Financial distress and firm performance: Evidence from the Asian financial crisis

Tih Koon Tan
The University of Tampa

ABSTRACT

Using a sample of 277 firms from eight East Asian economies, the relationship between financial distress and firm performance during the Asian Financial Crisis of 1997-1998 was tested. The crisis provides an exogenous shock which reduces the endogeneity issues between firm performance and leverage. The results from this study reaffirm that firms with low financial leverage tend to perform better than firms with high financial leverage. Additionally, the crisis magnifies the negative relationship between financial distress and firm performance. High-leverage firms experience worse performance during a crisis.

Keywords: financial distress, financial crisis, firm performance

Acknowledgement: This research was partially supported by The University of Tampa Dana Foundation Grant.

INTRODUCTION

The Asian Financial Crisis of 1997-1998 led to sharp declines in the currencies and stock market prices of a number of Asian countries/economies; it also caused repercussions to the global economy (International Monetary Fund, 2008). Prior research has studied the relationship between financial leverage and firm performance (Opler and Titman, 1994; Safieddine and Titman, 1999; Jandik and Makhija, 2005). However, these studies were conducted in the U.S. context. This study attempts to re-examine the performance-leverage relationship under an international context. To examine the indirect costs of financial distress in a way that minimizes the problem of reverse causality, Opler and Titman (1994) identify industries that have experienced economic distress and investigate whether firms in those industries with high financial leverage prior to the distressed period fare differently from their more conservatively financed counterparts. This study uses the crisis as an exogenous shock to reduce the endogeneity issues between firm performance and financial leverage.

Opler and Titman (1994) use market share and sales growth as proxies of performance and find that the relationship between firm performance and financial distress is negative and significant. Using a similar approach to Opler and Titman (1994), Asgharian (2002) tests the performance-distress relationship using Swedish firms and finds that highly leveraged firms in distressed industries face relatively lower stock returns. In a study by Jandik and Makhija (2005), they examine the effects of debt and debt structure on corporate performance after unsuccessful takeover attempts and find that the relation between corporate performance and leverage is negative. In contrast, Bergstrom and Sundgren (2002), using financially distressed firms in Sweden, find that that relationship is negligible.

According to Andrade and Kaplan (1998), the higher the firm's leverage, the higher its probability of financial distress. Using highly leveraged transactions that become financially distressed, they find that high leverage is the primary cause of distress. Hence, in this paper, leverage is used to proxy for financial distress.

Crises are often used in various studies as exogenous shocks to reduce the endogeneity issues. Gan (2004) examines the relationship between banking market structure and financial stability. To test whether reduced franchise value induces risk taking, she uses the Texas real estate crisis of the 1980s. When hit by an exogenous shock, the slope of risk with respect to franchise value becomes more negative because thrifts adopt strategies that choose minimal or maximal risk. Her results support the hypothesis that reduced franchise value induces risk taking. Garay et al. (2007) study the effect of firm performance on CEO reputation when the performance is affected by a systemic crisis, the Venezuelan banking crisis of 1994-1995. The crisis serves as an exogenous shock that provided a measure of banks' performance that is less likely to suffer the endogeneity problems. This crisis resulted in bank defaults, uncovering the managerial abilities of their CEOs and it allowed the authors to identify poor performers precisely. They find that the negative effect of firm performance on CEOs' reputations is significantly stronger in an emerging market. Similarly in this study, the financial crisis is used as an exogenous shock to reduce the endogeneity issues between performance and leverage, since the crisis led to reduction in performance while leverage was held relatively constant.

If leverage was a significant factor in the crisis, then leverage should explain not just cross-country differences in performance during the crisis, but also cross-firm differences in performance within countries. This paper investigates the relationship between firm performance and leverage (i.e. financial distress) in Asia under the influence of an exogenous

shock. Because the crisis was an unexpected event, it presents an interesting opportunity to study the effect of leverage on firm performance during a period of extreme distress. Specifically, this study examines whether differences in firm leverage can explain differences in firm performance in eight Asian economies[1] during the financial crisis that began in July 1997.

The crisis all began in Thailand with the financial collapse of the Thai baht because the Thai government refused to remove its peg to the dollar. This decision by the Thai government caused the baht to devaluate which in turn reduced import earnings. As the crisis spread, most of East Asia saw slumping currencies, devalued stock markets and asset prices (Hunter et al., 1999). The crisis provides a natural experiment that significantly lowered the available return on investment opportunities of firms in the affected economies while holding firm leverage relatively constant. Typically, firm performance deteriorates during a crisis. Hence, to a certain extent, firm performance will be impacted by the crisis. The link between financial distress and corporate performance by testing whether firms with higher leverage experience greater performance losses during the financial crisis was investigated.

Firms with high leverage have relatively low equity levels, implying lower management ownership. According to Jensen and Meckling (1976), firms not 100% owned by their managers incur agency costs. The agency cost in this case is that the managers of these firms are less likely to make optimal decisions and more likely to engage in risky projects, *ceteris paribus*. If those projects do not pay off, firm performance will be adversely affected. Consistent with this view, firm leverage is associated with significantly worse firm performance during the crisis. In addition, firms in the top decile of leverage were examined, which are more likely to be in financial distress.

The results show that a 1% increase in leverage is associated with a 9% decrease in ROA. A 1% increase in leverage is associated with an additional 7% decrease in ROA during the crisis. Firms in the top decile of leverage underperform relative to the rest of the firms. They suffer a performance loss of 10.65% in ROA. Firms in the top decile of leverage suffer an additional performance loss of 5.2% in ROA over the rest of the firms during the crisis. Overall, the results suggest that the crisis magnifies the negative relationship between firm performance and financial leverage.

SAMPLE/DATA

The countries studied in this paper are Hong Kong, Indonesia, Malaysia, Philippines, Singapore, South Korea, Taiwan, and Thailand. Indonesia, Malaysia, Philippines, South Korea, and Thailand were selected because they were most directly affected by the Asian financial crisis (Mitton, 2002). These five countries suffered disproportionately in terms of stock market decline and currency depreciation. Hong Kong, Singapore, and Taiwan, along with South Korea, form the newly industrialized economies (NIEs), which reported a plunge in their GDP growth rates during the crisis (Asian Development Bank, 2008). Hence, these three countries were also included to obtain a more complete sample.

To be included in the sample, firms must meet two criteria. First, each firm must have financial data reported in the Compustat Global database from December 31, 1993 to December 31, 2002. Second, each firm must have complete financial information for the entire sample period.

[1] Hong Kong, Indonesia, Malaysia, Philippines, Singapore, South Korea, Taiwan, and Thailand

The crisis period was defined as from 1997 to 1998, which corresponds to the one used by Lemmon and Lins (2003). An examination of changes in the exchange rates reveals that after July 1, 1997, the values of the major currencies (i.e. USD/IDR, USD/THB, USD/KRW, etc.) began to decline quickly[2]. The various stock indices began a sustained upward trend in August 1998, which signifies the ending point of the crisis period. The ending point of the crisis period corresponds with the one used by Mitton (2002). The crisis variable is equal one if the year of the data is 1997 or 1998 and zero otherwise.

Opler and Titman (1994) utilize stock return and sales growth as proxies for firm performance in their research. Stock return as a proxy for firm performance, however, is most appropriate for all-equity firms. In this study, of interest is how leverage affects performance, so stock return may not be as appropriately suited. Some have provided arguments on the appropriateness of using Tobin's *q* and ROA as proxies of firm performance. While each of those measures has its own deficiencies, they are highly correlated (Landsman and Shapiro, 1995). The results should not be qualitatively affected by the choice of the proxy. Hence, consistent with Mehran (1995), Tobin's *q* and return on assets (ROA) were used as proxies for firm performance.

Firm performance during the crisis is measured by return on assets (ROA) and Tobin's *q*. ROA is calculated as the ratio of the annual net income over total assets. Tobin's *q* is calculated using Chung and Pruitt's (1994) methodology. Their approximate *q* is defined as: $Approximate\_q = \frac{(MVE + PS + DEBT)}{TA}$, where MVE is the product of a firm's share price and the number of common shares outstanding; PS is the liquidating value of the firm's outstanding preferred stock; DEBT is the value of the firm's short-term liabilities net of its short-term assets, plus the book value of the firm's long-term debt; TA is the book value of the total assets of the firm. Leverage is calculated as the book value of the firm's long-term debt divided by total assets.

I obtain eight years of financial information from each firm. The final sample consists of 277 firms from the eight countries/economies, for a total of 2,216 firm-years. In general, the sample is representative of larger firms that trade on the major stock exchange of each country.

Descriptive statistics for the entire sample are summarized in the first column of Table 1. As shown, firms in the sample are about 54% leveraged, and earn an average of 1.87% return on their assets. On average, firms generate sales revenue of around $6.56 million per year and earn about $0.78 million in operating income.

Summary statistics for cross country differences are outlined in the remaining columns of Table 1. As shown in Table 1, Malaysia has the most firms in the sample, with 74; Philippines has the fewest, with 2. Firms in Indonesia and South Korea have the highest average leverage, at 0.6739 and 0.7672, respectively. In terms of ROA, firms in Hong Kong (4.91%) and Philippines (5.11%) have better performance while firms in South Korea (-2.27%) have the worst. Taiwanese firms have the highest average sales, at $32.19 million. Singapore, being the smallest country in the sample, firms there not surprisingly have the lowest average sales, at only $0.55 million. In terms of operating performance, firms in Indonesia have the highest average EBIT, at $3.72 million. On the other end of the spectrum, firms in Singapore have the lowest average EBIT, at $0.029 million. Looking at Tobin's *q*, the results from Indonesia and South Korea

[2] USD is U.S. dollar; IDR is Indonesian Rupiah; THB is Thai Baht; KRW is Korean Won.

stand out. Both countries have 3-digit Tobin's *q*, at 568.82 (Indonesia) and 202.71 (South Korea), which is quite unusual. This will warrant further investigation in the future.

Summary statistics for time-series differences are outlined in Figure 1. As shown in the illustrations, Tobin's *q*, ROA, Sales, and EBIT depict a similar time trend. All these variables bottomed out during the crisis, with the exception of leverage, which increased before the crisis and peaked in 1998 at 58.07%.

MODEL

To assess the impact of leverage on firm performance, the following econometric model was estimated:

$$FirmPerformance = a + b_1 Ln(Leverage) + b_2 Crisis + b_3 Crisis * Ln(Leverage) + b_4 Controls + b_5 IndustryDummy + b_6 CountryDummy + \varepsilon$$

in which the dependent variables are either ROA or Tobin's *q*. Leverage is measured using the natural logarithm of the book value of the firm's long-term debt divided by total assets. Control variables include sales, prior profitability, and prior total asset growth. The natural logarithm of sales was used to proxy for firm size. Sales are the annual sales less sales returns. To control for potential momentum-driven results, prior profitability is included. Prior profitability is defined as the operating income of the previous year scaled by total assets. Operating income is the annual earnings before interest and taxes (EBIT). Prior total asset growth is used to control for growth opportunities. Growth of total assets is calculated as the percentage change in total assets over the previous year. Industry and country dummy variables are included to control for differences across industries and countries. This study contains a panel of 277 firms, each with eight years of financial information. Using the fixed effects model, the average differences across firms are being controlled. What is of interest is the intra-, or within, group differences.

The negative relationship between (i) leverage and performance and (ii) crisis and performance to hold even after controlling for other effects were expected. Also, high-leverage firms underperform relative to low-leverage firms during the crisis is expected. The coefficient of the interaction term (b_3) is expected to be negative.

RESULTS

Table 2 presents the main regression results. First, models (1) and (4) present results from regressing the performance measures on leverage and crisis, without any control variables. Firms are expected to underperform during a crisis. High-leverage firms are expected to underperform relative to low-leverage firms. Consistent with Opler and Titman (1994) and Asgharian (2002), the results show that the coefficient for leverage is negative and statistically significant. A higher level of leverage, implying a higher probability of financial distress, deteriorates performance. The results also show that the coefficient for crisis is negative and significant, suggesting that firm performance is lower during the crisis.

Next, the various control variables were added to the model specifications (Models (2) and (5)) and the results are consistent with models (1) and (4). The regression results suggest that even after controlling for size, growth opportunities, and prior profitability, firms perform poorly during the crisis and high-leveraged firms perform poorly relative to low-leveraged firms.

To measure the leverage–performance sensitivity between the crisis and non-crisis periods, an interaction term, (Crisis * Ln(Leverage)), is added to models (3) and (6). The

interaction term shows the difference in sensitivity of performance to leverage between the crisis and non-crisis period. The results from regression model (3) show that b_2 and b_3 are negative and significant. This suggests that the leverage-performance relationship is sensitive to the crisis and the crisis magnifies the negative relationship between firm performance and financial leverage. A 1% increase in leverage is associated with an additional 7% decrease in ROA during the crisis.

Firms with extreme levels of leverage are more likely to be in distress (Andrade and Kaplan, 1998) and these firms would be most affected by an economic downturn. The top 10% of the sample were used to proxy for firms that are closer to financial distress. A firm is classified as high leveraged and the variable Hi-LLeverage takes the value one if its leverage ratio falls in the top 10% of the entire sample, and zero otherwise.

Table 3 reports the regression results. Of interest is the coefficient estimate of the effect of high leverage on performance. As shown in models (3) and (6), these coefficients are negative and statistically significant. Firms in the top decile of leverage suffer an additional performance loss of 5.2% in ROA over the rest of the firms during the crisis. These results suggest that financially distressed firms underperform relative to non-financially distressed firms during a financial crisis.

Overall, the results reaffirm the negative relationship between leverage and firm performance from prior research. In addition, the crisis strengthens this relationship – it magnifies the negative relationship between firm performance and financial leverage.

CONCLUSION/SUMMARY

Using the Asian Financial Crisis as an exogenous shock, the relationship between firm performance and financial leverage was tested. During a crisis, demand for goods and services will be weaker than normal; investors lose confidence in the economy. Firms are expected to perform below average. The negative relationship between crisis and firm performance reaffirms the fact that firm performance deteriorates during a crisis.

The results show that the relationship between firm performance and financial leverage is negative; firms with low financial leverage outperform firms with high financial leverage. Using financial leverage as a proxy for financial distress, the results suggest that financially distressed firms underperform. Additionally, the crisis magnifies this performance-leverage relationship.

FUTURE WORK

In this study, the sample contains firms from eight countries. For those countries with an adequate number of firms, a separate study to analyze the individual country to provide more insights on what might be driving the results is planned.

According to Khorana et al. (2005), countries' rules and norms affect financial development. The magnitude of firm performance deterioration from the impacts of a financial crisis may be reduced by how well-developed the financial system is. Currently, this study is in the process of examining how legal regimes of the countries might influence the results.

As mentioned earlier, the Tobin's *q* for firms in Indonesia and South Korea are very large and this warrants further investigation to see if large *q* values are typical in these countries.

REFERENCES

Andrade, G. and S. Kaplan (1998), "How Costly is Financial (Not Economic) Financial Distress – Evidence from Highly Leveraged Transactions that Became Distressed," *Journal of Finance*, 53:1443-1493.

Asgharian, H. (2003), "Are Highly Leveraged Firms More Sensitive to an Economic Downturn?" *The European Journal of Finance*, 9:219-241.

Asian Development Bank, "Regional and Country Highlights: Newly Industrialized Economies," http://www.adb.org/Countries/Highlights/NIE.asp, Retrieved on 29 February 2008.

Bergstrom, C. and S. Sundgren (2002), "Restructuring Activities and Changes in Performance Following Financial Distress," *SNS Occasional Paper No. 88*.

Chung, K.H. and S.W. Pruitt (1994), "A Simple Approximation of Tobin's *q*," *Financial Management*, 23(3): 70-74.

Gan, J. (2004), "Banking Market Structure and Financial Stability: Evidence from the Texas Real Estate Crisis in the 1980s," *Journal of Financial Economics*, 73: 567-601.

Garay, U., M. Gonzalez, C.A. Molina (2007), "Firm Performance and CEO Reputation Costs: New Evidence from the Venezuelan Banking Crisis," *Emerging Markets Finance and Trade*, 43(3): 16-33.

Hunter, W.C., G.C. Kaufman, T.H. Krueger (1999), *The Asian Financial Crisis: Origins, Implications and Solutions*, Kluwer Academic Publishers.

International Monetary Fund (2008), "Factsheet – The IMF's Response to the Asian Crisis," http://www.imf.org/external/np/exr/facts/asia.htm, Retrieved on 29 February 2008.

Jandik, T. and A.K. Makhija (2005), "Debt, Debt Structure and Corporate Performance after Unsuccessful Takeovers: Evidence from Targets that Remain Independent," *Journal of Corporate Finance*, 11: 882-914.

Jensen, M.C. and W.H. Meckling (1976), "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure," *Journal of Financial Economics*, 3:305-360.

Khorana, A., H. Servaes, P. Tufano (2005), "Explaining the Size of the Mutual Fund Industry Around the World," *Journal of Financial Economics*, 78: 145-185.

Landsman, W.R. and A.C. Shapiro (1995), "Tobin's q and the Relation between Accounting ROI and Economic Return," *Journal of Accounting, Auditing & Finance*, 10(1): 103-118.

Lemmon, M.L. and K.V. Lins (2003), "Ownership Structure, Corporate Governance, and Firm Value: Evidence from the East Asian Financial Crisis," *Journal of Finance*, 58: 1445-1468.

Mitton, T. (2002), "A Cross-Firm Analysis of the Impact of Corporate Governance on the East Asian Financial Crisis," *Journal of Financial Economics*, 64: 215-241.

Mehran, H. (1995), "Executive Compensation Structure, Ownership, and Firm Performance," *Journal of Financial Economics*, 38: 163-184.

Opler, T.C. and S. Titman (1994), "Financial Distress and Corporate Performance," *Journal of Finance*, 49: 1015-1040.

Safieddine, A. and S. Titman (1999), "Leverage and Corporate Performance: Evidence from Unsuccessful Takeovers," *Journal of Finance*, 54: 547-580.

Table 1: Summary Statistics (Cross-Country Differences)

		Countries/Economies							
Variables	**Entire Sample**	**HK**	**IND**	**MAL**	**PHI**	**SG**	**SK**	**THD**	**TW**
ROA	0.0187	0.0491	0.0098	0.0121	0.0511	0.0048	-0.0223	0.0289	0.0294
	(0.14)	(0.08)	(0.17)	(0.20)	(0.08)	(0.08)	(0.22)	(0.12)	(0.05)
Tobin's q	84.7445	12.7194	568.8209	1.5289	1.3792	1.1141	202.7115	4.6488	1.4512
	(399.50)	(99.45)	(934.03)	(1.41)	(0.46)	(0.65)	(156.32)	(60.28)	(0.64)
Leverage	0.5391	0.4126	0.6739	0.515	0.4416	0.5075	0.7672	0.5569	0.4862
	(0.42)	(0.20)	(0.29)	(0.69)	(0.28)	(0.19)	(0.18)	(0.31)	(0.16)
Sales	6.5569	5.7102	23.0146	0.9573	2.7030	0.5505	18.3980	2.5651	32.1902
	(25.88)	(9.51)	(60.78)	(1.56)	(3.34)	(1.06)	(10.97)	(5.15)	(34.93)
EBIT	0.7799	0.9101	3.7173	0.1052	0.4619	0.0292	0.7983	0.2407	1.5475
	(4.27)	(2.15)	(10.63)	(0.26)	(0.66)	(0.12)	(1.18)	(1.32)	(0.71)
# Firms	277	26	38	74	2	49	5	70	13

Note: Sales and EBIT are expressed in millions of dollars.
Standard deviations are shown in parentheses.

HK – Hong Kong, IND – Indonesia, MAL – Malaysia, PHI – Philippines, SG – Singapore, SK – South Korea, THD - Thailand, TW - Taiwan

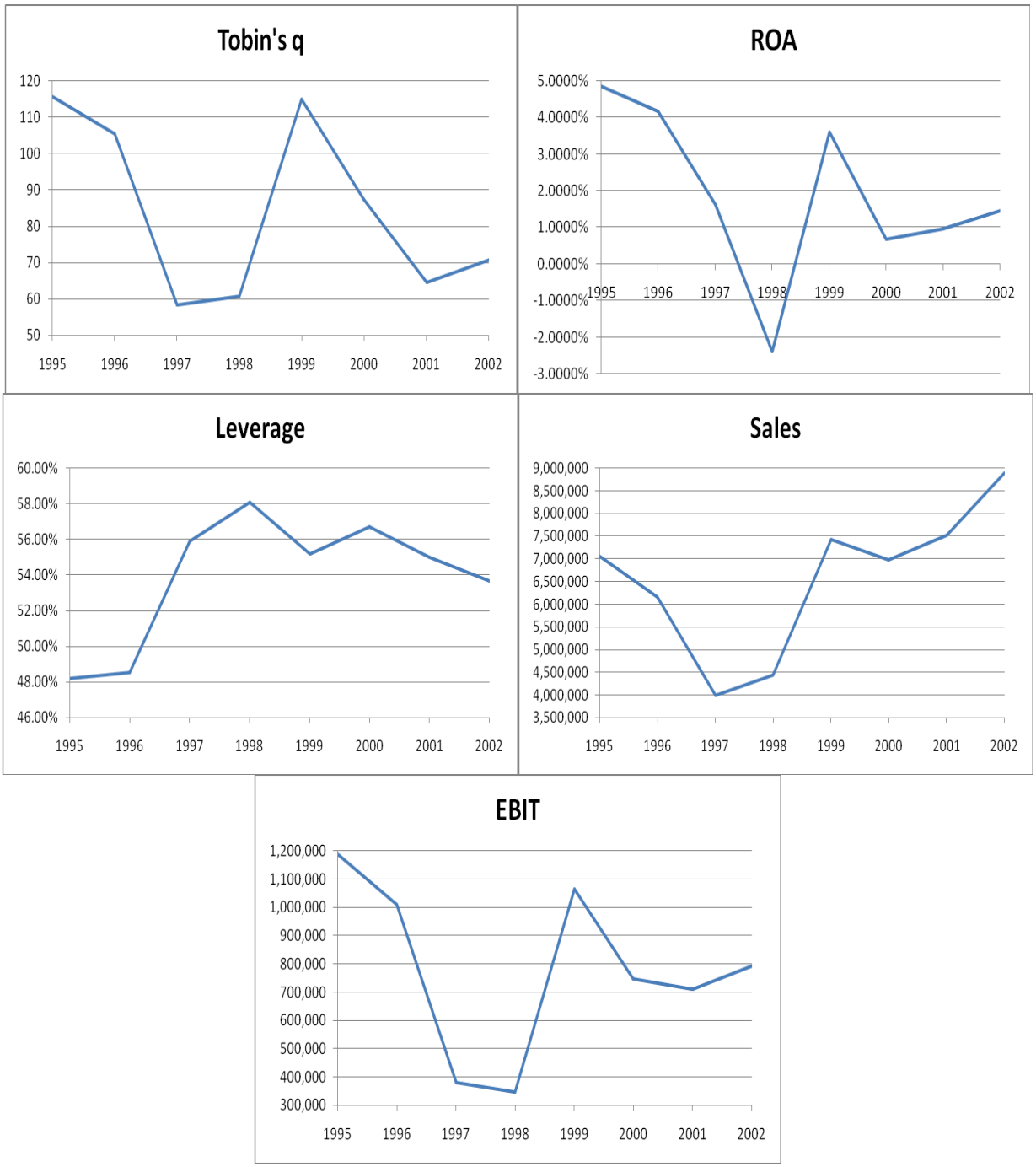

Figure 1: Graphs showing various variables from 1995 to 2002

Table 2: Regression Results

	Dependent Variable					
Variables	**(1) ROA**	**(2) ROA**	**(3) ROA**	**(4) Tobin's q**	**(5) Tobin's q**	**(6) Tobin's q**
Ln (Leverage)	-0.096051[1]	-0.099880[1]	-0.089969[1]	-53.06716[1]	-50.2246[1]	-44.77753[1]
	(-11.01)	(-11.37)	(-10.27)	(-3.39)	(-3.31)	(-2.92)
Crisis	-0.018831[1]	-0.016742[1]	-0.067579[1]	-27.44137[1]	-35.66888[1]	-63.60866[1]
	(-3.19)	(-2.85)	(-7.63)	(-2.60)	(-3.51)	(-4.10)
Crisis*Ln (Leverage)	-	-	-0.069977[1]	-	-	-38.45812[2]
			(-7.59)			(-2.38)
Ln (Sales)	-	0.017548[1]	0.017209[1]	-	-79.9754[1]	-80.1614[1]
		(5.19)	(5.17)		(-13.70)	(-13.74)
P_Opinc	-	4.29E-07	3.47E-07	-	-0.0005541	-0.0005991
		(0.52)	(0.43)		(-0.39)	(-0.42)
TA-Growth$_{t-1}$	-	7.83E-05	8.09E-05	-	0.1202058	0.1216681
		(1.56)	(1.64)		(1.39)	(1.41)
Constant	-0.053178[1]	-0.1699564[1]	-0.167461[1]	49.31459[1]	580.0087[1]	581.3804[1]
	(-6.84)	(-2.83)	(-2.83)	(3.54)	(5.59)	(5.61)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummy	No	Yes	Yes	No	Yes	Yes
Country Dummy	No	Yes	Yes	No	Yes	Yes
# Observations	2,216	2,216	2,216	2,216	2,216	2,216
R-Square	0.0709	0.0931	0.1195	0.0112	0.102	0.1046

[1], [2] - represents statistically significance at the 1% and 5% levels, respectively.
T-statistics are presented in parentheses.

Table 3: Regression Results

	Dependent Variable					
Variables	**(1) ROA**	**(2) ROA**	**(3) ROA**	**(4) Tobin's q**	**(5) Tobin's q**	**(6) Tobin's q**
Hi-LLeverage	-0.127992[1] (-11.24)	-0.124616[1] (-10.97)	-0.106527[1] (-8.12)	-73.89383[1] (-3.62)	-87.27863[1] (-4.47)	-69.62332[1] (-3.08)
Crisis	-0.023010[1] (-3.84)	-0.021567[1] (-3.71)	-0.015492[2] (-2.48)	-29.57578[1] (-2.83)	-36.47921[1] (-3.65)	-29.58447[1] (-2.76)
Crisis*Hi-LLeverage	-	-	-0.051965[1] (-2.81)	-	-	-59.05061[3] (-1.86)
Ln (Sales)	-	0.015272[1] (4.58)	0.014454[1] (4.27)	-	-79.6934[1] (-13.90)	-82.07985[1] (-14.08)
P_Opinc	-	4.07E-07 (0.50)	3.27E-07 (0.40)	-	-0.0006576 (-0.47)	-0.0006954 (-0.49)
TA-Growth$_{t-1}$	-	5.98E-05 (1.21)	6.77E-05 (1.35)	-	0.0971996 (1.15)	0.1127155 (1.31)
Constant	0.037176[1] (12.14)	-0.066803[1] (-2.94)	-0.068501 (-1.15)	99.50783[1] (18.12)	639.0002[1] (16.38)	633.8979[1] (6.18)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummy	No	Yes	Yes	No	Yes	Yes
Country Dummy	No	Yes	Yes	No	Yes	Yes
Number of Observations	2,216	2,216	2,216	2,216	2,216	2,216
R-Square	0.0732	0.0848	0.0923	0.012	0.1041	0.1083

[1], [2], and [3] - represents statistically significance at the 1%, 5%, and 10% levels, respectively.
T-statistics are presented in parentheses.