The Provision of Long-term Financing in the Transition Economies

by

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Abstract

A new data set from the transition economies shows that the private sector has increasing access to long-term bank financing. In a few transition countries, credit has similar maturity structure to that in Western Europe, while in others credit remains mostly short-term. Several factors explain these differences: the political and institutional environment, bank privatization, the rate of inflation, the levels of economic and financial development, and the establishment of credit information sharing institutions. In contrast, the share of foreign owned banks and banking sector competition have no influence on credit maturity.

Key words: financial development, credit maturity, liquidity, transition economies
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1. Introduction

Financing long-term capital investments is one of the important functions of the financial system. Long-term investments usually have larger scale and involve advanced technology that raises productivity and economic growth. However, these investments require continuous infusion of funds for an extended period of time until they reach gestation and generate high returns (Böhm-Bawerk, 1891, Cameron, 1967, Kydland and Prescott, 1982). Smaller, more liquid investments mature more rapidly but yield smaller productivity gains. Bencivenga and Smith (1991) establish formally the relationship between the availability of long-term financing and economic growth. In a recent paper, Tasić and Valev (2008) provide supporting empirical evidence using data from a broad sample of countries. They show that credit maturity matters for economic growth: countries grow faster if their banking systems provide relatively more long-term credit.

Given the importance of long-term financing, we wonder what factors influence its availability. We address that question in the context of the transition economies. Our focus on the transition countries is motivated by three factors. First, the financial systems in these countries changed dramatically in a short period of time. Banks were privatized, foreign ownership of banks increased, several countries implemented credit information sharing, inflation declined, and institutions improved. We can investigate the effect of these dynamics on credit maturity. Second, many transition countries have collected and published data on credit maturity that are consistent across countries and show short-term, medium-term, and long-term credit. Most other countries do not publish credit

maturity data and, if available, the data reveal only short-term credit. Third, the demand for investment credit in the transition economies is fueled by the rapid creation of new firms and the expansion of existing ones. In that environment, we can observe more distinctly the demand and supply factors driving credit maturity.

Our analysis shows that credit maturity in the transition economies has lengthened significantly over time. In a few transition countries, the maturity structure of bank credit has become similar to the maturity of credit in advanced economies. Several factors have aided this development, e.g. the improvements in institutions, the development of the financial sectors, and bank privatizations. These and other factors discussed in the paper also explain the large remaining differences among countries. For example, 54 percent of bank credit in Lithuania is long-term, whereas in Albania only 17 percent of credit is long-term. Interestingly, the share of foreign owned banks and banking sector competition have no influence on credit maturity.

A number of papers have studied the availability of external financing for the private sector in the transition countries (Brown, et al., 2007, Naaborg, et al., 2003). We add to this literature with a distinction between credits with different maturity. The availability of long-term financing has not been studied in the context of the transition economies. Qian and Strahan (2007) and Demirgüç-Kunt and Maksimovic (1999) investigate the determinants of credit maturity for publicly traded companies in samples of mostly developed economies. We stay close to their analysis in terms of the selection of explanatory variables but we use data on lending to the entire private sector. Furthermore, we investigate short-term, medium term, and long-term credit as opposed to only short-term credit. We also incorporate additional explanatory variables that have

specific relevance for the sample of transition economies, e.g. government vs. private ownership and domestic vs. foreign ownership of banks. We also investigate in detail the roles of credit information sharing and a rich set of institutional variables.

The rest of the paper proceeds as follows. We describe the credit maturity data in the following section. Section 3 draws empirical hypotheses from the literature and Section 4 describes our empirical strategy. We present the results in Section 5 and conclude in Section 6.

2. The maturity of bank credit – data and summary statistics

We use quarterly data on lending by commercial banks to the private sector in 14 transition countries. The sample covers the period from 1992 to 2007, depending on data availability with an average of 35 observations per country.[1] The data were collected from reports issued by the central banks of each individual county. Tables 1 and 2 present the definitions and the sources for the variables as well as the time period for each country in the sample.

Table 2 also shows large differences in terms of commercial bank credit to the private sector as share of GDP, a frequently used measure of financial development. This includes credits from all banks - government and private, as well as domestic and foreign owned. In Albania, private credit is below 10 percent of GDP whereas in the Slovak Republic it is over 200 percent of GDP.[2] Credit increased over time in most, but not all, countries. Figure 1 shows the credit to GDP ratio for eleven countries with at least ten

[1] Although credit data are available for a few other transition countries, we could not include them in the sample because of missing explanatory variables. For example, although quarterly credit data for Bosnia and Herzegovina are available from 1997 to 2007, we were unable to obtain GDP data for the same period.
[2] Note that we divide the stock of credit by quarterly, and not by yearly GDP, in order to preserve the consistency between the summary statistics discussed here and the estimations of the following sections. Therefore, the numbers are about four times greater compared to the commonly used measure.

years of data. Credit as percent of GDP grew little in Hungary and Poland, while it more that tripled in Estonia, Latvia, and the Ukraine.

Credit is decomposed into three categories: short-term credit with contractual maturity of one year or less, medium-term credit with contractual maturity between one year and five years, and long-term credit with contractual maturity longer than five years. Table 3 shows that, looking across all countries, about 41 percent of credit has maturity shorter than one year and about 32 percent has maturity longer than five years.

There are substantial differences between countries. From Table 2, 54 percent of credit in Lithuania has maturity longer than five years whereas less than 20 percent of credit in Albania and Romania is long-term. The percent long-term credit has trended upwards for most countries, although the trend varies, as Figure 2 illustrates. The share of long-term credit in Latvia grew from 4 percent in 1996 to 52 percent in 2006, whereas it grew from 30 percent to 55 percent in the Czech Republic. Overall, by 2005 credit maturity in many transition countries was similar to that in Western Europe.[3]

3. The determinants of bank credit maturity – empirical hypotheses

Institutions. Diamond (1991, 1993) and Rajan (1992) show that short-term lending facilitates the enforcement of credit contracts as it limits the period during which an opportunistic firm can exploit its creditors without being in default. Diamond (2004) argues that "maturity acts as a substitute contracting tool to control borrower risk," and that bank loan maturity is especially sensitive to the legal environment. Giannetti (2003) also argues that if the law does not guarantee creditor rights, lenders would prefer short-

[3] To illustrate, in 2005 credit with maturity longer than one year was 72.4 percent of all credit in the transition economies, while it was 73.9 percent in the rest of Europe.

term debt to control entrepreneurs' opportunistic behavior by using the threat of not renewing their loans. In line with these theories, we expect to find that weak institutions contribute to shorter credit maturity. We measure legal institutions using a Rule of Law index described in Table 1. The index ranges from -1.14 in Serbia in 2000 to 1 in Slovenia in 2002. As Table 3 shows, the rule of law is positively and significantly correlated with the credit maturity measures.

State Ownership of Banks. Demirgüç-Kunt and Maksimovic (1999) note that the government can promote long-term financial contracting by granting implicit loan guarantees when it adopts a policy of subsidizing loss-generating firms. The authors find that government subsidies to the corporate sector lengthen credit maturity. Furthermore, La Porta, Lopez-de-Silanes, and Shleifer (2002) note that government ownership of banks has an even stronger effect, as the government has more power to choose projects. According to this view, the ownership of banks enables the government to direct funds toward strategic long-term projects. However, the literature also suggests that bank privatization in the transition economies has raised banking efficiency (Berglof and Bolton, 2002, Eller, et al., 2005) . From that perspective, the transfer of ownership into private hands might improve information gathering and processing, and the monitoring of borrowers. The improved functioning of banks may then lead to more long-term lending.

Foreign Ownership of Banks. Berglof and Bolton (2002) and Eller, Haiss, and Steiner (2005) argue that foreign ownership leads to greater efficiency of the financial sectors in the transition countries. Foreign banks enhance transparency and corporate governance with a stronger commitment in these areas compared to domestic banks (Naaborg, et al., 2003). Foreign-owned banks also utilize greater risk management

expertise and can diversify risk across several countries (de Haas and van Lelyveld, 2006). All of those contribute to greater availability of long-term credit. However, foreign owned banks may also face difficulties gathering and evaluating information on local borrowers, especially in the transition countries where few borrowers have credit history.

Figure 3 shows that private and foreign ownership of banks have increased dramatically over time across the region. There are, however, differences across countries. Some countries privatized banks earlier than others. For example, while the government owned almost 98 percent of banks in Albania in 1994, Macedonia had privatized the entire banking sector by 1996. By 2005, the asset share of foreign owned banks was above 50 percent in most countries, while in the Baltic countries it was close to 100 percent. Table 3 shows that the asset share of state owned banks is negatively correlated, while the asset share of foreign owned banks is positively correlated with the share of long-term credit.

Credit Information Sharing. Zhang and Sorge (2007) show theoretically that credit information sharing is used by banks as a screening device; it leads to an equilibrium where long-term contracts are preferred. Empirically, Zhang and Sorge show that information sharing leads to longer credit maturity for publicly traded companies. We expect to find the same effect using bank credit to the entire private sector. Table 3 shows that the presence of a credit information sharing institution is positively and significantly correlated with credit maturity measures.

High Inflation. Boyd, Levine, and Smith (2001) and Rousseau and Wachtel (2002) argue that high inflation discourages long-term financial contracting by raising

uncertainty about the real value of future nominal payments. Therefore, high inflation should reduce the fraction of credits with long-term maturity. In our sample, inflation has been moderate for most countries with a period average of 13.75. There are, however, periods of very high inflation as in Latvia in 1992 (331.09 percent). Table 3 shows that inflation is negatively and significantly correlated with both maturity measures.

Output Volatility. In the context of international lending, Valev (2007) finds that greater output volatility in a country leads U.S. banks to shorten the maturity of credit to that country. The argument is that output volatility proxies for the short-term operational component of business risk. We expect to find the same effect with domestic credit. Output volatility, defined as in Table 1, has been lowest in Bulgaria in 2003, while it has been highest in Serbia in 2002. Table 3 reveals that the correlation of output volatility and both maturity measures is indeed negative and significant.

Overall Level of Bank Credit. Diamond (1984) highlights the function of banks as delegated monitors that reduce the cost of monitoring borrowers by exploiting economies of scale. Without banks, individual savers would incur the cost of assessing and monitoring investment projects. With economies of scale, a larger banking system would have lower monitoring costs, which reduces lending risk and increases the supply of long-term debt. Therefore, we expect that higher credit levels will be associated with more long-term credit. The correlations in Table 3 give preliminary support to this hypothesis.

Banking Sector Competition. Banking sector competition can have a dual effect on the provision of external financing and the provision of long-term financing in particular. High concentration may raise the cost of funds and reduce external financing

(Pagano, 1993). Alternatively, high concentration may foster close relationships between banks and borrowers; this lowers information asymmetries and the cost of monitoring borrowers (Mayer, 1988, Mayer and Hubbard, 1990, Petersen and Rajan, 1995). Testing the bank-firm relationship hypothesis Giannetti (2003) finds that, contrary to (her) expectations, maturity is shorter in countries where the banking system is more concentrated. Using the asset share of the three largest banks to measure concentration, the least concentrated banking sector was that of Serbia in 2005 where the three largest banks had a market share of 36 percent, while the most concentrated banking sectors were in Estonia and Romania where the three largest banks owned all assets for a number of years. In Table 3, banking industry concentration and the maturity measures are positively correlated, i.e. more concentrated banking systems are associated with longer credit maturity.

Stock Market Development. Stock market development also has an ambiguous effect on credit maturity. Diamond (1997) argues that developed stock markets cause the banking sector to shrink, primarily through reduced holdings of long-term assets. According to this view, selling equity is a substitute source of long-term financing; therefore, stock market development reduces the demand for long-term bank credit. An alternative view explains that stock markets reveal information about firms and this helps them access long-term bank financing (Grossman, 1976, Grossman and Stiglitz, 1980). The stock market turnover, which we use to measure stock market development, ranges from 0 (in Latvia in the first quarter of 1996) to 89 percent of GDP (in Estonia in the first quarter of 2005). In Table 3, the correlation of the stock market turnover with the fraction of credit with maturity longer than five years is positive and significant.

Real Per Capita GDP. Ravid (1996) points to the "industry paradigm" of matching maturities introduced by Morris (1976): firms with long-term assets should use long-term debt. If debt maturity is longer than the asset life, borrowers will have to identify new investment opportunities while having to continue servicing their debt. If debt maturity is shorter than the asset life, then borrowers may become short on cash when debt payments are due. Stohs and Mauer (1996) find evidence for maturity matching on the firm level. Following Demirgüç-Kunt and Maksimovic (1999), we use per capita GDP to proxy for the amount of fixed assets in a country, with richer countries having a larger stock of long-term assets. Thus, higher GDP per capita is expected to be associated with longer debt maturity. From Table 3, we see that the per capita GDP is indeed positively and significantly correlated with both maturity measures.

Real Per Capita GDP Growth. Smith and Watts (1992) note that GDP growth rates can proxy for investment opportunities: the demand for external financing would increase in boom times and will recede in recession periods. It is not clear, however, whether expansions would stimulate the demand for long-term and short-term credit in different ways. Nonetheless, we follow the literature (Demirgüç-Kunt and Maksimovic, 1999, Qian and Strahan, 2007, Valev, 2007) and include real per capita GDP growth in our estimations.

The literature (e.g., Fink, et al., 2005, Fink, et al., 2004) also points out that the stage of transition is important, with more advanced economies having more developed financial sectors. We include a dummy variable for EU membership as an indicator of the transition progress. In summary, the empirical hypotheses are as follows:

$$\text{Percentage of Long-Term Credit} = f\left(\begin{array}{l} \overset{+}{\text{rule of law}},\ \overset{-}{\text{inflation}},\ \overset{+/-}{\text{GDP growth}},\ \overset{+}{\text{credit info. sharing}}, \\ \overset{+/-}{\text{banking industry concentration}},\ \overset{+}{\text{credit}},\ \overset{-}{\text{output volatility}}, \\ \overset{+/-}{\text{stock market}},\ \overset{+}{\text{GDP per capita}},\ \overset{+/-}{\text{state banks}},\ \overset{+/-}{\text{foreign banks}} \end{array}\right).$$

Some of the explanatory variables: legal institutions, state and foreign bank ownership, inflation, banking sector concentration, financial development, and credit information sharing affect credit maturity primarily through the supply side. Other variables: stock market development, per capita GDP, and economic growth affect the maturity of credit primarily through the demand side.

4. Methodology

By construction private credit and credit maturity are determined jointly and we need to allow for endogeneity. Therefore, we implement the Hausman-Taylor (1981) estimator to correct for correlation between the explanatory variables and the country-level random-effects. This is a suitable procedure that does not require external instruments. For robustness, we also apply a fixed-effects estimator to eliminate country specific effect and a generalized least squares (GLS) random-effects estimator that controls for a heteroscedastic error structure (see Appendix).

One additional concern is that the dependent variable is a ratio (between 0 and 100 percent), making OLS problematic as the predicted values might lay outside the unit interval (Papke and Wooldridge, 1996). This may require the transformation of the dependent variable using a log-odds ratio ($\log(y/1-y)$). However, the coefficient estimates using the log-odds ratio are difficult to interpret in a panel setting and therefore we follow the previous literature (Demirgüç-Kunt and Maksimovic, 1999, Rodrik and

Velasco, 1999, Valev, 2007) and do not perform the transformation. Furthermore, less than 1 percent of the predicted values from the models are outside the unit interval.

5. Results

Table 4 presents the empirical results using the Hausman-Taylor estimation.[4] We begin with an equation that includes the rule of law index, GDP per capita and its growth, credit information sharing, the credit to GDP ratio, and the bank ownership variables. We then add inflation and output volatility, followed by the stock market turnover and banking system concentration. In columns (4) and (8) we include all explanatory variables. There are two dependent variables – the percentage of credit with maturity longer than one year and the percentage of credit with maturity longer than five years.

Greater rule of law is associated with longer credit maturity in all specifications. Furthermore, the coefficients using credit with maturity longer than five years are generally greater than the coefficients using maturity longer than one year, i.e. weak rule of law has a stronger negative effect over longer time horizons. Based on column (4), a one standard deviation decrease in the rule of raw, e.g. from the level in Poland to the level in Bulgaria, is associated with 5.16 percentage points (0.58*8.905) decrease in the percent of credit with maturity longer than one year. The coefficient estimates in the remaining columns predict an even stronger effect on the percent of credit with maturity longer than five years.

The asset share of state owned banks has a negative and statistically significant effect on both measures of maturity. In contrast, the asset share of foreign owned banks

[4] Table A1 in the appendix presents the results from the fixed-effects and the GLS estimations, along with the Hausman-Taylor results. Table A2 presents the same results when the dependent variables are the portion of short-term credit and the portion of medium-term credit.

is not statistically significant in any of the specifications. In this set of countries, private banks raise the provision of long-term financing regardless of their ownership – domestic or foreign. Looking at the results in column (4), a one standard deviation decrease in the asset share of state banks increases the portion of credit with maturity longer than one year by 6.06 percentage points (22.96*0.264).

To test whether information sharing affects credit maturity, we follow Qian and Strahan (2007) and include a dummy variable that equals 1 if a country had either a public credit registry or a private credit bureau at the beginning of the year. Using credit with maturity longer than one year produces two negative and statistically significant coefficients and two positive ones depending on the set of controls. The effect of credit with maturity longer than five years is unambiguously negative – credit information sharing reduces the percent long-term debt. We revisit this surprising result in the next section.

Credit as percent of GDP has a positive and, in most specifications, statistically significant effect on both maturity measures. Countries with deeper financial markets have a greater fraction of credit with longer maturity. The effect of economic development is similar – countries with greater GDP per capita have longer credit maturity. The effect is particularly strong for long-term credit with maturity longer than five years. In terms of sizes of the effects, an increase in private credit from the level of Macedonia (65.81 percent) to the level of Bulgaria (124.48 percent) is associated with a 2.21 percentage points increase in the fraction of credit with maturity longer than one year. An increase in per capita GDP of $1,000 results in an increase in the portion of

credit with maturity longer than five years by between 13.68 and 15.61 percentage points. This is not a negligible effect.

Per capita GDP growth significantly increases the portion of credit with maturity longer than one year, indicating that the demand for investment credits increase during expansions. Conversely, high inflation leads to a shift towards short-term credit indicated by the negative and statistically significant coefficient on inflation in three of the four specifications where inflation is included. Looking at the coefficient in column (4), an increase in inflation by one standard deviation decreases the portion of credit with maturity longer than one year by 6.42 percentage points (-21.541*0.298). Stock market development is also negative and statistically significant in three out of four specifications. Moreover, this negative effect is greater in magnitude (by about 40 percent) for the portion of credit with maturity longer than five years. Therefore, the results suggest that stock markets in the transition countries are an alternative source of long-term financing, especially at longer time horizons.

Output volatility and banking industry concentration are not significant determinants of credit maturity. The negative coefficient estimate of the EU membership dummy suggests that countries at the earlier stage of transition have a greater portion of credit with maturity longer than five years. The bias toward long-term credit may be attributed to the high prevalence of credits to public sector enterprises in the early years of transition. In many cases, these credits were restructured under government directive extending their maturity and easing other credit terms.

In summary, there are several supply-side factors explaining credit maturity in the transition economies. Improved rule of law, greater levels of financial development,

bank privatization, and relatively low inflation rates have contributed to lengthening the maturity of bank credit. Demand factors have played a role too. Stock market development has reduced the demand for long-term bank financing but rapid economic growth and increasing income levels have generated strong demand for long-term credit. Overall, the results show that the changes associated with transition are contributing factors for increasing the availability of long-term finance. Countries that have advanced rapidly in terms of institutional and economic development have also enjoyed the greatest gains in terms of long-term credit use.

5.1. Credit information sharing and credit maturity

For each country in this paper, Brown, Jappelli, and Pagano (2007) collected information about the year when a public credit registry or a private credit bureau was established. In addition, the authors identify whether these institutions collect information on consumers and/or firms, positive and/or negative information, how long the information is kept, and what is the minimum amount of loans for which data are collected. We use this information to construct a quality index for both types of institutions, similar to the one in Brown, Jappelli, and Pagano (2007). If the institution is present, the index takes on a value of 1, and 0 otherwise. If the institution existed for at least six consecutive quarters, an additional point is added to the index. If information is kept on both firms and consumers, an additional point is added to the index. Similarly, an additional point is added if both positive and negative information is reported. An additional point is added if information is kept for at least two years. The final point is added if the minimum amount of a loan for which the institution collects data is below yearly per capita GDP (or if the threshold does not exist). Therefore, the quality index

for each type of institution ranges from 0 (if the institution does not exist) to 6 (if it meets all criteria listed above). The quality index for the public credit registry and the private credit bureau are added together to form an overall quality index.

Table 5 presents the results when we estimate the impact of different measures of credit information sharing on both maturity measures. The results are based on a full set of determinants, but for brevity we do not report the coefficients of the other determinants. Columns (1) and (5) correspond to the estimated coefficients from columns (4) and (8) of Table 4. The presence of credit information sharing institutions increases the portion of credit with maturity longer than one year, while it decreases the portion of credit with maturity longer than five years. When we introduce separately public and private credit institutions in columns (2) and (6), we see that the results are driven by the presence of private credit bureaus. The presence of a public credit registry does not have a significant influence on either maturity measure.

Similar results are obtained in columns (3) and (7) when we use the index of overall quality, as defined above, instead of an indicator for the existence of an institution. Greater quality of the information sharing mechanisms increases the portion of credit with maturity longer than one year, while it decreases the portion of credit with maturity longer than five years. When the overall quality index is decomposed into a quality index of public credit registries and a quality index of private credit bureaus in columns (4) and (8), we see that the results are driven by the quality of public credit registries. The quality of private credit bureaus does not have a significant influence on either measure of maturity.

In summary, the results suggest that private credit bureaus affect credit maturity; public credit registries affect credit maturity as well, but only if they have enhanced features. Yet, in either case, the effect of credit information sharing is to reduce short-term and long-term credit and, by default, to increase the fraction of medium-term credit. This result counters our empirical hypothesis that information sharing would lengthen credit maturity across the board. One possible explanation for this finding can be found in Diamond (1991). With asymmetric information, firms have incentives to borrow short-term in order to signal the quality of their projects to lenders and to extract the benefits of good news. They also have an incentive to borrow long-term to lower liquidity risk. Therefore, the shares of short-term credit and long-term credit expand at the expanse of medium-term credit. One can argue that credit information sharing reduced information asymmetries and reverses this tendency: short-term and long-term borrowing decline while medium-term borrowing increases.

5.2. Institutions and credit maturity

We introduce several additional variables to explore the effect of institutions in greater detail: 1) an index of government effectiveness measuring the quality of public services, the quality of the civil service and the degree of its independence from political pressures; 2) political stability reflecting perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means; 3) control of corruption measuring the extent to which public power is exercised for private gain; 4) regulatory power measuring the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development; and 5) an EBRD index of banking reform and interest rate liberalization.

The first four indexes are from Kaufmann, Kraay, and Mastruzzi (2007) and range from -2.5 to 2.5. The EBRD index ranges from 1 to 5.

Table 6 presents the estimation results when we substitute the rule of law index with different institutional measures. The results are based on a full set of determinants, but for brevity we do not report the coefficients of other determinants. The statistically significant coefficients in almost all specifications confirm the importance of institutions and provide a few additional interesting observations. For example, political instability is only a long-term concern affecting only credit with maturity longer than five years. The remaining institutional effects work at medium and long-term horizons.

6. Conclusion

A new data set from the transition economies reveals that the maturity of bank credit to the private sector has lengthened substantially over time. Several factors contribute to this trend: the improvements in the political and institutional environment, the privatization of banks, the sustained low to moderate inflation, and the increasing levels of economic and financial development. By 2005, credit in several transition countries had maturity structure similar to that in Western Europe. Yet, credit in other transition countries remains mostly short-term.

Several factors that are not significant determinants of credit maturity are worth mentioning. The growing share of foreign owned banks has not contributed to longer credit maturity. Similarly, we find no evidence that competition in the banking system contributes to longer credit maturity. Output volatility is also not significant which brings up an interesting comparison with the effect of institutions – our results suggest

that credit maturity is affected by political and institutional uncertainty more so than by economic uncertainty.

There are various ways to build on this analysis. Future research can explore in more detail the effect of banking sector competition. We use market concentration but there are other measures that can be used to investigate the role of competition in making long-term finance available. Similarly, future research can investigate the role of state owned versus private banks in broader samples. The "developmental view" argues that government banks increase the provision of long-term financing in strategic areas. Our results suggest that private banks accomplish this task more effectively. Whether this result holds in broader samples has important implications for the desirability of government development banks. Similarly, whether competition matters for long-term finance has important implications for banking policy and regulations.

References

Beck, T., Demirgüç-Kunt, A., and Levine, R., 2000. A new database on financial development and structure. World Bank Economic Review 14**,** 597-605.

Bencivenga, V. R., and Smith, B. D., 1991. Financial intermediation and endogenous growth. Review of Economic Studies 58**,** 195-209.

Berglof, E., and Bolton, P., 2002. The great divide and beyond: Financial architecture in transition. Journal of Economic Perspectives 16**,** 77-100.

Böhm-Bawerk, E. v., 1891. Positive theory of capital. Macmillan, London.

Boyd, J. H., Levine, R., and Smith, B. D., 2001. The impact of inflation on financial sector performance. Journal of Monetary Economics 47**,** 221-248.

Brown, M., Jappelli, T., and Pagano, M., 2007. Information sharing and credit: Firm-level evidence from transition countries. C.E.P.R. Discussion Papers, CEPR Discussion Papers: 6313.

Cameron, R. E., 1967. Banking in the early stages of industrialization; a study in comparative economic history. Oxford University Press, New York.

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.

Demirgüç-Kunt, A., and Maksimovic, V., 1999. Institutions, financial markets, and firm debt maturity. Journal of Financial Economics 54**,** 295-336.

Diamond, D. W., 1984. Financial intermediation and delegated monitoring. Review of Economic Studies 51**,** 393-414.

Diamond, D. W., 1991. Debt maturity structure and liquidity risk. The Quarterly Journal of Economics 106**,** 709-737.

Diamond, D. W., 1993. Seniority and maturity of debt contracts. Journal of Financial Economics 33**,** 341-368.

Diamond, D. W., 1997. Liquidity, banks, and markets. Journal of Political Economy 105**,** 928-956.

Diamond, D. W., 2004. Presidential address, committing to commit: Short-term debt when enforcement is costly. Journal of Finance 59**,** 1447-1479.

Eller, M., Haiss, P., and Steiner, K., 2005. Foreign direct investment in the financial sector: The engine of growth for central and eastern Europe? EUROPAINSTITUT, Vienna.

Fink, G., Haiss, P., and Mantler, H. C., 2005. The finance-growth nexus: Market economies vs. Transition countries. EUROPAINSTITUT, Vienna.

Fink, G., Haiss, P., and Vukšić, G., 2004. Changing importance of financial sectors for growth from transition to cohesion and European integration. EUROPAINSTITUT, Vienna.

Giannetti, M., 2003. Do better institutions mitigate agency problems? Evidence from corporate finance choices. Journal of Financial and Quantitative Analysis 38**,** 185-212.

Grossman, S. J., 1976. On the efficiency of competitive stock markets where trades have diverse information. Journal of Finance 31**,** 573-585.

Grossman, S. J., and Stiglitz, J. E., 1980. On the impossibility of informationally efficient markets. American Economic Review 70**,** 393-408.

Hausman, J. A., and Taylor, W. E., 1981. Panel data and unobservable individual effects. Econometrica 49**,** 1377-1398.

Kaufmann, D., Kraay, A., and Mastruzzi, M., 2007. Governance matters VI: Aggregate and individual governance indicators for 1996-2006. The World Bank, Policy Research Working Paper Series: 4280.

Kydland, F. E., and Prescott, E. C., 1982. Time to build and aggregate fluctuations. Econometrica 50**,** 1345-1370.

La Porta, R., López-de-Silanes, F., and Shleifer, A., 2002. Government ownership of banks. Journal of Finance 57**,** 265-301.

Mayer, C., 1988. New issues in corporate finance. European Economic Review 32**,** 1167-1183.

Mayer, C., and Hubbard, R. G., 1990. Financial systems, corporate finance, and economic development, Asymmetric information, corporate finance, and investment. University of Chicago Press, Chicago and London, pp. 307-332.

Morris, J. R., 1976. On corporate debt maturity strategies. Journal of Finance 31**,** 29-37.

Naaborg, I., Scholtens, B., Haan, J. D., Bol, H., and Haas, R. D., 2003. How important are foreign banks in the financial development of European transition countries?, CESifo Working Paper. CESifo.

Pagano, M., 1993. Financial markets and growth: An overview. European Economic Review 37**,** 613-622.

Papke, L. E., and Wooldridge, J. M., 1996. Econometric methods for fractional response variables with an application to 401(k) plan participation rates. Journal of Applied Econometrics 11**,** 619-632.

Petersen, M. A., and Rajan, R. G., 1995. The effect of credit market competition on lending relationships. Quarterly Journal of Economics 110**,** 407-443.

Qian, J., and Strahan, P. E., 2007. How laws and institutions shape financial contracts: The case of bank loans. Journal of Finance 62**,** 2803-2834.

Rajan, R. G., 1992. Insiders and outsiders: The choice between informed and arm's-length debt. Journal of Finance 47**,** 1367-1400.

Ravid, S. A., 1996. Debt maturity--a survey. Financial Markets, Institutions and Instruments 5**,** 1-69.

Rodrik, D., and Velasco, A., 1999. Short-term capital flows. National Bureau of Economic Research, Inc, NBER Working Papers: 7364.

Rousseau, P. L., and Wachtel, P., 2002. Inflation thresholds and the finance-growth nexus. Journal of International Money and Finance 21**,** 777-793.

Smith, C. W., Jr., and Watts, R. L., 1992. The investment opportunity set and corporate financing, dividend, and compensation policies. Journal of Financial Economics 32**,** 263-292.

Stohs, M. H., and Mauer, D. C., 1996. The determinants of corporate debt maturity structure. Journal of Business 69**,** 279-312.

Tasić, N., and Valev, N. T., 2008. The maturity structure of bank credit: Determinants and effects on economic growth, Andrew Young School of Policy Studies Research Paper Series no. 08-12.

Valev, N. T., 2007. Uncertainty and international debt maturity. Journal of International Financial Markets, Institutions and Money 17**,** 372-386.

Zhang, C., and Sorge, M., 2007. Credit information quality and corporate debt maturity: Theory and evidence. The World Bank, Policy Research Working Paper Series: 4239.

Appendix. Additional Estimation Results

Table A1: Additional Estimators

	Percentage of Credit with Maturity Longer than 1 year			Percentage of Credit with Maturity Longer than 5 years		
	Fixed Effects	GLS	Hausman-Taylor	Fixed Effects	GLS	Hausman-Taylor
Rule of Law	8.663	13.757	8.905	10.508	16.573	10.744
	(0.015)	(0.000)	(0.009)	(0.009)	(0.000)	(0.004)
Inflation	-20.679	-53.893	-21.541	-15.085	-18.562	-14.898
	(0.061)	(0.000)	(0.000)	(0.066)	(0.086)	(0.048)
Previous Year GDP Growth	1.213	1.535	1.236	-0.080	0.786	-0.052
	(0.000)	(0.000)	(0.000)	(0.429)	(0.000)	(0.692)
Credit	3.312	9.605	3.764	2.572	7.423	3.208
	(0.039)	(0.000)	(0.005)	(0.135)	(0.000)	(0.021)
Per Capita GDP	2.690	-1.412	2.122	16.551	3.496	15.609
	(0.045)	(0.001)	(0.036)	(0.000)	(0.000)	(0.000)
Credit Information Sharing	2.536	-0.128	2.642	-3.030	5.513	-2.597
	(0.010)	(0.907)	(0.024)	(0.004)	(0.000)	(0.019)
Banking Industry Concentration	-4.134	4.680	-3.587	1.870	6.347	2.386
	(0.259)	(0.153)	(0.309)	(0.535)	(0.073)	(0.439)
Stock Market Turnover	-5.823	-21.639	-6.257	-8.744	-1.646	-8.758
	(0.009)	(0.000)	(0.042)	(0.007)	(0.767)	(0.009)
Output Volatility	0.119	1.258	0.170	-0.032	-0.029	-0.059
	(0.682)	(0.001)	(0.537)	(0.918)	(0.950)	(0.861)
State Banks' Asset Share	-0.254	-0.404	-0.264	-0.109	-0.095	-0.113
	(0.000)	(0.000)	(0.000)	(0.014)	(0.023)	(0.007)
Foreign Banks' Asset Share	-0.036	-0.087	-0.034	-0.030	0.002	-0.025
	(0.095)	(0.001)	(0.129)	(0.174)	(0.951)	(0.242)
EU Member		-5.148	-11.792		-5.722	-30.835
		(0.180)	(0.404)		(0.123)	(0.000)
Constant	47.115	63.263	57.806	-33.942		
	(0.000)	(0.000)	(0.000)	(0.000)		
Hausman test: χ^2 (d.f.)		8.99 (11)	1.05 (11)		201.14 (11)	0.37 (11)
p-value		0.6232	0.827		0.000	1.000
Observations	317	317	317	211	211	211
Countries	11	11	11	9	9	9

Notes: See Table 1 for variable definitions. *P*-values are reported in parentheses below coefficients. In the Hausman-Taylor estimation Credit is endogenous. The Hausman test has a null hypothesis that the explanatory variables are not correlated with the country-specific random-effects. Per Capita GDP is in thousands of USD.

Table A2: Alternative Measures of Credit Maturity

	Percentage of Credit with Maturity of 1 year or Less			Percentage of Credit with Maturity from 1 year to 5 years		
	Fixed Effects	GLS	Hausman-Taylor	Fixed Effects	GLS	Hausman-Taylor
Rule of Law	-8.663	-13.757	-8.905	-10.568	5.235	-10.348
	(0.015)	(0.000)	(0.009)	(0.000)	(0.028)	(0.002)
Inflation	20.679	53.893	21.541	-51.884	-95.924	-52.583
	(0.061)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Previous Year GDP Growth	-1.213	-1.535	-1.236	0.406	0.319	0.384
	(0.000)	(0.000)	(0.000)	(0.001)	(0.026)	(0.001)
Credit	-3.312	-9.605	-3.764	-2.215	-2.533	-2.836
	(0.039)	(0.000)	(0.005)	(0.066)	(0.000)	(0.015)
Per Capita GDP	-2.690	1.412	-2.122	-7.475	-5.906	-6.640
	(0.045)	(0.001)	(0.036)	(0.000)	(0.000)	(0.000)
Credit Information Sharing	-2.536	0.128	-2.642	3.696	-2.984	3.238
	(0.010)	(0.907)	(0.024)	(0.000)	(0.001)	(0.001)
Banking Industry Concentration	4.134	-4.680	3.587	-2.064	-4.137	-2.491
	(0.259)	(0.153)	(0.309)	(0.376)	(0.117)	(0.349)
Stock Market Turnover	5.823	21.639	6.257	2.624	5.414	2.733
	(0.009)	(0.000)	(0.042)	(0.322)	(0.201)	(0.346)
Output Volatility	-0.119	-1.258	-0.170	0.407	2.202	0.457
	(0.682)	(0.001)	(0.537)	(0.218)	(0.000)	(0.118)
State Banks' Asset Share	0.254	0.404	0.264	-0.158	-0.391	-0.158
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Foreign Banks' Asset Share	0.036	0.087	0.034	-0.117	-0.241	-0.124
	(0.095)	(0.001)	(0.129)	(0.000)	(0.000)	(0.000)
EU Member		5.148	11.792		84.248	74.932
		(0.180)	(0.404)		(0.000)	(0.000)
Constant	52.885	36.737	42.194	79.467		
	(0.000)	(0.000)	(0.002)	(0.000)		
Hausman test: χ^2 (d.f.)		537.00 (9)	5.10 (6)		118.12 (8)	3.95 (7)
p-value		0.000	0.5316		0.000	0.785
Observations	317	317	317	211	211	211
Countries	11	11	11	9	9	9

Notes: See Table 7 for variable definitions. *P*-values are reported in parentheses below coefficients. In the Hausman-Taylor estimation Credit is endogenous. The Hausman test has a null hypothesis that the explanatory variables are not correlated with the country-specific random-effects. Per Capita GDP is in thousands of USD.

Table 1: Variable Definitions and Sources

Variable	Definition	Sources
Credit / GDP	Credit by deposit money banks and other financial institutions to the private sector divided by quarterly GDP.	Central bank of the corresponding country. Consulted were the official publications and websites.
Percent of Credit with Maturity Longer than One Year	Credit with original contractual maturity longer than one year divided by total credit.	
Percent of Credit with Maturity Longer than Five Years	Credit with original contractual maturity longer than five years divided by total credit.	
Real Per Capita GDP Growth	Percent increase in real per capita GDP during the previous year.	The official statistical institute or the central bank of the corresponding country. Data were cross checked with IMF's IFS, Eurostat, and OECD's quarterly national accounts.
Per Capita GDP	Real per capita GDP in US dollars at the beginning of a year.	
Inflation	Percent increase in the CPI from the previous quarter.	
Rule of Law	Index that measures "the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement."	Kaufmann, Kraay, and Mastruzzi (2007).
Banking Industry Concentration	The assets of the three largest banks as a share of the assets of all commercial banks.	Beck, Demirgüç-Kunt, and Levine (2000).
Credit Information Sharing	Dummy taking 1 if public credit registry or private credit bureau operates in a country during a year, 0 otherwise.	Author constructed from Brown, Japelli, and Pagano (2007).
State Banks' Asset Share	Share of majority state-owned banks' assets in total bank sector assets.	EBRD "Structural change indicators."
Foreign Banks' Asset Share	Share of total bank sector assets in banks with foreign ownership exceeding 50 percent.	
Stock Market Turnover	Stock Market volume traded during a quarter divided by quarterly GDP.	Official stock exchange of corresponding country.
Output Volatility	Root mean squared errors from $y_t = \alpha + \varepsilon_t$, using data from the preceding 10 quarters, where y is Real GDP growth.	Author constructed from data on Real GDP growth.

Table 2: Bank Credit and Bank Credit Maturity by Country

Country	Country Average Values for the Available Quarters			Coverage	
	Credit as Share of Quarterly GDP	Percent of Credit with Maturity			
		over 1 year	over 5 years	From	To
Albania	9.32	52.03	17.42	Q3/2003	Q1/2006
Bulgaria	124.48	62.95	20.96	Q4/1999	Q1/2007
Czech Republic	195.96	64.46	39.64	Q1/1993	Q1/2007
Estonia	151.02	80.93	42.79	Q1/1994	Q1/2007
Hungary	85.73	52.60	34.40	Q4/1995	Q1/2007
Latvia	105.13	62.80	22.30	Q4/1992	Q1/2007
Lithuania	71.53	60.66	53.55	Q1/1995	Q4/2004
Macedonia, FYR	65.81	52.87	-	Q4/2000	Q4/2006
Poland	101.12	63.28	34.80	Q4/1996	Q1/2007
Romania	57.61	44.41	15.41	Q4/1997	Q1/2007
Serbia, Republic of	100.80	56.09	-	Q1/1999	Q1/2007
Slovak Republic	210.14	41.49	25.52	Q4/2002	Q2/2007
Slovenia	120.37	59.83	-	Q1/1992	Q1/2006
Ukraine	89.23	39.73	-	Q4/1996	Q2/2007
Sample	*112.32*	*59.02*	*31.59*		

Notes: For variable definitions, please see Table 1.

Table 3: Summary Statistics

	Credit / GDP	Credit w/ Maturity over 1 year(%)	Credit w/ Maturity over 5 years(%)	Real Per cap. GDP Growth	Per Capita GDP	Rule of Law	Inflation	Credit Info. Sharing	State Banks' Asset Share	Foreign Banks' Asset Share	Banking Industry Conc.	Output Volatility	Stock Market Turnover
Panel A: Descriptive Statistics													
Mean	112.32	59.02	31.59	3.92	3,903	0.18	13.75	0.69	22.16	50.45	0.71	2.66	0.10
Minimum	6.14	4.12	1.04	-31.34	590	-1.14	-1.65	0	0	0	0.36	0.44	0
Maximum	371.55	92.95	69.50	37.13	11,382	1	331.09	1	90.90	99.40	1	13.09	0.89
Std. Dev.	66.46	17.22	17.10	5.71	2,323	0.58	29.82	0.46	22.96	31.16	0.18	2.19	0.14
Panel B: Correlations													
Credit / GDP	1.00												
Maturity over 1 year (%)	0.47*	1.00											
Maturity over 5 years (%)	0.66*	0.81*	1.00										
Growth	0.17*	0.42*	0.40*	1.00									
Per Capita GDP	0.43*	0.33*	0.75*	0.00	1.00								
Rule of Law	0.48*	0.46*	0.72*	0.07	0.82*	1.00							
Inflation	-0.20*	-0.29*	-0.40*	-0.45*	-0.07	-0.35*	1.00						
Credit Info. Sharing	0.08	0.23*	0.38*	0.18*	0.27*	0.36*	-0.26*	1.00					
State Banks	0.06	-0.29*	-0.24*	-0.31*	0.04	-0.23*	0.51*	-0.30*	1.00				
Foreign Banks	0.09	0.40*	0.41*	0.24*	-0.09	0.28*	-0.43*	0.26*	-0.62*	1.00			
Bank. Ind. Conc.	0.13*	0.11*	0.18*	-0.16*	0.04	0.15*	0.16*	0.19*	0.10*	0.09	1.00		
Output Volatility	-0.33*	-0.24*	-0.36*	0.20*	-0.45*	-0.53*	0.55*	-0.11*	0.46*	-0.19*	0.12*	1.00	
Stock Market	0.02	0.02	0.26*	0.04	0.04	0.24*	-0.07	0.16*	-0.2*	0.17*	0.16*	-0.13*	1.00
EU membership	0.24*	0.26*	0.16*	-0.02	0.56*	0.82*	0.00	0.24*	0.00	0.23*	0.22*	-0.33*	0.10*

Notes: * denotes significance at the 5 percent. For variable definitions, please see Table 1.

Table 4: Determinants of Credit Maturity

	Percentage of Credit with Maturity Longer than 1 year				Percentage of Credit with Maturity Longer than 5 years			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Rule of Law	11.334	14.724	5.399	8.905	15.743	14.465	9.580	10.744
	(0.005)	(0.000)	(0.210)	(0.009)	(0.000)	(0.000)	(0.009)	(0.004)
State Banks'	-0.106	-0.240	-0.091	-0.264	-0.074	-0.067	-0.103	-0.113
Asset Share	(0.005)	(0.000)	(0.020)	(0.000)	(0.007)	(0.115)	(0.001)	(0.007)
Foreign Banks'	0.035	-0.022	0.023	-0.034	-0.010	-0.027	-0.002	-0.025
Asset Share	(0.216)	(0.343)	(0.404)	(0.129)	(0.577)	(0.216)	(0.924)	(0.242)
Credit Info.	-2.729	2.661	-2.679	2.642	-3.709	-3.096	-3.158	-2.597
Sharing	(0.051)	(0.025)	(0.048)	(0.024)	(0.000)	(0.007)	(0.001)	(0.019)
Credit	5.016	3.391	1.807	3.764	2.081	1.918	3.164	3.208
	(0.002)	(0.014)	(0.268)	(0.005)	(0.101)	(0.164)	(0.014)	(0.021)
Per Capita GDP	3.983	1.293	7.376	2.122	15.757	15.560	16.838	15.609
	(0.000)	(0.182)	(0.000)	(0.036)	(0.000)	(0.000)	(0.000)	(0.000)
Previous Year	0.365	1.215	0.183	1.236	0.010	-0.007	-0.115	-0.052
GDP Growth	(0.000)	(0.000)	(0.040)	(0.000)	(0.927)	(0.960)	(0.250)	(0.692)
Inflation		-15.352		-21.541		-10.121		-14.898
		(0.006)		(0.000)		(0.188)		(0.048)
Output Volatility		0.074		0.170		-0.234		-0.059
		(0.791)		(0.537)		(0.468)		(0.861)
Stock Market			2.525	-6.257			-6.966	-8.758
Turnover			(0.498)	(0.042)			(0.030)	(0.009)
Banking Industry			-5.568	-3.587			0.845	2.386
Concentration			(0.209)	(0.309)			(0.766)	(0.439)
EU Member	-15.920	-11.467	-29.647	-11.792	-44.510	-48.288	-36.244	-30.835
	(0.149)	(0.323)	(0.206)	(0.404)	(0.043)	(0.121)	(0.000)	(0.000)
Constant	49.195	54.938	59.538	57.806	11.669	18.783		
	(0.000)	(0.000)	(0.008)	(0.000)	(0.580)	(0.528)		
Hausman test:								
χ^2 (d.f.)	3.18 (7)	0.78 (9)	4.31 (8)	1.05 (11)	4.16 (7)	1.16 (8)	4.07 (9)	4.48 (10)
p-value	0.868	0.999	0.828	0.827	0.761	0.997	0.907	0.923
Observations	411	358	344	317	241	218	223	211
Countries	14	14	11	11	10	10	9	9

Notes: See Table 1 for variable definitions. Results are based on Hausman-Taylor estimation, where Credit is endogenous. *P*-values are reported in parentheses below coefficients. The Hausman test has a null hypothesis that the explanatory variables are not correlated with the country-specific random-effects.

Table 5: Credit Maturity and Credit Information Sharing

		Percentage of Credit with Maturity Longer than 1 year				Percentage of Credit with Maturity Longer than 5 years			
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Credit Information Sharing	Presence	2.642				-2.597			
		(0.024)				(0.019)			
	Public Credit Registry		0.603				1.586		
			(0.664)				(0.235)		
	Private Credit Bureau		3.869				-7.067		
			(0.002)				(0.000)		
	Quality Index (Overall)			0.628				-0.828	
				(0.003)				(0.000)	
	Quality Index (Public)				1.178				-1.818
					(0.001)				(0.000)
	Quality Index (Private)				-0.033				0.601
					(0.932)				(0.115)

Notes: See Table 1 and text for variable definitions. Estimation based on Hausman-Taylor model with a full set of determinants, as in columns (4) and (8) of Table 4. *P*-values are reported in parentheses below coefficients.

Table 6: Credit Maturity and Alternative Institutional Measures

Dependent Variable	Rule of Law	Government Effectiveness	Political Stability	Control of Corruption	Regulatory Power	EBRD Reform Index
Percentage of Credit with Maturity Longer than 1 year	8.905	17.026	2.909	16.171	10.101	11.061
	(0.009)	(0.000)	(0.160)	(0.000)	(0.000)	(0.000)
Percentage of Credit with Maturity Longer than 5 years	10.744	14.024	9.556	14.648	3.671	7.767
	(0.004)	(0.000)	(0.000)	(0.000)	(0.217)	(0.000)

Notes: See Table 1 for variable definitions. Estimation based on Hausman-Taylor model with a full set of determinants, as in columns (4) and (8) of Table 4. *P*-values are reported in parentheses below coefficients.

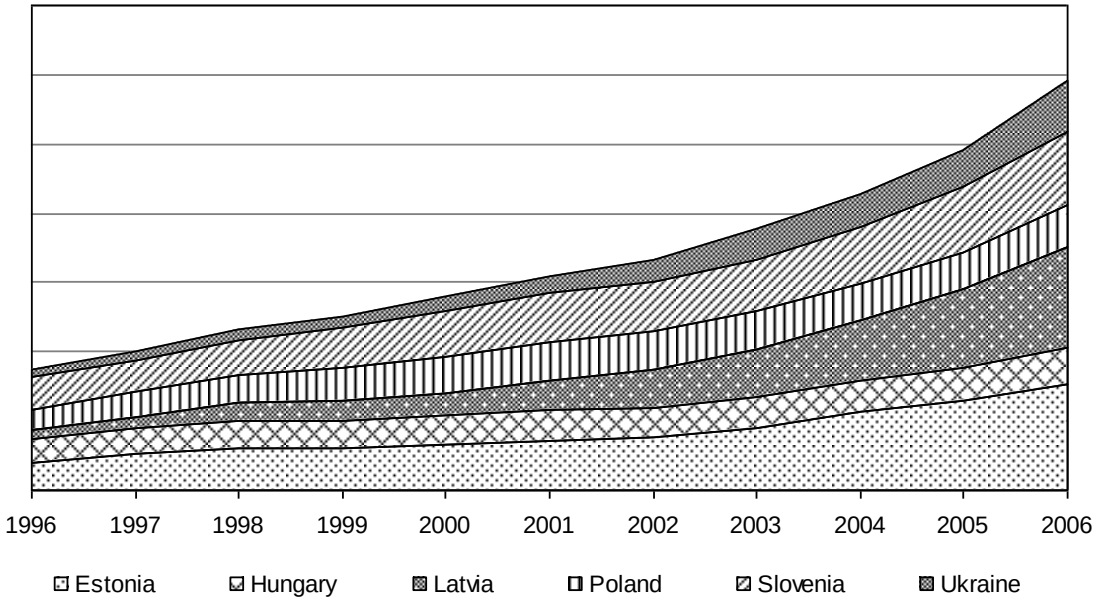

Figure 1: Credit as a Share of GDP.

Presented are yearly average values of credit divided by quarterly GDP for selected countries and time periods.

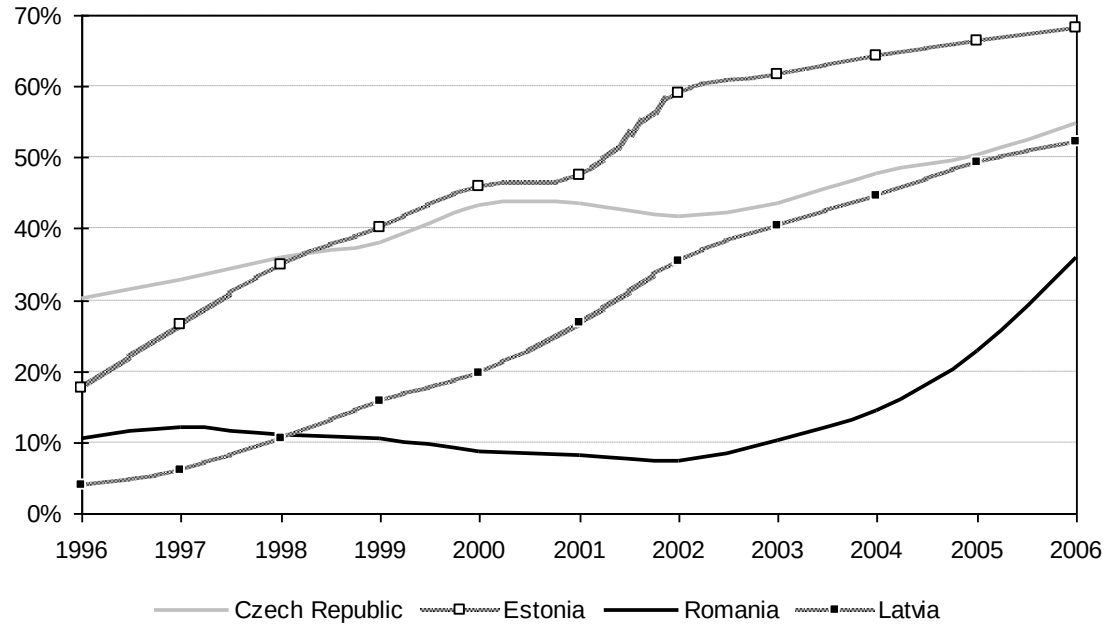

Figure 2: Percent Long-Term Credit.

Presented are yearly average values of the credit with maturity longer than 5 years as a share of total credit for selected countries and time periods.

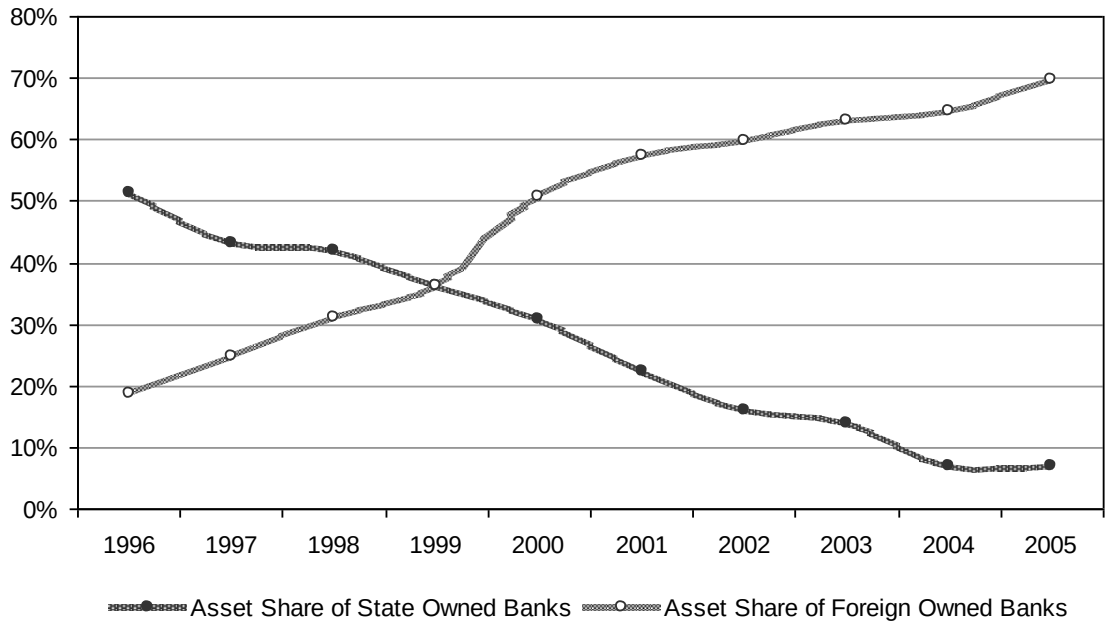

Figure 3: State and Foreign Ownership of Banks.

Presented are assets owned by each type of banks as a share of all bank assets. These are averages across countries.