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An Empirical Test

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ABSTRACT

Harmonization of accounting rules around the world has been a goal
of many international accounting groups. Often the term harmonization
is used to mean uniform measurement and disclosure rules. In this paper,
information content, rather than the numbers, of the financial statements
is chosen as the object of study. Prediction of corporate failures using
financial information in Korea and the U.S. is used as an example of
international use of accounting information. It was found that due to
reliability of Korean data, differences in accounting rules and economic
structure, the use of Korean accounting data should include appropriate
adjustments.

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Introduction

Comparability of accounting data between countries has become a

subject of interest due to the rapid increase in joint projects between

the companies in different countries and the efforts of foreign cor-

porations to raise capital in the U.S. capital markets.

Nair [1982] grouped countries based on accounting measurement rules

and on disclosure requirements. He asserted that comparisons of finan-

cial statements from countries in different groups should not be made.

Choi et. al., [1983] conducted a study comparing the properties of

financial ratios of companies in Japan and Korea to those of comparable

American corporations. They found significant differences between the

countries in the financial ratio measures. They attributed the dif-

ferences to accounting practices as well as to the different economic

climates and social structures. In both studies the authors concen-

trated on the data reported in the financial statements, rather than on

the information contained in the statements. It is not very surprising

to find differences between the financial statements of companies

operating under different socio-economic environments, prepared under

different measurement rules and disclosure requirements. Now that we

know the numbers are different, the remaining, and perhaps the real,

question is whether the financial statements contain the same types of

information on financial position and profitability of operations. If

they do, then we can ask, "Do specific ratios and line items represent

the same characteristics as they do in the United States?" A more fundamental question is "Can we use the knowledge gained through empirical research in financial statement analyses in the United States to analyze financial statements from foreign countries?"

The purpose of this paper is to provide some empirical evidence in the use of accounting data for risk analysis in Korea and compare the results to the findings in the U.S. Assessment of default risk on loans to corporations before and after the loan decisions are made is a common practice. For non-banking users of the statements, the default risk information can be useful for evaluating potential partners in joint ventures or in licensing agreements in' Korea. In any event, use of financial accounting data for prediction of corporate failure is assumed to be an important example.

The empirical study performed with Korean data is presented in the next section. The findings are compared to those of U.S. studies. Finally, implications of the findings for use of foreign (Korean) financial statements are drawn.

The Korean Study

During the past two decades, Korea experienced a steady and rapid economic growth under the control of government economic planners and policymakers. Although the actors were private enterprises, the writers and the stage managers were government officials. The role of commercial banks was to act merely as windows to dispense funds, after allocation decisions had been made by the government. The emphasis on export markets, international competitiveness, and on controllability

of the economy naturally lead to resource allocation decisions
favorable toward a few very large companies. Therefore, the decisions
on large loans to the major corporations were based more on political
and policy goals rather than based on financial information and risk of
default. The role of accounting information to aid in efficient allo-
cation of resources in the market place was largely ignored as being
purely academic with little practical substance. The banks themselves
had no real authority nor responsibility for making major loan deci-
sions. Loans to smaller companies were not available as a general rule
unless they were well secured by some collateral.

During the past two years, the government has taken steps to
liberalize the banking practices. The government went as far as to
sell virtually all of its holdings in the commercial banks. Not
completely independent of these activities, the major banks started to
explore ways to evaluate credit worthiness of their corporate customers
[Korea Development Bank 1982]. Their study was exclusively on very
large companies whose success and failure depended to some extent on
direct political decisions of the government rather than solely on
financial factors or general economic conditions. Nevertheless, the
banks felt that they will be held responsible for bad debt losses in
the future. They started to seek ways to improve their loan granting
decisions.

This study is based on the experience of small companies which,
individually, would not have sufficient political power to engineer
favorable intervention by the government. Specifically, the data are

obtained from the Korea Loan Guaranty Fund, Korea's Small Business Administration loan program. In 1976, the government established a fund, Korea Loan Guaranty Fund (Fund), to help small businesses in their effort to obtain bank loans, at an interest rate up to 20 percent per annum lower than the curb-market rates (14% to 35% annual interest rate). The Fund does not make loans directly to businesses but guarantees the repayment of loans made by commercial banks, for a nominal fee of one percent of the loan amount per annum.

The Fund is different from commercial banks in three aspects. First, the Fund guarantees only loans to companies whose ability to put up collaterals to obtain secured loans have been exhausted. Thus, the Fund's guaranty must be based on an assessment of the company's future cash generation ability through profitable operations. Second, most of the companies are small businesses run by the owners, rather than by professional managers. The smallness of the companies reduces the possibility of external forces influencing the loan decisions and future outcomes. Also, the accounting information of the small companies tend to be less reliable than reports of the large companies whose financial statements are examined by independent auditors. Third, the objective of the Fund is not solely to minimize the losses due to defaulted loans. Afterall, the Fund's very existence is to make funds available to the companies whose ability to raise funds through regular channels have been already exhausted. The Fund must balance the need to support the promising companies in need of funds against putting good money after the bad. In other words, the Fund must be able to encourage the economy while minimizing the cost (of bad loans).

By the end of 1981, the outstanding balance of the guaranteed loans stood at approximately two billion U.S. dollars, spread over 18,640 companies. The annual amount of losses to the Fund due to defaulted loans reached 150 million dollars. The default rate has been increasing since 1980, and has been rising steadily.

This trend was a cause for alarm among managers of the Fund as well as among government officials, since the government has final responsibility for resource requirements of the Fund. Therefore, a study was performed to help improve the loan guaranty decisions. That study is the basis for the analysis of information content of financial ratios in Korea, reported in this paper [Park and Jee 1982].

Sample and Data

Initially a random sample of 150 problem cases from the past three years were selected. Two hundred fifty-eight normal cases were selected at random from the active file to serve as the control group. Request for data were made to the field offices by the home office. Non-response and the insufficient data reduced the usable cases to 42 problem cases and 154 normal cases.[1] Several cross tabulations were made to test for sample representativeness and no profound differences between the sample and the population were found except for the large proportion of problem cases in the sample which is due to the stratified sampling procedure. Each of the problem cases were matched in the control group based on the industry (see Table 1).

Insert Table 1 about here

Financial records and other credit evaluation information on the companies were collected for three years, 1979-1981. As noted earlier the subject companies were small businesses and the reliability of their accounting records were questionable. Therefore, the information was obtained from their tax returns.[2] While the tax return information may be biased, it was assumed that the information tends to understate assets and income, rather than overstate[3], thus giving a more conservative picture of the company's credit worthiness.

This study suffers from the following inherent shortcomings of the sample and data. The sample was selected from the population of companies who were granted credits initially. The population did not include the companies whose application for a guaranty was denied. Thus, the sample selected can provide information only for type II errors (erroneous decision to guaranty) but not for type I errors (erroneous decision to deny).[4] Another limitation is that the quality of accounting data fall short of that of large corporations or of U.S. corporations. However, it is the best available data and the real decision makers at the Fund must use this data for the actual loan guaranty decisions.[5] These problems not withstanding the analysis of the data were performed assuming reliability of the data.

Analysis of Data

Initially financial ratios identified as being important by previous studies were computed for each of the 84 cases for two years.

Indicator variable (y) was used to classify the cases into normal (0) and problem (1) cases. A stepwise regression was made with this indicator variable as the dependent measure, and the financial

exercise in futility. Second, it could be such that the management
became aware of worsening financial conditions and the need for addi-
tional loans. Management then adopted certain accounting principles to
make the financial conditions look healthier. Third, the management
may have taken certain steps, other than accounting, to temporarily
make the financial statements look better.[7] If the second and/or third
reason were valid, the credit analysts should take care to utilize data
that are somewhat immune to management manipulations. Therefore a
regression run was made with additional non-financial variables in the
equation. The result was somewhat better, (R^2 = .395) with market
share, industry competitiveness, and capacity utilization rate being
included as significant variables. The classification was 80 percent
correct in the sample.[8]

   Finally, based on the results of the regression runs significant
financial and other variables were selected. Then, two discriminant
functions were developed; one with financial ratios only and another
with other information included. The results of the discriminant ana-
lyses are quite similar to those of the regression runs.

Insert Table 3 about here

   The variables found to be most significant were market share and
sales growth rate data among the non-financial ratio data and current
asset/sales, net working capital/total assets and quick assets/sales
among the financial ratios. Therefore, the direct indicator of default
in Korean small business were determined to be the inability to meet

short term financial needs rather than long term profitability or soundness of the operations.[9]

In order to examine the validity of this finding, another study was examined. The author is not aware of any other study that dealt with small businesses in Korea. Only one among several studies that dealt with large companies has been made public [Korea Development Bank, 1982]. The study was based on 24 failed firms and 24 healthy firms matched on industry, sales and total asset size. Discriminant functions were developed based on 21 financial ratios.

The discriminatory power of the models were 68.75 percent for three years ahead, 85.42 percent two years ahead and 93.75 percent for one year ahead predictions of the failures. The key variables for each of the three models are presented in Table 4 below.

Insert Table 4 about here

Concentrating on the two years ahead model, we can compare the results of the KDB study with ours. The non-financial data were not included in the KDB study, therefore only the financial ratios can be compared.[10] Among the key variables in the KDB study we find the income/total assets and the rate of increase in profit. The major difference is that while our study picked mostly balance sheet based information, KDB study picked all but one income statement based ratios. The result could be in the design of the study, initial selection of variables, or in the nature of the sample firms, small vs. large. It also could be due to the differences in quality of data.

Since the information for the large companies were audited by independent auditors, they should be more reliable than those of the small companies. This may explain the large difference in the classificaiton ability between the two and one year before models. The fact that balance sheet data are easier to verify than the flow data in the income statement may have contributed to the small business study selecting the balance sheet ratios. In any event, if the tax return information were the best financial information available for small companies at reasonable cost we should develop means to use the information. Next, we briefly compare the above two studies with those of the U.S. based studies.

Comparison with the U.S. Findings

The purpose of this section is to present a highly condensed summary of the results of U.S. based studies, and to compare the findings with those of the Korean studies.

The credit evaluation studies in the U.S. can be classified into (1) prediction of failure and (2) bond rating studies. Prediction of failure studies aim to provide some sort of a scoring model which will classify the firms into either the survival class or the failure class and the goodness of the model is determined by the accuracy of the classification and how far in advance the classification can be made. The bond rating studies try to determine the ratings that will be provided by the bond rating agencies. The major difference between the two types of studies is that the failure studies are trying to predict a state of nature while the rating studies are trying to model the decisions made by experts which may or may not be entirely correct.

Table 5 presents the variables most commonly cited as being signifi-
cant in various studies.

Insert Table 5 about here

Most of the published studies in the U.S. are based on large com-
panies. Since we found differences between the large and small com-
panies, it was important to determine whether the differences are due
to the design differences of the study (study specific), unique to
Korea (country specific), or due to differences in size (general).
Unpublished study on small business failures by Alvez [1978] was exa-
mined to compare with the studies based on large companies.

Understandably, the bond rating studies tend to emphasize the
ratios related to debt coverage and interest payments while the
failure studies concern themselves more with the profitability of the
firms. The results of the failure studies are more directly applicable
to our study.

Comparing the results with that of the Korean studies we find that
the variables picked in the U.S. studies and the KDB studies were
rather different. For the failure studies only the Net income/Total
assets is the common ratio picked by both. Interest coverage ratio
picked in bond rating studies were also picked in the KDB study.
Comparing with the Korean small business study, we find current assets
to sales and quick assets to sales data as the common ratios. Casual
observation of the Table 5 does not reveal any glaring differences
between the Korean and U.S. small businesses or between small and large
businesses in the U.S. A plausible inference is that the Korean large

businesses operate in a different political/economic environment from others, at least in obtaining funds. This type of comparison, however, is too subjective and study specific to be acceptable as evidence. In order to provide more objective evidence, replications of studies using the Korean data were conducted.

Replications

In order to evaluate the compatibility between the U.S. and Korean financial statements and between the small and large companies, the default prediction models developed in other studies were applied to the Korean small business data. Since we were interested in the information content of the financial data rather than the direct applicability of the models, the variables identified in various studies were used as discriminant factors and the factor coefficients were recalculated based on the Korean data. Replications were repeated to determine the stability of the findings. The accuracy of two year ahead predictions of various sets is presented in Table 6.

Insert Table 6 about here

The results indicate that the predictive accuracy varies somewhat from sample to sample. We find the variables from U.S. studies performed slightly better than the KDB studies. This is somewhat surprising since the differences were expected to stem from the different economic structure and accounting practices. The large size effect, difference between Korean large and small companies, may indicate the impact of government intervention in financing activities of large companies in Korea.

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The result indicates that there exist some differences between the Korean small businesses and other groups. The variables selected for discriminant models and their significance is not consistent across the board. Availability and quality of data somewhat limits the generalizability of the results, but we wish to argue that sufficient evidence has been provided to call attention to the fact that the information content and comparability in decision setting is the real issue rather than harmonization of the financial statement numbers.

Comparability of the Financial Statement Information

In this paper we tried to evaluate the information content of the financial statement data between U.S. and Korea. It was known already that the two countries have different accounting disclosure standards and measurement rules, and that equity structure and other financing strategies are somewhat different. The specific aim of this study was to see whether the financial statements of Korean firms can be evaluated in a manner similar to that of U.S. firms. This question would remain even if the statements of a Korean company were adjusted to meet the U.S. GAAP, since the underlying economic factors are not likely to be similar to the conditions in the U.S. Therefore, the question is an empirical one and has significance for evaluating potential partners in Korea.

The result of this study indicates that the quality of the accounting information varies greatly by the size of the companies in Korea. Relatively short history of public markets for capital and tax oriented accounting practices may have contributed to poor financial accounting information for non-public companies.

As for the decision at hand of evaluating a potential partner, especially a small business, some adjustments need to be made. The companies' market position within the Korean market (i.e., market share) should be evaluated. Since Korea is a relatively small market, compared to that of U.S., a number of strong competitors in the market place can make the investment in the smaller companies a risky one. However, if the U.S. company is willing to support the Korean companies short-term financial needs as well, a substantial portion of the risk can be eliminated. Heavier emphasis should be placed on the financial data pertaining to and prepared before the negotiations began. There exist some circumstantial evidence that firms can take actions so as to temporarily make the financial ratios favorable without improving the real conditions at all. This can be accomplished through (cosmetic) accounting changes and/or off statement financing activities in addition to outright falsifications. Therefore, more reliance should be put on the data that are not likely to have been manipulated and can be verified by direct observations. The tax return information before the talks began is less likely to have been subject to manipulation. Balance sheet data can be verified by independent auditors through physical inspection and confirmation with the external data sources such as banks and customers.

Returning to the original purpose of this paper, we conclude that the use of Korean accounting data should include appropriate adjustments for differences in accounting and economic structures. Reliability of accounting data cannot be taken for granted in using Korean data, in addition to the measurement and disclosure differences. Not only the

debt-equity structure of the U.S. and Korean companies different, the key factors for survival seems to be some what different. In Korea, the short-term liquidity seems to be a very important characteristics of a healthy company.

Notes

[1] Unusually large number of the problem cases were processed based on recommendations of governmental units. Governmental decision to support a particular industry would preempt any decision by the Fund. Accordingly, the records of those cases did not include sufficient financial data for analysis. Exclusion of these cases does not limit the scope of the study since the case are out of the Fund's jurisdiction in reality.

[2] The Fund itself uses the tax return information. In many cases the companies did not have adequate enough accounting system to produce even the basic financial statements.

[3] There were isolated cases where the company reported higher income and paid additional taxes to obtain the benefits of the Fund's guaranty and the lower interest rate. However, it was not a prevalent phenomena and the overall validity of the data was assumed to be unaffected by those cases.

[4] This limitation is not unique to this study. Any study of loan portfolio would contain this limitation, see Dietrich and Kaplan [1981] for example.

[5] While the poor quality of data does not affect the validity of the study as to the loan guaranty decisions, it does diminish the comparative analyses of financial ratios between the countries.

[6] This finding, however, could be due to the fact the firms in the population all had large debts, at least more than they can put up collaterals and obtain secured loans. Therefore, this finding may simply suggest that when all the firms are highly debt financed, their short-term surival ability is important in assessing the long-term profitability.

[7] While it is very important to determine the cause of this phenomenon, it is a major project by itself. In this study the possiblity of complete data inadequacy is assumed away.

[8] When the changes in the financial ratios were included (in effect two years of ratio data), the R^2 improved to .418 and the classification accuracy increased to 83.2 percent. However, the differences were considered insignificant.

[9] An example would be where a sound small business sub-contract with a large corporation and finances the production with short-term loans, possibly at a very high curb market rate, and experiences a long delay of several months in collection of the receivable from the large corporation. Consequently, the small business would default on the loan it used to finance the production.

[10] Since the experimental and control firms were matched on industry and sales, the market share data would have been a controlled variable.

[11] The Korean studies are of the failure prection type. A study of rating type could not be performed since the data were not available for those firms whose applications for loan guaranty were declined.

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Table 1: Industry Distribution of Sample Firms

Group Industry	Default (Experiment)	Normal (Control)
Manufacturing	32	32
Construction	4	4
Retailing	3	3
Trucking	2	2
Others	1	1
Total	42	42

Table 2:   Multiple Regression Using Financial Ratios

Step	Variables	b	R^2	R^2	r
1	Current Assets/Total Assets	.1289	.052	.052	.2289
2	Net Working Capital/Sales	−.6078	.124	.071	−.1203
3	Quick Assets/Current Liabilities	.3179	.184	.064	.1223
4	Accounts Receivable/Sales	−.3708	.260	.076	−.1201
5	Current Assets/Sales	.5465	.274	.014	−.0245
6	Quick Assets/Sales	−.4147	.294	.020	−.0653
7	Quick Assets/Total Assets	.5025	.302	.008	.2141
8	Current Assets/Current Liabilities	−.1212	.210	.008	.1038
9	Cash/Sales	−.2037	.313	.003	−.1581
10	Net Working Capital/Current Liab.	.4253	.316	.003	−.0122
11	Cash/Total Assets	−.2449	.322	.006	.0314
12	Net Income/Total Assets	−.1452	.326	.004	−.0024
13	Total Debt/Total Assets	−.0905	.330	.004	−.0807
14	Net Working Capital/Total Assets	.0782	.331	.001	.1165
15	Cash Flow/Total Debt	.0409	.331	.000	.0009
	Constant	.2758			

Table 3: Summary of Regression and MDA Analyses

Data	Regression			MDA		
	Actual	Prediction Good	Bad	Actual	Prediction Good	Bad
1 Year Financial	Good	26	16	Good	29	13
	Bad	10	32	Bad	12	30
	Total	(69.05%)			(70.24%)	
2 years Financial	Good	31	11	Good	33	9
	Bad	10	32	Bad	14	28
	Total	(75%)			(72.62%)	
1 year Financial & Others	Good	32	10	Good	34	8
	Bad	7	35	Bad	7	35
	Total	(79.76%)			(82.14%)	

Key Variables Selected:

Financial: Current Assets/Sales
                  Net Working Capital/Total Assets
                  Cash/Total Assets
                  Quick Assets/Sales

Non-financial: Market Share
                  Sales Growth
                  Years in Business

Table 4: Discriminant Analysis by Korea Development Bank

Years Prior to Failure	Variables	Actual	Prediction	
			Good	Bad
3 Years	11,8,7,5	Good	18	6
		Bad	9	15
		Total	(68.75%)	
2 Years	5,4,6,3,1,2,7,8,12		Good	Bad
		Good	21	3
		Bad	4	30
		Total	(85.42%)	
1 Year	2,9,10,7,6,1,12		Good	Bad
		Good	24	0
		Bad	3	21
		Total	(93.75%)	

Variables:

1   Owner's Equity/Total Assets
2   Total Assets/Total Debt
3   Net Income/Sales
4   Gross Profit/Sales
5   Operating Income/Total Assets
6   Ordinary Income/Sales
7   Total Revenue/Total Expenses
8   Total Debt/ Interest Expense
9   Sales/Total Assets
10 Sales/Fixed Assets
11 Sales/Inventory
12 Increase in Ordinary Income/Ordinary income$_{t-1}$

Table 5:   Comparison of Significant Variables by Company Size and Country

	KOREAN	U.S.
SMALL	Current Assets/Sales Net Working Capital/Total Assets Cash/Total Assets Quick Assets/Sales Market Share Sales Growth Rate Years in Business	ALVEZ: NET PROFIT ON SALES NET PROFIT ON NETWORTH CURD/NETWORTH CURD/INVEN CURRATIO QUICK RATIO EBT/NETWORTH EBT/TOTA Product line Experience Diversification
LARGE	KOREAN DEV'T BANK 2 yrs- OPERATING INCOME/TOTA GROSS PROFIT/SALES ORDINARY INC/SALES NETINC/SALES OWNER'S EQUITY/TOT. ASSET TOTA/TOTD TOTR/TOTEXP INC. IN ORDINARY INCOME/ORD. INCOME $t-1$	DEAKIN: CURA/TOTA TOTD/TOTA CURA/SALES WORKING CAP/SALES

Table 6: Discriminant Analyses of Korean Small Business Loan Defaults Using Various Financial Ratios

	U.S.-Small	U.S.-Large	Korea-Large
All 185 cases	65.41% CURRATIO NWC/TOTA C. DEBT/NETWORTH TOT DEBT/NETW	65.41% NWC/SALES TOTD/TOTA CURA/CURL NWC/TOTA	54.05% NETW/TOTA SALES/TOTA SALES/FXTASSET
84 Cases First Set	61.90% CUR. A/CUR. L TOTD/TOTA NWC/TOTA CURD/INVEN	60.71% NWC/SALES TOTD/TOTA NWC/TOTA CURA/CURL <u>CASHFLOW</u> TOTD	67.86% NETW/TOTA
Second Set	73.81 CURRATIO NWC/TOTA NETW/TOTA	70.24% NWC/SALES CURA/TOTA NWC/SALES NWC/TOTA CURA/CURL	66.67% NETW/TOTA
Third Set	67.86 NETW/TOTA	71.43% NWC/SALES CURA/SALES NWC/TOTA CURA/CURL	59.14% TOTD/INTEREST EXP (.13)
Fourth Set	63.10 CURRATIO CURD/INVEN	60.71% QUICKAST/SALES CURA/CURL	57.14% NO SIGNIF. VAR.
	82.5%	90%	85.42%

accuracy in the
original data