THE EFFECTS OF INTANGIBLE ASSETS ON THE LOAN INTEREST RATES FOR SMES IN TAIWAN

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Abstract: This study is motivated by the lack of direct empirical research on the relationship between intangible assets and loan interest rates for small and medium-sized enterprises (SMEs) in emerging markets. We use a multivariate regression to investigate the effects of intangible assets *(IA)* on loan interest rates by focusing on SMEs. Using a panel sample of 952 SME annual observations in Taiwan from 2001 to 2006, our empirical findings indicate that an SME's *IA* does negatively affect loan interest rates. The results imply that SMEs should strive to invest in *IA* and enhance their knowledge management for obtaining the benefits of loan interest rates. Our results provide empirical evidence for SMEs in emerging markets and can be compared with those for firms in industrialized economies.

1. INTRODUCTION

This study is motivated by the lack of direct empirical research on the relationship between intangible assets (*IA*) and loan interest rates to small and medium-sized enterprises (SMEs) in emerging markets. Generally, current investments in intangible assets are associated with higher future earnings and stock returns. While an extensive body of empirical literature has provided evidence on the relevance of intangible assets for equity valuation and has pointed out the need to take intangibles into account in investment and credit decision making (Goldfinger 1997; Tan et al., 2007), several recent studies have investigated the impact of intangible assets on firm's cost of capital (Doppegieter et al., 2004, Tokmakcioglu et al., 2007). However, to the best of our knowledge, no studies have analyzed directly on the effect of a firm's intangible assets on its cost of debt financing, especially in the context of SMEs in emerging markets.

This study aims to investigate the effects of *IA* on loan interest rates with a focus on SMEs. The SMEs are selected for the reason that SMEs make great contributions on the economic development of many emerging markets. By using interest rate data on actual bank loans to publicly-listed SMEs in Taiwan, we expect to provide empirical evidence on whether *IC* affects loan interest rates in an emerging market.

While a number of studies have argued that it is difficult to value intangible assets (Bontis et al., 1999; Lev, 2003; Lev and Daum, 2004), many recent empirical studies have indicated that *IA* has a positive impact on a firm's market value and financial performance (Chauvin and Hirschey, 1993; Hand 1998; Chen et al., 2005). Thus, we infer that an SME's *IA* will positively affect its market value and financial performance and thus result in lower loan interest rates.

In this study, we use a multivariate regression to analyze whether *IA* affects loan interest rates for SMEs in Taiwan, while controlling for other potentially important firm and loan characteristics. Using a panel sample of 186 publicly-listed SMEs with 952 annual observations in Taiwan during the period 2001- 2006, the empirical results show that an SME's *IA* does negatively affect loan interest rates.

The main contribution of this paper lies in its directly testing whether an SME's *IA* affects its loan interest rates and debt ratios in an emerging market. Our findings provide empirical evidence that an SME with greater *IA* leads to lower interest rates on bank loans to the SMEs, implying that SMEs with greater *IA* probably have higher market value and financial performance, and that SMEs should strive to invest in *IA* and enhance their knowledge management for obtaining the benefits of loan interest rates. The results may provide empirical evidence for SMEs in emerging markets and can be compared with those for firms in industrialized economies.

The remainder of this paper is organized as follows. Section 2 presents the theoretical background, discussing the definition of SMEs and reviewing the empirical research concerned with the effects of *IA* on the cost of debt. Section 3 describes the data and the methodology used in this study. The descriptive statistics and the results of the regression analysis are presented in Section 4. Finally, Section 5 concludes the paper.

2. THEORETICAL BACKGROUND

2.1 Definition of SMES and Intangible Assets

In Taiwan, an SME refers to an enterprise with a paid-in capital not exceeding NT$ 80 million or no more than 200 regular employees, while micro enterprises refer to SMEs with fewer than 5 regular persons. Therefore, the publicly-listed SMEs in our sample are defined as enterprises with between 6 and 200 regular employees or a paid-in capital not exceeding NT$ 80 million. During the last fifty years, Taiwanese SMEs have made great contributions to the economic development of Taiwan. The average firm size of SMEs is much smaller than that of large firms. Therefore, they need to aggressively expand into international markets (Capar and Kotabe, 2003) and strive to invest in *IA* to enhance their competitive advantages (Lev, 2001; Kaplan and Norton, 2004).

Most intangible assets are not reflected on the balance sheet under current Generally Accepted Accounting Principles (GAAP). However, during the last three decades knowledge assets have been increasingly recognized as key sources of firm's competitive advantage (Edvinsson and Malone, 1997; Kaplan and Norton 2004). Therefore, investments in human resources, information technology, research and development (R&D), advertising and customer satisfaction have become essential in order to ensure the firm's future viability (Edvinsson and Malone, 1997; Lev, 2001). In addition, many authors have used the value of most intangible assets to explain the difference between the market value and the book value of firm's equity (Booth, 1998; Dzinkowsik, 2000; Roslender, 2000). In this study, we use the total expenditures of R&D and advertising to proxy for the firm's *IA.*

2.2 *IA*, Market Value and the Cost of Debt

In today's knowledge-based and technology-intensive economies, the creation of firm value has become more and more related to intangible assets. However, the traditional balance sheet can not capture most of the firm's intangibles under current GAAP, which results in a dramatic increase in the market-to-book ratio (M/B ratio) of stocks (Lee et al., 1999; Lev, 2001; Core et al., 2001). As Lee et al. (1999) indicate, the sharp uptrend in the M/B ratio has risen three times between 1981 and 1996 for the Dow Jones Industrial Average. Lev (2001) reports a dramatic increase in the mean M/B ratio of US stocks, from 1 in the 1970s to almost 6 in March 2001. In researching the stock prices of New Economy companies, Core et al. (2001) also obtain similar results.

While a number of studies have argued that it is difficult to value intangible assets (Bontis et al., 1999; Lev, 2003; Lev and Daum, 2004), an extensive body of empirical literature has provided evidence on the relevance of intangibles for equity valuation and has pointed out the need to take intangibles into account in investment and credit decision making, because current investments in intangibles are associated with higher future earnings and stock returns (Goldfinger, 1997; Tan, et al., 2007).

Recently, many empirical studies have indicated that investment in intangibles has a positive impact on the firm's market value and financial performance (Chauvin and Hirschey 1993; Hand 1998; Chen et al., 2005). Chauvin and Hirschey (1993) find that advertising investments and R&D expenditures have positive and consistent influences on the value of companies. Hand (1998) reports the existence of a positive and significant relationship between investments in human resources and the market value of companies. Chen et al. (2005) use Taiwanese listed companies as a sample to examine the relationship between corporate value creation efficiency and a firm's M/B ratio. Their results also support the hypothesis that a firm's intangible capital has a positive impact on its market value and financial performance.

Based on the above explanation, we may infer that an SME's *IA* will positively affect its market value and financial performance and thus result in lower loan interest rates. Thus, we propose testing Hypothesis 1 as follows:

H1: An SME with greater *IA* does lead to lower risk premium of loan interest rates.

3. RESEARCH METHODOLOGY

3.1 Sample and Data Collection

Our sample includes 186 publicly-listed SMEs with 952 annual observations of the last revolving bank loans active at the end of each year during the period 2001-2006. The revolving bank loans are borrowed from the Eight-Largest Banks in Taiwan. All the data needed for the variables used in this study are collected from the Taiwan Economic Journal (TEJ) database, including loan interest rates, R&D expenditures, advertising expenditures, foreign sales ratios, total assets, total sales, credit ratings, audit

firm size, collateral, and so on. In addition, we use the interest rate for government Treasury securities as the risk-free interest rate in each year of our research period.

3.2 The Empirical Model

In this study, we use a multivariate regression to analyze whether *IA* affects loan interest rates for the SMEs in Taiwan, while controlling for other potentially important firm and loan characteristics. The empirical model for examining the effects of intangible assets on loan interest rates is as follows:

$$RP_t = \alpha_0 + \alpha_1 Ln(IA_t) + \alpha_2 Ln(TA_t) + \alpha_3 CR_t + \alpha_4 AQ_t Dummy + \alpha_5 COL_t Dummy + \alpha_6 [AQ_t Dummy \times CR_t] + \alpha_7 ICT_t Dummy + \varepsilon \quad (1)$$

where RP_t is the risk premium of bank loans for the firm in year t; $Ln(IA_t)$ is the natural log of firm's total expenditures of R&D and advertisement at the end of year t, which is used to proxy for the firm's *IA*; $Ln(TA_t)$ is the natural log of firm's total assets at the end of year t, included to control for firm size; CR_t is the credit rating for the firm in year t, included to control for the firm's credit risk; $AQ_t Dummy$ is the dummy variable to proxy for audit quality, which equals one for the loans of Big 4 (5) audited firms and zero for the loans of non-Big 4 (5) audited firms, included to control for audit quality; $COL_t Dummy$ is the dummy variable used to control for the effect of collateral on the interest rate; $AQ_t Dummy \times CR_t$ is the interaction term between audit quality and the credit rating for the firm; and $ICT_t Dummy$ is the dummy variable used to control for the industry effect of information and communication technology (ICT) firms on the interest rates. A discussion of these variables follows.

Our dependent variable is the risk premium of the bank loan, which is equal to the interest rate for the bank loan minus the risk-free interest rate. The bank loans in our sample are annually renewable revolving credit loans borrowed by the SMEs from the Eight-Largest Banks in Taiwan during the period from 2001 to 2006, and the yearly observation for each firm is the interest rate on its last loan in every sample year.

This study uses the natural log of firm's total expenditures of R&D and advertising as a proxy for the firm's *IA*. Many studies indicate that a firm's *IA* has a positive impact on its market value and financial performance (Chauvin and Hirschey, 1993; Hand, 1998; Chen et al., 2005). If an SME with greater *IA* is associated with a higher financial performance and thus results in a lower interest rate, the variable $Ln(IA_t)$ will have a negative coefficient.

To control for firm size, we include the independent variable $Ln(TA_t)$. We expect interest rates to vary inversely with firm size because loan officers tend to view larger firms as less risky (Sinkey, 1998; Chkir and Cosset, 2001), and because larger firms tend to have better reputations in debt markets (Diamond, 1989). Petersen and Rajan (1994) find a significantly negative relationship between loan interest rates and firm size. Similarly, Blackwell and Winters (1997) also find that loan interest rates are negatively related to both firm size and the frequency of monitoring by loan officers. Thus, we expect this variable $Ln(TA_t)$ to have a positive coefficient.

Our credit risk control variable is CR_t, the credit rating for the firm. Credit ratings are commonly used by lenders to measure the firm's overall level of default risk. We expect the credit rating variable to have a positive coefficient because the credit rating is a principal determinant in the cost of debt capital (Reeb et al., 2001). In Taiwan, a firm's credit rating is measured by the risk level of the Taiwan Corporate Credit Risk Index (TCRI) obtained from the Taiwan Economic Journal (TEJ) database. By integrating 10 different kinds of financial data, a score representing a rating is obtained that ranges between 1 and 9. The 10 different kinds of financial data are the ROE, ROA, Operating profit ratio, Quick ratio, Interest payout ratio, Debt to equity ratio, Months accounts receivable outstanding, Months sales outstanding, Operating income, and Total assets. The higher the rating level that a firm has, the higher its credit risk is.

Blackwell et al. (1998) and Pittman and Fortin (2004) suggest that audit assurance is negatively correlated with the cost of debt. Moreover, many empirical studies support the view that audit firm size is positively correlated with audit quality (Becker et al., 1998; Francis et al., 1999; Abbott et al., 2006). Therefore, we choose audit firm size as a proxy for audit quality and expect that a Big 4 (5) audit will lead to lower loan interest rates. To control for the effect of audit quality on the interest rate, we include a dummy variable $AQ_t Dummy$ that equals one for the loans of Big 4 (5) audited firms and zero for the loans of non-Big 4 (5) audited firms. Its coefficient measures the average difference in interest rates between the Big 4 (5) and non-Big 4 (5) audited firms holding other characteristics constant. If the presence of a Big 4 (5) audit is associated with a lower loan interest rate, the variable $AQ_t Dummy$ will have a negative coefficient.

In addition, Reeb et al. (2001) indicate that a credit rating is a principal determinant in the cost of debt capital. According to this viewpoint, the interest rate benefit of a bank loan resulting from purchasing a Big N audit will vary with the firm's credit rating. Thus, we include the interaction term between audit quality and the credit rating for the firm, $AQ_t Dummy \times CR_t$. If the interest rate benefit of purchasing a Big N audit is a decreasing function of the firm's credit rating, the coefficient of this interaction term will be positive.

To control for the effect of collateral on the interest rate, we include a dummy variable $COL_t Dummy$ that equals one in the presence of collateral and zero otherwise. Previous studies have found collateral to be associated with both higher credit risk and higher interest rates (Berger and Udell, 1990; Blackwell and Winters, 1997). Therefore, we expect this dummy variable to have a

positive coefficient.

Furthermore, to control for the industry effect of information and communication technology (ICT) firms on the interest rate, we include a dummy variable ICT_t *Dummy* that equals one for the information and communication technology (ICT) firms and zero otherwise. The ICT industries are developed differently with respect to the capital market and growth. Aoun and Heshmati (2008) show that ICT firms have lower cost of debt financing than non-ICT firms. Thus, we expect this dummy variable to have a negative coefficient.

4. EMPIRICAL RESULTS

4.1 Descriptive Statistics

Table 1 presents descriptive statistics of the variables for our sample, including the maximum, median, minimum, standard deviation and mean value. From Table 1, the averaged total asset and the averaged total sales are NT$ 1,257.112 million and NT$ 1,287.792 million, respectively, while the averaged R&D-and-advertising expenditure is NT$ 22.477 million; the mean loan interest risk premium are 178 basis points, while the mean TCRI credit rating level and the mean foreign sales ratio are 5.74 and 43.50 %, respectively.

Table 1
Descriptive Statistics for a Sample of 952 Revolving Bank Loans during the Period 2001-2006

Variables	Number of Bank Loans	Mean	Standard Deviation	Minimum	Median	Maximum
Basis Points above Risk-free Rate	952	178	133	-75	137	665
R&D and Advertising Expenditures [a] (NT$000)	952	22447	24288	0	14888	133447
Foreign sales ratio [b] (%)	952	43.50	35.67	0.00	43.01	100
Total Assets (NT$000)	952	1257112	1188181	127107	970794	16125172
Credit Ratings [c]	952	5.74	1.21	3	5	9
Audit Quality Dummy [d]	952	0.65	0.48	0.00	1.00	1.00
Collateral Dummy [e]	952	0.51	0.50	0.00	1.00	1.00
ICT Dummy	952	0.56	0.50	1.00	1.00	1.00

[a] The sum of R&D and advertising expenditures is used to proxy for the firm's *IA.*

[b] The foreign sales ratio is used to proxy for the firm's degree of internationalization, which equals the percentage of foreign sales to total sales.

[c] The TCRI credit ratings are categorized into 9 levels of credit ratings. The higher rating of a firm means the higher credit risk it has.

[d] The dummy variable AQ_t *Dummy* equals one for the loans of Big 4 (5) audited firms and zero for the loans of non-Big 4 (5) audited firms.

[e] The dummy variable *Collateral Dummy* equals one for collateralized loans and 0 otherwise.

Data source: The Taiwan Economic Journal (TEJ) database.

4.2 The Effects if IA on Loan Interest Rates

Our regression results for testing the effects of *IA* on loan interest rates are presented in Table 2. The first column contains coefficient estimates for the regression equation (1) based on the sample of 952 revolving bank loans. The second column provides the basic tests of the hypothesized relationship between *IA* and loan interest rates.

Table 2
***Ordinary Least Squares Regression Results for a Sample of 952 Revolving Bank Loans Active at the End of Each Year during the Period 2001-2006* (*Dependent Variable is the Loan Interest Rate minus the Risk-free Rate* [a])**

	Regression (1)	
Independent Variables [b]	Coefficient (Standard deviation)	*P-value* [c]

Intercept	6.701 (1.067)	0.000
Ln (IC_t)	-0.062 (0.021)	0.004
Ln (*Total Assets*)	-0.398 (0.068)	0.000
Credit Ratings	0.226 (0.056)	0.000
AQ_t *Dummy*	-0.714 (0.405)	0.028
AQ_t *Dummy* × *Credit Ratings*	0.114 (0.069)	0.049
Collateral Dummy	0.149 (0.081)	0.065
ICT Dummy	-0.324 (0.083)	0.000
Number of Observations	952	
Adjusted R^2	0.194	
F-statistic	23.631	0.000

[a] The regression model is $RP_t = \alpha_0 + \alpha_1 Ln(IC_t) + \alpha_2 Ln(TA_t) + \alpha_3 CR_t + \alpha_4 AQ_t Dummy + \alpha_5 COL_t Dummy + \alpha_6 [AQ_t Dummy \times CR_t] + \alpha_7 ICT Dummy + \varepsilon$.

[b] RP_t is the risk premium on bank loans for the firm in year t; *Ln* (IC_t) is the natural log of firm's total expenditures of R&D and advertisement at the end of year t; Ln(*Total Assets*) is the natural logarithm of the borrowing firm's total assets (NT$'000); *Credit Ratings* is the credit rating level of the borrowing firm; AQ_t *Dummy* is the dummy variable to proxy for audit quality, which equals one for loans of Big 4 (5) audited firms and zero for loans of non-Big 4 (5) audited firms; COL_t. *Dummy* equals one for collateralized loans and 0 otherwise; and *ICT Dummy* equals one for the information and communications technology (ICT) firms and 0 otherwise.

[c] The *P*-values are for two-tailed *t*-tests.

Data source: The Taiwan Economic Journal (TEJ) database.

From the first column of Table 2, the regression results are indicative of a good explanatory power (the adjusted R^2 value is 0.194) and the *F*-statistic is significant at the 0.001 level. The coefficient of the *Ln* (IA_t) is both significantly (P-value = 0.004) and negatively (-0.062) correlated with the interest rates on bank loans, suggesting that an SME with a greater *IA* does pay lower interest rates. Previous studies have indicated that *IA* has a positive impact on the firm's market value and financial performance (Chauvin and Hirschey 1993; Hand 1998; Chen, Cheng and Hwang, 2005). However, no empirical studies have analyzed directly on the effect of a firm's *IC* on its cost of debt financing, especially in emerging markets. Our study provides empirical evidence that the firm's *IA* is negatively correlated with the cost of debt. Hypothesis H1 is found to hold.

In addition, the coefficients of *Ln* (TA_t) and AQ_t *Dummy* are both significantly (P-value = 0.000 and 0.028, respectively) and negatively (-0.398 and -0.714, respectively) related to the interest rates on bank loans, indicating that SMEs that have greater total assets or purchase Big 4 (5) audits enjoy lower interest rates, on average, than SMEs that have less total assets or purchase non-Big 4 (5) audits. The coefficient of ICT_t *Dummy* is also significantly (P-value = 0.001) and negatively (-0.324) related to the

loan interest rates, suggesting that ICT SMEs are able to benefit from lower interest rates, on average, than non-ICT SMEs . On the other hand, the empirical results of regression equation (1) also indicate that the coefficients of CR_t and COL_t *Dummy* are both significantly (P-value=0.000 and 0.065, respectively) and positively (0.226 and 0.149, respectively) related to the interest rates on bank loans, suggesting that SMEs with worse credit ratings or with collateral face higher interest rates, on average, than SMEs with better credit ratings or without collateral. These results are consistent with those of Reeb et al. (2001) and Czarnitzki and Kraft (2007), which suggests that well credit-rated firms will benefit from lower interest rates while badly credit-rated firms will be subjected to higher interest rates.

5. SUMMARY AND CONCLUSIONS

Using a sample of 952 revolving bank loans extended to publicly-listed SMEs in Taiwan, we investigate the effects of *IA* on the interest rates of such bank loans. Our research is motivated by the lack of direct empirical research on the relationship between *IA* and loan interest rates for SMEs in emerging markets. By using a multivariate regression, we analyze whether an SME's *IA* affects the risk premium associated with revolving bank loans, while controlling for other potentially important firm and loan characteristics. Our empirical results show that the SME's *IA* does negatively affect the interest rates on bank loans, suggesting that an SME with greater *IA* enjoys lower interest rates. The results are probably resulted from that a firm's *IC* has a positive impact on its market value and financial performance.

The main contribution of this study lies in its directly testing whether *IC* can affect the loan interest rates for SMEs in an emerging market. Our finding provide empirical evidence that an SME with greater *IA* leads to lower interest rates on bank loans, implying that SMEs should strive to invest in *IA* and enhance their knowledge management for obtaining more benefits of loan interest rates. Furthermore, our findings may provide empirical evidence for SMEs in emerging markets and can be compared with those for firms in industrialized economies.

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