Bankruptcy and Institutions

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Abstract

We use a simple model to show that the importance of retained earnings and ownership concentration as bankruptcy determinants is inversely related to institutional quality. A test employing firm-level data for Korea and the US is consistent with this prediction.

JEL Classification: G33; L25

Keywords: Bankruptcy; Institutions; Ownership Concentration

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1. Introduction

Substantial empirical literature examines factors determining the likelihood of firm bankruptcy in various countries, but there has been no rigorous comparative analysis of this issue for countries with different institutional quality. We use a simple theoretical framework for such comparative analysis based on models that relate asset stripping by an entrepreneur who controls the firm to the strength of minority investor protections (Johnson et al., 2000; La Porta et al., 2002). In these models, the entrepreneur can loot the company’s assets. The opportunity cost of stealing is the entrepreneur’s share of the loss of return on investing the firm’s assets and the (expected) transaction costs of stealing such as the punishment if caught. The latter costs depend on the strength of minority shareholder protections or, more generally, on institutional quality of the country. The main conclusion of these models is that the amount of asset stripping (tunneling) by the entrepreneur negatively depends on the country’s institutional quality. Also, tunneling negatively depends on the controlling shareholder’s share of the firm. Intuitively, the greater the entrepreneur’s share of the firm, the more he would be stealing from himself if he loots it.

Neither Johnson et al. (2000) nor La Porta et al. (2002) focus on firm bankruptcy, but their framework is easily adapted for this purpose. Our analysis implies that the entrepreneur would choose to bankrupt the firm (strip all assets) when the firm’s financial distress as measured by the ratio of its retained earnings to assets (REA) becomes sufficiently severe. Given low REA, the entrepreneur would strip the company’s assets rather than settle for (his

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share of) a low return on investment. A direct implication is that both high REA and ownership concentration affect the probability of bankruptcy negatively. Higher REA lowers the probability of bankruptcy even when tunneling does not occur. Ownership concentration, however, would be important only in weak institutional environments. We show that the effect of both factors on bankruptcy is stronger in countries with weaker institutions. We test the effects of REA and ownership concentration on the probability of bankruptcy in Korea and the US. Our results support the above implications. In particular, we find that the negative effect of REA and ownership concentration on the probability of bankruptcy is much more pronounced in Korea than in the institutionally stronger US.

The next section presents a simplified version of the model of Johnson et al. (2000) and derives its implications for the relationship between bankruptcy determinants and institutional quality. Section 3 describes the data and presents the estimates. Section 4 concludes.

2. A Model of the Relationship between Bankruptcy and Institutions

Consider a risk-neutral entrepreneur who is the controlling shareholder of a firm with an ownership share $\alpha$. The firm’s assets are normalized to 1. The entrepreneur can either invest the firm’s retained earnings (REA), $T > 0$, in a new project or expropriate them. The rate of return on investment is $R > 0$. We also assume that the firm’s profit is subject to an exogenous stochastic shock $v$ with the expected value $E(v) = 0$ and twice differentiable cumulative distribution function $F(v)$ and density $f(v)$. Expropriation is illegal and is costly for the entrepreneur in expectation terms. The net benefit from expropriating portion $s \in [0,1]$ of $T$ is defined as the expropriation amount less cost, i.e., $Benefit = sT - C(\kappa, sT)$, where $C(\kappa, sT)$ is a cost function that increases in both arguments and $\kappa > 0$ reflects institutional quality of the country (higher $\kappa$ corresponds to better institutions),
particularly the degree of protection enjoyed by minority shareholders. We assume that
\[ C(\kappa, sT) = \frac{\kappa}{2} (sT)^2. \]
The entrepreneur chooses the optimal expropriation rate by trading off his share of the return on non-expropriated retained earnings, \( \alpha(T(1 - s)R + v) \) and the net benefit of expropriation:

\[
\max_s \left\{ \alpha(T(1 - s)R + v) + sT - \frac{\kappa}{2} (sT)^2 \right\} \quad \text{s.t.} \quad 0 \leq s \leq 1
\]

(1)

It is straightforward to show that the solution to (1) is

\[ s^* = \frac{1 - \alpha R}{\kappa T}; \quad s^* = 0 \quad \text{if} \quad \frac{1 - \alpha R}{\kappa T} < 0; \quad \text{and} \quad s^* = 1 \quad \text{if} \quad \frac{1 - \alpha R}{\kappa T} > 1. \]

(2)

The firm becomes bankrupt if its profit turns non-positive, i.e., assuming interior \( s \), if

\[ \Pi = T(1 - s)R + v = TR - \frac{1 - \alpha R}{\kappa} R + v \leq 0 \]

(3)

The probability of bankruptcy is then \( P = F \left( -TR + \frac{1 - \alpha R}{\kappa} R \right) \). Therefore,

\[ \frac{\partial P}{\partial T} = f \times (-R) < 0 \quad \text{and} \quad \frac{\partial P}{\partial \alpha} = f \times \left( -\frac{R^2}{\kappa} \right) < 0, \]

(4)

where \( f \) is evaluated at \( \left( -TR + \frac{1 - \alpha R}{\kappa} R \right) < 0 \). Moreover, assuming that \( f'(v) > 0 \) for \( v < E(v) = 0 \) (this is true for many common symmetric distributions, including normal)

\[ \frac{\partial^2 P}{\partial T \partial \kappa} = f' \times \left( -\frac{1 - \alpha R}{\kappa^2} R \right) (-R) \geq 0 \quad \text{and} \]

\[ \frac{\partial^2 P}{\partial \alpha \partial \kappa} = f' \times \left( -\frac{1 - \alpha R}{\kappa^2} R \right) \left( -\frac{R^2}{\kappa} \right) + f \times \left( \frac{R^2}{\kappa^2} \right) \geq 0. \]

(5)

Comparative statics in (4) imply that in a Probit regression of bankruptcy on REA and ownership concentration, the respective coefficients would be negative. Also, (5) implies that these coefficients would be greater (i.e., smaller in absolute value) in a country with better institutions. We test these predictions below.
3. Data and estimation results

We use the data on Korean and US firms. The Korean data are collected from Korea Investors Service-Financial Analysis System and Maekyung Annual Corporation Reports for firms listed on the Korea Stock Exchange during 1991-2001. After excluding non-manufacturing firms, start-up firms that have been in business for less than three years, and firms for which we do not have sufficient data, we are left with the final data set of 108 defaulted firms and 392 non-default firms.\(^2\)

The data for the US firms are from COMPUSTAT North American industrial annual database for 1990-2003, which provides information about “active” and “inactive” publicly traded firms. The raw dataset contains 5,513 firms, comprised of 2,523 inactive firms and 2,990 active firms. We drop observations with incomplete data and firms that are headquartered outside the US. This reduces the total number of firms to 4,590 (2,197 inactive firms and 2,393 active firms). 159 firms became inactive due to Chapter 11 (reorganization) and 51 due to Chapter 7 (Liquidation). We define as bankrupt only these firms, dropping all other inactive firms, including 1,294 firms that became inactive due to merges and 693 firms that became inactive for other reasons. Additionally, in order to eliminate outliers, we drop firms with assets of less than $10 million or more than $1 billion. This leaves 84 defaulted firms and 1,222 non-default firms in the final data set. Finally, in order to keep the number of firms in the US dataset comparable to the number of Korean firms and make the dataset more manageable (obtaining ownership concentration data for the US firms is difficult), we select 333 non-default US firms for which we could find ownership data and that matched in terms of asset size 80 defaulted firms with known ownership concentration (each defaulted firm was matched with 3 or 4 non-defaulted firms). Therefore, our benchmark estimation uses 500

\(^2\) For more information about these data see Alexeev and Kim (2008).
Korean firms and 413 US firms.\textsuperscript{3}

Our dependent default dummy variable is 1 if a firm defaulted during our time period, and 0 otherwise. Consistent with the model in the previous section, our two main independent variables are REA and ownership concentration. Unfortunately, the US and Korean data on ownership are not entirely comparable. For the US firms, we have the share of ownership belonging to shareholders that have 5\% or greater stake in the company.\textsuperscript{4} For the Korean firms, we have the ownership share of the largest shareholder and the share of the minority shareholders (those with less than 1\% of the company). We present the results for the Korean firms based on either definition of ownership concentration (either the largest shareholder or 100\% minus minority shareholders share). The regression coefficients for the two measures are similar, suggesting that the results are not significantly influenced by the particular measure of ownership concentration. Also, estimating elasticities alleviates this problem.

All measures for defaulted firms are for the year prior to default. The data for non-defaulted firms are for the same year as the defaulted firm to which non-defaulted firms were matched by asset size.

The Table below shows Probit results for the US firms and for two alternative measures of ownership concentration of the Korean firms. As expected, REA has a negative and statistically significant effect on the probability of default in both countries. Ownership concentration effect is statistically insignificant for the US firms, but negative and highly significant for the Korean firms. Moreover, consistent with the model, the coefficients of both REA and ownership concentration are smaller (greater in absolute value) for the Korean

\textsuperscript{3} We also estimated Probit regressions with identical number of firms in both datasets by symmetrically eliminating the smallest and largest Korean firms. The results did not change appreciably and are available upon request.

\textsuperscript{4} The ownership concentration data for the US firms are from Compact D/SEC that includes financials and text extracted from 10-Ks and other SEC filings.
firms. The difference is particularly large for REA, suggesting that it plays a much more important role in Korea than it does in the US. The absolute value of REA coefficient is much greater for Korean firms because mean REA in the Korean sample is smaller. The difference between respective elasticities is smaller, but still highly statistically significant. The coefficients of the firm size are not statistically significant due to our selection of non-defaulted firms to match defaulted firms in asset size.

Table 1. The effect of REA and ownership concentration on bankruptcy in the US and Korea

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>USA Coefficients</th>
<th>USA Elasticities</th>
<th>Korea Coefficients</th>
<th>Korea Elasticities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>Retained earnings ratio</td>
<td>-.177*** (.056)</td>
<td>.110*** (.035)</td>
<td>-6.082*** (1.736)</td>
<td>.324*** (.093)</td>
</tr>
<tr>
<td>Ownership concentration</td>
<td>.005 (.003)</td>
<td>.156 (.109)</td>
<td>-.018*** (.005)</td>
<td>.727*** (.209)</td>
</tr>
<tr>
<td>Firm size</td>
<td>.069 (.073)</td>
<td>.099 (.106)</td>
<td>-.013 (.024)</td>
<td>.018 (.034)</td>
</tr>
<tr>
<td>Number of observations</td>
<td>413</td>
<td>500</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>Pseudo-R²</td>
<td>.055</td>
<td>-</td>
<td>.186</td>
<td>.171</td>
</tr>
</tbody>
</table>

Notes: (1) Robust standard errors are in parentheses; (2) *** - significant at 1%; (3) Results in Columns 3 and 4 use the share of largest shareholder as ownership concentration measure while in Columns 5 and 6 use 100 minus minority shareholder share; (4) Constants not shown; (5) Elasticities are evaluated at midpoints

4. Conclusions

We adapt the “tunneling” model of Johnson et al. (2000) to examine the effect of countries’ institutional quality on the determinants of firm bankruptcy. The model implies that while retained earnings and ownership concentration both have negative impact on the probability of bankruptcy, these factors should exert greater influence on bankruptcy in countries with lower institutional quality. Firm-level evidence comparing bankruptcy patterns
in Korea and the US is consistent with the predictions of the model. The smaller effect of retained earnings on default in the US may also be due to an easier procedure to file for bankruptcy in the US and to a harsher treatment of bankrupt firms in Korea. For example, unlike in the US, in Korea, to be allowed to file, a firm must be insolvent. Also, the US law offers stronger protections from creditors, and makes it easier for bankrupt firms to obtain financing and to revoke collective bargaining agreements with labor. However, these legal differences do not explain the greater effect of ownership concentration on bankruptcy in Korea. Nonetheless, research involving more countries is needed to confirm our findings.
References


