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## **Corporate Responses to Currency Depreciations: Evidence from Indonesia**

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2007

Online at <http://mpra.ub.uni-muenchen.de/6502/>

MPRA Paper No. 6502, posted 31. December 2007 / 03:12

# Corporate Responses to Currency Depreciations: Evidence from Indonesia<sup>1</sup>

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## *Abstract*

*This paper examines the impact of macro fluctuation on firm's balance sheet to understand firm's net worth as well as the corporate distress probability. We argue that debt policies could be pro-cyclical, since it enhances corporate distress risk when currency depreciation comes.*

*Key words:* currency depreciation, firm performance, debt ratio

*JEL Classification:* D21, F3, G32

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<sup>1</sup> We thanks to Professor Alain Sand for his valuable comment. Also discussants and participants of the conferences in Hamburg and Barcelona. We thank also to French Embassy for giving an opportunity to stay in French during 3 years. All remaining error is mine.

## **1. Introduction**

Several studies, both empirical and theoretical, have been mobilized to understand what happened in the 1997 Asian crisis. Some studies accentuate on the macroeconomic weaknesses, for instance, by linking speedy financial liberalization and unsound regulation or supervision on banking and financial institutions. However, it is irresponsible to blame macro economic variables as a single factor provoking financial turbulence.

Meanwhile, some strands of studies focus on micro side of the story of crises. In these strands, corporate sector vulnerabilities, indicated by weak performance and high leverage accompanied by the poor governance system have frequently been cited as main sources of Asian crisis. In hindsight, Claessens, Djankov and Xu (2000) explain that it has become apparent that the corporate financial structure of many companies was too weak to withstand the combined shocks of increased interest rates, devalued currencies, and sharp declines in domestic demand. Corporate financing policies and performance in response to external shocks such as falls in aggregate demand and increases in interest rate pay a major attention in understanding how crisis devastated countries in East-Asian region or other regions, such as Latin American countries.

This chapter intends to investigate empirically the corporate responses to the currency crises in Southeast Asian countries by focusing on the case of Indonesia. Theoretical and empirical works, for example Aguiar (2004), show that basically currency depreciation could affect firm sector by two principal channels, namely competitiveness effect and net worth or balance sheet effect. In some cases, depreciation gives a competitive effect when it is followed by a surge in export performance and improvement in economic growth. While, in other cases the depreciation were followed by a decline in production activities, including tradable or exportable firms, which is accompanied by severe recession. The latter case is

mostly due to the financing constraints of the corporate sector to pursue their investment activities.

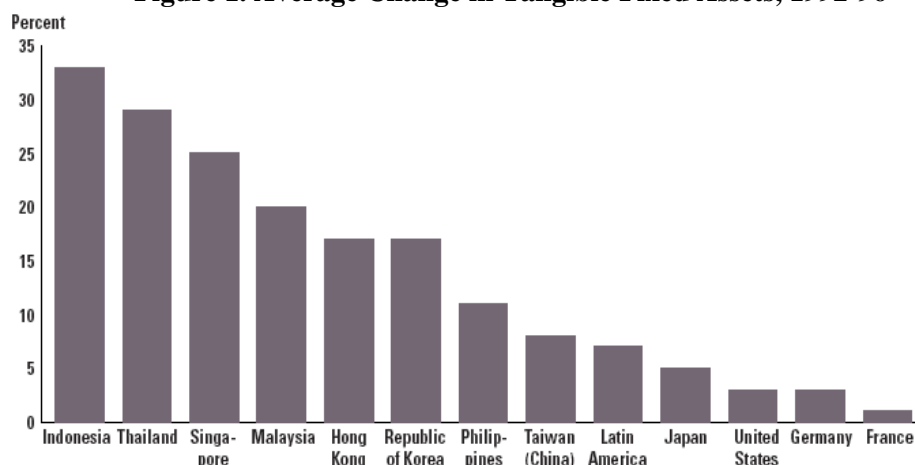
The objective of the chapter is twofold, firstly it engages in the impact of “extraordinary” currency depreciation on the firm sector in Indonesia, and second, it is concerned with the impact of debt-equity ratio of the firms on their firm value, due to currency depreciation. Subsequently, this chapter also examines the factors inducing the likelihood of corporate distress. Basically, this chapter argues that firms with higher debt-equity ratio will have lower profitability when currency depreciation is present. This study employs econometrical analysis of panel data for 238 firms listed in Jakarta Stock Exchange (JSX) with 5 consecutive years for the period of 1994 – 2004.

## **2. Related Studies**

### *2.1. Asian vulnerability*

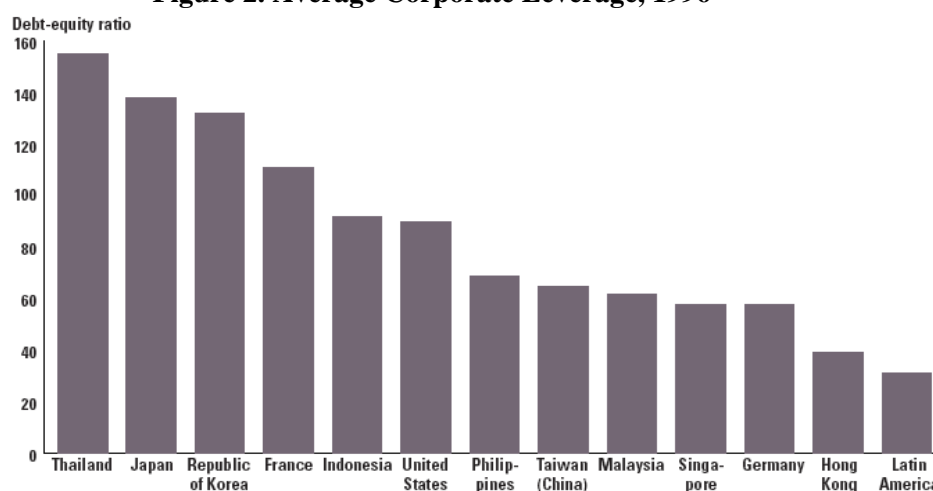
Pomerleano (1998) demonstrates that Indonesia is a country with highest rate of change in tangible fixed asset where the average between the period of 1992 to 1996 was 33 percent. Thailand is in the second rank with 29 percent average fixed asset growth. The question is where the main source of this high rate of investment came from. And the answer is external debt. Average debt-equity ratio to investment is high for Asian countries: Thailand (78 percent), Korea (69 percent) and Indonesia (67 percent), which means that most investment in these countries was financed by external debts (Pomerleano, 1998).

**Figure 1. Average Change in Tangible Fixed Assets, 1992-96**



Source: World Bank staff calculations based on the Financial Times Information's Extel database; taken from Pomerleano (1998).

**Figure 2. Average Corporate Leverage, 1996**



Note: Data are for December 31

Source: World Bank staff calculations based on the Financial Times Information's Extel database; taken from Pomerleano (1998).

Unsustainable rapid investment in fixed asset was financed by excessive borrowing. For comparison, the average ratio is 8 percent in USA and 6 percent in Germany. Latin American countries, over all, have 19 percent average ratio.

Indonesia is one of the countries with high rate of firm-level profitability. Claessens et al. (1998) document that the average of Return on Asset (ROA) in local currency of Indonesia during 1988 – 1996 was 7.1 percent, 9.8 percent in Thailand, and 7.9 in Philippines. For

comparison, ROA in US in the same period was 5.3 percent, and Germany 4.7 percent. If it is measured by ROA in US currency the average ROA in the same period was higher than ROA in local currency. 13.0 percent in Indonesia, 17.2 percent in Philippines and 14.7 in Thailand.

Operating margin of the three countries was also high, Indonesia had 32.9 percent of operating margin, Thailand had 25.2 percent and Philippines had 27.7 percent. For comparison, operating margin in same period was just 14.4 percent in US and 14.6 in Germany. The same tendency was in real sales growth.

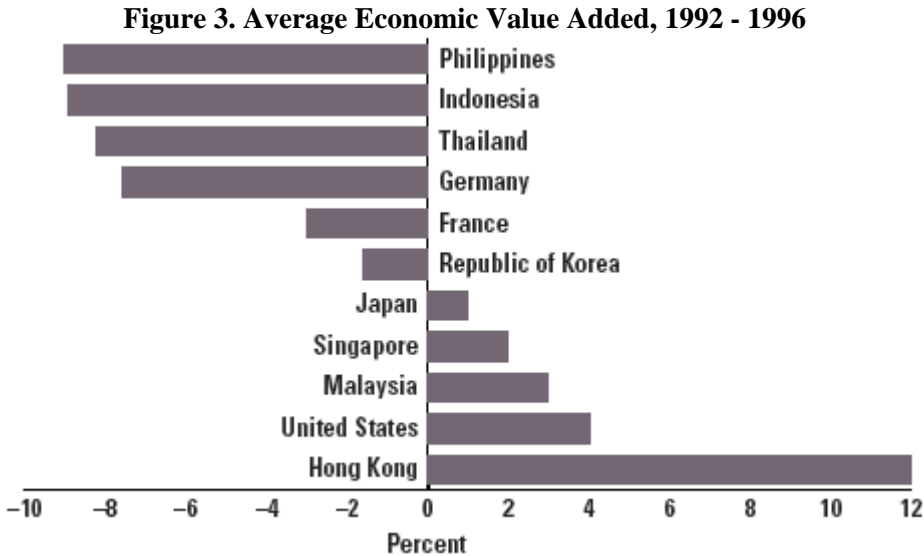
Meanwhile, Harvey and Roper (1999) describe also that stock exchange in Indonesia, Malaysia, the Philippines, Taiwan, and Thailand increased their market capitalization by factors of 10, 5, 12, 2, and 3 respectively. The growth of market capitalization of Asian stock markets, with the exception of Taiwan and Korea, exceeded the 270 percent growth rate that emerging markets as a group posted during the same period. Overall, local Asian stock markets increased their market capitalization at a faster pace than most developed markets.

To be compared with the combined stock markets in Latin American countries, Asian stock markets were four times, even though the growth of stock markets in Latin America was higher than those in Asian countries. Furthermore, Harvey and Roper (1999) also mention that the increase in market capitalization on the Latin American stock exchanges resulted primarily from share price appreciation, while on the Asian markets market capitalization in large part increased through the successful floatation of new equity offerings.

Harvey and Roper (1999) also describe that in the period of 1990 to 1996 equity markets in Indonesia and Thailand were more aggressive in issuing shares relative to the larger markets in East Asia.

In Latin America, the ratio of total value of new equity to market capitalization averages 1.41 percent between 1990 and 1996, while in Asia, the ratio averaged 2.89 percent during the same period.

Economic value added is commonly used to measure the corporate sector profitability. EVA is net operating profits after taxes minus the cost of capital, including borrowed capital and equity capital, used to generate those profits.



*Note:* Calculated as return on capital employed minus the lending rate  
*Source:* World Bank staff calculations based on the Financial Times Information’s Extel database; taken from Pomerleano (1998).

The following table shows the result of Altman’s Z Score<sup>2</sup> for several countries. The Z Score use of multiple discriminant analysis (MDA) is modelled to predict corporate distress. Pomerleano (1998) in this result of Z Score use the old-fashioned formula. Z-Score statistical technique use five ratios of the corporate financial statements, namely return on total assets,

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<sup>2</sup> Edward I. Altman, *The Z-Score Bankruptcy Model: Past, Present, and Future* (New York: John Wiley & Sons, 1977), and *Corporate Financial Distress and Bankruptcy*, 2<sup>nd</sup> edition (New York: John Wiley & Sons, 1993).

sales to total assets, equity to debt, working capital to total assets, and retained earnings to total assets.

**Table 1. Altman's Z-Score**

	1992	1993	1994	1995	1996	Average
Hong Kong	10.585	13.710	9.307	7.179	6.9	9.54
Indonesia	2.261	2.755	3.613	2.831	2.6	2.81
Korea	1.341	1.469	1.573	1.547	n/a	1.48
Malaysia	5.969	8.432	6.346	4.844	3.9	5.89
Philippines	2.357	3.506	4.867	4.259	3.4	3.68
Singapore	3.883	6.033	5.177	3.858	2.9	4.36
Taiwan	2.521	3.215	3.665	2.901	3.2	3.09
Thailand	3.115	4.481	2.934	2.269	1.5	2.86
Latin America	0.977	0.999	1.330	1.489	1.9	1.34

Source: Pomerleano (1998)

## 2.2. Currency depreciation

Recent crises in emerging markets have highlighted the role of the corporate sector in transmitting financial shocks to the macro economy. The central mechanism is relied on the reciprocal relation between corporate net worth and macro fluctuation such as currency depreciation. Depreciation devastates corporate balance sheet, and subsequently by net worth effect of corporate balance sheet, micro sector condition could propagate the mechanism of crisis. Balance sheet effects basically bear if a firm has far more leverage than its capacity to repay the debts.

The firm's balance sheet healthiness is considered as an important factor inducing economic vulnerability. Dornbusch (2001) mention that there are three primary sources of vulnerability: a substantially misaligned exchange rate, balance sheet problems in the form of nonperforming loans, and balance sheet problems in the form of mismatched exposure. Mismatched exposures contain maturity mismatches leading to liquidity problem and currency mismatches.



There is a link between misaligned exchange rate and corporate balance sheet. In this research, we are concerned with the impact of currency depreciation and corporate balance sheet. Currency depreciation itself actually is not necessarily a cause of the crisis. There is a good depreciation and a bad one. Bad depreciation, by definition, is that a rapid real appreciation, over 2 or 3 years, amounting to 25 percent or more, and an increase in the current account deficit that exceed 4 percent of GDP, without the prospect of a correction, takes a country into the red zone (Dornbusch, 2001). Bad depreciation leads to currency crisis.

In general term, currency crisis could be defined as rapid outflows of financial capital in anticipation of a possible currency depreciation, inducing depletion of reserves, financial instability and subsequent of economic contraction. More technically, Forbes (2002) includes countries in a currency crisis if the local currency depreciated by 10 percent or more to US currency. A currency crisis occurs when market participants lose confidence in the currency of a particular country and seek to escape assets denominated in that currency. Because investors try to avoid short-term capital losses, they exit from countries where they expect that large nominal exchange rate depreciation will soon take place.

Dornbusch (1996) explain that vulnerability means that if something goes wrong, then suddenly a lot goes wrong. Some researches show the economic vulnerability by providing data from micro sector.

The relation between corporate balance sheet and currency depreciation is subject to several studies. Mulder, Perrelli and Rocha (2002) examine the extent to which increased leverage on corporate balance sheets can exacerbate macroeconomic imbalances and increase the likelihood of a macroeconomic crisis. They find that corporate balance sheet variables have a very significant impact on both the likelihood of crisis and its depth. Higher levels of debt and shorter maturities are associated with higher probability of a macroeconomic crisis.

Meanwhile, Stone (2000) investigates corporate sector dynamics during systemic financial crises. He documents the extent to which the crises were amplified through the corporate sector through exchange rate and interest rate effects.

Claessens, Djankov and Nenova (2000) examine corporate risk measures globally and relate them to a variety of firm-level, institutional and macroeconomic factors. They find that legal origin, creditor rights and the nature of the financial system all play an important role in determining the level of risk that a firm is willing to hold. And Claessens, Djankov and Klapper (1999) studies the extent to which distressed firms exploit bankruptcy in order to resolve their problems and the factors, both corporate and institutional, that influences the bankruptcy decision. They find that ownership structure and creditor rights are important determinants of the use of bankruptcy. Their analysis provides considerable insight into the nature of bankruptcy in several countries and the conditions under which firms enter into that process, but they provide little insight into the factors, either within the firm or outside the firm, that cause firms to become distressed in the first place.

Another strand of studies shown by Allayanis, Brown and Klapper (2003) who are able to decompose the capital structure of a sample of Asian firms by currency denomination. As a result, they are able to examine the extent to which firms that had significant foreign currency denominated exposures performed worse during the crisis than other firms. Interesting, they find that firms with higher foreign exchange exposure were also more likely to have foreign currency denominated revenues, allowing them to perform reasonably well during the crisis. They also examine the ratio of cash flow to interest expense in their analysis and find that use of foreign currency denominated debt did not result in additional distress for the borrowers.

### *2.3. Net-worth effect*

Before Asian crisis in 1997 (and Mexican and Latin American countries in 1995), little attention was paid to the analysis of the relation between corporate balance sheets and macro economic condition. The fashionable financial crisis in 1990s disclosed corporate sector contribution on the macro economic fragility.

The recent literatures based on the third generation models of crisis pay more attention on the negative net worth effect of the currency depreciation on economies. According to this approach, two sources of financial fragility are the currency mismatch and maturity mismatch, in firm and country-level. It means therefore that financing policies or capital structure of the firms contribute significantly on the macro economic fragility.

Traditional literature explains that depreciation should enhance competitiveness of the countries, since the price of goods for the concerned countries would be cheaper than those countries of competitors. Nevertheless, since most of firms (and economy) are indebted on foreign denominated debt and short-term maturity debt, depreciation decreases net worth of the firms (and economy).

In many previous researches, it is found that the impacts of currency depreciation are mixed among different types of firms, industries and countries. Forbes (2002) differentiates several channels by which currency depreciations affect firm performance. First, depreciation could downgrade firm competitiveness since the cost of imported inputs raises relatively to foreign competitors. Second, depreciation may provide exporters with a relative cost advantage relative to foreign competitors. Third, depreciation could generate higher borrowing costs and a contraction in lending. The impact of currency depreciation should be based on the heterogeneity of the firms.

In macro-level analysis, Kruger and Tornell (1999) provide empirical evidence that currency depreciation give different competitiveness effect on the different sector of economy. Calvo and Reinhart (2000) differentiate the impact of crisis on separate characteristic of countries, namely developed countries and emerging countries. They find that currency crises in emerging countries are more likely to have large contraction effects.

Forbes (2002) pioneered another strand of research by linking directly currency depreciation and firm performance. She finds that firms with greater foreign sales exposure have significantly better performance after depreciations and firms with higher debt-equity ratios tend to have lower net income growth. Desai, Foley and Forbes (2004) find different responses between U.S. multinational affiliates and local firms when depreciation is present. U.S. multinational affiliates have higher sales, assets and investment than local firms during, and subsequent to, currency crisis.

### **3. Data and Methodology**

#### *3.1. Data*

This chapter begins with the analysis of the financial ratio of listed companies by using accounting data provided by Jakarta Stock Exchange (JSX) and Indonesian Capital Market Directory published by ECFIN (Institute for Economic and Finance Research) in various publications.

The accounting data covers the period of 1994-2004. We include all non-financial sectors and exclude the financial sector, since the debt structure of banks and investment institutions is not comparable with other sectors. All variables of data are deflated by wholesale price index (WPI) in 2000 for gaining a current value. This chapter includes 238 listed companies with at least 5 consecutives years. For ownership structure, we access

directly to the annual report of the firms documented by JSX. In this research, we note ownership structure in two different periods, namely 1996 for pre-crisis ownership structure and 2003 for post-crisis ownership structure.

### 3.2. Simple Models

For capturing the general impact of currency depreciation on firm's net worth, we employ equation as written in equation (1). This method is used by Forbes (2002), Desai, Foley and Forbes (2004) on their research for cross-country data. Firstly, we use the existing method as shown by equation (1). This equation measures the general impact of depreciation and analyzes by different characteristic of firms, namely sector (tradable versus non-tradable) and ownership (firm owned by foreign parties versus local parties).

(1)

$$Y_{it} = \phi_1 Inflation_t + \phi_2 Dep_{(t-1)} + \phi_3 Dep_{(t)} + \phi_4 Dep_{(t+1)} + \mu_5 Dep_{(t-1)} * MNC + \mu_6 Dep_{(t)} * MNC + \mu_7 Dep_{(t+1)} * MNC + \phi_8 Dep_{(t-1)} * T + \phi_9 Dep_{(t)} * T + \phi_{10} Dep_{(t+1)} * T + \varepsilon_{it}$$

Equation (2) measures directly the impact of debt-equity ratio to firm value. In this case, we use longer period to test the interaction with debt-equity ratio. In equation (1), we just use three years, which are 1996 for pre-crisis period, 1998 for crisis period and 1999 for post-crisis period. In the equation (2), we use years from 1996 – 2000. The interest is to check the result of regression in each year during longer period, whether the behaviour changes each year.

(2)

$$Y_{it} = \phi_1 Inflation_t + \phi_2 Dep_{(1996)} * DER + \phi_3 Dep_{(1997)} * DER + \phi_4 Dep_{(1998)} * DER + \phi_5 Dep_{(1999)} * DER + \phi_6 Dep_{(2000)} + \varepsilon_{it}$$

where  $i$  is a subscript for each firm, and  $t$  for each year.  $Y_{it}$  represents corporate net worth (asset and liabilities). Since the interest of this chapter is to measure the balance sheet effect of the currency depreciation, we use profitability (proxied by natural logarithm of total asset and sales) and the change of market capitalization<sup>3</sup> in one side, and debt-equity ratio on the other side.

$Dep$  represents depreciation dummy. The depreciation dummy variables are respectively set equal 1 for observations from one year before *Depreciation* ( $t-1$ ), the year of *Depreciation* ( $t$ ) and one year after *Depreciation* ( $t+1$ ). In this study, we include a macro variable for controlling the estimation, namely inflation rate<sup>4</sup>. DER is debt-equity ratio, which represents the level of debt.

This chapter has three main goals. First, it intends to understand the different response to the currency depreciation among firms with different characteristics, such as tradable versus non-tradable sector and the degree of foreign ownership participation. Second, this study wants to understand the impact of the using debt in their firm-value. And third, it is also concerned with the impact of debt-equity ratio to the corporate distress probability due to currency depreciation.

For equation (1), we define depreciation period as 1998, instead of 1997, because we assume that the impact of depreciation on the firms would be evident in the end of 1998 (not 1997). Meanwhile, 1996 is defined as a pre-crisis period. And post-crisis period is defined as 1999, since the fluctuation of exchange rate started to be stable. Meanwhile, for equation (2), we consider longer period in examining the different impact of currency depreciation on firm value. In the equation (2), we employ each year from 1996 to 2000.

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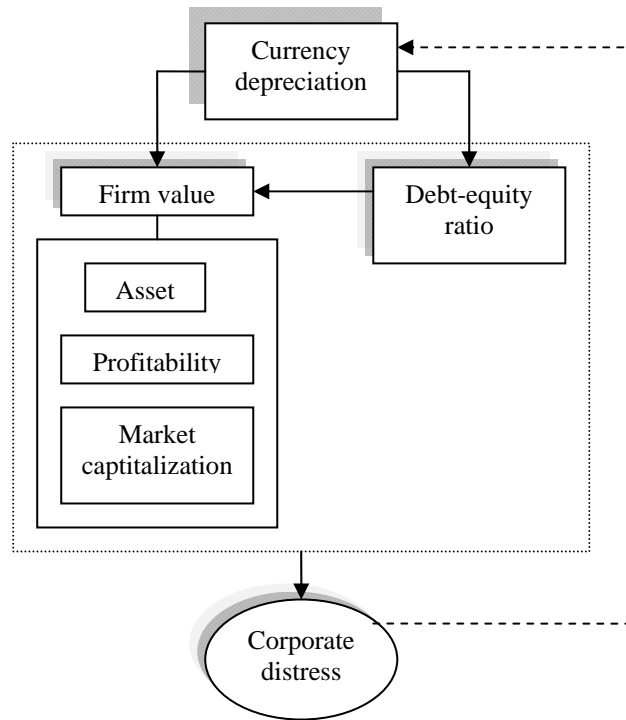
<sup>3</sup> Change of market capitalization are calculated by equation as follows:  $\frac{X_{(t)} - X_{(t-1)}}{X_{(t-1)}}$

<sup>4</sup> Measured by  $\frac{WPI_t - WPI_{t-1}}{WPI_{t-1}}$ , where WPI is wholesales price index

For examining the general effects of currency depreciation, we use equation (1), whereas to test the role of debt on firm value we use equation (2). For equation (2), Our specific question is whether firms with higher debt-equity ratio will have less firm value, measured by market capitalization growth and firm profitability, following currency depreciation. The findings of this study are expected to be interesting in micro-level as well as macro-level analysis.

The relation between currency depreciation, firm net worth and corporate distress is described as following figure. In the first step, currency depreciation would affect separately firm value (asset) and debt-equity ratio (liabilities). The impact of currency depreciation on firm value is examined by equation by equation (1). And then, debt-equity ration would induce the firm value, due to currency depreciation (equation 2). Afterwards, firm value and debt-equity ratio – as firm net worth—influence directly the probability of corporate distress. The latter issue is addressed by equation (3).

**Figure 4. Currency Depreciation, Firm Net-worth and Distress**



Note: dashed line is feedback effect, dashed-dot line represents the firm net worth

Source: author

### 3.3. Probability model

For verifying the findings of the previous regression, especially the results from equation (2), we employ probit and logit model for the likelihood of financial distress. This chapter employs the conventional method of a discrete regression model to analyze the determinants of financial distress.

The likelihood of financial distress is modelled as follows.

$$(3) \quad y_i = X_i\beta' + \mu_i$$

Where

$$y_i = \begin{cases} 1 & \text{if } y_i > 0, \text{ i.e. firm } i \text{ is financial distress} \\ 0 & \text{otherwise} \end{cases}$$



$X_i$  is the set of exogenous (independent) explanatory variables and  $\mu_i$  is the error term.

The probability of financial distress can be modelled as a logit model as follows.

$$prob(y_i = 1) = \frac{\exp X_i \beta'}{1 + \exp X_i \beta'}$$

For defining qualitative dependent variable, this chapter uses Altman Z-score to identify the financial vulnerability of the firms in the sample. The strategy is to set 1 for firms with less than median of Z-score, and 0 for those with higher than the median value. For proxy, we use financial ratio in 1998. Actually, the Z-Score have a range between  $-4$  and  $+8$ . Financially sound companies show Z-score above 2.99, while those scoring below 1.81 are financially distressed, and face possible bankruptcy in an environment conducive to corporate reorganisation. Scores between 1.81 and 2.99 indicate vulnerability (Pomerleano, 1998).

Independent variables are firm size (natural logarithm of total asset), profitability proxied by natural logarithm of total sales, tradable or non-tradable sector and proportion in foreign ownership.

For Z-score, we adopt the equation as follows<sup>5</sup>.

$$Z = 0.012X_1 + 0.014X_2 + 0.033X_3 + 0.006X_4 + 0.999X_5$$

where

$X_1$  = working capital/total assets,

$X_2$  = retained earnings/total assets,

$X_3$  = earnings before interest and taxes/total assets,

$X_4$  = market value equity/book value of total liabilities,

$X_5$  = sales/total assets, and

Z = overall index.

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<sup>5</sup> Modification of Altman in 2000, see Edward I. Altman (2000), Predicting Financial Distress of Companies: Revisiting the Z-score and ZETA® Models, *mimeo*.

## 4. Results

### 4.1. General impacts

Currency depreciation around Asian countries was started by Thai Baht depreciation in July 2, 1997. The impact to Indonesian Rupiah (IDR) was severe in July 24, 1997. After that, due to political and social problems in domestic country, depreciation of IDR becomes one of the most extreme depreciation cases in Asian countries. Mid-May 1998 riots sparked in the major cities in the country followed by the presidential succession from Soeharto to his vice president, BJ. Habibie<sup>6</sup>.

**Table 2. Timeline of Financial Crisis**

<b>1997</b>	
July 2	Thai Baht was floated and depreciated by 15-20 percent
July 11	Widening of rupiah band
July 24	Currency meltdown with severe pressure on baht, ringgit, peso and rupiah
August 14	Ending of rupiah band and immediate plunge
November 1	16 banks closed, with promise of more to follow. Deposits were not guaranteed
November 5	Three-years standby agreement with IMF approved
Mid-December	Almost half of Indonesian bank deposits exit the system
<b>1998</b>	
Mid-January	Further downward pressure on the rupiah
January 27	Bank deposits formally guaranteed by the new super-agency: Indonesia Bank Reconstruction Agency
March 11	President Soeharto re-elected
Mid-May	Widespread rioting
May 21	Vice president Habibie succeeded Suharto as president

Source: taken from Blalock, Gertler and Levine 2005

Table 4.3 shows the summary of descriptive statistic for some variables used in this study. In the post-crisis period, most listed firms in Indonesia have lower sales and assets, but they have much higher debt-equity ratio than in the pre-crisis period. By these descriptive

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<sup>6</sup> More detailed event, see chapter 1. In this chapter we just mention some relevant events for giving a context for our analysis

data, we have an intuition that currency depreciation has induced firm sector by deteriorating both sides of the corporate balance sheets: asset and liabilities.

Meanwhile, the downgrade of sales and asset in the post-crisis period can be identified by the decline of mean and median of sales and asset in the post-crisis period, whereas we can also see that the volatility of the value of asset and sales also increase. In general, firm value in the post-crisis period is lower than those in the pre-crisis period.

<b>Table 3. Summary of Descriptive Statistic</b>			
<b><i>Ln(Total sales)</i></b>	<b>1996</b>	<b>1998</b>	<b>1999</b>
Mean	21.9974	22.2005	21.9109
Median	22.0067	22.0844	21.9670
Standard Deviation	1.5961	1.2740	1.7188
Maximum	26.6212	26.6212	26.5210
Minimum	13.7803	18.6580	14.1035
Skewness	-0.4786	0.2829	-0.5233
Kurtosis	4.6879	3.2580	4.4671
Observation	2458	597	1390
<b><i>Ln( Total asset)</i></b>			
Mean	22.7002	22.9165	22.5497
Median	22.6366	22.7551	22.4416
Standard Deviation	1.4377	1.2822	1.4439
Maximum	27.0816	26.9460	26.9536
Minimum	17.4572	19.4195	18.2183
Skewness	0.1537	0.3731	0.2430
Kurtosis	3.0260	2.9157	2.9368
Observation	2460	597	1392
<b><i>Debt-equity ratio</i></b>			
Mean	0.7092	0.5038	0.7765
Median	0.6035	0.5175	0.6290
Standard Deviation	0.9337	0.3569	1.0363
Maximum	30.0695	7.9127	30.0695
Minimum	0.0004	0.0344	0.0004
Skewness	19.0737	14.9625	17.6428
Kurtosis	524.3631	312.3739	468.0238
Observation	2460	597	1392

In 2000, the IDR experienced renewed depreciation with increased volatility. The Standard & Poor's (rating agency) had also downgraded sovereign long-term and short-term debt (from CCC+ and C to be Selective Default/SD). All these factors had encouraged private individuals and corporations to sell IDR for US dollars followed by the weakening of exchange rate of IDR to US dollar. The IDR subsequently lost its support and weakened from early April 2000 due to social unrest, political uncertainties and the threat of disintegration of several regions in Indonesia. The main factor was the declining investor confidence in line with difficulties in social and political conditions ahead of the Annual Session of the People's Consultative Assembly. From then until the end of 2000, the IDR weakened further due to the strengthening of the US dollar against major currencies during the period, coupled with increasing corporate demand and social unrest related to terrorist bombing acts at a number of religious places at year end<sup>7</sup>.

The main concern of this research is to investigate the impact of currency depreciation on firm value or firm net worth based on different characteristic of the firms. Table (3) demonstrates the results from baseline regressions. We differentiate the impact of currency depreciation on firm level into two principal measurements, namely sales and asset in one side, and debt-equity ratio on the other side. By this distinction, we can evaluate simultaneously the impact of depreciation on asset and liabilities sides of corporate balance sheet.

We are also concerned with the different impact of currency depreciation on different characteristic of the firm. And we find that firms with majority foreign ownership have a higher performance in sales during crises (1998) and in one year after crisis (1999). Tradable sector firms also have much higher sales in during and one year after crisis period than non-

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<sup>7</sup> For further information around this issue, see BIS Papers No 24, "Foreign exchange intervention and policy: Bank Indonesia experiences 1997 - October 2004". Bank of International Settlements,

tradable sector. And in the case of asset, there are no significant different impacts among firms with different characteristics. Meanwhile, tradable sector have less debt-equity ratio than non-tradable sector during and in one year after crisis.

#### *4.2. Impact of debt to firm-value*

Table 4.4 provides results of regression for the impact of debt-equity ratio to the firm value in three different measurements, namely market capitalization growth, total sales and total asset. After controlling by inflation rate, we can see that in the pre-crisis period, debt-equity ratio was not related significantly with market capitalization growth. But during crisis (1997 and 1998), debt equity ratio is related negatively to firm market value. It means that firms with higher debt-equity ratio have less market capitalization growth.

**Table 4. Result of Regression for the General Impact of Currency Depreciation**

Dependent variables are natural logarithm (ln) of sales and natural logarithm (ln) of asset as proxies of firm profitability or “assets” and debt to equity ratio for a proxy of debt or “liability”. Estimates techniques are pooled OLS robust (with heteroscedasticity correction from White) and Random Effects. Breusch and Pagan Lagrangian multiplier (LM) test is employed to choose which estimate should more efficient. \*, \*\*, \*\*\* denote significance at the 10, 5 and 1 percent levels, respectively. Standard deviation is reported in parentheses for specifications.

	Ln(Total sales)			Ln(Total asset)			Debt-equity ratio			
	<i>OLS</i> <i>Robust</i>		<i>RE</i>	<i>OLS</i> <i>Robust</i>		<i>RE</i>	<i>OLS</i> <i>Robust</i>		<i>RE</i>	
Inflation	0.1532		0.2993	1.1946		1.4949	0.6725		0.6725	
	(0.8913)		(0.5705)	(0.8049)		(0.4025)	(0.5209)		(0.5209)	
Dep1996	0.0553		0.2277 *	0.6132	***	0.4599	-0.1276	***	-0.1276	
	(0.1896)		(0.1203)	(0.1714)		(0.0845)	(0.1109)		(0.1109)	
Dep1998	-0.7373		-0.4546	-1.0386		-1.2820	-0.2513	***	-0.2513	
	(0.8521)		(0.5456)	(0.7695)		(0.3849)	(0.4980)		(0.4980)	
Dep1999	-0.7398	***	-0.3141	-0.0205	***	0.0001	0.3729	***	0.3729	
	(0.1788)		(0.1141)	(0.1616)		(0.0802)	(0.1046)		(0.1046)	
MNC*1996	0.3288		0.0455	-0.0907		-0.0291	0.0351		0.0351	
	(0.4332)		(0.3047)	(0.3916)		(0.2204)	(0.2534)		(0.2534)	
MNC*1998	0.5128	*	0.2657	0.1246		0.0391	-0.1307		-0.1307	
	(0.2820)		(0.1889)	(0.2549)		(0.1344)	(0.1650)		(0.1650)	
MNC*1999	0.5841	**	0.2321	0.1506		0.0435	-0.2345		-0.2345	
	(0.2820)		(0.1889)	(0.2549)		(0.1344)	(0.1650)		(0.1650)	
Tradable*1996	0.0160		-0.3350	-0.3366	**	-0.2040	0.0015	*	0.0015	
	(0.2328)		(0.1521)	(0.2104)		(0.1075)	(0.1362)		(0.1362)	
Tradable*1998	0.6203	***	0.0815	-0.1235		-0.1041	-0.2203	*	-0.2203	
	(0.2188)		(0.1443)	(0.1977)		(0.1022)	(0.1280)		(0.1280)	
Continued										

Tradable*1999	0.7371	***	0.2688	*	-0.0698		-0.0398		-0.2522	**	-0.2522	**
	(0.2180)		(0.1441)		(0.1971)		(0.1021)		(0.1275)		(0.1275)	
Observation	2458	***	2458		2460		2460		2460		2460	
R-squared	0.0148		0.0082		0.008		0.006		0.0149		0.0054	
Breusch and Pagan LM test			2436.3	***			2890.6	***			347.18	***

**Table 5. Impact of Debt-Equity Ratio on Firm Value**

Dependent variables are market capitalization growth proxied by  $\frac{X_{(t)} - X_{(t-1)}}{X_{(t-1)}}$ , where  $X_t$  is market capitalization in year t. Natural logarithm (ln) of Total Sales and natural logarithm (ln) of Total Asset are included for proxies of firm value. DER is debt to equity ratio. Estimates techniques are pooled OLS robust (with heteroscedasticity correction from White) and Random Effects. Breusch and Pagan Lagrangian multiplier (LM) test is employed to choose which estimate should more efficient. \*, \*\*, \*\*\* denote significance at the 10, 5 and 1 percent levels, respectively. Standard deviation is reported in parentheses for specifications.

	Market Cap growth				Ln(Total sales)				Ln(Total asset)			
	OLS robust		Random Effect		OLS-robust		Random Effect		OLS Robust		Random Effect	
Inflation	-0.8164	***	-0.8164	***	0.0389		-0.0571		0.2056	*	0.1148	**
	(0.1190)		(0.2925)		(0.1318)		(0.0834)		(0.1217)		(0.0577)	
Dep96*DER	0.0623		0.0623		0.3113	***	0.0637	**	0.4519	*	0.0542	
	(0.1022)		(0.1969)		(0.0870)		(0.0794)		(0.2355)		(0.0530)	
Dep97*DER	-0.9592	***	-0.9592	***	0.1433		0.2075		0.5446	**	0.6243	***
	(0.1384)		(0.2310)		(0.1869)		(0.0990)		(0.2181)		(0.0686)	
Dep98*DER	-0.1808	**	-0.1808		-0.1403	***	-0.0015		-0.1550	***	-0.0164	
	(0.0880)		(0.2830)		(0.0357)		(0.0362)		(0.0351)		(0.0238)	
Dep99*DER	1.5271	***	1.5271	***	-0.1297	***	-0.0171		-0.1105	***	-0.0185	
	(0.3870)		(0.1542)		(0.0179)		(0.0251)		(0.0354)		(0.0166)	
Dep00*DER	-0.1968		-0.1968		-0.0840		-0.0644		0.0644		0.0065	
	(0.3371)		(0.1380)		(0.0985)		(0.0670)		(0.0913)		(0.0464)	
Observation	1945		2458		2458		2458		2460		2460	
R-squared	0.0815		0.0022		0.0075		0.0022		0.0158		0.0818	
Breusch and Pagan LM test			5.41	**			2452.97	***			2761.54	***



From table 4.5, we can learn that the negative impact of debt-equity ratio to the market capitalization growth due to currency depreciation was occurring in 1997 by coefficient correlation -0.9592. Market capitalization growth could be identified as a quick response to currency depreciation. Meanwhile, the negative impact of debt-equity ratio on total assets and total sales due to currency depreciation could be found in 1998. In 1999, the impact of debt-equity ratio to the firm value changed to positive sign, but the signs were still negative for total assets and total sales.

Compared to other countries in East Asia, on January 2006, Indonesia had a highest stock market indices growth. The best performing stock market in the whole period since the start of 2003 has been Indonesia. However, it is not the case for the fundamental performance of the firms. It seems that listed companies in Indonesia were ones of the worst performing sectors among countries in East Asia region.

Several indicators of firm value in Indonesia show faulty condition. If we take data of debt equity ratio (DER) of listed companies in Indonesia, we can see that most listed firms in Indonesia have highest level of leverages comparing to neighbouring countries in East Asia. In 2004, DER of Indonesian listed companies was 68 percent or highest around East Asian countries. In term of firm profitability measured by return on asset (ROA), Indonesian listed companies were 4 percent or lowest among East Asian countries.

For benchmark in the same year, DER in Thailand was 47 percent and ROA was 9 percent, whereas average rate for East Asia countries was 52 percent for DER and 5 percent for ROA<sup>8</sup>. These data show that even though fundamental performance of listed companies in Indonesia is relatively weak, the price of equity in stock market seems to increase significantly. It leads to the explanation that equity price could not be related to fundamental performance of listed companies.

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<sup>8</sup> Further data can be found on East Asia Up-Date March 2006 titled “Solid Growth, New Challenges”, The World Bank

### *4.3. Corporate distress probability*

This section tries to show the contribution of several chosen variables to predict the likelihood of corporate distress. This chapter uses Altman Z-score (2000) to create the qualitative dependent variables. For benchmark, this chapter uses the median value of the Altman Z score in 1998. Then, we discriminate sample into two groups, namely firms with high potential distress and those with low distress risk. We include firm having Z-score higher than median value as a healthy firm and firm whose Z-score is lower than the median value as a potential distress firm. We use median value for benchmark since basically higher Z-score means lower probability to distress and otherwise respectively.

Table 4.6 shows the result of estimates probit and logit model. We find that three explanatory variables have a high significant relation to the probability of a financial distress. Firm size, log of sales and debt to equity ratio are significantly related to financial distress. Size is clearly the variable with the largest impact on financial distress.

Table 4.6 also demonstrates that firm size enhances the likelihood of a financial distress, while sales reduces the likelihood of a financial distress. The results also show that debt-equity ratio increases the probability of financial distress. For summarize, it is clearly evident that size and debt-equity ratio contribute positively to the financial distress, whereas firm profitability impedes the distress mechanism.

**Table 6. Maximum Likelihood Estimates of the Corporate Distress**

Pooled probit and logit regression over the period 1994 – 2004. Standard Errors are robust. \*, \*\*, \*\*\* denote significance at the 10, 5 and 1 percent levels, respectively. Dependent variable is corporate distress proxied by Altman-Z score revised in 2000, as follows.

$$Z = 0.012X1 + 0.014X2 + 0.033X3 + 0.006X4 + 0.999X5.$$

Where: X1 is working capital deflated by total assets, X2 is retained earnings deflated by total assets, X3 is earnings before interest and taxes deflated total assets, X4 is market value equity deflated book value of total liabilities, X5 is sales deflated total assets, and Z is overall index.

Dependent Variable: Corporate distress						
	<i>Probit</i>			<i>Logit</i>		
	Parameter		Standard Error (Robust)	Parameter		Standard Error (Robust)
Size	0.4377	***	0.0462	0.8400	***	0.0957
Ln(Sales)	-0.3529	***	0.0373	-0.6428	***	0.0734
DER	0.0591	**	0.0236	0.1117	***	0.0378
MNC	-0.0084		0.1451	-0.0302		0.3201
N	0.1213		0.1099	0.2398		0.2399
Constant	-4.1129	***	0.8062	-8.4593	***	1.7595
Observations	2458			2458		
Pseudo R-squared	0.1031			0.0927		
Likelihood Ratio	-424.601			-429.517		
Probability LR	0.0000			0.0000		

By evidences provided by Table 4.6, we can also summarize that sales --as proxy of profitability-- is important variable to predict the competitive effect to the firm sector. Meanwhile, debts contribute to firms by giving a net worth effect. These findings are consistent with the argument of balance sheet effect in which currency depreciation induces corporate sector by two channels, competitiveness effect and net worth effect.

Ownership and sector dummy have no significant impact to the likelihood of a financial distress. Firms with majority foreign ownership do not necessarily mean to be more healthy than those with less important proportion of foreign parties in the firm ownership structure. Anyway, tradable or non-tradable sector do not correspond to the likelihood of financial distress. In this case, non-tradable sector firms do not necessarily become more prone to distress.

Logit estimates give higher level of correlation. For example, one standard deviation increases in the firm size augments the probability of a distress by 84 percent (versus 44 percent in probit model). Furthermore, one standard deviation increase in the debt-equity ratio increases the likelihood of a financial distress by 11 percent (versus 6 percent in probit model).

## **5. Conclusion**

The main concern of this chapter is to investigate the corporate responses to the currency depreciation in which financing policy is considered as important variable. Explicitly, the main question is whether firms with higher debt-equity ratio have lower firm value following currency depreciation.

Firms with higher debt-equity ratio would have lower value in market capitalization growth, sales and asset during crisis and in one year after crisis. Meanwhile, firms with majority foreign ownership have higher sales during crisis and in one year after crisis. Firms in tradable sector have higher sales and less debt-equity ratio during crisis and one year after crisis.

This chapter considers the mechanism of balance sheet effect by examining the impact of debt-equity ratio to firm value. Also, it investigates the impact of currency depreciation on the both, asset and liabilities sheets by employing the value of sales and asset as proxies of firm value.

In investigating the balance sheet effect of currency crisis, this chapter contains significant discrepancies which should be due to the lack of variables, since it does not include the foreign debts and others variables on foreign exposure (like export and foreign assets). In the future research, it has to be considered in the study for gaining better explanation of balance sheet effect of currency depreciation.

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