We find no indication of excessive risk taking by specific ownership or size categories of banks. Also, we find no connections between risk taking and the quality of the institutional environment although an unsound environment is associated with higher levels of capital.

Introduction

The banking sectors of the transition countries have progressed remarkably in the last 15 years. In fact, banking in most transition countries has largely shaken off the traumas of the transition era. At the start of the 21st century banks in these countries look very much like banks elsewhere. That is, they are by no means problem free but they are struggling with the same issues as banks in other emerging market countries. There have been a surprisingly large number of studies that have told us about the performance of these banks but we know very little about their risk taking behaviour and how the banking environment influences it.

Reprinted from *Comparative Economic Studies*, 49: 411–429, 2007, 'Risk Taking by Banks in the Transition Countries', by Rainer Haselmann and Paul Wachtel. With kind permission from Association of Comparative Economic Studies. All rights reserved.

In this paper, we examine risk taking by banks in transition with information from the EBRD's 2005 survey of bank managers¹ and balance sheet and income data prepared by BankScope. The institutional environment differs considerably among the countries in our sample. The western European countries that joined the European Union (EU) in 2004 were obliged to establish creditor rights and ensure proper law enforcement while many of the other countries were not exposed to these external pressures for reform. Thus, institutions in these countries offer, on average, less protection for lenders as compared to the new member states (see EBRD, 2004 and Pistor, 2000). In this paper, we examine the relationship between the institutional environment and risk taking by banks.

The role of financial intermediaries such as banks is to channel savings to investors. In a modern economy, banks do this by maintaining a delicate balance between risk taking and managing risk. Our aim here is to examine the link between banks' risk-taking and risk management activities and the quality of the institutional environment. An examination of the relationship is interesting because theory is ambiguous about its direction. We can demonstrate this by considering the role of collateral, a widely used mechanism for ameliorating risk.

Bankers face information asymmetries when they engage in lending since only the borrowers know about the 'true' risk of their investment projects. However, there are several covenants that bankers can include in their credit contracts to overcome information asymmetries. Bester (1985) showed that collateral can serve as a signalling device, so that borrowers reveal their true riskiness by the amount of collateral they are willing to offer. To ensure that devices like collateral can be effective, laws that define collateral relationships and adequate institutions for enforcement are essential. More reliable collateral laws and arrangements could result in greater use of collateral to overcome asymmetric information and an overall reduction of risk. In a poor legal environment, a borrower might use the same asset as collateral in several lending agreements or might refuse to surrender the collateral in case of default. In this view, a better institutional environment will be associated with a greater willingness to use collateralised loans and more lending. This is consistent with results in the law and finance literature that show a positive relationship between good creditor rights and credit market development (La Porta, *et al.*, 1997, 1998, commonly called LLSV).

However, Berger and Udell (2002), Berger *et al.* (2001) and Haselmann and Wachtel (2006) have shown that banks behave differently under

different institutional settings. For example, Berger and Udell (2002) find that banks are more willing to provide financing to information opaque borrowers in a better legal system. That is, with reliable collateral arrangements, banks will lend to more risky borrowers even if 'hard' information such as audited financial statements are unavailable. In this view, improvements in the institutional environment are associated with greater risk taking by banks.

We find no indication of excessive risk taking by any specific group of transition banks. Overall banking markets in transition economies are relatively homogenous with only small differences among the average bank operating in different regions, belonging to different ownership groups or having a different size. Interestingly, we find no connection between the level of risk banks take and the institutional environment they operate in. Nevertheless, banks that operate in an unsound environment generally maintain a higher level of capital. Furthermore, banks with higher risk measures compared to their competitors also do more risk management activities. This suggests that banks in transition economies have learned how to manage their risks by now.

The first section discusses the relationship between the banking environment and risk taking, as well as the relevant literature. The next section presents the bank data and the relationship of bank performance to ownership and size. Our measures of bank risk are presented in the following section. The relationship between risk and bank characteristics is discussed in the succeeding section. Bank risk measures are related to risk management activities and specific types of risk taking in the penultimate section. The conclusions are given in the last section.

The banking environment in transition

Banking in the transition countries has quickly passed through four stages (see Bonin and Wachtel, 2003). The first stage of banking development in the transition economies involved the establishment of banking institutions in the early 1990s. During the planned economy era, the only financial institutions were adjuncts of the state mechanism and banking in the contemporary sense of the word was largely unknown. Commercial banks were established as spin-offs of the central bank payments system and new banks were chartered. However, the role of these institutions was largely unchanged. The state-owned banks financed state-owned enterprises and were soon insolvent. The second stage of transition banking involved bank failures and systemic crises that affected every transition economy in the middle of the 1990s (see

Bonin and Wachtel, 2005). The third stage involved a lengthy process of restructuring through privatisation and the entry of foreign banks. By the end of the century, most banks were privately owned and in virtually all of the transition countries foreign banks predominated. The fourth stage brings us to the present. In most transition economies, banks are largely sound, appropriately regulated and competitive institutions. Banking in transition has largely shaken off its planned economy heritage.

Although research on banking on transition is fairly extensive, the issues of risk taking and risk management remain unexamined. The earliest studies of banking in transition focused on the creation and design of banking institutions (see eg Corbet and Mayer, 1992; Udell and Wachtel, 1995). As the transition proceeded, research interest turned to bank performance (see eg Fries *et al.*, 2006; Claeys and Vander Venet, 2003) and, later on, bank efficiency (Fries and Taci, 2005; Bonin *et al.*, 2005a; Weil, 2003). More recently, research examined the banking crises, restructurings and privatisations that characterised transition (see eg Tang *et al.*, 2000; Bonin and Wachtel, 2005; Bonin *et al.*, 2005b). Finally, de Haas and Lelyveld (2006) and Haselmann (2006) focus on the consequences of foreign banking penetration on banking sector stability.

Studies on risk taking and risk management by banks in transition economies are rare because data on specific banking activities are limited.² Schardax and Reininger (2001) examine the vulnerability to financial contagion of the financial sectors in transition economies at the macro-economic level. Focusing more on individual banks, Kager (2002) shows that the problem of bad loans persisted in many banks in transition economies.

Bank data and bank performance

The BEPS (Banking Environment and Performance Survey) was based on a random sample of 423 banks in 20 countries (with an over sampling of banks in the smaller countries and also in Russia). The response rate was 50% but it rises to 63% when Russia is excluded. The countries with the lowest response rates were in addition to Russia, the Ukraine and also Hungary and the Czech Republic.³ Each bank was linked to the BankScope data after a careful examination to make sure that the correct data were used. That is, care was taken to make sure that the BankScope data used had the proper bank identification and level of consolidation.⁴ When the BankScope data for the entire sample frame

were compared to the data for the banks that responded to the survey, there was no indication of systematic response bias.⁵ Sample sizes in the analysis are somewhat smaller than the number of survey respondents because BankScope does not provide data for a few banks that responded to the survey and survey respondents often did not provide answers to all the questions.⁶

In order to relate bank risk to the banking environment, we use both objective institutional indicators of the environment and indicators based on the banks' own assessments as provided in the BEPS. The objective measures are based on the EBRD Legal Transition Program (LTP) evaluations of each country's legal system relating to secured transactions. The first indicator is an index of the quality of collateral law (LTP – Quality) and the second is an index of the quality of law enforcement (LTP – Enforcement). The component questions for each index are found in Haselmann and Wachtel (2006).

The BEPS asked bank managers about their perceptions of collateral laws, and the quality of law enforcement and bank regulation. In each instance the survey respondent was asked for his or her opinions on several relevant criteria and the responses were aggregated into an overall index that measures their confidence in the banking environment. Three perceptions indexes based on BEPS were constructed (see Hoshi, 2006, for similar indices with these data). The first two measure perceptions of the quality of the laws regarding collateral on movable assets and collateral on immovable assets. The third measures their confidence in the ability of the court system to resolve disputes.

All of the banking environment indices are sums of several subjective survey responses and thus provide an ordinal ranking rather than a meaningful measure of intensity. Therefore, we divide the legal indicators into below and above median groups to differentiate among banks with lesser and greater confidence in the environment.

Summary statistics for the banks in our data set are shown in Table 11.1. Means for common performance measures are shown for the whole sample and several sub-groups. To begin, we distinguish among three bank ownership groups using BEPS information to determine majority ownership.⁷ Bank ownership is important for several reasons. First, government banks might still face soft budget constraints that affect their willingness to take on risk. Second, private domestic- and foreign-owned banks will also have different risk profiles. Foreign banks are likely to have less local expertise or 'soft' information that enables banks to reduce risk through customer relationships.

Table 11.1 Means of performance measures by ownership, region, assets and market share, 2004

	ROA	ROE	NIM	Assets
<i>Total sample</i>				
Mean	0.014	0.115	0.051	19,617
Obs	194	191	193	212
<i>Ownership groups</i>				
Government				
Mean	-0.016	-0.017	0.035	44,472
Obs	16	16	16	18
Domestic				
Mean	0.018	0.129	0.051	10,385
Obs	68	66	67	80
Foreign				
Mean	0.016	0.126	0.053	21,541
Obs	110	109	110	114
<i>Region groups</i>				
EU				
Mean	0.013	0.138	0.039	36,426
Obs	71	71	71	72
FSU				
Mean	0.019	0.143	0.060	11,555
Obs	49	47	48	62
SEE				
Mean	0.011	0.074	0.056	8,609
Obs	74	73	74	78
<i>Asset groups</i>				
0-200 million				
Mean	0.007	0.042	0.057	1,034
Obs	55	53	54	63
200 million-1 billion				
Mean	0.017	0.105	0.061	5,364
Obs	73	72	73	83
>1 Billion				
Mean	0.016	0.184	0.034	50,304
Obs	66	66	66	66
<i>Market share groups</i>				
<2%				
Mean	0.010	0.084	0.043	5,766
Obs	83	83	83	90
2%-10%				
Mean	0.025	0.298	0.062	14,147
Obs	58	58	58	60
>10%				
Mean	0.015	0.157	0.034	71,279
Obs	34	34	34	34

Note: Assets in million of dollars.

Next, differences in transition progress will affect risk characteristics of banks. Since the number of respondent banks in many countries is quite small, a comparison of country averages is not particularly informative. Instead, we show the means for three country groups: the transition countries that are now members of the EU, the countries of the former Soviet Union (FSU) with the exception of the Baltic countries that are already part of the EU, and the countries of south eastern Europe (SEE).⁸ Finally, we group the banks into three size groups with roughly about a third of the banks in each group: assets less than \$200 million, between \$200 million and \$1 billion and in excess of \$1 billion. Since the largest banks tend to be concentrated in larger countries, we also group the banks by their share of aggregate domestic credit in the country where they are located.⁹ Many of the banks in our data set have a small market share; 42% are in the smallest share category and only 16% in largest share category.

Foreign and domestic banks perform similarly and both outperform the government banks. The government banks are on average twice the size of foreign banks and the domestic banks are on average much smaller. The return on assets (ROA) and return on equity (ROE) are negative for the government-owned banks and about the same for the foreign and domestic banks. Similarly, net interest margins (NIM) are smaller for the government banks and about the same for the others. The few banks that are still state owned are in very poor shape, although efforts are underway to improve accounting standards and make them ready for privatisation.

Average ROA is quite similar across the three regions. ROE is about the same in the EU and FSU but lower in SEE. NIM are much lower in the EU countries than elsewhere. Banks in the SEE countries are considerably smaller according to asset size than banks in the other two regions. Grouping our sample by assets or by market share yields similar conclusions. Smaller banks have a lower ROA and ROE compared to their larger competitors.

Measuring bank risk

As noted earlier, banking is the business of balancing risk taking and risk management. However, there is no ideal single measure of risk and, in fact, there any number of measures. We will consider three approaches to risk measurement. First, we present accounting measures that utilise various balance sheet ratios that are standard indicators of riskiness. Second, we will use out of sample forecasts from a default probability model (DPM) to predict the default probability for each bank in our

sample. Finally, we offer Basel type risk measures based on each bank's asset composition.

Accounting risk measures

The Bank Scope data are used to construct standard accounting measures of risk activity. We examine the following balance sheet ratios to describe the risk taking behaviour of banks:

Name	Definition
Solvency	Equity/assets
Liquidity	Liquid assets (deposits with banks+treasury bills)/assets
Custdepo	Customer deposits/assets
Contliab	Contingent liabilities/assets
Loan	Total customer loans/assets
Loanloss	Loan loss reserves/customer loans
Shortloans	Short-term loans/customer loans

The default probability model

Estimation of a DPM requires a sample that includes default experiences. Since the BEPS (conducted in 2005) does not include failed banks, we estimated the model with a different data set and applied the estimates to the banks in our sample to obtain out of sample forecasts of default probability.

The basic idea of a DPM is to predict whether a bank will default with the help of different accounting and macro measures. The model estimated here is based on a different sample of banks (including, of course, those that failed) and a somewhat different group of transition countries. We use these results to make out of sample estimates of default probabilities for the banks in our sample.¹⁰

The data consists of all banks in the Czech Republic, Hungary, Slovakia and Poland from the period of 1994 until 2002. In order to determine whether a bank has defaulted, further information from Bankers Almanac was collected for each bank. Once a bank has been characterised as defaulted, the actual years of default as well as the two previous periods are classified as defaulted. All other observations for a defaulted bank are excluded from the sample in order to prevent any bias.¹¹

The logit model has been widely used to estimate bank default probability.¹² It can be written as:

$$p(L = 1) = \frac{e^z}{1 + e^z}, \text{ with } z = a + \sum_{j=1}^J \delta_j X_{ij} + \varepsilon_i$$

where i indexes the bank year observations and j the proximate determinants of default. In the equation, L is a binary variable, taking the value of one if a bank defaulted and zero otherwise. The probability function is described by $p(L)$. For estimating $p(L)$ an empirically non-observable latent variable z is introduced that is determined by the independent variables X_{ij} . Thus, a linear relationship is assumed for the determination of z , however, not for the estimation of $p(L)$.

The variables in X_{ij} include measures of the risks that a bank faces, which include credit risk, market risk, operational risk and liquidity risk.¹³ Specifically, the variables X_{ij} in our model along with their expected effect on default probability are shown in the table below.

Credit risk measures:	Equity/assets	-
	Loan loss reserves/loans	+
	Loans/assets	+
Market risk measure:	Net interest margin/assets	-
Operations risk measure:	Personnel expenses/operational expenses	-
Liquidity risk measures:	Short-term deposits/assets	+
	Liquid assets/assets	-
	Loans/deposits	+
General risk measures:	Net income/assets	-
	Net income/equity	-
Bank characteristics:	Log of assets	-
	Customer deposits/assets	+

The multivariate model was estimated with a rolling forward routine to exclude insignificant variables. The final model included six independent variables and all except the loan to asset ratio have the expected sign. The Nagelkerke R^2 , which estimates the explained variance of the dependent variable by the independent variables, is above 40%. The variables and coefficient estimates of the final model are shown in the table below.

Constant	10.071
Loan loss reserves/loans	4.641
Loans/assets	-16.122
Personnel expenses/operational expenses	-2.209
Liquid assets/assets	-19.909
Log of assets	-1.218
Customer deposits/assets	9.545

In order to further evaluate the underlying model, we examine the accuracy of the model predictions. There are two types of possible

prediction errors. First, a bank that has actually defaulted might be classified as non-defaulted by the model (a type I error). As shown below, 28 of the 36 problem bank year observations (78%) have been correctly detected. Second, there is the possibility that a healthy bank will be classified as defaulted (a type II error). 95% of the 595 non-defaulted bank year observations are classified as such.

	Predicted		Percentage of correct prediction
	No-default	Default	
<i>Observed</i>			
No-default	556	29	95.1
Default	8	28	77.8
Overall			94.1

While the overall fit of the model is extremely high, the question of applicability of these results to the broader set of countries and later time period of the EBRD survey remains. In order to answer this question, we examine the influence of year and country-specific controls in the estimated DPM. That is, the model was estimated with year fixed effects and three country-level macro variables (the ratio of private credit to GDP, GDP growth and interest rate spreads). The results show that only the ratio of private credit to GDP turns out to have a significant effect on the banks default probability. The magnitude of this coefficient is, however, in relationship to the coefficients of the bank-specific variables rather small and the overall detection rate of the model including macro and year controls decreases. Therefore, we concluded that the estimation of default probability is not specific to the countries or years included in the sample, but to measures describing the conditions of the individual banks. Thus, we apply the coefficients from the DPM shown above to obtain default probabilities for the banks in the BEPS sample.

Risk-adjusted assets and credit risk

Finally, the EBRD questionnaire asked banks to provide more detailed information about the characteristics of their assets than can be found in BankScope. This information is used to construct two risk measures: a credit risk measure that uses risk weights like those found in the Basle agreements and also a measure of risk-adjusted assets.¹⁴

The BEPS provides a breakdown of assets by type that is more detailed than the classifications available in BankScope. We use this information to construct risk-adjusted assets, $\sum w_i A_i$ where A_i is the holdings of the

i -th asset category and w_i is the risk weight for that asset category. The risk weights are based on the Basel II risk buckets although the available categories do not match the Basel definitions exactly. The weights assigned are in the spirit of the Basel agreement and are a reasonable approximation. The asset categories and the risk weights % assigned are shown in the table below.

Mortgage loans	50
Other household borrowing	100
Loans to small corporations	100
Loans to medium corporations	75
Loans to domestic subsidiaries of foreign corporations	20
Loans to state-owned enterprises	20
Loans to government or government agencies	10
All other assets	100

We construct two risk measures using the risk-adjusted assets. First, our measure of credit risk is the ratio of risk-adjusted asset to total assets:

$$CR = \sum W_i A_i / A$$

Second, we will examine a risk-adjusted capital adequacy measure, which is the ratio of capital to risk-adjusted assets.

Bank risk, region, ownership and size

Table 11.2 provides the means for bank groups of the various risk measures. It starts with balance sheet measures based on BankScope data for 2004. The first five columns show ratios to total bank assets for equity (solvency), liquid assets, customer deposits, contingent liabilities and loans. The next two columns provide the ratio of loan loss reserves to total loans followed by short-term loans to total loans. Many banks fail to report contingent liabilities and only about half provide the break down of loans between short and long term. The default probability predicted by the model in the previous section is next. The last three columns provide capital adequacy measures that use BEPS data. First is the Tier I capital ratio which was only reported by about one-half the bank respondents. It is followed by the credit risk measure and, finally, the ratio of capital to risk-adjusted assets where risk-adjusted assets are based on the Basle type weights described above.

There are some noticeable differences in balance sheet characteristics among bank ownership groups and across regions as well. The

Table 11.2 Means of risk measures by ownership, region, assets and market share, 2004

	Ratios to assets					Ratios to loans			Tier I capital ratio	Credit ratio risk	Capital to risk- adjusted assets
	Solvency	Liquidity	Customer deposits	Contingent liabilities	Loan reserve	Loan loss reserve	Short-term loans	Default probability			
<i>Total sample</i>	0.138	0.170	0.569	0.255	0.554	0.046	0.587	0.123	0.184	0.748	0.271
<i>Ownership group</i>											
Government	0.195	0.180	0.562	0.282	0.547	0.091	0.689	0.158	0.358	0.722	0.641
Domestic	0.151	0.153	0.587	0.130	0.545	0.049	0.583	0.154	0.185	0.770	0.239
Foreign	0.122	0.178	0.559	0.336	0.560	0.037	0.566	0.106	0.167	0.735	0.239
<i>Region groups</i>											
EU	0.103	0.234	0.562	0.518	0.512	0.027	0.540	0.100	0.126	0.739	0.181
FSU	0.150	0.091	0.536	0.080	0.597	0.046	0.651	0.139	0.182	0.728	0.286
SEE	0.164	0.159	0.596	0.119	0.567	0.062	0.578	0.142	0.237	0.760	0.316
<i>Asset groups</i>											
0–200 million	0.223	0.177	0.563	0.106	0.549	0.067	0.611	0.173	0.261	0.781	0.339
200 million–1 billion	0.121	0.176	0.554	0.226	0.558	0.037	0.681	0.129	0.158	0.751	0.205
>1 billion	0.089	0.156	0.590	0.400	0.553	0.038	0.507	0.078	0.132	0.712	0.205
<i>Market share groups</i>											
<2%	0.152	0.235	0.547	0.347	0.496	0.041	0.630	0.136	0.184	0.790	0.237
2%–10%	0.110	0.115	0.564	0.166	0.608	0.034	0.592	0.110	0.138	0.677	0.211
>10%	0.095	0.136	0.655	0.243	0.582	0.042	0.423	0.102	0.137	0.754	0.194

government banks have more capital, larger loan loss reserves and more short-term loans than the others. The domestic banks make less use of contingent liabilities and are less liquid while the foreign banks maintain less equity than the others.

EU banks have smaller solvency ratios and loan loss reserves but they maintain more liquid assets. The use of contingent liabilities is rare except for EU region banks. Finally, there are some differences by bank size or share. There is clearly an inverse relationship between the solvency ratio and bank size or market share. Also, the very large banks and those with shares over 10% make fewer short-term loans than others.

The estimated default probability summarises the risk characteristics of the balance sheet. It is lower among EU banks, foreign banks and large banks (both size and share). Reported Tier I capital is very high for all bank types. Although the credit risk measure is widely dispersed overall, the means for all of the bank type groups are very similar. There is some variation with bank size; credit risk is higher for small banks, since these banks generally provide a larger fraction of small- and medium-sized enterprises (SME) lending. The capital to risk-adjusted assets varies in the same way (just more so) than the Tier I capital to asset ratio. Government, SEE and small banks have a considerably higher capital to risk adjusted asset ratio than their competitors, which might well reflect a desire to signal their creditworthiness.

Bank risk and the banking environment

The differences in bank risk by bank type discussed in the previous section are generally not large. A bank's taste for risk might well be independent of its size, ownership and even location, and depends instead on its perceptions of the banking environment. Banks with greater confidence in the banking environment or in countries with an objectively better legal environment for banking might be willing to take on more risk.

In order to test this presumption, we present means of our risk measures grouped by the institutional indicators in Table 11.3. We examine how average bank risk differs between those with below median and above median quality of law or perceptions of the legal environment. Interestingly, there is no clear pattern between estimated default probability and the institutional environment. When bankers have better perceptions of the quality of law and when the laws are objectively better, their default probability is higher. This suggests that bankers are willing to take on risky lending when the legal environment for dealing with bad loans is better. However, better perceptions of the courts and

Table 11.3 Means of the bank risk measures grouped by legal indicators, 2004

	Tier I capital ratio	Credit risk	Capital to risk- adjusted assets	Default probability	Solvency	Liquidity
<i>LTP Quality of law</i>						
Below median	0.190	0.743	0.286	0.105	0.148	0.156
Above median	0.198	0.750	0.251	0.153	0.122	0.206
<i>LTP Enforcement of law</i>						
Below median	0.202	0.749	0.308	0.129	0.147	0.163
Above median	0.186	0.744	0.241	0.121	0.131	0.185
<i>BEPS Perception of law on movable assets</i>						
Below median	0.223	0.740	0.324	0.109	0.169	0.163
Above median	0.158	0.755	0.210	0.142	0.113	0.204
<i>BEPS Perception of law on immovable assets</i>						
Below median	0.213	0.736	0.321	0.094	0.151	0.176
Above median	0.175	0.752	0.227	0.146	0.134	0.187
<i>BEPS Court perception</i>						
Below median	0.211	0.757	0.305	0.132	0.152	0.166
Above median	0.173	0.735	0.238	0.102	0.135	0.184

better law enforcement are associated with lower default probabilities. Also no clear pattern could be detected for the relationship between bank risk and credit risk.

On the other hand, we can find a clear pattern for the relationship between our capital risk-adjusted assets ratio, solvency and institutional environment. By all our indicators no matter whether they are based on subjective surveys or bankers' own perception show that banks that operate in a poor environment tend to keep a higher capital risk-adjusted assets and solvency ratio. Results for the Tier I capital support this conclusion. The data lead us to conclude that the legal environment itself does not influence the banks' overall riskiness. However, banks respond to their environment by adjusting their own capital. In Haselmann and Wachtel (2006) we show that differences in the legal environment effect the composition of loan portfolio.

Previous findings are supported when we use the actual index values as continuous variables. Correlations of the quality indexes and the bank risk measures as presented yield some interesting observations. As shown below, there are consistently negative relationships between the quality of the environment and measures of bank capital (the Tier I ratio, capital to risk-adjusted assets ratio and solvency). Credit risk and default probability do not exhibit a consistent pattern with the indexes of the quality of the banking environment.

	Tier1 capital ratio	Credit risk	Capital to risk-adjusted assets	Default probability	Solvency	Liquidity
LTP Law of the book	-0.068	0.012	-0.209	0.166	-0.160	0.069
LTP Enforcement of law	-0.155	-0.128	-0.229	-0.052	-0.209	0.137
BEPS Perception of law on movable assets	-0.311	0.034	-0.339	-0.030	-0.249	0.091
BEPS Perception of law on immovable assets	-0.131	0.023	-0.184	0.087	-0.110	0.109
BEPS Court perception	-0.024	-0.003	-0.072	0.012	0.012	0.080

Correlation coefficients of risk measures and institutional variables.

Panel I from Table 11.4 reports the relationship between further characteristics of a bank's environment and our risk measures. BEPS collected information about the banks' access to credit registry and risk management activities of banks. Banks that have access to a credit registry show a considerable lower default probability than banks that have no access. If such a credit registry exists, the bankers' assessment about the reliability of the registry seems of minor importance.

In Panel II of the same table, we turn to the relationship between risk and the banker's reported risk management behaviour. Generally banks with active risk management show a higher default probability (except to those banks that have an internal risk rating system). However, banks that manage their risk more actively are mostly more solvent, liquid and have a higher capital risk-adjusted asset ratio.

Overall, evidence for a relationship between banks' risk and their institutional environment is not very strong with one exception. Banks that have access to a credit registry clearly show a lower probability of default. Nevertheless, this does not mean that the institutional setting is unrelated to banking risk. One reason for our finding could be the specific nature of banking risk. Bank lending involves uncertainty and an efficiently functioning bank needs to take on risks. Under bad institutional settings, banks are less active lenders (eg Qian and Strahan, forthcoming; Haselmann *et al.*, 2006) and mostly lend to borrowers about whom they can easily obtain information like large enterprises and the government (see Haselmann and Wachtel, 2006). Such lending is, however, less risky than lending to information opaque borrowers like households and SMEs. This could explain why we do not find a clear pattern between a solid institutional environment and banks' probability of default.

On the other hand, we find that those banks that operate in an unsound environment have more capital. This finding shows that banks

Table 11.4 Means of the bank risk measures, 2004, grouped by BEPS responses

	Tier I capital ratio	Credit risk	Capital to risk-adjusted assets	Default probability	Solvency	Liquidity
<i>I. Banks' environment</i>						
Does credit agency exist?						
Yes	0.206	0.753	0.280	0.077	0.144	0.197
No	0.179	0.733	0.262	0.168	0.126	0.134
Is information of credit registry accurate and reliable?						
Yes	0.238	0.746	0.310	0.087	0.126	0.218
No	0.207	0.754	0.265	0.075	0.146	0.184
Were loan applicants rejected due to a lack of acceptable collateral?						
Yes	0.165	0.733	0.241	0.124	0.124	0.175
No	0.232	0.758	0.310	0.092	0.157	0.182
Was lack of creditworthy customers the main constraint on bank's ability to make customer loans?						
Yes	0.205	0.771	0.263	0.090	0.139	0.185
No	0.187	0.720	0.280	0.121	0.131	0.163
<i>II. Banks' risk management</i>						
Did your bank obtain information on credit histories of borrowers from credit information registries?						
Yes	0.196	0.757	0.352	0.087	0.146	0.207
No	0.209	0.753	0.265	0.071	0.142	0.197
Did your bank have a separate department responsible for the risk management?						
Yes	0.306	0.787	0.415	0.159	0.187	0.247
No	0.167	0.738	0.240	0.100	0.131	0.165
Does your bank measure the value at risk in its trading portfolio?						
Yes	0.200	0.764	0.286	0.129	0.158	0.167
No	0.196	0.735	0.273	0.087	0.126	0.205
Has your bank an internal ratings based approach for the measurement of credit risk?						
Yes	0.158	0.755	0.224	0.097	0.167	0.237
No	0.208	0.747	0.292	0.116	0.135	0.167

adapt to their environment by adjusting their capital. Furthermore, banks that take on more risk also actively manage their risk by creating a risk management department or obtaining credit histories from their borrowers. These findings suggest that banks are aware about the level of risk they take on.

Conclusion

For the first time, data are available to examine the risk taking and risk management behaviour of transition banks. In this paper, we relate various measures of bank risk – solvency, liquidity, default probability and credit risk among others – to the size, location, ownership, institutional

settings and management characteristics of banks. The following three points summarise our findings:

- Certain groups of banks differ in their riskiness; for example, foreign, EU and large banks show a lower probability of default compared to their competitors. Nevertheless, these differences are not large and generally not statistically significant. This suggests that banking markets are relatively homogenous and no clear groups of banks with excessive risk taking can be identified.
- We find no clear relationship between banks' risk taking and their institutional environment (with banks' access to a credit registry being an exception). Our findings do, however, suggest that banks that operate in an unsound institutional environment respond to their situation by holding more capital and taking less credit risk.
- Banks that take on more risk also actively manage their risk by, for example, establishing a risk management department or obtaining information on borrowers' histories. Such banks also tend to hold more capital.

Overall, we find that no group of banks is subject to excessive risk taking and that those banks that take on risks also take on a higher share of capital and undertake active risk management. Thus, we conclude that the transition banks in our sample seem to basically operate and manage risk as banks in other developed markets.

Acknowledgements

The authors appreciate financial support for this work from the Japan Europe Cooperation Fund and the European Bank for Reconstruction and Development. Rainer Haselmann was a visiting scholar at the Columbia University Business School when the paper was written. Yves Metzner provided excellent research assistance. Comments from the Dubrovnik Economic Conference discussant, Randy Filer, and the referees are appreciated.

Notes

1. The Banking Environment and Performance Survey (BEPS) was a random sampling of banks in 20 transition countries with a common questionnaire that was translated into each local language and presented to a senior bank officer in an interview (EBRD, Transition Report, 2006, Chapter 4).
2. The BankScope data generally only include aggregate balance sheet items.
3. Successful bankers in the advanced transition countries might have been less inclined to set aside the time for an EBRD interview than others. In the

tense environment in Russia and the Ukraine, bankers might have had other reasons to avoid responding.

4. The BankScope data were checked for anomalies. Several corrections were made using information provided by the banks in the survey and one bank in Serbia was eliminated. The BankScope data set was prepared with the help of Dr. Anita Taci of the EBRD.
5. In most countries, the average asset level and the return on assets are about the same for responding and non-responding banks. The correlation of the average country ROAs from full sample and from the survey respondents is 0.97 and the rank correlation is 0.76.
6. The survey design included all banks in the country, which might include some institutions that are not picked up by BankScope. There were 17 respondent banks excluded because there were not adequate BankScope data for 2004 in Moldova, three in Macedonia, three in Belarus, two in Slovakia and one in each of Bosnia, Bulgaria, Poland, Serbia, and Ukraine. One additional Serbian bank is eliminated because of inconsistencies in the BankScope data.
7. Only 8% of the banks were government owned at the time of the survey. The privatization process was largely completed and even banks that reverted to government ownership during banking crises in the late 1990s (eg in Romania and Croatia) had been privatised when the survey was conducted in 2005. Fully 54% of the respondent banks are foreign and that number proportion would be much higher if the FSU were excluded. The foreign banks include both greenfield banks and banks acquired by mergers and acquisitions.
8. The BEPS respondents are about evenly divided among the regions (29% are from the FSU and about 35% from each of the other regions). The countries in each region are: EU: Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia; FSU: Belarus, Kazakhstan, Moldova, Russia and Ukraine; SEE: Albania, Bosnia, Bulgaria, Croatia, Macedonia, Romania and Serbia.
9. Domestic credit (IMF IFS line 32) includes credit from non-bank sources as well; so small shares are expected even when we know that banking is highly concentrated. Further, no domestic credit measure was available for Serbia; so Serbian banks are excluded from market share analyses, as are banks that did not report assets to BankScope.
10. Our intention is to develop a simple DPM that can be used for out of sample forecasts rather than fully investigate the specification of such models.
11. There are in total 631 bank year observations of which 36 represent banks in default. For a detailed description of the underlying data set, see Haselmann (2006).
12. The main advantage of logit models over other methods is that no strict assumptions are imposed on the estimation. Furthermore, the results can be directly interpreted as default probabilities.
13. For different specifications of DPMs with accounting measures and other data, see for example Claey's and Schoors (2007) who use Russian data.
14. The familiar Basle measure is the ratio of capital to risk-adjusted assets. The well-known minimum capital requirement is that the ratio of Tier I capital to risk-adjusted assets should be at least 8%. The Basle criterion is our credit risk measure (assets to risk-adjusted assets) multiplied by the capital asset ratio. The credit risk ratio can be constructed for all respondent banks because it

does not rely on BankScope data. Further many additional banks do not provide data on capital in BankScope.

References

- Berger, AN, Klapper, LF and Udell, GF. (2001): The ability of banks to lend to informationally opaque small businesses. *Journal of Banking & Finance* 25(12): 2127–2167.
- Berger, AN and Udell, GF. (2002): Small business credit availability and relationship lending: The importance of bank organizational structure. *Economic Journal* 112(477): F32–F53.
- Bester, H. (1985): Screening vs. rationing in credit markets with imperfect information. *American Economic Review* 75(4): 850–855.
- Bonin, J and Wachtel, P. (2003): Financial sector development in transition economies: Lessons from the first decade. *Financial Markets Institutions and Instruments* 12: 1–66.
- Bonin, J and Wachtel, P. (2005): Dealing with financial fragility in transition economies. In: Evanoff, D and Kaufman, G. (eds). *Systemic Financial Crises: Resolving Large Bank Insolvencies*. World Scientific Publishing Company: Hackensack, NJ, USA.
- Bonin, J, Hasan, I and Wachtel, P. (2005a): Bank performance efficiency and ownership in transition countries. *Journal of Banking and Finance* 29: 31–53.
- Bonin, J, Hasan, I and Wachtel, P. (2005b): Privatization matters: Bank performance in transition countries. *Journal of Banking and Finance* 29: 2155–2178.
- Claeys, S and Schoors, K. (2007): Bank supervision Russian style: Evidence of conflicts between micro- and macro-prudential concerns. *Journal of Comparative Economics*.
- Corbet, J and Mayer, C. (1992): Financial reforms in eastern Europe: Progress with the wrong model. *Oxford Review of Economic Policy* 7(4): 5–75.
- de Haas, R and van Lelyveld, I. (2006): Foreign banks and credit stability in central and eastern Europe: A panel data analysis. *Journal of Banking and Finance* 30: 1927–1952.
- EBRD. (2004): Legal transaction programme, Internet database, European Bank for Reconstruction and Development, <http://www.ebrd.com/country/sector/law/index.html>, accessed on 11 August 2006.
- EBRD Transition Report. (2006): *Finance in Transition*. European Bank for Reconstruction and Development: London.
- Fries, S and Taci, A. (2005): Cost efficiency of banks in transition: Evidence from 289 banks in 15 post-communist countries. *Journal of Banking and Finance* 29: 55–81.
- Fries, S, Neven, D, Seabright, P and Taci, A. (2006): Market entry, privatization and bank performance in transition. *Economics of Transition* 14: 579–610.
- Haselmann, R. (2006): Strategies of foreign banks in transition economies. *Emerging Market Review* 7: 283–299.
- Haselmann, R, Vig, Vand Pistor, K. (2006): *How law affects lending*. Columbia Law School, Working Paper 285.
- Haselmann, R and Wachtel, P. (2006): *Institutions and bank behavior*. New York University, Stern School of Business, Working Paper EC06-16.

- Hoshi, T (2006): Creditor rights and credit creation by banks in transition countries: Evidence from BEPS, EBRD, Tokyo Conference, University of California, San Diego.
- Kager, M. (2002): *The banking system in the accession countries on the eve of EU entry*. Austrian Central Bank, Working Paper.
- La Porta, R, Lopez-de-Silanes, F, Shleifer, A and Vishny, R. (1997): Legal determinants of external finance. *Journal of Finance* 52: 1131–1150.
- La Porta, R, Lopez-de-Silanes, F, Shleifer, A and Vishny, R. (1998): Law and finance. *Journal of Political Economy* 106(6): 1113–1155.
- Pistor, K. (2000): Patterns of legal change: Shareholder and creditor rights in transition economies. *European Business Organization Law Review* 1: 59–108.
- Qian, J and Strahan, PE (forthcoming): How law and institutions shape financial contracts: The case of bank loans. *Journal of Finance*.
- Schardax, F and Reininger, T (2001): The financial sector in five central and eastern European Countries: An overview. *Focus on Transition 1/2001* Austrian Central Bank: Vienna.
- Tang, H, Zoli, E and Klytchnikova, I. (2000): *Banking crises in transition countries: Fiscal costs and related issues*. World Bank Working Paper, No. 2484.
- Udell, G and Wachtel, P. (1995): Financial system design for the formerly planned economies: Defining the issues. *Financial Markets Institutions and Instruments* 4(2): 1–59.
- Weil, L. (2003): Banking efficiency in transition economies: The role of foreign ownership. *Economics of Transition* 11: 569–592.