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**Corporate Debt/Equity Ratios and the Korean Financial
Crisis**

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Corporate Debt/Equity Ratios and the Korean Financial Crisis

By Paul M. Dickie*

Abstract: High corporate debt/equity ratios are the key systemic issue in many explanations of the Korean financial crisis. Most analysts argue that high debt/equity ratios were linked with a weak credit culture in the financial sector and poor corporate governance. The facts dispute this. In this paper, the high Korean debt/equity ratios are shown to be consistent with the theory of capital structure in the context of asymmetric information and the Government assuming default risk. Korean debt/equity ratios reflect traditional firm behaviour and associated macroeconomic variables. To reduce high debt/equity capital structure, the Government has to transfer default risks back to the market, thereby reducing the moral hazards that determined rational investment behaviour. (JEL G3, L5, F3)

In the East Asian financial crisis of 1997/1998, Korea was surprisingly one of the most adversely affected. From one of the poorest countries in the early 1950s, Korea became an industrial economy within four decades endorsed by OECD membership in 1994.

Korean debt/equity ratios were not unusual in East Asia as Claessens (1998) noted:

In recent years, East Asia corporations were more highly leveraged than those of other countries. These high levels of debt went hand in hand with low profitability, suggesting that banks and other outside investors did a poor job of monitoring corporate management. Typically, banks did not apply modern credit-risk analysis and management techniques, and credit tended to flow to borrowers on the basis of close relationships with bank owners and to favored sectors, rather than on fundamentals, such as projected cash flows, or receivable collateral values.

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This assessment is endorsed by most other analysts. Similar views shaped the structural reforms in the financial and corporate sectors under the IMF program intended to restore confidence in the Korean economy (Lane et. al.,1999).

In the financial sector these reforms followed very closely the recommendations of the Presidential Commission on Financial Reforms (1997). High debt/equity ratios in the Korean manufacturing sector were not only long standing but to be expected given information asymmetry and the assuming of default risk by the Government. The crisis in Korea encourages elimination of moral hazard in corporate debt.

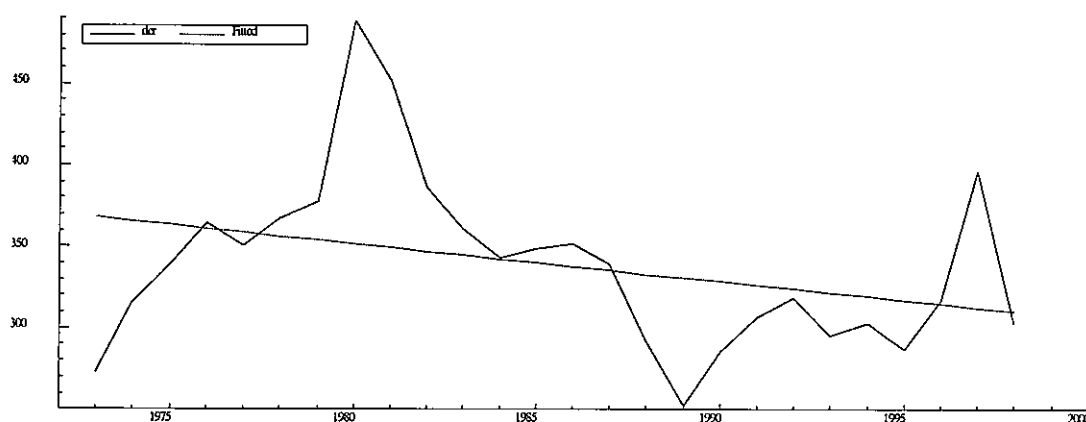
First the history of the debt/equity ratios in the manufacturing sector is reviewed in the context of both the macroeconomic and corporate finance theory. A model is constructed using the theory of capital structures under asymmetrical information with the Government assuming the default risk. In the model firm level parameters predominate, although macroeconomic variables are included. The paper concludes that high debt/equity ratios can be explained in terms of firm parameters, the exchange rate, and the Government's assumption of default risk.

I. Debt/Equity Ratios in the Manufacturing Sector

Kim and Stone (1999) find that the pre-crisis corporate debt/equity ratios are inversely correlated with GDP during the East Asian crisis. The average debt/equity ratio in the Korean manufacturing sector, the ratio of total liabilities to net worth, has been the highest in East Asia. On a comparison over the 1987-1996 period, Korea's manufacturing sector debt/equity averaged 300 percent which was triple that in Taiwan (96), almost double that in the United States (153) and almost forty percent higher than that in Japan (221).¹ After an initial rise over the late 1960s due to interest rate subsidies and the desire of manufacturers to rapidly expand their operations using debt (Sundararajan,1987), the debt/equity ratio has been relatively stable between 1971-1998. Figure I. The trend is not highly significant and the coefficient is negative indicating some marginal decline over the time period under review. High debt/equity ratios have prevailed over the past 30 years.

¹ Statistics are from the 1998 Financial Statement Analysis, Bank of Korea.

Figure 1: Debt/Equity Ratios in Korean Manufacturing



Government promoted chemical and heavy industries in the late 1960s by providing finance (Cho Soon, 1994). With the Korean economic slowdown in the early 1970s debt servicing became a problem so the Government felt obliged to assume the risk and bail out unsound firms with the August Third Measure (Emergency Decree on Economic Stabilization and Growth of 1972).² Under this decree, all private loans some 34 percent of total credit were frozen. These loans were converted into long-term debt at favorable terms or into equity. Cho Soon (1994) concludes “ Such measures further encouraged the Korean firms to incur debts without being seriously concerned about default.” In other words the Government had assumed the default risk and sanctioned very high debt/equity ratios at the beginning of the period under review.

In the early 1980s the Korean economy experienced a recession and again many highly leveraged industrial groups encountered debt servicing difficulties. The Government restructured many of these debts on favorable terms in the mid-1980s and in some cases mandated sound corporations to take over their failing counterparts. Interest rate subsidies and favorable loan extensions were used as incentives (Balino and Ubide, 1999). Again the Government confirmed acceptance of high debt/equity ratios and its assumption of the default risk in the manufacturing sector.

² Of course the relative underdevelopment of the debt market also had a major impact. As Nam Duck Woo (1995) explains this period “Korean companies were faced with a structural problem. There had been no long-term credit facilities whatsoever. The maturity of bank loans did not exceed one year. There had been very vigorous investment activities in the past ten years. The companies had to borrow short-term money for long-term investment. It was very natural for them to have a credit crunch.”

Over these decades there was substantial market oriented liberalization in both manufacturing and financial sectors. The stock exchange was promoted and corporations were encouraged to seek public equity. While incentives were provided to reduce financial leverage, the Government never altered the acceptance of high debt/equity ratios or shed its assumption of default risk. In addition no bank was allowed to fail between 1971-1997.

II. Capital Structures and Macroeconomics

In the context of savings, investment and the growth of the Korean economy, Sandarajan (1987) modeled the debt/equity ratio in manufacturing sector. He found significant relationships between foreign and corporate savings rates (relative to nominal GDP) and the real effective interest rate (incorporating the concept of an optimal debt/equity ratio).² While Sundarjan's approach could be updated to reflect econometric advances, it still would be deficient in its microeconomic foundations.

Corporate finance theory states that the cost of capital is independent of the financing mix in a world of perfect capital markets, rational investors, no taxes, and no default or bankruptcy costs (Modigliani-Miller theorem).In the case of taxes where interest is deductible, a firm should carry 100 percent debt (Modigliani and Miller, 1963). However, with high bankruptcy costs, there is a tradeoff between the tax advantages of higher debt levels and the increased likelihood of bankruptcy. In addition, due to asymmetrical information between insiders and outsiders, signalling theories support a "pecking" order of capital structures whereby retained earnings are preferred to debt and debt to equity. This sequencing explains corporate finance in Korea even when the Government assumes the default risk.

While microeconomics provides the foundations for a model, adding macroeconomic variables ensures that wider influences are included.

² In addition, the explanatory variables included the lagged value of the debt/equity ratio and a dummy variable representing the new policy regime that Sundarajan dated from 1973.

III. The Model

The focus is on the behavior of the Korean manufacturing sector in the financial crisis, on its high debt/equity ratio and attendant risks. The variables which affect the high debt/equity ratios fall into two groups, firm specific and macroeconomic.

The debt/equity ratio relates to sales, the driver of investment. Investment and its financing affect the debt/equity structure. Myers (1984) suggests that firms prefer using retained earnings as their principal source of financing. Then external debt; external equity financing is the least preferred. When positive net present value (NPV) projects are financed with equity, information asymmetries between the insiders and the potential investors pose difficult problems (Myers and Majluf, 1984).³ In signalling theory positive NPV projects are good news for potential investors but more equity is bad news relative to corporate valuation. The signal to investors tends to be mixed so firms are reluctant to issue equity. Korean managers are closely connected with the dominant family shareholder and these fears are intensified. The dominant shareholder is concerned about losing control through dilution of ownership with outside equity. So internally generated funds are used first to finance the positive net present value (NPV) projects while external debt financing fills the remaining gap.

The data limitations are important. Financial Statement Analysis compiled by the Bank of Korea provides some 18 financial ratios for the manufacturing sector over the 1971-1998 period. Macroeconomic variables are available for this time period but data breaks occur. These data limitations restrict the analysis to key ratios. A model is developed as follows.

Investment responds to the growth in sales, the driver of the manufacturing sector's development:

$$I_t = a + b (\text{sgt})_t \quad (i)$$

³ The asymmetric information explanation is chosen over the competing explanation of agency problems, as explored in Jensen and Meckling (1976), Grossman and Hart (1982), Jensen (1986), Stulz (1990), and Hart and Moore (1994). As reported by Chung and Wang (1999), a large share of corporations in Korea are controlled by families who participate actively in management so that the agency problems based on widely dispersed ownership structures are not expected to dominate in Korea.

where I_t is investment in year t , and sgt_t is growth in sales [i.e., $sgt_t = (S_t - S_{t-1})/S_t$ where S_t is the sales in year t], and a and b are constants.

Investment is financed first from retained earnings, the availability of which is assessed from the profitability of sales and the level of sales.

$$RE_t - RE_{t-1} = S_t (P/S)_t \quad (ii)$$

where $RE_t - RE_{t-1}$ is the increment in retained earnings in year t and $(P/S)_t$ is the profitability of sales in year t as measured by ordinary income to sales ratio. The allocation of ordinary income for dividends is not available for the earlier years and comprises a relatively small share of income (dividends in the 1990s were between 15-25 percent of ordinary income). Debt equals new investments not financed from retained earnings.

$$D_t - D_{t-1} = I_t - (RE_t - RE_{t-1}) \quad (iii)$$

where D_t is the level of debt. Korean manufacturing firms are generally financially constrained so there are no liquid assets available from previous years.

The debt equity ratio will then be as follows:

$$\left(\frac{D}{E}\right)_t = w \left(\frac{D_t - D_{t-1}}{RE_t - RE_{t-1}}\right) + \left(\frac{D}{E}\right)_{t-1} \quad (iv)$$

where w is equal to the weight of the current year's additions to the previous year's debt/equity ratio. Substituting equations (I), (ii) and (iii) into equation (iv) yields:

$$\left(\frac{D}{E}\right)_t - \left(\frac{D}{E}\right)_{t-1} = \left(\frac{a + b(sgr) - S_t(P/S)_t}{S_t(P/S)_t}\right) \quad (v)$$

Thus the changes in the manufacturing sector's debt equity ratio are positively related to innovations in sales and negatively related to innovations in the profitability of sales.⁴ Logarithms make the

⁴ This formulation based upon the theory of capital structures helps to explain the apparent anomaly noted by Borensztein and Lee(1999). They were concerned that an increase in bank loans is negatively correlated with the corporate profit rate. From the corporate point of view, access to bank credit is only sought when all the positive NPV projects cannot be financed from retained earnings. This recourse to

relationship in equation (v) linear. External macroeconomic influences were also considered as shown in equation (vi):

$$\Delta\left(\frac{D}{E}\right)_t = f\left(sgr, \left(-\frac{P}{S}\right)_t, \text{macroeconomy}\right) \quad (\text{vi})$$

The macroeconomic variables related to the manufacturing sector debt/equity ratios include the level of real activity and credit conditions. Domestic and export activity, interest rates, the supply of alternative forms of credit, and the exchange rate which influences the cost of foreign debt, are included.

All macroeconomic and firm level variables were tested for unit roots and differenced so that all data was stationary. Most variables were stationary in first differences (I(1)), a number of the macroeconomic variables such as the industrial production index, exports, and claims on the private sector from the trust accounts of the commercial banks were found to be stationary only with second differences (I(2)).

All the firm specific variables together with a rotating selection of the macroeconomic variables were included in a vector autoregression analysis (VAR) to confirm that the right hand side variables are independent (i.e., the debt/ equity ratio does not affect these variables). In no case was the debt/equity ratio a significant regressor.⁵

Second, sales growth (Dsgr), profitability of sales (Dps), some of macroeconomic variables⁶ together with their lags and the lagged debt/equity ratio (Dder) were included as regressors.

Reductions of the system, which were tested, excluded all the macroeconomic variables except the foreign exchange rate and all the lagged variables, leaving the following equation:

$$Dlder = 0.106 DLsgr - 5.36 DLps + 0.215 DLfx$$

increased bank loans may therefore tend to occur more frequently when profitability is unexpectedly low.

⁵ The lagged value of the debt/equity ratio was close to being significant in explaining changes in the industrial production index, presumably because the increased debt/equity ratio presages increased plant capacity and higher output. However, the index of industrial output was not significant in explaining the debt/equity ratio and is therefore not included in this formulation.

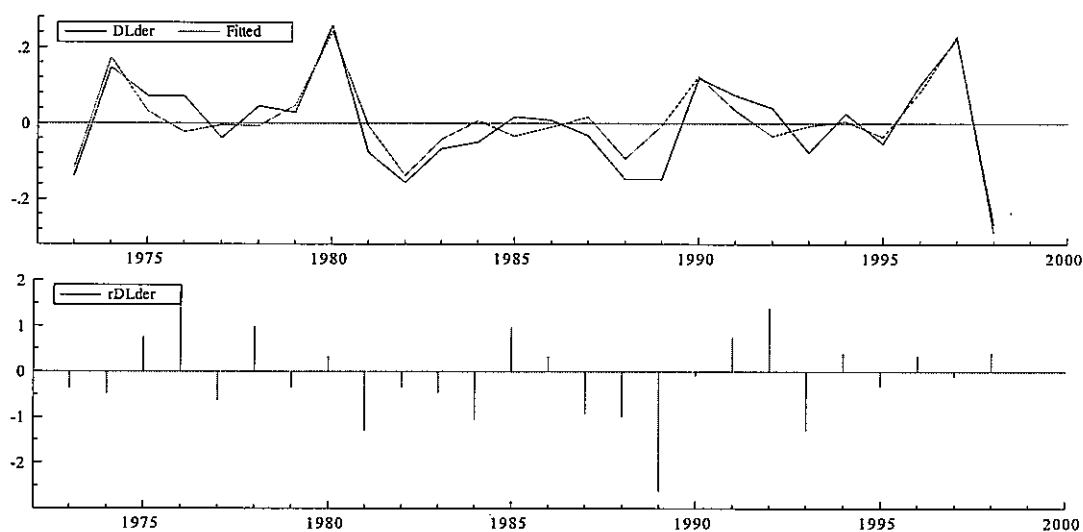
⁶ This approach was utilized in light of the relatively small sample size (n=24) which limited the available degrees of freedom.

(5.686)** (-5.530)** (2.945)**

Correlation between actual and fitted: 0.905

The operator D indicates a first difference and the operator L indicates a logarithm. Graphical output of actual and estimated values and residuals are shown in Figure 2.

Figure 2: Graphical Output of Estimated Equation



IV. Implications

Financing the manufacturing sector predominantly with debt was a high risk strategy that succeeded in Korea for over three decades, a testament to good economic management. Three years after Korea was recognized as an OECD member in 1994 the declining growth rates in conjunction with continued high rates of investment led to capacity under-utilization and major difficulty in debt service. The first bankruptcies in early 1997 of the Hanbo and the Kia groups in steel and automobiles heralded problems that compounded in the following months to a full crisis in November 1997.

High/debt ratios were a consequence of the Government assuming default risk. So has Government reduced responsibility and consequently moral hazard in corporate finance? The answer appears to be mixed. Many firms were allowed to go bankrupt. However when it came to the largest five groups, the Government mandated a reduction in their debt/equity ratios to 200 percent by the end of 1999. President Kim Dae Jung warned that new bank loans for these five groups would be cut off if the companies fail to carry out restructuring.⁷ The Government helped to restructure the Daewoo group. There now needs to be a clear Government decision to withdraw and allow market-based governance to play the predominant role.

High debt/equity ratios in the corporate sector result in systemic risks for the entire economy. Such ratios are not sustainable even in relatively stable industrial economies. The key lesson is that high debt/equity ratios would not have prevailed in the absence of the Government assuming default risk. The Government was culpable in promoting this moral hazard.

⁷ Asian Wall Street Journal, 15 April 1999.

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